Developing and Monitoring Safety Risk Mitigations
May 26, 2022

Public Transportation Agency Safety Plan
Technical Assistance Center
(PTASP TAC)
Objectives

This webinar will provide participants with knowledge and skills to support the development and monitoring of safety risk mitigations

After this presentation, participants should be able to:

• Identify mitigations in response to safety risk assessment data
• Describe processes for documenting mitigations
• Identify mitigation monitoring methods
Industry Speakers

Serena Stevenson
General Manager
Waco Transit System

Seth Page
Safety Manager
Greater Portland Metro
Agenda

1. Introduction
2. Identifying mitigations following safety risk assessments
3. Documenting mitigations
4. Monitoring mitigations
5. Questions and answers
Related Resources

Log onto FTA’s PTASP TAC Resource Library for more webinars, tools, and fact sheets related to Safety Risk Management and Safety Assurance

www.transit.dot.gov/PTASP-TAC

For information related to the Bipartisan Infrastructure Law, visit www.transit.dot.gov/BIL

Contact FTA-IIJA@dot.gov with your questions related to the Bipartisan Infrastructure Law
Feedback

Your feedback helps us deliver the resources and tools that are most relevant to your needs. Based on feedback from the previous webinar surveys, this webinar features:

• Multiple speakers
• Speakers on video
• Integrated audience feedback

Please stay tuned for another survey at the conclusion of this webinar!
Audience Poll

Are you personally involved in the safety risk mitigation process at your agency?

- **44%** Yes, both developing and monitoring mitigations
- **24%** Yes, developing mitigations
- **13%** Yes, monitoring mitigations
- **10%** No, not involved
- **9%** Not applicable
Identifying Mitigations
Safety Management Systems (SMS)

The PTASP regulation establishes requirements for an SMS, including Safety Management Policy, Safety Risk Management (SRM), Safety Assurance (SA), and Safety Promotion.
https://www.transit.dot.gov/PTASP-TAC
Safety Risk Mitigations

Safety risk mitigations generally reduce either the likelihood or severity of the potential consequence of a hazard.

### Example Safety Risk Assessment Chart

<table>
<thead>
<tr>
<th>Likelihood/Severity</th>
<th>Catastrophic (1)</th>
<th>Serious (2)</th>
<th>Marginal (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent (A)</td>
<td>High (1A)</td>
<td>High (2A)</td>
<td>Medium (3A)</td>
</tr>
<tr>
<td>Occasional (B)</td>
<td>High (1B)</td>
<td>Medium (2B)</td>
<td>Low (3B)</td>
</tr>
<tr>
<td>Remote (C)</td>
<td>High (1C)</td>
<td>Medium (2C)</td>
<td>Low (3C)</td>
</tr>
</tbody>
</table>

A safety risk mitigation may reduce the likelihood of the potential consequence of a hazard, such as reducing the likelihood from frequent to occasional, or occasional to remote.
Safety Risk Mitigations

Safety risk mitigations generally reduce either the likelihood or severity of the potential consequence of a hazard.

<table>
<thead>
<tr>
<th>Likelihood/Severity</th>
<th>Catastrophic (1)</th>
<th>Serious (2)</th>
<th>Marginal (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent (A)</td>
<td>High (1A)</td>
<td>High (2A)</td>
<td>Medium (3A)</td>
</tr>
<tr>
<td>Occasional (B)</td>
<td>High (1B)</td>
<td>Medium (2B)</td>
<td>Low (3B)</td>
</tr>
<tr>
<td>Remote (C)</td>
<td>High (1C)</td>
<td>Medium (2C)</td>
<td>Low (3C)</td>
</tr>
</tbody>
</table>

A safety risk mitigation may reduce the severity of the potential consequence of a hazard, such as reducing the severity from catastrophic to serious, or serious to marginal.
Safety Risk Mitigations

Safety risk mitigations generally reduce either the likelihood or severity of the potential consequence of a hazard.

