



U.S. Department of Transportation
Federal Transit Administration

Public Transportation Agency Safety Plan (PTASP) Workshop PARTICIPANT GUIDE



2019

Version 1.1

2019

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1.0 Public Transportation Agency Safety Plan Rule

1.1 Public Transportation Agency Safety Plan Rule Overview Presentation

Session Objectives

- Review the Public Transportation Agency Safety Plans (PTASP) Rule's applicability, requirements, and timeline
- Review the resources needed to draft and implement the Agency Safety Plan
- Review the next steps for agencies, and respond to your questions

1.1.1 Public Transportation Agency Safety Plan Overview

Key Takeaways

- The PTASP rule completes the regulatory foundation of the Public Transportation Safety Program under 49 U.S.C. §5329
- The rule implements an innovative approach to improving transit safety that is:
 - Founded on SMS principles and methods
 - Risk and performance-based
 - Flexible and scalable

Applicability

PTASP Rule	
Applies to: • Operators of transit systems that receive Urbanized Area Formula Program funds and all rail transit operators, regardless of FTA funding source – §673.1(a)	Does NOT Apply to: • FTA recipients that do not operate transit systems • Commuter rail service regulated by Federal Railroad Administration – §673.11(f) • Passenger ferry service regulated by United States Coast Guard – §673.11(f)

Impacted Agencies



**65 Rail Transit
Agencies**



**128 Large 5307
Bus Agencies**

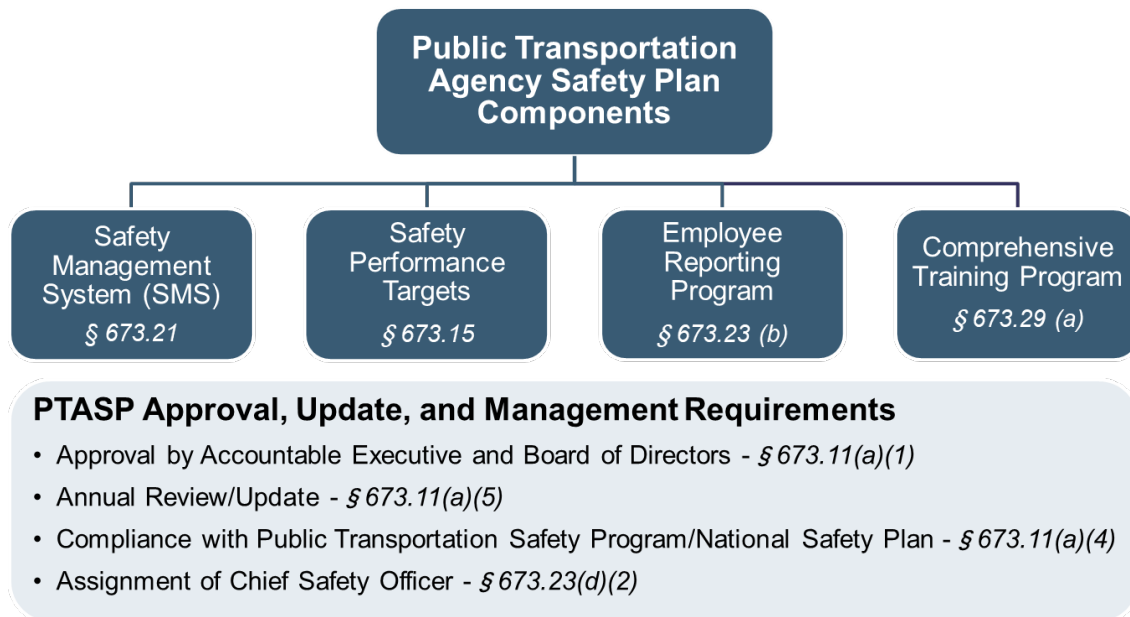


**737 Small 5307
Bus Agencies**



**Multi-modal Transit
Agencies**

Requirements



Accountable Executive

- Is a single, identifiable person who has ultimate responsibility for carrying out the Agency Safety Plan and the Transit Asset Management (TAM) Plan
- Has control or direction over the human and capital resources needed to develop and maintain Agency Safety Plan and TAM Plan
- Is accountable for ensuring that the agency's SMS is effectively implemented, and action is taken, as necessary, to address substandard performance in the agency's SMS
- Accountable Executive may be a contractor if these criteria are met
 - §673.5 | 673.23 (d)(1)

Chief Safety Officer

- The CSO is an adequately trained individual with authority and responsibility for day-to-day implementation and operation of SMS
- The CSO must meet the following criteria:
 - Designated as the CSO/SMS Executive by the Accountable Executive
 - Report directly to the Accountable Executive
 - May be a full-time or a part-time employee of the transit system, or a contracted employee
 - May serve functions other than safety, such as operations and maintenance (FTA recommends large public transportation agencies to have a full-time CSO/SMS Executive who is fully dedicated to ensuring safety)
 - §673.5 | 673.23 (d)(2)

Small Bus Agency Safety Plan

- The requirements of the rule differ for Small Public Transportation Providers, defined as:

- Recipients or subrecipients of Federal financial assistance under FTA’s Urbanized Area Formula Program (49 U.S.C. §5307)
- With 100 or fewer vehicles in revenue service during peak regular service across all non-rail fixed route modes or in any one non-fixed route mode
- § 673.5 & 625.15
- A State must draft and certify an Agency Safety Plan (ASP) on behalf of a small provider in that State – §673.11(d)
- Small Public Transportation Providers are:

Required to:	Not Required to:
• Develop processes for safety performance monitoring and measurement under the Safety Assurance component of SMS – §673.27(b)	• Develop and implement processes for management of change and continuous improvement – § 673.27(d) • Include or incorporate by reference in the ASP an emergency preparedness and response plan or procedures – §673.11(a)

State DOTs	• May draft a separate plan for each small bus agency, or one plan that includes all or a number of small agencies
State Safety Oversight (SSO) Agencies	• <u>Cannot</u> use SSO formula funds to draft a plan for a small bus transit agency
Small Bus Transit Agencies	• Can opt to draft their own plan, but must notify the State DOT - §673.11(d) • Must implement the Agency Safety Plan

Large Bus Agency Safety Plan

- Public transportation providers that do not meet the definition of a small public transportation provider:
 - Must develop and implement their own Agency Safety Plans – §673.11(a)
 - Some may already have a safety plan, but the requirement to have a safety plan is new with this rule
 - Must incorporate all elements of SMS into their safety plans – §673.21

Performance Targets and Coordination with the Planning Process

- Transit agencies must:
 - Include performance targets based on the safety performance measures in the National Public Transportation Safety Plan (NSP) – §673.11(a)(3)

- Make their safety performance targets available to States and Metropolitan Planning Organizations (MPOs) to aid in the planning process – §673.15(a)
- Coordinate with States and MPOs (to the maximum extent practicable) in the selection of State and MPO safety performance targets – §673.15(b)
 - The safety performance targets will help States and MPOs develop their investment priorities

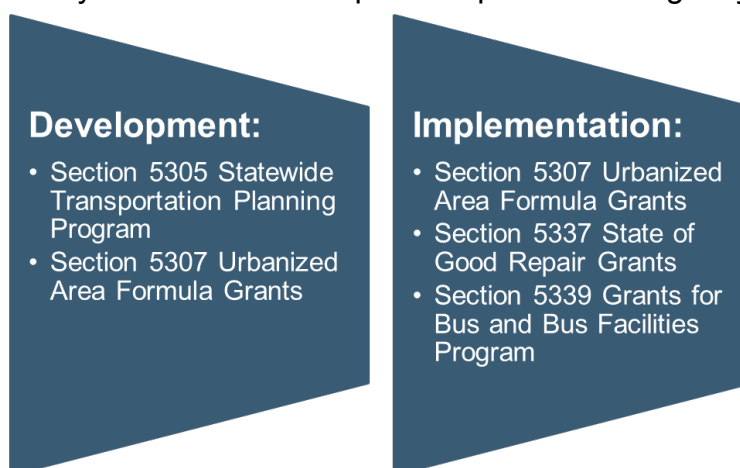
FTA's Safety Performance Measures (by Mode)*

Injuries	• Total number and rate per total vehicle revenue miles
Fatalities	• Total number and rate per total vehicle revenue miles
Safety Events	• Total number and rate per total vehicle revenue miles
System Reliability	• Mean distance between major mechanical failures

**Established in FTA's National Public Transportation Safety Plan*

Funds for Safety Plan Development and Implementation

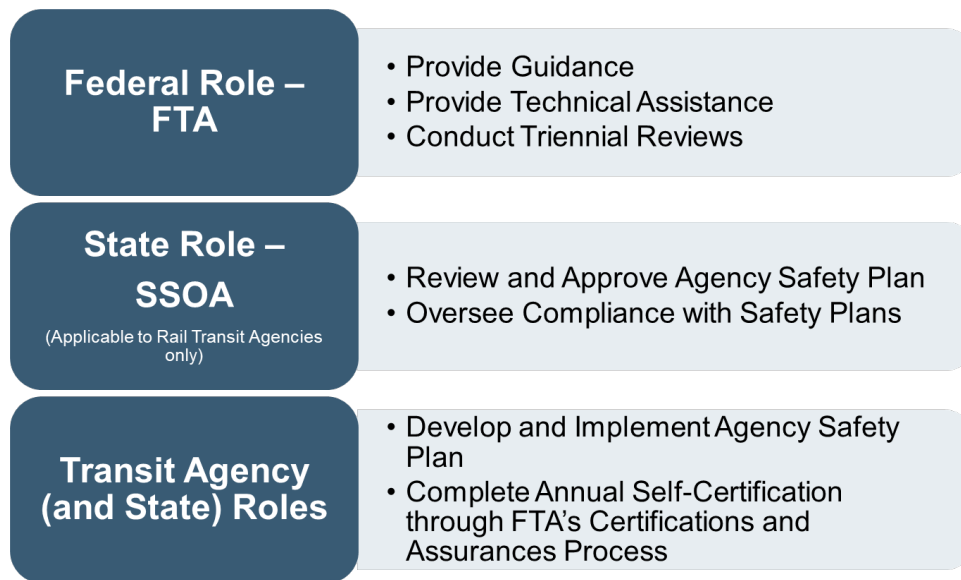
- Federal funds may be used to develop and implement an Agency Safety Plan



Effective Date vs. Compliance Date

- The rule is **effective** on **July 19, 2019**
- Transit agencies must **develop, certify, and implement an Agency Safety Plan** by **July 20, 2020**
 - Transit agencies should not wait to begin development of the Agency Safety Plan
 - FTA cannot waive or extend the compliance deadline

Oversight Framework



Documentation and Recordkeeping

- Transit agencies must maintain records related to their safety plan for three years
 - Documents related to the implementation of Safety Management System (SMS) and results from SMS processes and activities
 - Documents, in whole or by reference, that describe the programs, policies, and procedures for carrying out the Agency Safety Plan
- Documents must be made available upon request by FTA, other Federal entity, or a SSOA – §673.31

1.1.2 Safety Management System Overview



1.1.3 Next steps for Federal Transit Administration Recipients

- ☐ Designate a Chief Safety Officer or SMS Executive
- ☐ Identify SMS roles and responsibilities and key stakeholder groups
- ☐ Identify key staff to support implementation and ensure they receive SMS training
- ☐ Develop a plan for implementing SMS
- ☐ Engage labor union and all agency staff in development of the Agency Safety Plan
- ☐ Inform stakeholders about the Agency Safety Plan
- ☐ Discuss the plan with the Board and planning partners

1.1.4 Public Transportation Agency Safety Plan Resources

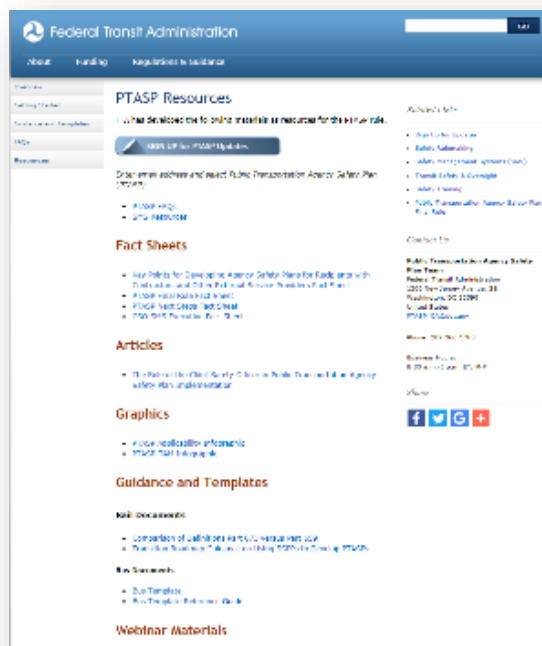
Resources for Agency Safety Plan Development



PTASP Resources

- Resources available include:
 - Fact Sheets
 - Articles
 - Infographics
 - Guidance and Templates
 - Past Webinar Materials (Recordings and Presentations)
- Questions? Email PTASP_QA@dot.gov or call the TSO Main Number at 202-366-1783

Resources page:
<https://www.transit.dot.gov/PTASPPResources>



2.0 Safety Management Policy and Safety Promotion

2.1 Safety Management Policy and Safety Promotion Presentation

Session Objectives

- Provide an overview of Safety Management System (SMS) components
- Explain Safety Management Policy (SMP) and Safety Promotion (SP) requirements
- Give examples of activities and programs that agencies could include in their Agency Safety Plans (ASP)
- Identify the personnel resources and documentation necessary to develop an ASP
- Help participants identify actions to take in preparation for July 20, 2020

2.1.1 Safety Management System Components Overview



How are the SMS Components Different?

