

# **Safety Advisory 24-2: Street-Running Rail Vehicle Collisions**

Federal Transit Administration  
Office of System Safety

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12/12/2024



U.S. Department of Transportation  
Federal Transit Administration

# Today's Speakers



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Office of System Safety,  
Safety Risk Management Program Manager



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Office of System Safety,  
Program Analyst

# Agenda and Purpose

The purpose of this webinar is to provide a summary of Safety Advisory 24-2 issued by the Federal Transit Administration (FTA) regarding street-running rail vehicle collisions, to detail data insights, and to provide an overview of risk assessment considerations.

## Webinar Agenda

- Safety Advisory Overview
- Data Analysis
- Recommended Actions
- Resources

# Safety Advisory 24-2: Street-Running Rail Vehicle Collisions

## Distribution:

Notice in the Federal Register and published on the FTA webpage

## Effective Date:

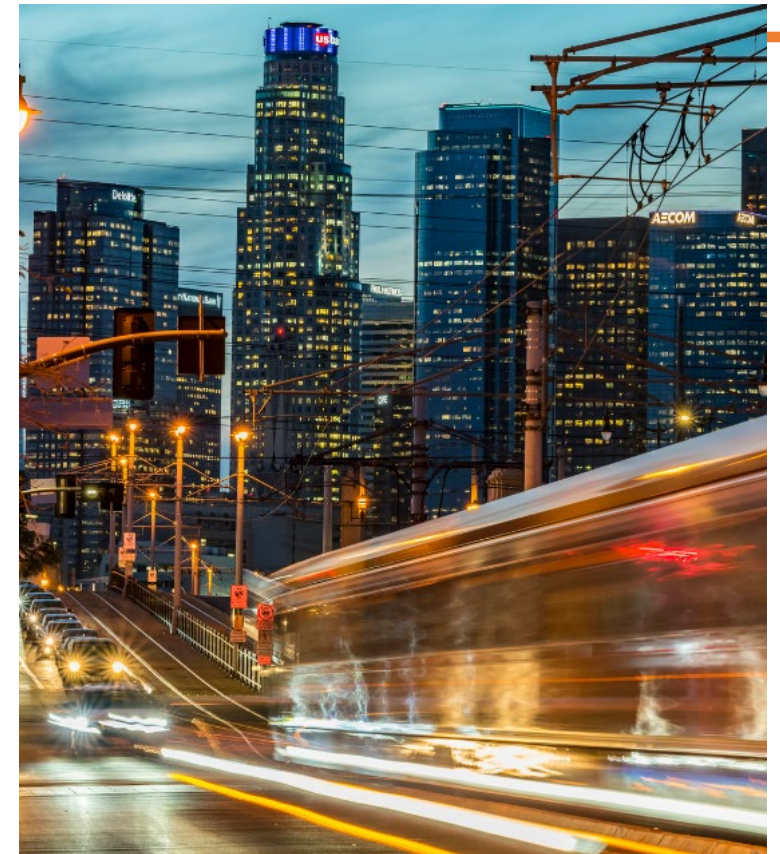
November 25, 2024

## Audience:

State Safety Oversight Agencies (SSOAs) and Rail Transit Agencies (RTAs)

## Recommendations to SSOAs:

1. Direct RTAs in their jurisdictions to:
  - Conduct safety risk assessments of street-running rail collisions
  - Identify specific hazards that may cause or contribute to street-running rail collisions
  - Identify proposed and implemented safety risk mitigations
2. Incorporate evaluation of mitigation effectiveness into their oversight activities



# Street-Running Rail Modes and Types - Overview

Light rail, streetcar, hybrid rail, and cable car vehicles, with semi-exclusive and non-exclusive alignments, operate in shared right of ways and at rail grade crossings among other roadway users.

## Alignments

### Semi-exclusive



### Non-exclusive



## Rights of Way (ROWs)

### Shared ROW street intersections



### Rail ROW in pedestrian malls



## Rail Grade Crossings (RGX)

### Traditional rail grade crossings



### Street intersection grade crossings



# Street-Running Rail Modes and Types (1 of 3)

## Alignments

Light rail, streetcar, hybrid rail, and cable car vehicles operate in semi-exclusive and non-exclusive alignments:

Semi-exclusive



Non-exclusive



# Street-Running Rail Modes and Types (2 of 3)

## Rights of Way (ROWs)

Light rail, streetcar, hybrid rail, and cable car vehicles, with semi-exclusive and non-exclusive alignments, **operate in shared right of ways among other roadway users.**

Shared ROW street intersections



Rail ROW in pedestrian malls



# Street-Running Rail Modes and Types (3 of 3)

## Rail Grade Crossings (RGX)

Light rail, streetcar, hybrid rail, and cable car vehicles, with semi-exclusive and non-exclusive alignments, **operate at rail grade crossings among other roadway users.**

Traditional rail grade crossings



Street intersection grade crossings





# Street-Running Rail Modes and Types - Summary

Light rail, streetcar, hybrid rail, and cable car vehicles, with semi-exclusive and non-exclusive alignments, operate in shared right of ways and at rail grade crossings among other roadway users.