<table>
<thead>
<tr>
<th>Likelihood/Severity</th>
<th>Catastrophic (1)</th>
<th>Serious (2)</th>
<th>Marginal (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent (A)</td>
<td>High (1A)</td>
<td>High (2A)</td>
<td>Medium (3A)</td>
</tr>
<tr>
<td>Occasional (B)</td>
<td>High (1B)</td>
<td>Medium (2B)</td>
<td>Low (3B)</td>
</tr>
<tr>
<td>Remote (C)</td>
<td>High (1C)</td>
<td>Medium (2C)</td>
<td>Low (3C)</td>
</tr>
</tbody>
</table>

A safety risk mitigation may reduce both the likelihood and the severity of the potential consequence of a hazard.
Safety Risk Mitigations

Example:
A rail transit agency determines that the risk associated with falls on an open platform is not adequately mitigated

What are some example mitigations?
Safety Risk Mitigations

Example:
A rail transit agency determines that the risk associated with falls on an open platform is not adequately mitigated

Example Mitigation:
Increase platform monitoring by assigning personnel, such as station agents or transit police or security officers, to warn individuals to stay back from the platform edge

This mitigation reduces the likelihood of the potential consequence of the hazard
Safety Risk Mitigations

Example:
A rail transit agency determines that the risk associated with falls on an open platform is not adequately mitigated

Example Mitigation:
Install sensors that feed into the Operations Control Center to alert controllers to stop trains on approach to the station when someone has fallen on the right-of-way

This mitigation reduces the severity of the potential consequence of the hazard
Safety Risk Mitigations

Example:
A rail transit agency determines that the risk associated with falls on an open platform is not adequately mitigated.

Example Mitigation:
Install platform screens that prevent passengers from falling to the right-way when the screens are closed.

This mitigation reduces both the likelihood and the severity of the potential consequence of the hazard.
Safety Risk Mitigations

- Reduce **likelihood**
- Reduce **severity**
- Reduce **likelihood** and **severity**
- Eliminate **risk**
Developing Safety Risk Mitigations

When deciding on a safety risk mitigation:

• An agency may not be able to make a consequence less likely, but they may be able to make it less severe.
• An agency may only be able to reduce the likelihood of the consequence.

Deciding on a mitigation may come down to a practical decision:

• Is it more practical/cost effective to reduce the likelihood or the severity?

What will our safety risk mitigation achieve?

- Reduce likelihood
- Reduce severity
- Reduce likelihood and severity
- Eliminate risk
Developing Safety Risk Mitigations

One mitigation may impact the safety risk associated with another hazard

• A mitigation may increase the safety risk associated with another hazard

What will our safety risk mitigation achieve?

- Reduce **likelihood**
- Reduce **severity**
- Reduce **likelihood** and **severity**
- Eliminate **risk**
Developing Safety Risk Mitigations

Example:
Reducing maximum authorized speeds when approaching intersection

• Provides operators more time to visually assess the road and to identify and react to potential situations, potentially reducing the likelihood of a collision with a pedestrian or bicyclist

• However, slowing transit service also may lead to crowding on transit vehicles that increases the potential for passenger boarding and alighting injuries
Some Safety Risk Mitigations may be more effective than others

When deciding on a mitigation strategy, consider whether the mitigation will lower the safety risk to a level acceptable by the agency.

- For example, a “hard” mitigation, such as rehabilitating a station to eliminate a sightline obstruction may be more effective than training operators to approach at a low speed.
Deciding on a Safety Risk Mitigation

Some Safety Risk Mitigations may be more effective than others

When deciding on a mitigation strategy, consider whether the mitigation will lower the safety risk to a level acceptable by the agency

- In some cases, multiple mitigations may be applied to lower the level of safety risk to a level acceptable by the transit agency
- For example, a combination of operator training and signs warning pedestrians of limited sightlines
Subject Matter Expertise

Subject matter experts can help agencies identify effective safety risk mitigations

• Leverage experience in identifying potential mitigations
• Provide valuable insight and ensure that your proposed mitigation does not unintentionally create new hazards or worsen existing hazards
Audience Poll

Which, if any, of the below does your agency use to identify safety risk mitigations? Select all that apply.