Safety Risk Management (SRM) and Safety Assurance (SA) are the key processes and activities for managing safety	Safety Management Policy (SMP) and Safety Promotion (SP) provide the structure and supporting activities to make SRM and SA possible and sustainable
Actions	Enablers

SMS Contents in Agency Safety Plan

ASP content could include:

Descriptions of how the transit agency meets Part 673 requirements

References to other documents, such as agency procedures, that establish or demonstrate Part 673 requirements

Explanation of how information in referenced documents satisfies Part 673 requirements

Discussion of how the transit agency **has implemented, or plans to implement**, Part 673 requirements described or referenced in the ASP

2.1.2 Safety Management Policy

Safety Management Policy Requirements

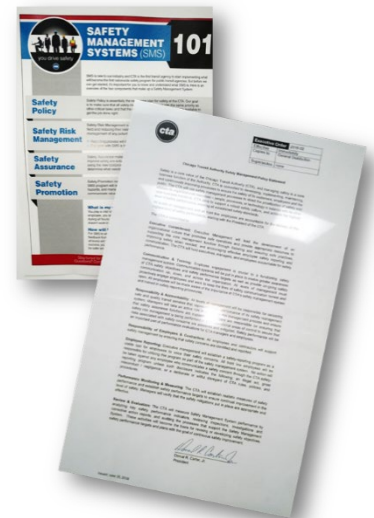
- Safety **management** policy, not all safety policy
- Include information **relevant to** developing and carrying out the **other SMS components**
- Consider how you will **develop, maintain, and make available** required documents

§ 673.23

- a) Written statement, with safety objectives
- b) Employee safety reporting program
- c) Safety management policy communication
- d) Authorities, accountabilities, and responsibilities

The Safety Management Policy Statement §673.23(a)

- Presents the agency's safety objectives
- Can clarify and communicate:
 - Management and employee responsibilities for safety
 - Policies, procedures, and organizational structures necessary to accomplish the safety objectives
- To develop the statement, transit agencies could consider:
 - Relevant audiences
 - Key take-aways
 - Communication approaches
- May be part of, or referenced in, the ASP



Relevant Materials

Safety Management Policy Statement Checklist and Examples (*Appendix E-1*)

Safety Objectives §673.23(a)

- **Must be part of the written statement of safety management policy**
- Part 673 does not specify what the safety objectives must include, be based on, or be used for
 - No requirement to achieve safety objectives, but objectives should be a useful tool for transit agencies to drive safety improvements and priorities
- To develop safety objectives, transit agencies may find it useful to consider:

Leadership goals and priorities	Local, regional, or State priorities	Concerns or targeted areas for improvement	Strategic and long-term planning documents
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Employee Safety Reporting Program §673.23(b)

- Must establish and implement a process that allows **all employees** – including relevant contract employees – to **report safety conditions to senior management**
- Intended to help the Accountable Executive and other senior managers get important safety information from across the transit agency
- The program can be an agency's most important source of information
- Part 673 does not specify which methods should be used – transit agencies may consider:

• Hotline • Paper form • Safety meetings or toolbox talks	 • SharePoint site or form • Phone or tablet app • Third party information collection service
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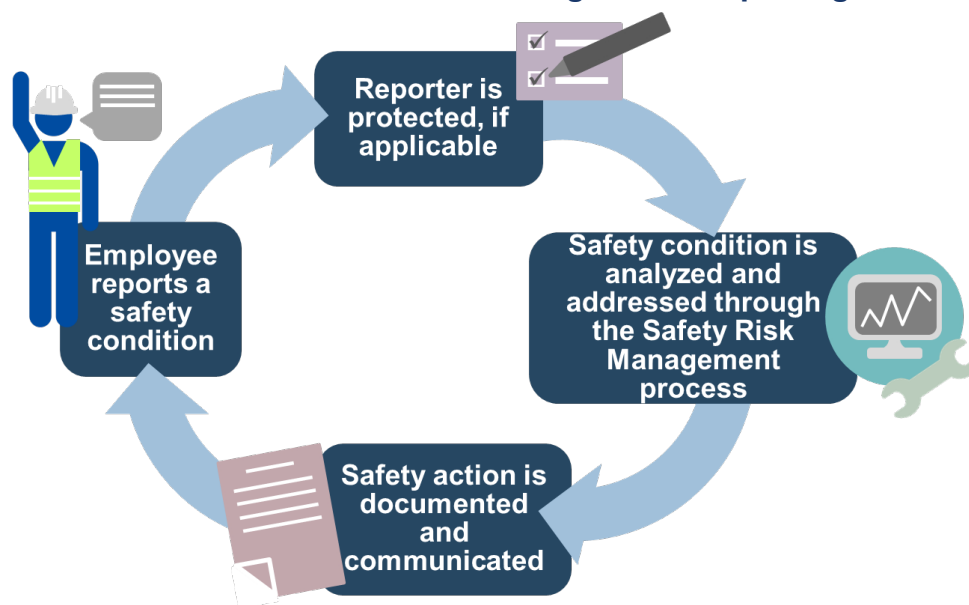
Employee Safety Reporting Program §673.23(b)

- Reported **safety conditions** could include:

Hazards	Potential consequences of hazards	Other relevant safety information
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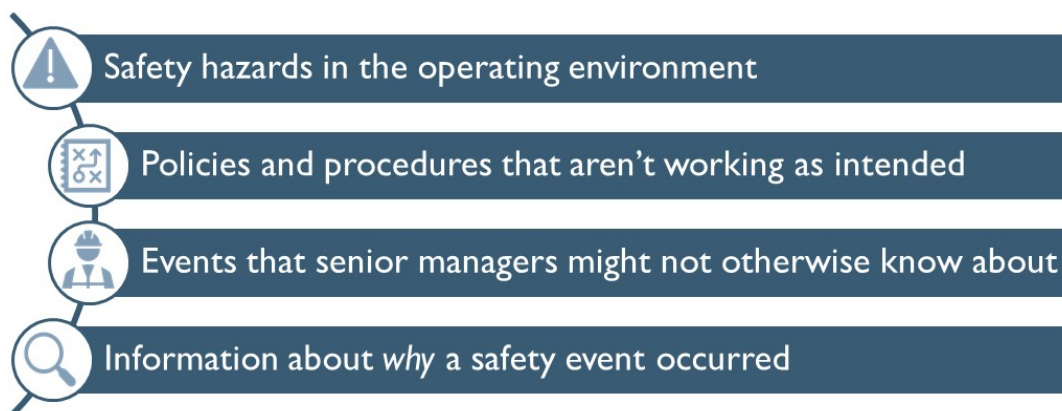
- Must **specify protections** for employees who report safety conditions to senior management
 - Part 673 does not specify what those protections must be
- Must describe **employee behaviors** that may result in disciplinary action – and therefore would not be covered by protections
- **Must inform employees of safety actions taken in response to reports** submitted through an employee safety reporting program – §673.29(b)

Protections and Communication can Encourage more Reporting



Employee Safety Reporting Program §673.23(b)

- It may be helpful to **consider what safety information the agency needs from employees** when developing the process, methods, and protections for employee reporting, such as:



- Note: Other industries may have helpful experience with effective safety reporting programs. Transit agencies should consider reaching out to local or partner organizations in rail, aviation, utilities, healthcare, etc., for relevant insights.

Exercise – Employee Safety Reporting Program

Please write down your responses and discuss:



1. **How do employees share safety conditions with management at your transit agency today?**
 2. **What protections does your transit agency have in place for employees who report safety conditions?**
-

Notes:

Key take-aways:

- Every transit agency already has some kind of employee reporting method in place
- Most agencies provide some amount of protection to employees
- It can be helpful to formalize reporting and clearly communicate protections and safety actions to encourage more reporting

Communicating the Policy §673.23(c)

- Must demonstrate that the **safety management policy is communicated throughout the agency's organization**
- May choose to use the following communication methods, among others:

Posters in Employee Work Areas	Videos	Meetings or Briefings	Training Materials	Job or Position Descriptions
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- No requirement to communicate all policy information in the same way, so you may **consider the best method(s) for what you expect to achieve** through the communication

Communicating the Policy § 673.23(c)

- May be helpful to **ensure that communications** about safety management policy **set realistic expectations**
 - For example, before posting a written statement of safety management policy on bulletin boards in all maintenance shops, a transit agency may consider:
 - Does the language in the document mean what we think it means to all intended audiences?
 - Do we currently perform the activities as described?
 - Are we able to consistently deliver the outcomes as promised?

Authorities, Accountabilities, and Responsibilities §673.23(d)

- Must establish necessary **authorities, accountabilities, and responsibilities for the development and management of the transit agency's SMS**

Authorities	Accountabilities	Responsibilities
• What is the position authorized to do?	• What is the position accountable for, which cannot be delegated?	• What must the position do or oversee the accomplishment of?

- Required positions or categories of positions include:
 - Accountable Executive
 - Chief Safety Officer or SMS Executive
 - Agency leadership and executive management
 - Key staff

Authorities, Accountabilities, and Responsibilities §673.23(d)

- May choose to document authorities, accountabilities, and responsibilities in job or position descriptions, among other options
- Transit agencies are **responsible for ensuring that requirements specified for a role** in Part 673 **are met** – both in §673.23(d) and in §673.5 Definitions
- It may be helpful to **consider all the requirements in Part 673** to identify what authorities, accountabilities, and responsibilities are necessary for the development and management of the SMS
- Using clear and concise language can help reduce confusion and misunderstanding, especially when implementing new processes and activities

Exercise – Safety Management Policy Statement

Please write down your responses and discuss:

1. **Who should be involved in developing the Policy Statement at your transit agency?**
2. **Who should be involved in communicating it?**
3. **Why is their involvement important?**



Relevant Materials

Safety Management Policy Statement Checklist and Examples (*Appendix E-1*)

Notes:

Key take-aways:

- Can be helpful to include transit agency leaders and others who have a significant role in determining agency policies and priorities
- May be beneficial to include managers and leaders in efforts to communicate the policy, to avoid mixed messages or misunderstanding

2.1.3 Safety Promotion

Safety Promotion Requirements

- Includes **all safety topics**, not just safety management
- **Separate requirement** from the Public Transportation Safety Certification Training Program rule at 49 C.F.R. Part 672
 - No requirements for bus transit in Part 672

§ 673.29

- a) Competencies and training
- b) Safety communication

Competencies and Training §673.29(a)

- Must **establish and implement a comprehensive safety training program for all agency employees directly responsible for safety**
 - Part 673 does not define “directly responsible for safety”
 - Must include relevant contractors
 - Must include refresher training
 - May consider training for Board Members or others involved in approving or overseeing the ASP

Relevant Materials

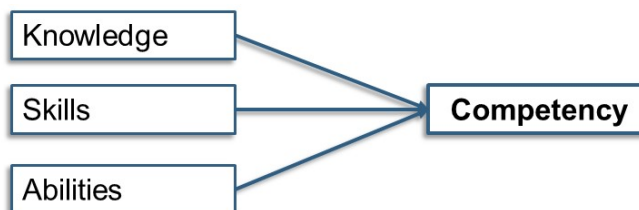
Safety Training Opportunities for Bus Transit Agencies (*Folder Pocket*)