- 36% Safety Department
- 27% Operations Subject Matter Experts
- 21% Research into industry practices
- 16% External Subject Matter Experts
Documenting Mitigations
How do I document mitigations?

- FTA does not specify how agencies must document their mitigations
- What documentation looks like is up to each agency
# How do I document mitigations?

**Items to consider documenting:**

<table>
<thead>
<tr>
<th>Hazard and Potential Consequence(s)</th>
<th>Safety Risk Rating</th>
<th>Implementation</th>
<th>Safety Performance Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hazard</td>
<td>- Safety Risk Rating before mitigation</td>
<td>- Implementation lead</td>
<td>- Measures to determine whether the mitigation is effective, implemented as intended, and appropriate</td>
</tr>
<tr>
<td>- Hazard Type</td>
<td>- Revised Safety Risk Rating (following mitigation)</td>
<td>- Department responsible</td>
<td></td>
</tr>
<tr>
<td>- Identification Date</td>
<td></td>
<td>- Implementation timeframe/schedule</td>
<td></td>
</tr>
<tr>
<td>- Potential Consequence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Existing Mitigations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Hazard and Potential Consequence(s):**
- Hazard
- Hazard Type
- Identification Date
- Potential Consequence
- Existing Mitigations

**Safety Risk Rating:**
- Safety Risk Rating before mitigation
- Revised Safety Risk Rating (following mitigation)

**Implementation:**
- Implementation lead
- Department responsible
- Implementation timeframe/schedule
Serena Stevenson
General Manager
Waco Area Transit
Characteristics and Service

- Waco Transit System is a small urban provider that operates motor bus and demand response. We operate nine Fixed Routes, two Downtown Waco Shuttles, complementary Paratransit and Evening Link services, Monday-Saturday.
- Waco Transit System operates seven shuttles for the BUS-Baylor University Service, Monday-Friday, and two of those shuttles run on Saturday and Sunday as well.
- Waco Transit System maintains its own vehicles.
- Waco Transit System’s downtown transfer center, is an intermodal facility, and is under lease by FlixBus/Greyhound for inter-city bus service.
- Waco Transit System contracts (5310) purchase of service.
- Waco Transit System provides (5311) Rural services under an interlocal agreement between the City of Waco and McLennan County.
# Waco Transit System FY 2022 Year To Date Safety Data and Trends

<table>
<thead>
<tr>
<th>Target</th>
<th>Waco FY22 - YTD as of March</th>
<th>MWA</th>
<th>select</th>
<th>FY21</th>
<th>FY22</th>
<th>FY22</th>
<th>FY22</th>
<th>FY22</th>
<th>Target Status</th>
<th>FY21</th>
<th>ZONE RATING</th>
<th>Improve By</th>
<th>FY22 GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Collision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Passenger Injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Employee Injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lost Time Injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PrevCollisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pedestrian / Bike Strike</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## FY22 ZONE GOAL

<table>
<thead>
<tr>
<th>FY22 ZONE GOAL</th>
<th>ZONE RATING</th>
<th>Improve By</th>
<th>FY22 GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Excellence</td>
<td>Flat</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Zone 1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Zone 2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Zone 3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Zone 4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Zone 5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Beyond Tolerance</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

## YTD SAFETY TRENDS

### COLLISION CAUSES

<table>
<thead>
<tr>
<th>Waco</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper Backing</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Hit Fixed Object</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Hit Parked Vehicle</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Intersection</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Read End</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Pedestrian/Cyclist</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Improper Turning</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>All Other</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