Voluntary Bus Program Curriculum (49 C.F.R. Part 672)

- **As part of a comprehensive safety training program, you may consider the following voluntary bus safety training curriculum** described under the Public Transportation Safety Certification Training Program regulation (49 C.F.R. Part 672):
 - a. SMS Awareness (e-learning)
 - b. Safety Assurance (virtual classroom)
 - c. SMS Principles for Transit
 - d. Courses offered through the Transit Safety and Security Program (TSSP) Certificate (Bus)
 - i. Effectively Managing Transit Emergencies
 - ii. Transit Bus System Safety
 - iii. Fundamentals of Bus Collision Investigation

Competencies and Training §673.29(a)

- May choose to define necessary **competencies**
 - Competencies combine the knowledge, skills, and abilities required to effectively fulfill job roles
 - May cross various job roles and functions
 - May be useful as an employee training topic
 - Can be developed from a variety of sources



Competencies and Training §673.29(a)

- A **training needs assessment** can help ensure training is focused on what employees need to succeed
- May find that **SMS training is most effective when focused on the specific activities** an individual must perform to manage safety
 - For example, you may focus frontline employee SMS training on how to report safety conditions, rather than just general SMS concepts

Exercise – Competencies and Training

Please write down your responses and discuss:



1. **Who in your transit agency would be considered “directly responsible for safety”?**
 2. **How might the training for these positions change, given the requirements under Part 673?**
-

Notes:

Key take-aways:

- Positions that are “directly responsible for safety” will vary from agency to agency
- Responsibilities under Part 673 extend beyond the Safety Department, so agencies may consider looking beyond positions with “safety” in their name
- New training could include safety management topics and updates to existing procedures (e.g., documentation and recordkeeping)

Safety Communication §673.29(b)

- Must demonstrate that **safety and safety performance information is communicated** throughout the agency's organization
 - Must include **information on hazards and safety risk relevant to employees' roles and responsibilities**
 - Must **inform employees of safety actions taken in response to reports** submitted through an employee safety reporting program
 - A safety action doesn't have to mean implementing a new safety solution
 - Could communicate safety action information to a group of employees, not just the individual reporter
 - Must include relevant contractors

Safety Communication §673.29(b)

- **More doesn't always mean better**
- **May consider what and how to communicate** safety information
- Relevant questions include, but are not limited to:

What information does this individual need to do their job?

How can we ensure they understand what is communicated?

How can we ensure they understand what action they must take as a result of the information?

How can we ensure the information is accurate and kept up-to-date?

Are there any privacy or security concerns to consider when sharing information? If so, what should we do to address these concerns?

Safety Communication Example



Exercise – Safety Communication

Please write down your responses and discuss:



1. **What are the most common ways that safety information is communicated at your transit agency?**
2. **How does your transit agency communicate information about:**
 - Hazards and safety risk?
 - Safety performance?
 - Actions taken in response to employee safety reports?

Notes:

Key take-aways:

- All agencies communicate safety information, but it may not be formal, and it may vary across the agency
- Formally documenting how your agency communicates certain information can help to ensure the communication happens and that it's effective
- Sometimes communication methods can favor documentation and recordkeeping over information sharing
 - Can be helpful to consider these requirements separately

3.0 Safety Risk Management and Safety Assurance

3.1 Safety Risk Management and Safety Assurance Presentation

Session Objectives

- Explain Safety Risk Management (SRM) and Safety Assurance (SA) requirements
- Provide examples of activities and programs that agencies could include in their Agency Safety Plans (ASP)
- Identify the personnel resources and documentation necessary to develop an ASP
- Help participants identify actions to take in preparation for July 20, 2020

3.1.1 Safety Risk Management

- Enables a **proactive approach** to managing safety
- Helps **allocate resources** to areas of **highest safety risk** and/or unacceptable safety risk

§ 673.5 Definitions

Safety Risk Management means a process within a transit agency's Public Transportation Agency Safety Plan for **identifying hazards** and **analyzing, assessing, and mitigating safety risk**

How is Safety Risk Management Different from Hazard Management?

Hazard Management	Safety Risk Management
• Assumes systems – as designed – are sufficient to prevent hazards • Focused on preventing system failures and the bad outcomes of those failures • Addresses failures through corrective actions	• Assumes systems are changing • Focused on the routine, ongoing capture and analysis of safety information to assess safety risk • Supports decision-making on managing safety risk and allocating safety resources

3.1.2 Safety Risk Management Definitions

Risk

- A **measure** of severity and likelihood, combined
- **Predicted** – in the future; hasn't happened yet
- Measures the **potential effects** of a hazard, not the hazard itself
- Likelihood (**how often**) vs. severity (**how bad**)
- **Avoid confusing risk** with hazard
 - We often call something “a safety risk” when we mean “a hazard”

§ 673.5 Definitions

Risk means the composite of predicted severity and likelihood of the potential effect of a hazard

Hazard

- **Real or potential** condition – not an event
 - **Real:** Observable condition that exists in the transit system
 - **Potential:** Condition that doesn't exist, but could exist if a change is made in the transit system
- **Can cause** consequences

§ 673.5 Definitions

Hazard means any real or potential condition that can cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment

Consequence

- Important to **distinguish hazards from consequences** for accurate safety risk assessment
- Potential consequences are **the focus of safety risk assessment**
 - Assess the **severity and likelihood of potential consequences, not hazards**
- A single hazard could cause multiple consequences

Not defined in § 673.5, but can be derived from the definition of *Hazard*. Transit agencies may choose to use the following definition:

Consequence means an effect of a hazard, involving injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment

Event

- **Something that happened**, not a condition or system state
- Important to distinguish from a hazard
- Safety event investigation may reveal hazards
- Used primarily for reporting, not SRM
 - Event definitions are based on type of event and magnitude of outcomes

§ 673.5 Definitions

Event means any accident, incident, or occurrence

Sample Tool: SRM Definitions Checklist

What is it? If you can select all 3 in one box, it's...	A Potential Consequence ☐ Not a real or potential condition ☐ Can be caused by a hazard ☐ Hasn't happened yet, but could be similar to a past event
A Hazard ☐ Real or potential condition ☐ Can cause a consequence ☐ Not an event	An Event ☐ Accident, incident, or occurrence ☐ Not a real or potential condition ☐ Has already occurred

Example of Hazard vs. Consequence



HAZARD

Near-side bus stop



CONSEQUENCE

Bus pulls away from the near-side bus stop and the car, trying to turn right in front of the bus, collides with the bus

Risk Mitigation

- **Solution** to a problem, not the problem itself
- Eliminates or reduces **likelihood and/or severity of consequences**
- Usually focused on **reducing safety risk to an acceptable level**, not getting the level of risk to zero

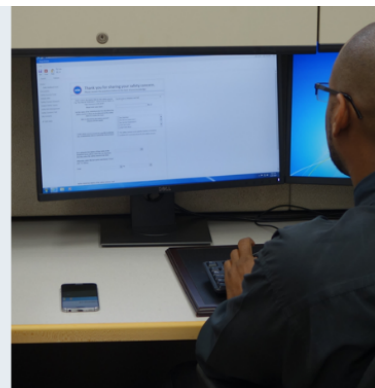
§ 673.5 Definitions

Risk mitigation means a method or methods to eliminate or reduce the effects of hazards

Engaging Employees in SRM

- Consistently and accurately distinguishing key terms can be challenging
- **Could use key terms for analysis, while using other words to communicate** about safety throughout the agency

For example, in its SRM Pilot, the Chicago Transit Authority **asks individuals to report** whatever concerns they regarding safety—**their safety concerns**. Safety specialists then ensure the safety concerns are properly characterized for analysis



3.1.3 The Safety Risk Management Process

Safety Risk Management Requirements

- For **all elements** of a transit agency's system
- Consider how you will **develop, maintain, and make available** required documents
- Detailed documentation can help **increase consistency**, and therefore **confidence** in the process and its results
- Consider defining **when** SRM is conducted

§ 673.25

- a) A transit agency must **develop and implement a Safety Risk Management process** for all elements of its public transportation system

Developing and Implementing the SRM Process

- Models for conducting SRM include:
 - **Centralized:** Safety Department leads the SRM process with input from subject matter experts across the agency
 - **Decentralized:** Personnel throughout the agency conduct SRM and the Safety Department assists
- **Consider testing** SRM procedures before implementing them agency-wide

Safety Hazard Identification Requirements

- Must establish how the agency will **identify hazards and consequences**
- All agencies **must consider FTA and oversight authority information**
- Some agencies **must consider changes that may impact safety performance** §673.27(c)(2)
- Information sources **may include employee safety reporting and Safety Assurance outputs** §673.27

§ 673.25

- b) Safety hazard identification
- 1) A transit agency must establish **methods or processes to identify hazards and consequences** of hazards
 - 2) A transit agency **must consider**, as a source for hazard identification, **data and information provided by an oversight authority and the FTA**

Sources of Hazard and Consequence Information

Hazards and potential consequences could be identified from:

- Single reports
- Analysis of data from multiple sources
- Trends of multiple data points



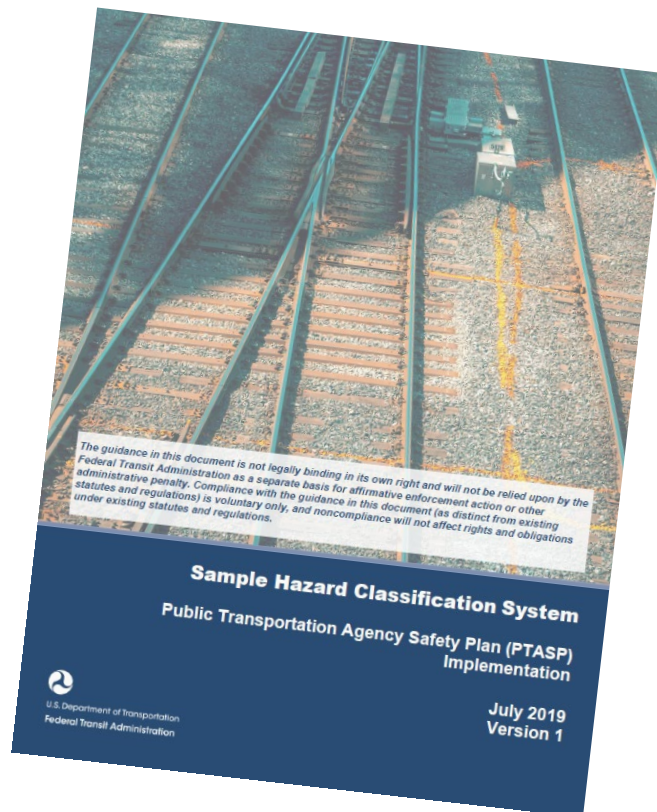
Documenting Hazards and Consequences

- Could **consolidate hazard** and consequence information in **one location** for sorting and analysis
- For example, a **Risk Register** (paper or electronic)

A	B	C	D	E	F
Hazard	Type of hazard	Identification Date	Identification Source	Date of Analysis	Worst Credible Potential Consequence(s)
Buses misaligned over maintenance pits	Maintenance	1/14/2018	Employee safety reporting	02/01/18	Bus falling into pit resulting in worker fatality
Near side bus stop at the intersection of First and Main	Operational	3/20/2018	Inspection report	3/22/2018	Car turning right in front and colliding with the bus as the bus pulls out of the stop

Categorizing Hazards

- Could use a **system to categorize and organize hazards** for analysis
- May adopt the method described in FTA's Sample Hazard Classification System (*Appendix G-1*)



Exercise – Information Sources for Hazard Identification

Please write down your responses and discuss:

1. **What information sources does your transit agency currently have that could provide information about hazards?**
2. **How could you identify which sources of hazard information are most important for your agency?**



Relevant Materials

Potential Sources of Hazard Information for Bus Transit Operations (*Appendix F-1*)

Notes:

Key take-aways:

- Almost all transit data and information sources could provide information about hazards
- Could consider information sources in your community, region, state, or industry associations
- Could focus SRM on a limited number of sources
 - Could prioritize based on requirements, usefulness, accuracy, comprehensiveness, timeliness, ease of analysis

Scenario – Hazard Identification

We will review the Safety Event Investigation Report Summary (*Folder Pocket*). Prepare to share relevant information about the collision from the perspective of your assigned agency function:



1. **Bus Operations**
2. **Training and Evaluation**
3. **Depot Clerk**
4. **Bus Maintenance**
5. **Bus Engineering**
6. **Inventory Management**

Can you identify any possible hazards?

Notes:

Key take-aways:

- Safety event investigations can be a good source of hazard and consequence information, but they're a *reactive* source
- When selecting hazards for further analysis, consider:
 - Does a potential consequence of the hazard seem to have a high level of risk?
 - Is the hazard something we thought was addressed effectively through an existing mitigation?
 - Is the hazard a single point of failure?

Safety Risk Assessment Requirements

- Must **assess likelihood and severity** of the consequences of hazards
 - Must include existing mitigations
- Must **prioritize hazards based on the safety risk** of their potential consequences
- Consider how your agency will **select or prioritize** hazards and potential consequences to **undergo safety risk assessment**

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- c) Safety risk assessment
- 1) A transit agency must **establish methods or processes to assess safety risks** associated with identified safety hazards
 - 2) A safety risk assessment includes an assessment of the likelihood and severity of the consequences of the hazards, including existing mitigations, and prioritization of the hazards based on the safety risk.

Conducting Safety Risk Assessment

Examples of methods and processes:

- Managers assess safety risk and prioritize hazards as part of day-to-day work, using defined practices (e.g., procedures, forms, escalation criteria)
- Agency adopts a safety risk matrix and associated criteria to standardize assessments and encourage data analysis
- Rotating group of subject matter experts helps the Safety Department conduct safety risk assessments using a defined process

Conducting Safety Risk Assessment with a Risk Matrix

1. Apply criteria to **identify the level of severity** (e.g., catastrophic) and **level of likelihood** (e.g., frequent) of a potential consequence

Severity Categories			Likelihood Levels			
Description	Severity Category	Criteria	Description	Level	Individual item	System or Vehicle Fleet
Catastrophic	1	Could result in death, per exceeding \$250,000, system shutdown, or irreversible damage that violates law	Frequent	A	Likely to occur often in the life of an item.	Continuously experienced. Potential consequence may occur more than once in 500 operating hours.
Serious	2	Could result in permanent occupational illness that results in loss of at least one person, per \$25K but less than \$250,000, lasting between 10 minutes and 100 minutes, or mitigatable environmental violation of law or regulation	Occasional	B	Will occur several times in the life of an item.	Will occur several times. Potential consequence may be experienced once in 500 to 60,000 operating hours.
Marginal	3	Could result in injury or illness, or loss of one or more lost work hours, per \$25,000, system shutdown minutes, or mitigatable environmental damage without violation of law or regulation.	Remote	C	Unlikely to occur in the life of an item.	Unlikely but possible. Potential consequence may be experienced once in 60,000 to 1,800,000 operating hours.

Relevant Materials

Sample Safety Risk Assessment Matrices for Bus Transit Agencies (*Appendix H-1*)

- Based on identified levels of severity (e.g., catastrophic) and likelihood (e.g., frequent), **identify the safety risk index** (e.g., high)

Risk Assessment Matrix			
Likelihood/Severity	Catastrophic (1)	Serious (2)	Marginal (3)
Frequent (A)	HIGH (1A)	HIGH (2A)	MEDIUM (3A)
Occasional (B)	HIGH (1B)	MEDIUM (2B)	LOW (3B)
Remote (C)	HIGH (1C)	MEDIUM (2C)	LOW (3C)

- Identify next steps based** on the safety risk index (e.g., safety risk must be mitigated or eliminated)

Safety Risk Index	Criteria by Index
HIGH	<u>Unacceptable – Action Required:</u> Safety risk must be mitigated or eliminated.
MEDIUM	<u>Undesirable – Management Decision:</u> Executive management must decide whether to accept safety risk with monitoring or require additional action.
LOW	<u>Acceptable with Review:</u> Safety risk is acceptable pending management review.

Relevant Materials

Sample Safety Risk Assessment Matrices for Bus Transit Agencies (*Appendix H-1*)

Benefits of Using a Safety Risk Matrix

- Communicates leadership guidance to support decision-making (e.g., what is unacceptable)
- Supports consistent assessment
- Leverages data analysis
- Can make it easier to communicate and track changes in safety risk
- Enables easier comparison of hazards

Severity Likelihood	1	2	3	4
A	1A	2A	3A	4A
B	1B	2B	3B	4B
C	1C	2C	3C	4C
D	1D	2D	3D	4D
E	1E	2E	3E	4E

Severity Table			
1	2	3	4

Likelihood Table			
A	B	C	D
E			

Scenario – Safety Risk Assessment

- The wheel balancer hasn't been calibrated since 2017 and is significantly out of calibration
- Maintenance brought in a specialist to calibrate it
- However, you (a Straightline Transit safety specialist) are concerned that existing mitigations were ineffective to prevent the bus collision in the first place
- You decide to conduct a safety risk assessment to determine if further mitigation is needed



Before we begin, please review the Straightline Transit Safety Risk Assessment Matrix (Folder Pocket)

Hazard	Description	Category	Subcategory
Out of Calibration Wheel Balancer	Maintenance employees are balancing wheels using an out of calibration balancer	Technical	Equipment

Worst Credible Potential Consequence(s)	Existing Mitigations
Collision resulting in death, permanent injury, or destruction of property (losses over \$1,000,000)	

Severity of Consequence(s)	Likelihood of Consequence(s)	Safety Risk Index
?	?	?

Scenario – Safety Risk Assessment

To determine severity, we figure out **how bad the potential consequence could be, based on the severity criteria**

- This is informed, but not limited to historical information
- The worst credible outcome may not have happened yet



Which severity category would apply to this potential consequence?

Notes:

Scenario – Safety Risk Assessment

To determine likelihood, we figure out **how often a potential consequence could happen within the scope of the issue**—usually based on historical data



What do we need to know?

- **Scope** – Agency-wide or a particular bus garage? Over what time period? What type of equipment, etc.? Unique circumstances?
- **Exposure** – What is the number of possible opportunities for the consequence to happen? Usually in the unit used to measure likelihood (e.g., VRMs, operating hours, process cycles, etc.)
- **Experience** – What is the number of times the consequence has happened or is expected to happen?

Notes:

Scenario – Safety Risk Assessment

Scope

- Place – **North Division bus garage**
 - The out of calibration wheel balancer was only used at this garage
- Equipment – **New Flyer Xcelsior buses**
- Timeframe – Last six months (January 1 – June 30, 2019, total of **180 days**)



Exposure – in Vehicle Revenue Miles (VRMs)

Within scope, when possible

- Number of VRMs per bus per day: **400**
- Scope is the last six months (**180 days**)
- Number of New Flyer Xcelsior buses at the North Division bus garage: **75**

$$400 \text{ VRMs} \times 180 \text{ days} \times 75 \text{ buses} = 5,400,000 \text{ VRMs}$$

Experience – the number of times the consequence has happened or is expected to happen

Within scope, when possible

- Number of tire failures resulting in collisions in the past six months, from the North Division bus garage: **2 (in first half of 2019)**
 - **See Annual Tire Failure Trend Report (North Division) (Folder Pocket)**
- Percentage of collisions that result in:
 - Fatality: **2%**
 - Serious injury: **56%**
 - Significant property damage (losses equal to or over \$1 million): **60%**
 - **See Annual Event Severity Report (Folder Pocket)**

$$\begin{array}{l} \mathbf{2} \text{ collisions due to tire} \\ \text{failure at the North} \\ \text{Division bus garage in} \\ \text{the past 6 months} \end{array} \times \begin{array}{l} \mathbf{60\% \text{ (or 0.6)}} \text{ of} \\ \text{collisions result in property} \\ \text{damage with losses equal} \\ \text{to or over \$1M} \end{array} =$$

1.2 collisions due to tire failure at the North Division bus garage that result in property damage with losses equal to or over \$1M

Scenario – Safety Risk Assessment



To determine likelihood:

$$\frac{\text{Experience}}{\text{Exposure}} = \text{Likelihood (rate)}$$

$$\frac{1.2 \text{ collisions due to tire failure at the North Division bus garage that result in property damage with losses equal to or over \$1M}}{5,400,000 \text{ VRMs}} = \frac{1 \text{ in } 4,500,000 \text{ VRMs}}{1 \text{ in } 4,500,000 \text{ VRMs}}$$

Notes:

Scenario – Safety Risk Assessment



Worst Credible Potential Consequence(s)	Existing Mitigations
Collision resulting in death, permanent injury, or destruction of property (losses over \$1,000,000)	• Pre-trip inspection • Routine inspection and maintenance • Wheel balancer inspection and calibration

Severity of Consequence(s)	Likelihood of Consequence(s)	Safety Risk Index

Notes:

Key take-aways:

- **When choosing methods or processes** to conduct safety risk assessment, **consider what is:**
 - **Feasible** for your agency to perform, and
 - **Useful** to support prioritization of hazards based on safety risk
- Building data collection and analysis capabilities can be important for timely and accurate safety risk assessment

Safety Risk Mitigation Requirements

- Must have methods or processes to **identify necessary mitigations or strategies**
- **Can reduce risk by reducing likelihood and/or severity**
 - No requirement for a single mitigation to address both
- When identifying and choosing mitigations, **consider mitigation monitoring needs** – §673.27(b)(2)

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d) Safety risk mitigation

A transit agency must **establish methods or processes to identify mitigations** or strategies necessary as a result of the agency's safety risk assessment to reduce the likelihood and severity of the consequences

Sample Guidance for Developing Mitigations

Consider providing guidance to help identify appropriate mitigations, such as:

MIL-STD-882E Risk Mitigation Measures

- Eliminate hazards
- Reduce risk through alteration
- Incorporate engineered features or devices
- Provide warning devices
- Incorporate signage, procedures, training, and personal protective equipment (PPE)

Safety Risk Mitigation Strategies

- Safety risk avoidance
- Safety risk reduction
- Safety risk segregation

Scenario – Safety Risk Mitigation

Because the safety risk of a potential consequence of an out of calibration wheel balancer is 1C (unacceptable), further safety risk mitigation is necessary



Can you identify any new mitigations that Straightline Transit could implement to reduce the level of safety risk to an acceptable level?

Please write down your ideas and discuss

Notes:

Scenario – Safety Risk Mitigation



Further Mitigation Action	Revised Safety Risk Index
	1E - Acceptable

Notes:

Key take-aways:

- Consider a set of mitigations or mitigation options to adequately reduce safety risk
 - A single mitigation may not be enough
- Consider the mitigation as you *expect* it will be implemented
 - No procedure is implemented perfectly all the time
- Use mitigations to reduce safety risk to an acceptable level
 - It may not be necessary to eliminate the hazard
- Never assume the mitigation works until you monitor it!

3.1.4 Safety Assurance

- Processes for the **collection, analysis, and assessment of information**
- Help to ensure:
 - Safeguards are in place and *actually* effective
 - Early identification of potential safety issues
 - Safety objectives are met

§ 673.5 Definitions

Safety Assurance means processes within a transit agency's Safety Management System that function to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that the transit agency meets or exceeds its safety objectives through the collection, analysis, and assessment of information

Safety Assurance Applicability (§673.27(a))

Must meet requirements in (b), (c), and (d)	Must meet requirements in (b) only
• Rail fixed guideway public transportation systems • Recipients or subrecipients of Federal financial assistance under 49 U.S.C. Chapter 53 that operate more than one hundred vehicles in peak revenue service	• Small public transportation providers—recipients or subrecipients of Federal financial assistance under 49 U.S.C. 5307 that have 100 or fewer vehicles in peak regular service (across all non-rail fixed route modes or in any one non-fixed route mode) and do not operate a rail fixed guideway public transportation system

3.1.5 Safety Performance Monitoring and Measurement

Safety Performance Monitoring and Measurement Requirements

- Focused on **current** agency processes and activities
- To **validate expectations** and **identify system changes**:
 - Do our assumptions match reality? Is there something we missed that could be a safety concern?
 - How is the system changing? Is the change a safety concern?