## INJURY CAUSES

<table>
<thead>
<tr>
<th>Waco</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slip, Trip, Fall</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Improper lifting</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Push, Pull, Twist</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cut/laceration/puncture</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Occupational injury</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Assault</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Other</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

## PrevCollisions

<table>
<thead>
<tr>
<th>PrevCollisions</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Audience Poll

How does your agency document your mitigations? *Select all that apply.*

- **38%** Other
- **36%** Excel or other data processor
- **14%** Safety Risk Register
- **12%** Specialized software
Mitigation Monitoring Methods
Monitoring Mitigations

Under **Safety Assurance (SA)**, transit agencies are required to monitor operations to identify safety risk mitigations that may be:

- Ineffective
- Inappropriate
- Not implemented as intended
Monitoring Mitigations

One way transit agencies could monitor safety risk mitigations is to establish safety performance indicators (SPIs) and safety performance targets (SPTs) for the mitigation

- Define the data you will watch to in order to know if a mitigation is working

An **SPI** is a signal or early warning sign that measures inputs, outputs, outcomes, or impacts of a particular process or activity

**Number of passenger injuries from slip/fall events on vehicles per vehicle revenue mile**

**SPTs** apply quantitative thresholds to draw conclusions from observed changes in an SPI over a specific timeframe compared to the expected change

*Reduce the number of passenger injuries from slip/fall events on vehicles per vehicle revenue mile by 10% over the next 12 months*
Monitoring Mitigations

Safety risk mitigation: bus mirror is moved to reduce visual obstruction

Example SPIs and SPTs:
Effectiveness
- SPI: Number of collisions with pedestrians during left-hand turns
- SPT: Zero collisions with pedestrians during left-hand turns over the next six months

Mirror obstructs the operator’s view of pedestrians during left-hand turns
Mirror placement reduces obstruction of the operator’s view during left-hand turns
Monitoring Mitigations

Safety risk mitigation: bus mirror is moved to reduce visual obstruction

Example SPIs and SPTs:
Implementation
- SPI: Percentage of mirrors adjusted
- SPT: 100-percent implementation 30-days after issuing maintenance instruction

Mirror obstructs the operator’s view of pedestrians during left-hand turns

Mirror placement reduces obstruction of the operator’s view during left-hand turns
Monitoring Mitigations

Example SPIs and SPTs:
Effectiveness
- SPI: Number of operator reports about mirrors blocking line-of-sight
- SPT: Reduction of over 75% of reports over the next six months

Safety risk mitigation: bus mirror is moved to reduce visual obstruction

Mirror obstructs the operator’s view of pedestrians during left-hand turns

Mirror placement reduces obstruction of the operator’s view during left-hand turns
## Mitigation Monitoring Plan

<table>
<thead>
<tr>
<th>Mitigation Description</th>
<th>Move bus mirrors to reduce visual obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Roles and Responsibilities</td>
<td>Maintenance Department; Susan Smith</td>
</tr>
<tr>
<td>Defined SPIs and SPTs</td>
<td></td>
</tr>
</tbody>
</table>
| - Effectiveness: Zero collisions with pedestrians during left-hand turns over the next six months;  
- Implementation: 100% implementation by 30 days after issuing maintenance instruction |
| Implementation Timeframes | Completion within 30 days of maintenance instruction |
| How agency will report on safety performance | Monthly report provided by the safety department to the safety committee |
Guest Speaker
Seth Page
Safety Manager
Greater Portland Metro
Related Resources

• Today’s webinar focused on topics in Safety Risk Management (SRM), and Safety Assurance (SA)
• Log onto FTA’s PTASP TAC Resource Library for more webinars, tools, and fact sheets related to SRM and SA

www.transit.dot.gov/PTASP-TAC

For information related to the Bipartisan Infrastructure Law, visit www.transit.dot.gov/BIL

Contact FTA-IIJA@dot.gov with your questions related to the Bipartisan Infrastructure Law
PTASP Technical Assistance Center

Welcome to the Public Transportation Agency Safety Plan (PTASP) Technical Assistance Center (TAC). We are here to help you meet PTASP regulation requirements.