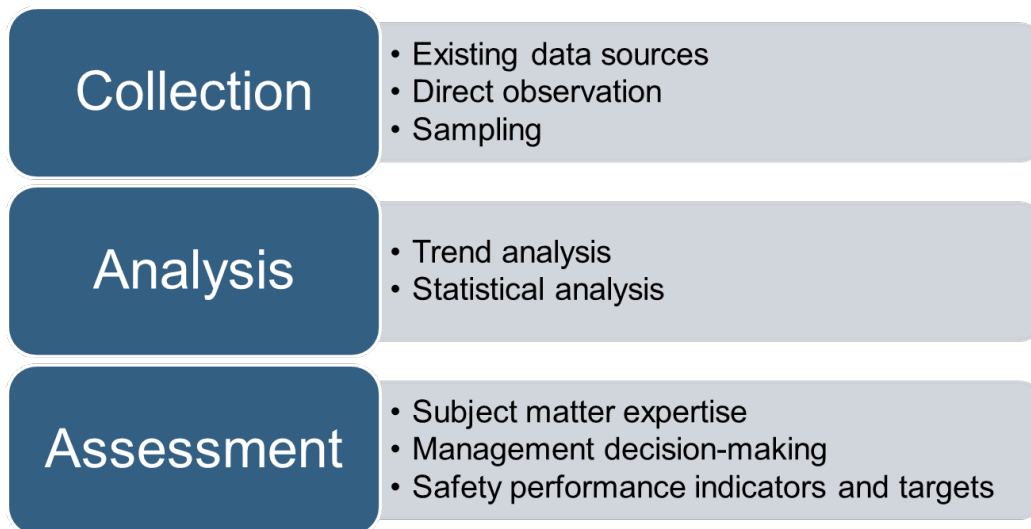
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- b) Safety performance monitoring and measurement. A transit agency must establish activities to:
- 1) Monitor its system for compliance with, and sufficiency of, the agency's procedures for operations and maintenance;
 - 2) Monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended;
 - 3) Conduct investigations of safety events to identify causal factors; and
 - 4) Monitor information reported through any internal safety reporting programs

What Does Safety Performance Monitoring and Measurement Look Like?

- **Roles and responsibilities could vary**, for example:
 - Safety Department could perform monitoring and measurement
 - Safety Department could oversee monitoring performed by other departments, and conduct measurement
 - Operations and Maintenance Departments could conduct monitoring and measurement, while the Safety Department oversees and develops reports for decision-makers
- Consider how to **avoid potential bias** in self-assessment, but **leverage subject matter expertise**

Examples of Information Collection, Analysis, and Assessment Approaches



What Does Safety Performance Monitoring and Measurement Look Like?

- Consider defining:
 - **Methods** to monitor and measure
 - Including roles and responsibilities
 - **Scope** (the focus and level of effort) of activities
 - **What happens next** when issues are identified

Mapping Safety Performance Monitoring and Measurement Processes – Example

Safety Assurance Process		If yes, then...
Procedures Monitoring and Measurement		
	Inadequate compliance?	Address non-compliance
	Insufficient?	Evaluate hazards through SRM
Safety Risk Mitigation Monitoring and Measurement		
	Ineffective?	Evaluate hazards through SRM
	Inappropriate?	Identify new mitigation under SRM
	Not implemented?	Address non-compliance
Safety Event Investigations		
	Causal factors identified?	Evaluate hazards through SRM
	Information collected?	Use to monitor and measure through other SA processes
Internal Reporting Programs Monitoring and Measurement		
	Safety concerns identified?	Evaluate hazards through SRM
	Information collected?	Use to monitor and measure through other SA processes

Monitoring Operations and Maintenance Procedures (§673.27(b)(1))

Must monitor system for **compliance** with and **sufficiency** of **operations and maintenance procedures**

- Could address **non-compliance** through training, coaching, and management oversight, among other approaches
- Could address **insufficient procedures** through Safety Risk Management

Monitoring Safety Risk Mitigations (§673.27(b)(2))

Must monitor operations to **identify safety risk mitigations** that may be **ineffective**, **inappropriate**, or were **not implemented as intended**

- If **ineffective**, could re-analyze the hazard(s) and consequence(s) the mitigation was intended to address through SRM
- If **inappropriate**, could identify new mitigation options
 - The mitigation may not be feasible
- If **not implemented as intended**, could consider alternative mitigations or alternative approaches to implementation

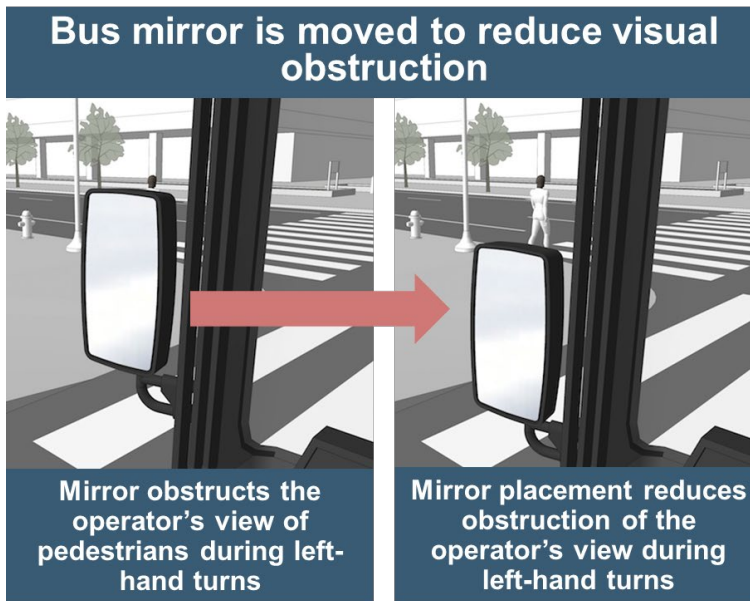
Safety Performance Indicators and Targets

Safety Performance Indicator (SPI)	Safety Performance Target (SPT)
• A signal or early warning sign • Can measure inputs, outputs, outcomes, or impacts – For example, the number of hard braking events per month on Bus Route 45	• Level or extent of expected change in the SPI over a period of time • Quantifiable – For example, hard braking events per month are <u>10% lower</u> on Bus Route 45 <u>over the next 12 months</u>

Types of SPIs for Safety Performance Monitoring and Measurement

Lagging Indicators	Leading Indicators
• Monitor negative safety outcomes the agency aims to prevent • For example, the number of collisions caused by icy road conditions • Data may be more readily available	• Monitor conditions with potential to become or contribute to negative safety outcomes • Can be focused on monitoring operational and environmental conditions or agency processes • For example, the number of days of freezing rain • More useful for safety performance monitoring and measurement than lagging indicators

SPIs for Safety Risk Mitigation Monitoring Example



Lagging Indicator:

- Number of collisions with pedestrians during left-hand turns

Leading Indicators:

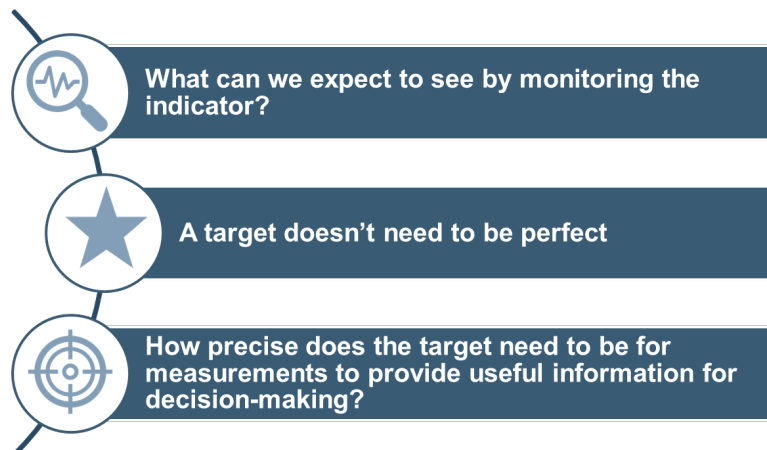
- Percentage of mirrors adjusted
- Number of operator reports about mirrors blocking line of sight
- Number of complaints of near-collisions from bicyclists and pedestrians

Setting SPIs for Safety Performance Monitoring and Measurement

When establishing safety performance indicators, it may be helpful to consider:

- **What is a reliable indicator – or set of indicators – of what we are trying to monitor?**
 - Consider alternatives if an indicator isn't a reliable source of information
- **What is the minimum number of indicators needed?**
 - A large set of indicators can be resource-intensive to monitor over time
- **Are there existing data sources we can use to monitor the indicator?**
 - If not, consider allocating monitoring resources based on safety risk

Setting SPTs for Safety Performance Monitoring and Measurement



Scenario – Monitoring Safety Risk Mitigations

Consequence	Safety Performance Indicator
Collision resulting in death, permanent injury, or destruction of property (losses over \$1,000,000)	Tire failure rate



SPI Value	Safety Performance Target
Annual rate of tire failures (in VRM)	? tire failures per ? VRM per year

- Current North Division bus garage tire failure rate per year, based on data from first half of 2019: **1 in 1,080,000 VRM**
- Safety performance target to monitor mitigation effectiveness: **1 in 10,800,000 VRM**

Notes:

Key take-aways:

- Could set a safety performance target based on:
 - The acceptable, historical level or rate
 - The effect you expect to see in a specified timeframe
 - If the mitigation is expected to affect likelihood, consider what rate is necessary for the risk to be in a certain likelihood category (e.g., Improbable (E))
- A range or rough estimate may be sufficient to show that the likelihood has moved to the correct level

Mitigation Monitoring Plans

Mitigation Monitoring Plans **help ensure safety performance monitoring and measurement activities are performed** to confirm that mitigations are effective, appropriate, and fully implemented

Contents of a Mitigation Monitoring Plan may include, but are not limited to:

Selected safety risk mitigation(s)	Safety performance indicators and targets	Data sources used for monitoring	Description of performance monitoring activities
Timeframe of safety performance monitoring activities	Safety performance monitoring responsibility	Safety performance reporting frequency	Safety performance reporting format

Corrective Action Plan vs Mitigation Monitoring Plan

Corrective Action Plan (CAP)

- Documents the corrective action
- Typically addresses short-term defects or compliance issues
- Helps ensure the corrective action is implemented

Mitigation Monitoring Plan (MMP)

- Documents mitigation(s) and monitoring activities
- Defines how the transit agency will monitor whether the mitigation is performing as intended—implemented, appropriate, and effective
- Helps the agency prioritize safety resource investments

Safety Event Investigation (§673.27(b)(3))

- Transit agencies must **conduct investigations of safety events** to **identify causal factors**
- Safety events include **accidents**, **incidents**, and **occurrences**
- Identified factors could include rule violations and technical failures, among others
- Investigation is important, **whether or not the event is considered preventable**
- Identified causal factors **may reveal hazards** that could be addressed through SRM
- Investigations may be an additional **source of safety data**

Exercise – Safety Event Investigation

Please write down your responses and discuss



- 1. How does the sample Safety Event Investigation Report compare to investigation reports you have seen at your transit agency or other transit agencies?**
- 2. How would the safety event investigation approach at your transit agency change to address Part 673 requirements, if at all?**

Notes:

Key take-aways:

- Transit agencies may:
 - Investigate more types of safety events (e.g., occurrences)
 - Change categories used for different types of events
 - Investigate non-preventable events differently
 - Adopt new approaches to causal factors identification

Monitoring Internal Safety Reporting (§673.27(b)(4))

Transit agencies must **monitor information reported** through **any internal safety reporting programs**

- Including, but not limited to:
 - Employee safety reporting programs
 - Mandatory safety reporting programs (e.g., accident notification)
- **Could collect, analyze, and assess information** reported from programs over time
- May be an important **source of safety data**
- Analysis of reports **may lead to the identification of hazards** to address through Safety Risk Management

3.1.6 Management of Change

Management of Change Requirements

- Management of change, **not change management**
- **Evaluates *proposed or future* changes**
 - Once a change is made (e.g., new procedure implemented) it may be monitored through other SA activities
- **Focused on non-safety changes**
- Recommended, but **not required for small public transportation providers**

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b) Management of change

- 1) A transit agency must establish a process for identifying and assessing changes that may introduce new hazards or impact the transit agency's safety performance
- 2) If a transit agency determines that a change may impact its safety performance, then the transit agency must evaluate the proposed change through its Safety Risk Management process

Identifying Changes (§673.27(c)(1))

Transit agencies must establish a process for **identifying and assessing changes** that **may introduce new hazards** or **impact** the transit agency's **safety performance**

- Examples of approaches include:
 - **Centralized** – A person or group assesses changes (all, or a certain type) to determine safety impacts
 - **Decentralized** – All departments evaluate if proposed changes have a safety impact, and the Safety Department provides guidance and oversight
- May use existing processes
- Could identify and assess different proposed changes in different ways
- Proposed changes can be initiated within or outside the transit agency

Assessing Changes (§673.27(c)(2))

- Transit agencies must **evaluate proposed changes** that may impact safety performance **through the Safety Risk Management** process
- Transit agencies may choose to:

Send all types of hazards through the agency's **standard SRM process**

Establish a **separate SRM process** for addressing proposed changes (all changes or certain types)

3.1.7 Required Safety Performance Targets

The Safety Performance Target Requirement in Part 673

- Transit agencies **must develop performance targets based on the safety performance measures established under the National Public Transportation Safety Plan** §673.11(a)(4)

Performance Measure §673.5	Performance Target §673.5
• Expression based on a quantifiable indicator of performance or condition • Used to establish targets and assess progress toward meeting targets	• Quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by FTA

Setting SPTs Based on National Public Transportation Safety Plan (NSP) Safety Performance Measures

- The NSP contains four measures:

Fatalities

Injuries

**Safety
Events**

**System
Reliability**

- Part 673 **does not establish requirements for how** the safety performance targets must be set or what they **must be based on**
- A State or transit agency **must make its safety performance targets available to and coordinate with** States and Metropolitan Planning Organizations (MPOs) **on the selection of State and MPO performance targets** to the maximum extent practicable – §673.15

Setting SPTs Based on NSP Safety Performance Measures

- Transit agencies can set targets for each measure based on, but not limited to:
 - **Transit agency data and experience**
 - **Benchmarking against peer transit agencies**
 - **Leadership direction**
 - **Transit industry data**
- Transit agencies may choose to also set safety performance targets:
 - **At a lower level of detail (e.g., by mode, event type)**
 - **Based on key areas of safety risk or leadership priorities**



3.1.8 Continuous Improvement

Continuous Improvement Requirements

Focused on **agency-wide safety performance**

- Assessment could use:
 - **Required safety performance targets** (e.g., number of injuries)
 - **Safety objectives**
- Additional **agency-wide or mode-wide SPTs**
- Recommended, but **not required for small public transportation providers**

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c) Continuous improvement

- 1) A transit agency must establish a **process to assess its safety performance**
- 2) If a transit agency identifies any deficiencies as part of its safety performance assessment, then the transit agency must develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies

Assessing Safety Performance (§673.27(d)(1))

Must establish a **process to assess safety performance**

- Part 673 **does not** specify **how to conduct** assessments or **which standard** to base assessments on
 - FTA may establish performance standards at a later time §673.11(a)(4))
- Should be sufficient for the Accountable Executive to know **when to take action** to address inadequate safety performance
- May choose to **develop SPIs and SPTs for safety objectives**
- Consider a **small set of meaningful SPIs and SPTs** to measure overall safety performance

Assessing Safety Performance (§673.27(d)(1))

- Safety performance assessment **might not show you *what* is wrong, only that *something* is wrong** that requires a closer look
- Consider indicators for safety performance assessment that:
 - Have a **clear connection to safety performance**
 - Are **relevant to transit agency objectives and leadership goals**
 - **Measure change reliably and sufficiently** to inform decision-making
 - Are not **easy to manipulate or misinterpret**
 - Are relatively **easy to track**

Assessing Safety Performance Examples

Transit agencies may decide to monitor safety performance based on, but not limited to:

Safety objectives, or targets based on safety objectives

Required safety performance targets

Major segments of required safety performance measures

Key sources of safety information

Key areas of safety risk

Performance of key safety processes or activities

Addressing Safety Deficiencies (§673.27(d)(2))

- Must **develop and carry out**, under the direction of the Accountable Executive, a **plan to address identified safety deficiencies**
- Safety deficiencies can be in the **transit agency's SMS or related to other agency processes and activities**
- A plan to address identified safety deficiencies could involve:
 - Addressing underlying hazards and potential consequences through Safety Risk Management
 - Changing data collection or analysis techniques to better understand what's really going on
 - Testing and evaluating new approaches to SMS processes

Appendix A. Public Transportation Agency Safety Plan Regulatory Text

Subpart A – General

673.1 Applicability

- a. This part applies to any State, local governmental authority, and any other operator of a public transportation system that receives Federal financial assistance under **49 U.S.C. Chapter 53**.
- b. This part does not apply to an operator of a public transportation system that only receives Federal financial assistance under **49 U.S.C. 5310**, **49 U.S.C. 5311**, or both **49 U.S.C. 5310** and **49 U.S.C. 5311**.

673.3 Policy

The Federal Transit Administration (FTA) has adopted the principles and methods of Safety Management Systems (SMS) as the basis for enhancing the safety of public transportation in the United States. FTA will follow the principles and methods of SMS in its development of rules, regulations, policies, guidance, best practices, and technical assistance administered under the authority of **49 U.S.C. 5329**. This part sets standards for the Public Transportation Agency Safety Plan, which will be responsive to FTA's Public Transportation Safety Program, and reflect the specific safety objectives, standards, and priorities of each transit agency. Each Public Transportation Agency Safety Plan will incorporate SMS principles and methods tailored to the size, complexity, and scope of the public transportation system and the environment in which it operates.

673.5 Definitions

As used in this part:

Accident means an Event that involves any of the following: A loss of life; a report of a serious injury to a person; a collision of public transportation vehicles; a runaway train; an evacuation for life safety reasons; or any derailment of a rail transit vehicle, at any location, at any time, whatever the cause.

Accountable Executive means a single, identifiable person who has ultimate responsibility for carrying out the Public Transportation Agency Safety Plan of a public transportation agency; responsibility for carrying out the agency's Transit Asset Management Plan; and control or direction over the human and capital resources needed to develop and maintain both the agency's Public Transportation Agency Safety Plan, in accordance with **49 U.S.C. 5329(d)**, and the agency's Transit Asset Management Plan in accordance with **49 U.S.C. 5326**.

Chief Safety Officer means an adequately trained individual who has responsibility for safety and reports directly to a transit agency's chief executive officer, general manager, president, or equivalent officer. A Chief Safety Officer may not serve in other operational or maintenance capacities, unless the Chief Safety Officer is employed by a transit agency that a small public transportation provider as defined in this part, or a public transportation provider that does not operate a rail fixed guideway public transportation system.

Equivalent Authority means an entity that carries out duties similar to that of a Board of Directors, for a recipient or subrecipient of FTA funds under **49 U.S.C. Chapter 53**, including sufficient authority to review and approve a recipient or subrecipient's Public Transportation Agency Safety Plan.

Event means any Accident, Incident, or Occurrence.

FTA means the Federal Transit Administration, an operating administration within the United States Department of Transportation.

Hazard means any real or potential condition that can cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment.

Incident means an event that involves any of the following: A personal injury that is not a serious injury; one or more injuries requiring medical transport; or damage to facilities, equipment, rolling stock, or infrastructure that disrupts the operations of a transit agency.

Investigation means the process of determining the causal and contributing factors of an accident, incident, or hazard, for the purpose of preventing recurrence and mitigating risk.

National Public Transportation Safety Plan means the plan to improve the safety of all public transportation systems that receive Federal financial assistance under **49 U.S.C. Chapter 53**.

Occurrence means an Event without any personal injury in which any damage to facilities, equipment, rolling stock, or infrastructure does not disrupt the operations of a transit agency.

Operator of a public transportation system means a provider of public transportation as defined under **49 U.S.C. 5302 (14)**.

Performance measure means an expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets.

Performance target means a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Transit Administration (FTA).

Public Transportation Agency Safety Plan means the documented comprehensive agency safety plan for a transit agency that is required by **49 U.S.C. 5329** and this part.

Rail fixed guideway public transportation system means any fixed guideway system that uses rail, is operated for public transportation, is within the jurisdiction of a State, and is not subject to the jurisdiction of the Federal Railroad Administration, or any such system in engineering or construction. Rail fixed guideway public transportation systems include but are not limited to rapid rail, heavy rail, light rail, monorail, trolley, inclined plane, funicular, and automated guideway.

Rail transit agency means any entity that provides services on a rail fixed guideway public transportation system.

Risk means the composite of predicted severity and likelihood of the potential effect of a hazard.

Risk mitigation means a method or methods to eliminate or reduce the effects of hazards.

Safety Assurance means processes within a transit agency's Safety Management System that functions to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that the transit agency meets or exceeds its safety objectives through the collection, analysis, and assessment of information.

Safety Management Policy means a transit agency's documented commitment to safety, which defines the transit agency's safety objectives and the accountabilities and responsibilities of its employees in regard to safety.

Safety Management System (SMS) means the formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of a transit agency's safety risk mitigation. SMS includes systematic procedures, practices, and policies for managing risks and hazards.

Safety Management System (SMS) Executive means a Chief Safety Officer or an equivalent.

Safety performance target means a Performance Target related to safety management activities.

Safety Promotion means a combination of training and communication of safety information to support SMS as applied to the transit agency's public transportation system.

Safety risk assessment means the formal activity whereby a transit agency determines Safety Risk Management priorities by establishing the significance or value of its safety risks.

Safety Risk Management means a process within a transit agency's Public Transportation Agency Safety Plan for identifying hazards and analyzing, assessing, and mitigating safety risk.

Serious injury means any injury which:

- Requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received;
- Results in a fracture of any bone (except simple fractures of fingers, toes, or noses);
- Causes severe hemorrhages, nerve, muscle, or tendon damage;
- Involves any internal organ; or
- Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

Small public transportation provider means a recipient or subrecipient of Federal financial assistance under **49 U.S.C. 5307** that has one hundred (100) or fewer vehicles in peak revenue service and does not operate a rail fixed guideway public transportation system.

State means a State of the United States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, Guam, American Samoa, and the Virgin Islands.

State of good repair means the condition in which a capital asset is able to operate at a full level of performance.

State Safety Oversight Agency means an agency established by a State that meets the requirements and performs the functions specified by **49 U.S.C. 5329(e)** and the regulations set forth in **49 CFR part 674**.

Transit agency means an operator of a public transportation system.

Transit Asset Management Plan means the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life cycles, for the purpose of providing safe, cost-effective, and reliable public transportation, as required by **49 U.S.C. 5326** and **49 CFR part 625**.

Subpart B – Safety Plans

673.11 General requirements.

- a. A transit agency must, within one calendar year after July 19, 2019, establish a Public Transportation Agency Safety Plan that meets the requirements of this part and, at a minimum, consists of the following elements:
 1. The Public Transportation Agency Safety Plan, and subsequent updates, must be signed by the Accountable Executive and approved by the agency's Board of Directors, or an Equivalent Authority.
 2. The Public Transportation Agency Safety Plan must document the processes and activities related to Safety Management System (SMS) implementation, as required under subpart C of this part.
 3. The Public Transportation Agency Safety Plan must include performance targets based on the safety performance measures established under the National Public Transportation Safety Plan.
 4. The Public Transportation Agency Safety Plan must address all applicable requirements and standards as set forth in FTA's Public Transportation Safety Program and the National Public Transportation Safety Plan. Compliance with the minimum safety performance standards authorized under **49 U.S.C. 5329(b)(2)(C)** is not required until standards have been established through the public notice and comment process.
 5. Each transit agency must establish a process and timeline for conducting an annual review and update of the Public Transportation Agency Safety Plan.
 6. A rail transit agency must include or incorporate by reference in its Public Transportation Agency Safety Plan an emergency preparedness and response plan or procedures that addresses, at a minimum, the assignment of employee responsibilities during an emergency; 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.
- b. A transit agency may develop one Public Transportation Agency Safety Plan for all modes of service, or may develop a Public Transportation Agency Safety Plan for each mode of service not subject to safety regulation by another Federal entity.

- c. A transit agency must maintain its Public Transportation Agency Safety Plan in accordance with the recordkeeping requirements in subpart D of this part.
- d. A State must draft and certify a Public Transportation Agency Safety Plan on behalf of any small public transportation provider that is located in that State. A State is not required to draft a Public Transportation Agency Safety Plan for a small public transportation provider if that agency notifies the State that it will draft its own plan. In each 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 must notify the State. The transit agency has one year from the date of the notification to draft and certify a Public Transportation Agency Safety Plan that is compliant with this part. The Public Transportation Agency Safety Plan drafted by the State will remain in effect until the transit agency drafts its own Public Transportation Agency Safety Plan.
- e. Any rail fixed guideway public transportation system that had a System Safety Program Plan compliant with **49 CFR part 659** as of October 1, 2012, may keep that plan in effect until one year after July 19, 2019.
- f. Agencies that operate passenger ferries regulated by the United States Coast Guard (USCG) or rail fixed guideway public transportation 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.