For information on Bipartisan Infrastructure Law safety requirements, see FTA's web page or email FTA-ILJA@dot.gov.

PTASP Resource Library

Choose your agency type to begin

https://www.transit.dot.gov/PTASP-TAC
Bus Transit Providers

FTA developed a host of materials to help large bus transit providers develop Agency Safety Plans.

- Applicability
- Plan Development
- Certification
- Safety Performance Targets
- Safety Management Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion
- Implementation
- SMS Records and Documentation
- Annual ASP Review

https://www.transit.dot.gov/PTASP-TAC
Safety Risk Management

Fact Sheets
- Guide to Developing the Safety Risk Management Component of a Public Transportation Agency Safety Plan
- Addressing Operator Assault through a Safety Management System

Guidance
- Sample Hazard Classification System
- Hazard Management vs. Safety Risk Management Guide
- Potential Sources of Hazard Information for Bus Transit Operations

Tools
- Sample Safety Risk Assessment Matrices for Bus Transit Agencies
- Guide to the Sample Safety Risk Register for Bus Transit Agencies
  - Sample Safety Risk Register for Bus Transit Agencies

Training
- PTASP Hazards and Consequences Self Guided Learning Tool

Webinars
- Safety Risk Assessment in Practice: April 27, 2022
  - Webinar Presentation | Webinar Recording
- Implementing Safety Risk Assessment Approaches: Thursday, June 30, 2021
  - Webinar Presentation

https://www.transit.dot.gov/PTASP-TAC
Bus Transit Providers

FTA developed a host of materials to help large bus transit providers develop Agency Safety Plans.

- Applicability
- Plan Development
- Certification
- Safety Performance Targets
- Safety Management Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion
- Implementation
- SMS Records and Documentation
- Annual ASP Review

https://www.transit.dot.gov/PTASP-TAC
Safety Assurance

Fact Sheets
- SMS Techniques for Monitoring Operations and Maintenance Procedures
- Guide to Developing the Safety Assurance Component of a Public Transportation Agency Safety Plan
- Monitoring Compliance and Sufficiency of Operations and Maintenance Procedures
- Lessons Learned from Voluntary Agency Safety Plan Reviews (Part 2)

Guidance
- Introduction to Safety Performance Indicators and Targets

Webinars
- SMS Techniques for Monitoring Operations and Maintenance Procedures: February 24, 2022
  - Webinar Presentation | Webinar Recording
- Safety Event Investigation in an SMS: Wednesday, July 28, 2021
  - Webinar Presentation | Webinar Recording
- Safety Assurance: Thursday, July 11, 2019
  - Webinar Presentation | Webinar Recording
- Safety Assurance Agency Safety Plan Section Lessons Learned: Thursday, March 26, 2020
  - Webinar Presentation | Webinar Recording
- Management of Change: Thursday, August 27, 2020
  - Webinar Presentation | Webinar Recording
- Compliance Monitoring Webinar: Wednesday, September 16, 2020

https://www.transit.dot.gov/PTASP-TAC
Technical Assistance

• TAC Website transit.dot.gov/PTASP-TAC
• FAQs transit.dot.gov/PTASP-FAQs

The TAC help desk is available to assist the transit industry with PTASP questions, including questions about ASP development and implementation:

• Email PTASP-TAC@dot.gov
Questions and Answers

• Question and Answer session on safety risk mitigations

• For information related to the Bipartisan Infrastructure Law
  • Please visit FTA's Bipartisan Infrastructure Law webpage
  • Review FTA's March 1, 2022 Bipartisan Infrastructure Law webinar
  • Contact FTA-IIJA@dot.gov with your questions related to the Bipartisan Infrastructure Law