- a. Each transit agency, or State as authorized in **673.11(d)**, must certify that it has established a Public Transportation Agency Safety Plan meeting the requirements of this part one year after July 19, 2019. A State Safety Oversight Agency must review and approve a Public Transportation Agency Safety Plan developed by rail fixed guideway system, as authorized in **49 U.S.C. 5329(e)** and its implementing regulations at **49 CFR part 674**.
- b. On an annual basis, a transit agency, direct recipient, or State must certify its compliance with this part.

673.15 Coordination with metropolitan, statewide, and non-metropolitan planning processes.

- a. A State or transit agency must make its safety performance targets available to States and Metropolitan Planning Organizations to aid in the planning process.
- b. To the maximum extent practicable, a State or transit agency must 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.

Each transit agency must establish and implement a Safety Management System under this part. A transit agency Safety Management System must be appropriately scaled to the size, scope and complexity of the transit agency and include the following elements:

- a. Safety Management Policy as described in **673.23**;
- b. Safety Risk Management as described in **673.25**;

- c. Safety Assurance as described in **673.27**; and
- d. Safety Promotion as described in **673.29**.

673.23 Safety management policy

- a. 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.
- b. A transit agency must establish and implement 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.
- c. The safety management policy must be communicated throughout the agency's organization.
- 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):
 - 1. Accountable Executive. The transit agency must identify an Accountable Executive. The Accountable Executive is accountable for ensuring that the agency's SMS is effectively implemented, throughout the agency's public transportation system. The Accountable Executive is accountable for ensuring action is taken, as necessary, to address substandard performance in the agency's SMS. The Accountable Executive may delegate specific responsibilities, but the ultimate accountability for the transit agency's safety performance cannot be delegated and always rests with the Accountable Executive.
 - 2. Chief Safety Officer or Safety Management System (SMS) Executive. The Accountable Executive must designate a Chief Safety Officer or SMS Executive who has the authority and responsibility for day-to-day implementation and operation of an agency's SMS. The Chief Safety Officer or SMS Executive must hold a direct line of reporting to the Accountable Executive. A transit agency may allow the Accountable Executive to also serve as the Chief Safety Officer or SMS Executive.
 - 3. Agency leadership and executive management. A transit agency must identify those members of its leadership or executive management, other than an Accountable Executive, Chief Safety Officer, or SMS Executive, who have authorities or responsibilities for day-to-day implementation and operation of an agency's SMS.
 - 4. Key staff. A transit agency may designate key staff, groups of staff, or committees to support the Accountable Executive, Chief Safety Officer, or SMS Executive in developing, implementing, and operating the agency's SMS.

673.25 Safety risk management

- 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. The Safety Risk Management process must be comprised of the following activities: Safety hazard identification, safety risk assessment, and safety risk mitigation.

- b. Safety hazard identification.
 - 1. A transit agency must establish methods or processes to identify hazards and consequences of the hazards.
 - 2. A transit agency must consider, as a source for hazard identification, data and information provided by an oversight authority and the FTA.
- c. Safety risk assessment.
 - 1. A transit agency must establish methods or processes to assess the safety risks associated with identified safety hazards.
 - 2. A safety risk assessment includes an assessment of the likelihood and severity of the consequences of the hazards, including existing mitigations, and prioritization of the hazards based on the safety risk.
- d. Safety risk mitigation. A transit agency must establish methods or processes to identify mitigations or strategies necessary as a result of the agency's safety risk assessment to reduce the likelihood and severity of the consequences.

673.27 Safety assurance

- a. Safety assurance process. A transit agency must develop and implement a safety assurance process, consistent with this subpart. A rail fixed guideway public transportation system, and a recipient or subrecipient of Federal financial assistance under **49 U.S.C. Chapter 53** that operates more than one hundred vehicles in peak revenue service, must include in its safety assurance process each of the requirements in paragraphs (b), (c), and (d) of this section. A small public transportation provider only must include in its safety assurance process the requirements in paragraph (b) of this section.
- b. Safety performance monitoring and measurement. A transit agency must establish activities to:
 - 1. Monitor its system for compliance with, and sufficiency of, the agency's procedures for operations and maintenance;
 - 2. Monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended;
 - 3. Conduct investigations of safety events to identify causal factors; and
 - 4. Monitor information reported through any internal safety reporting programs.
- c. Management of change.
 - 1. A transit agency must establish a process for identifying and assessing changes that may introduce new hazards or impact the transit agency's safety performance.
 - 2. If a transit agency determines that a change may impact its safety performance, then the transit agency must evaluate the proposed change through its Safety Risk Management process.
- d. Continuous improvement.
 - 1. A transit agency must establish a process to assess its safety performance.
 - 2. If a transit agency identifies any deficiencies as part of its safety performance assessment, then the transit agency must develop and carry out, under the

direction of the Accountable Executive, a plan to address the identified safety deficiencies.

673.29 Safety promotion

- a. Competencies and training. A transit agency must establish and implement a comprehensive safety training program for all agency employees and contractors directly responsible for safety in the agency's public transportation system. The training program must include refresher training, as necessary.
- 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.

Subpart D – Safety Plan Documentation and Recordkeeping

673.31 Safety plan documentation

At all times, a transit agency must maintain documents that set forth its Public Transportation Agency Safety Plan, including those related to the implementation of its Safety Management System (SMS), and results from SMS processes and activities. A transit agency must maintain documents that are included in whole, or by reference, that describe the programs, policies, and procedures that the agency uses to carry out its Public Transportation Agency Safety Plan. These documents must be made available upon request by the Federal Transit Administration or other Federal entity, or a State Safety Oversight Agency having jurisdiction. A transit agency must maintain these documents for a minimum of three years after they are created.

Appendix B. Safety Event Investigation Report

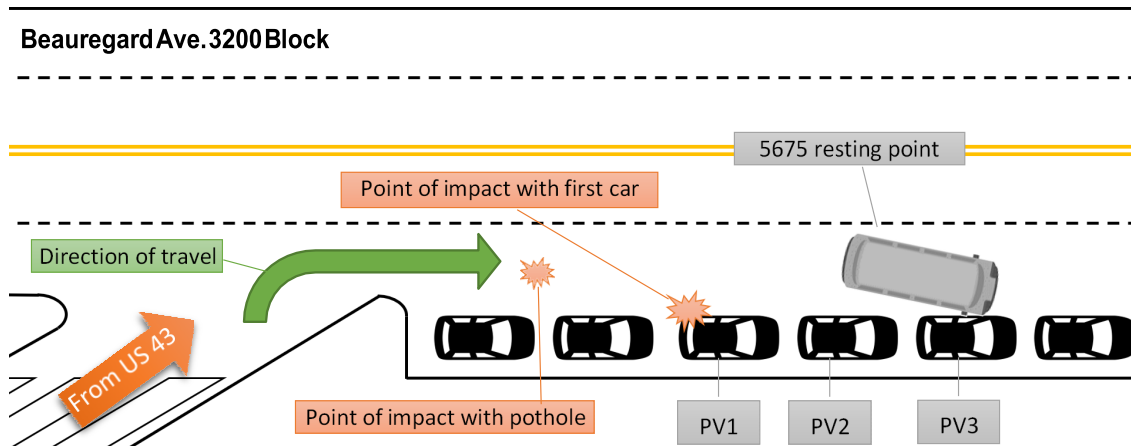
Event Description

At approximately 8:45 AM on Tuesday, April 23, 2019, a Straightline Transit bus collided with 3 parked cars on Beauregard Avenue following the failure of the bus' right front tire due to impact with a pothole. One seated passenger and one standing passenger sustained minor injuries when they were thrown at the initial impact with the parked cars. All parked vehicles were unoccupied and sustained heavy damage. The operator tested negative for drugs and alcohol. At the time of the incident, the weather was clear and the pavement was dry.

Data Summary Table

Date	April 23, 2019	Direction	Inbound
Time	8:45 AM	Route	32-City Center
Weather	Clear	Run	3215
Event Type	Collision with non-transit vehicle	Operator ID	170165
Fatalities	0	Bus ID	5675
Injuries	2 (2 Passengers)	Bus Mileage	352,571
Location	3200ck of Beauregard Ave.		

Event Diagram



Additional Details

Route 32-City Center merges onto Beauregard Avenue from US 43. Bus camera footage shows the bus impacting a pothole on Beauregard Avenue and the bus' front right wheel rupturing in the pothole. Following the tire blowout, traffic camera footage requested from the city shows the bus pulling to the right and striking private vehicles (PV) 1, 2, and 3, coming to rest against PV3. Operator 170165 states, and the camera footage and electronic data recorder (EDR) data confirm, that following the tire rupture, she applied the brakes to stop. This action is contrary to Straightline training and policy, and worsened the skid into the cars.

Bus 5675 is based at the North Division bus garage, which has been experiencing premature and irregular tire wear, causing a 40 percent reduction in service life for these tires. A review of the pretrip and maintenance inspection records show that the front right tire of 5675 had been reported for unusual wear nearing the condemning limits for the tire.

Investigation

Route Characteristics

Route 32-City Center is a cross city route that runs from the east side of Springfield, through the center of town, to the West End Regional Transportation Center (RTC) between 5:00 am and 12:00 am every day. As with most Straightline routes, the typical mileage for a bus on this route is 400 vehicle revenue miles per day. Passengers include city and private employees, as well as travelers connecting to Amtrak at the West End RTC. Ridership is typically heaviest in the morning and evening rush periods.

Route 32-City Center is mostly flat with some hills, but no steep grades or sharp turns. This route is serviced by the New Flyer Xcelsior fleet, from Straightline's North Division bus garage.

Camera Monitoring and Event Data Recorder Data

Straightline buses are equipped with camera monitoring systems and EDRs, which are linked together to provide evidence of actions inside and outside the bus. The camera monitoring system uses an accelerometer to detect any safety events (such as hard braking, collisions, and fast turns) and mark those items for review by Straightline's Office of Safety and Quality (OSQ). The camera monitoring system is also used by OSQ to perform random audits of Straightline operators, which are performed twice a year. Each bus is equipped with cameras that film the operating compartment, the operator's perspective, and the sides and rear of each bus.

Camera footage down the side of bus 5675 shows the bus' front right wheel impacting the pothole prior to failing. Footage also shows the front right tire rupturing in the pothole. Inward facing cameras show the operator applying the brakes to stop, which was also confirmed by the EDR.

Bus Operations

Operator

Operator 170165 was hired in June 2005 and has no accidents on file with Straightline Transit. Operator 170165 typically works out of the North Division bus garage and drives commuter routes from the surrounding suburbs. At the time of the incident, Operator 170165 was serving as an extra board⁷ and driving Route 32-City Center in relief of a sick operator. Operator 170165 has no incidents or reprimands on her Straightline driving record. Her commercial driver's license (CDL) is in good standing, including her medical card.

⁷ An extra board is an operator that is on standby at a facility as a backup operator in case of emergency or no-show. Extra boards may also be assigned other tasks, such as switching out buses on route, depending on agency size.

Interview Statement

Supervisor 392 interviewed Operator 170165 at the North Division bus garage following the event and a drug and alcohol screening.

During the interview, Operator 170165 stated that she was instructed to relieve Operator 189011 who had fallen ill on run 3215 of Route 32-City Center at the Fountainhead Mall stop. Run 3215 was delayed by 25 minutes due to the sick operator. Operator 170165 stated that she was able to make up time throughout the route, but was still 15 minutes behind schedule when merging onto Beauregard Ave. and was hearing multiple complaints from passengers who were late to work.

Operator 170165 stated that immediately after hitting the pothole, she slammed on the brakes in an effort to stop the bus. When asked if this was how she was trained, she stated she could not remember the exact instructions, but that it was covered in class. Operator 170165 also stated she was unaware of the tire condition and that a handoff from Operator 189011 was not completed.

Operator 170165 also explained that she does not typically pick up extra board shifts, but was trying to work extra overtime to help earn money to pay for home repairs. She further explained that her typical shift is driving the 12 Express (E12) and 12 Weekend (W12) routes from the suburbs to the city center, mostly on highways, and not routes that mostly cover city streets.

30 Day Work History

Operator 170165's 30-day work history shows that she picked up 5 extra board shifts (highlighted) on overtime. The Straightline Transit fatigue policy limits employees to working up to 6 days or 48 total hours within a calendar week (Sunday to Saturday) but does not provide restrictions on consecutive days or mandatory rest periods between shifts.

Date	Route	Run	Start Time	End Time	Hours	Scheduled
3/25/2018	E12	E1208	0500	1300	8	Y
3/26/2018	E12	E1208	0500	1300	8	Y
3/27/2019	E12	E1208	0500	1300	8	Y
3/28/2019	E12	E1208	0500	1300	8	Y
3/29/2019	EB	N/A	0600	1400	8	N
3/30/2019	W12	W1222	1000	1800	8	Y
4/1/2019	E12	E1208	0500	1300	8	Y
4/2/2019	E12	E1208	0500	1300	8	Y
4/3/2019	E12	E1208	0500	1300	8	Y
4/4/2019	E12	E1208	0500	1300	8	Y
4/5/2019	E12	E1208	0500	1300	8	Y
4/6/2019	EB	N/A	0600	1400	8	N
4/8/2019	E12	E1208	0500	1300	8	Y
4/9/2019	E12	E1208	0500	1300	8	Y
4/10/2019	E12	E1208	0500	1300	8	Y
4/11/2019	E12	E1208	0500	1300	8	Y
4/12/2019	EB	N/A	0600	1400	8	N
4/13/2019	W12	W1222	1000	1800	8	Y

Date	Route	Run	Start Time	End Time	Hours	Scheduled
4/15/2019	E12	E1208	0500	1300	8	Y
4/16/2019	E12	E1208	0500	1300	8	Y
4/17/2019	EB	N/A	0600	1400	8	N
4/18/2019	E12	E1208	0500	1300	8	Y
4/19/2019	E12	E1208	0500	1300	8	Y
4/20/2019	W12	W1222	1000	1800	8	Y
4/22/2019	E12	E1208	0500	1300	8	Y
4/23/2019	EB	N/A	0600	0900	4	N

Training and Evaluation Record

Records show Operator 170165 completed all required Straightline Transit initial training and triennial refresher training and evaluations. Additionally, Operator 170165 passed all random camera observations.

Type	Start Date	End Date	Exam Score	Certified
Initial Classroom	6/6/2005	9/5/2005	93	Y
Initial Road	9/12/2005	1/13/2006	100	Y
Camera Review	1/6/2006	1/6/2006	Pass	Y
Camera Review	8/2/2006	8/2/2006	Pass	Y
Camera Review	2/12/2007	2/12/2007	Pass	Y
Camera Review	6/11/2007	6/11/2007	Pass	Y
Camera Review	1/22/2008	1/22/2008	Pass	Y
Classroom Refresher	7/7/2008	7/18/2008	91	Y
Camera Review	8/1/2008	8/1/2008	Pass	Y
Camera Review	1/31/2009	1/31/2009	Pass	Y
Camera Review	7/16/2009	7/16/2009	Pass	Y
Camera Review	2/4/2010	2/4/2010	Pass	Y
Camera Review	6/30/2010	6/30/2010	Pass	Y
Camera Review	1/5/2011	1/5/2011	Pass	Y
Camera Review	6/22/2011	6/22/2011	Pass	Y
Classroom Refresher	7/18/2011	7/29/2011	96	Y
Camera Review	2/14/2012	2/14/2012	Pass	Y
Camera Review	8/1/2012	8/1/2012	Pass	Y
Camera Review	1/28/2013	1/28/2013	Pass	Y
Camera Review	7/15/2013	7/15/2013	Pass	Y
Camera Review	1/9/2014	1/9/2014	Pass	Y
Classroom Refresher	7/7/2014	7/18/2014	90	Y
Camera Review	8/15/2014	8/15/2014	Pass	Y
Camera Review	3/1/2015	3/1/2015	Pass	Y
Camera Review	6/24/2015	6/24/2015	Pass	Y
Camera Review	1/2/2016	1/2/2016	Pass	Y
Camera Review	8/1/2016	8/1/2016	Pass	Y

Type	Start Date	End Date	Exam Score	Certified
Camera Review	1/19/2017	1/19/2017	Pass	Y
Classroom Refresher	7/10/2017	7/21/2017	95	Y
Camera Review	8/3/2017	8/3/2017	Pass	Y
Camera Review	2/6/2018	2/6/2018	Pass	Y
Camera Review	9/1/2018	9/1/2018	Pass	Y
Camera Review	1/16/2019	1/16/2019	Pass	Y

Bus Maintenance

Bus 5675 is a 40-foot New Flyer Xcelsior diesel bus based at the North Division bus garage. Bus 5675 was commissioned in January 2017 as part of a large order to replace aging vehicles. Bus 5675 has not suffered any major mechanical failures or been involved in any accidents during its service life.

Bus 5675 has received all its scheduled A (8,125 miles), B (32,500 miles), and C (75,000 miles) inspections and maintenance with minimal deficiencies noted. To date, Straightline Transit has not issued any changes to Bus 5675's fleet.

Straightline Transit Scheduled Inspections Summary

A Inspection (8,125 Miles)	• Change Motor Oil and Filter • Rotate Tires • Interior and Exterior Cleaning • Inspect and Replace Interior and Exterior Lighting	• Engine and Electrical System Diagnostic and Repair • Check and Refill Fluids
B Inspection (32,500 Miles)	• All Activities Performed in A inspection • Replace Fuel Filter	• Service Braking System • Service HVAC system
C Inspection (75,000 Miles)	• All Activities Performed in B inspection • Tire Replacement	• Transmission Flush and Fluid Replacement

Straightline Transit changes all six tires as part of its C inspections every 75,000 miles. Straightline policy is to change all six tires at once to ensure even traction during braking and acceleration. Bus 5675 had its tires replaced during its 300,000-mile C service and inspection and was 20,000 miles from its next scheduled change.

Pretrip Inspection

Operator 189011 performed a pretrip inspection prior to leaving the garage that morning. All fields were completed as required on the Straightline Transit checkout form and submitted to the depot clerk, noting an irregular wear pattern on the front right wheel. A review of yard security footage confirmed that Operator 189011 performed the required checks.

The depot clerk states that she alerted a mechanic to the concern regarding the tire. The mechanic states that he checked the tire and said it was okay for service. He also states that the irregular wear pattern was noted during the most recent service and inspection, but no replacement tires were available and the tire was within Straightline's guidelines for acceptable tire condition.

90-Day Maintenance Record

Date	Inspection Type	Defects Noted	Date Returned to Service
1/25/2019	300,000 C Service and Inspection	0	1/25/2019
2/8/2019	308,125 A Service and Inspection	0	2/8/2019
2/21/2019	316,250 A Service and Inspection	0	2/21/2019
3/7/2019	324,375 A Service and Inspection	0	3/7/2019
3/22/2019	332,500 B Service and Inspection	0	3/22/2019
4/3/2019	340,625 A Service and Inspection	0	4/3/2019
4/17/2019	348,750 A Service and Inspection	1	4/17/2019

The most recent service and inspection, conducted on April 17, 2019, showed an irregular wear pattern on the front right tire. The notes for the inspection state that no replacements are available. Bus 5675 is flagged in the maintenance tracking system for a tire replacement as soon as inventory is available.

Tire Failure Analysis

The Office of Bus Engineering (OBE) performed an analysis of the failed tire, including a complete reconstruction of the tire. As part of their review, the OBE investigators determined that the failure was due to patch wear on the outside portion of the tire tread which, upon striking the pothole, caused the tire to rupture. The investigators state that this failure pattern is consistent with out of balance wheels or significant alignment issues.

Prior to installation, each wheel is balanced to ensure a smooth ride and even tire wear pattern. To support proper balancing, the wheel balancer is supposed to be calibrated annually by Straightline maintenance staff, in accordance with Standard Operating Procedure (SOP) #47 and the manufacturer's recommendations. Straightline Transit currently does not have a process to monitor compliance with tool and equipment calibration.

Tire inspection guidelines for maintenance and pretrip inspections are specified in the Straightline Transit Bus Inspection manual. The manual requires a certain tread depth, measured at three equally spaced intervals. The requirement is quoted below.

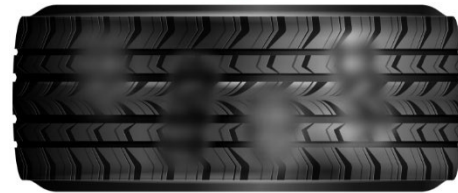
The tire tread depth shall not be less than 4/32 inch in any two adjacent major tread grooves at three equally spaced intervals around the circumference of the tire.

Thus, the tire would not necessarily have failed inspection depending on where the measurements are taken. If the patch wear is deep enough, the tire can also fail if it has exposed or damaged body chords.

Fleetwide Deficiencies

The 75 New Flyer Xcelsior buses from the North Division bus garage are experiencing faster than usual wear on tires and more tire failures than usual. Typically, the North Division bus garage performs 12 tire replacements a month. Over the past 6 months

PATCH WEAR: PATCHY
TREAD WEAR OR SPOTS



(January 1 – June 30, 2019), that number has increased to an average of 16 and the average lifespan of a tire has decreased nearly 40 percent.

OSQ interviewed personnel at the North Division bus garage who are aware of the patch wear issue, but without required stock, cannot replace the tires as needed. Since the tires do not fail inspection due to the localized wear until it has exposed or damaged body chords, the buses are returned to service until the wear reaches that level or regular replacement is scheduled.

Witness Statements

Supervisor 165 interviewed 2 passengers regarding their recollection of events.

Witness 1-Passenger

Witness 1 is a 57-year-old female passenger who was seated at the front of the bus. At the time of the accident, she was looking out the front windshield. She stated she heard a loud bang and the bus pulled to the right and struck three cars. She went on to say the bus operator did her best to stop but could not before striking the cars. She also noted that many passengers were loudly complaining about the delay and that the operator was clearly attempting to make up time. Prior to the incident, she stated the operator was looking intently for a spot to merge and did not appear to be focused on the road ahead as she pulled into traffic.

Witness 2-Passenger

Witness 2 is a 26-year-old male who was standing near the rear exit doors. At the time of the incident, he caught a passenger who was falling down the stairs due to the impact of the collision. He stated that the operator was driving quickly to try and make up for lost time. The passenger is a frequent rider of Route 32-City Center. He stated that this turn always seemed dangerous to him because the bus operator has little space to merge, so is focused on traffic coming from the left, not the road ahead on the right. The passenger also mentioned that he has observed an increased number of potholes on city streets since the last winter.

Appendix C. Acronym Definitions

Acronym	Definition
AE	Accountable Executive
ASP	Agency Safety Plan
CDL	Commercial Driver's License
CFR	Code of Federal Regulations
CSO	Chief Safety Officer
EDR	Electronic Data Recorder
ESRP	Employee Safety Reporting Program
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
MPO	Metropolitan Planning Organizations
MTBE	Mean Time Between Events
NSP	National Public Transportation Safety Plan
OBE	Office of Bus Engineering
OSQ	Office of Safety and Quality
PTASP	Public Transportation Agency Safety Plan
PV	Private Vehicle
RTC	Regional Transportation Center
SA	Safety Assurance
SMP	Safety Management Policy
SMS	Safety Management System
SOP	Standard Operating Procedure
SP	Safety Promotion
SPI	Safety Performance Indicator
SPT	Safety Performance Target
SRM	Safety Risk Management
STIP	Statewide Transportation Improvement Program
TAM	Transit Asset Management
TSO	Office of Transit Safety and Oversight
TSSP	Transit Safety and Security Program
USCG	United States Coast Guard
VRM	Vehicle Revenue Miles

Appendix D. List of Resource Documents

- [PTASP Checklist for Bus Transit](#)
- [PTASP Template for Bus Transit](#)
- [PTASP Template for Bus Transit Reference Tool](#)
- [Developing the Safety Management Policy Statement](#)
- [Potential Sources of Hazard Information for Bus Transit Operations](#)
- [Sample Hazard Classification System](#)
- [Sample Safety Risk Assessment Matrices for Bus Transit Agencies](#)
- [Sample List of Documented Safety Risk Management and Safety Assurance Process Elements](#)