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# Street-Running Rail Vehicle Collisions Data Analysis



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# Street-Running Rail Vehicle Collisions Examined

FTA's Safety Risk Management program examined the following rail vehicle collision types between light rail, streetcar, hybrid rail, or cable car vehicles and at least one of the following:

Persons outside a motor vehicle<sup>1</sup>, including pedestrians, bicyclists, and people using micro-mobility devices, across shared ROW locations



Privately-owned vehicles (POVs) at RGX

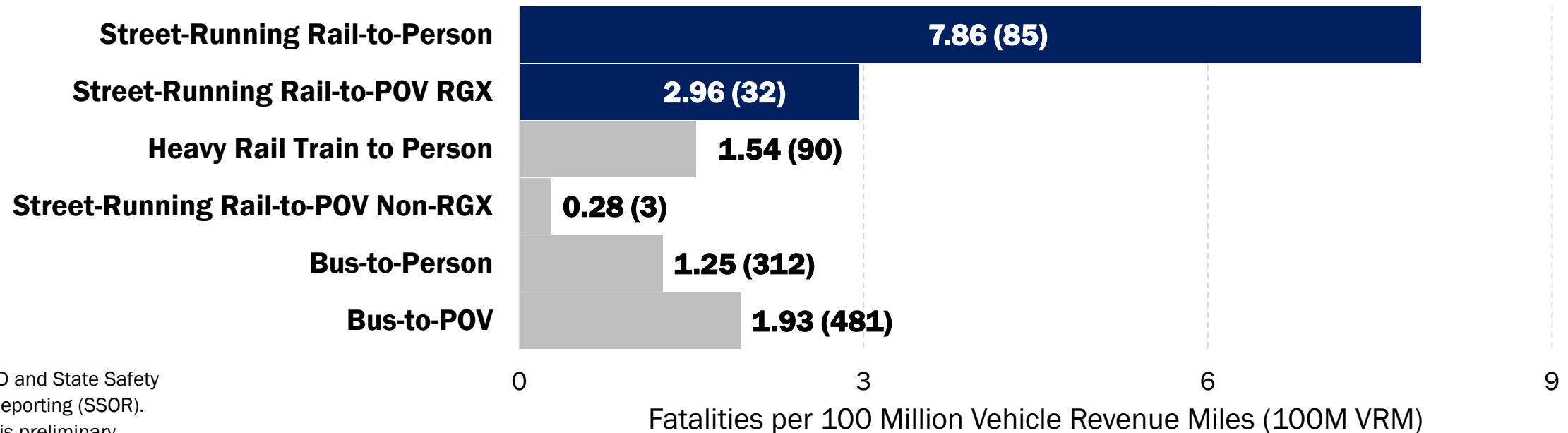


<sup>1</sup> Excludes trespassing and suicides, and rules violations, as these are planned to be examined under a separate, FTA analysis

# Purpose for Safety Advisory 24-2: The Data

Street-running rail vehicle collisions result in fatalities at a higher rate than other frequently reported collision types, across all modes, in National Transit Database (NTD) data.

**Fatality Rate for Frequently-Reported Collision Types,  
Calendar Year (CY) 2015 – 2023**

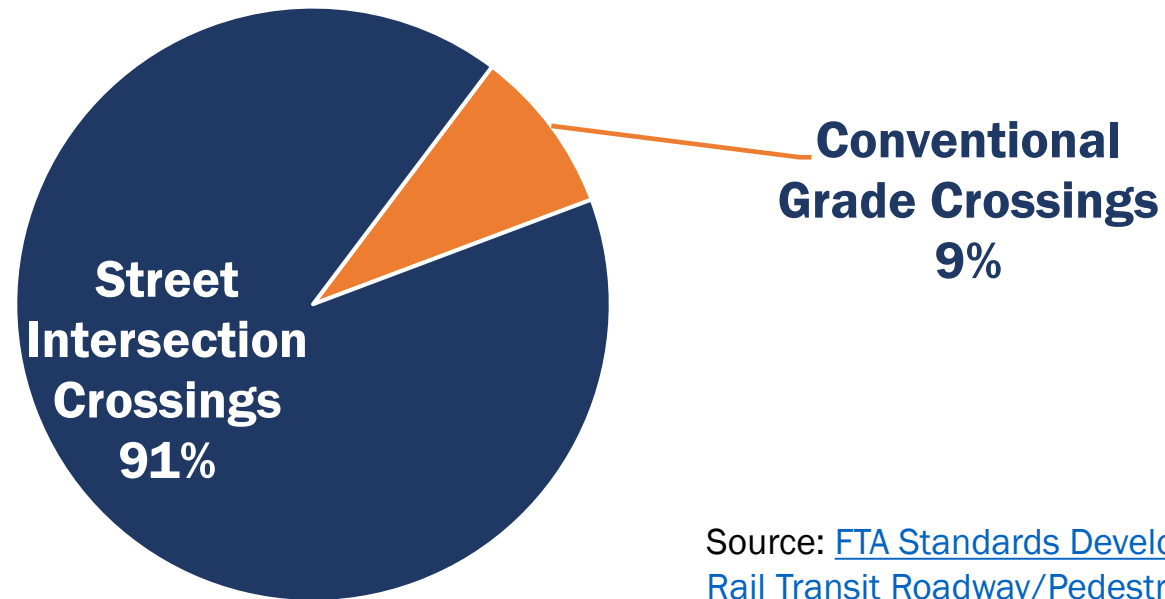


Source: NTD and State Safety Oversight Reporting (SSOR).  
2023 data is preliminary.  
Total fatalities included in parentheses.  
Data as of 8/16/24.

# FTA Survey of Rail Collisions by Crossing Type

The number of collisions reported was nearly *10 times higher* at street intersection crossings than conventional grade crossings during a recent FTA survey.

**Collisions Reported at Conventional Grade Crossings vs. Street Intersection Crossings**



Source: [FTA Standards Development Program: Rail Transit Roadway/Pedestrian Grade Crossing Exploratory Report, May 2022](#)

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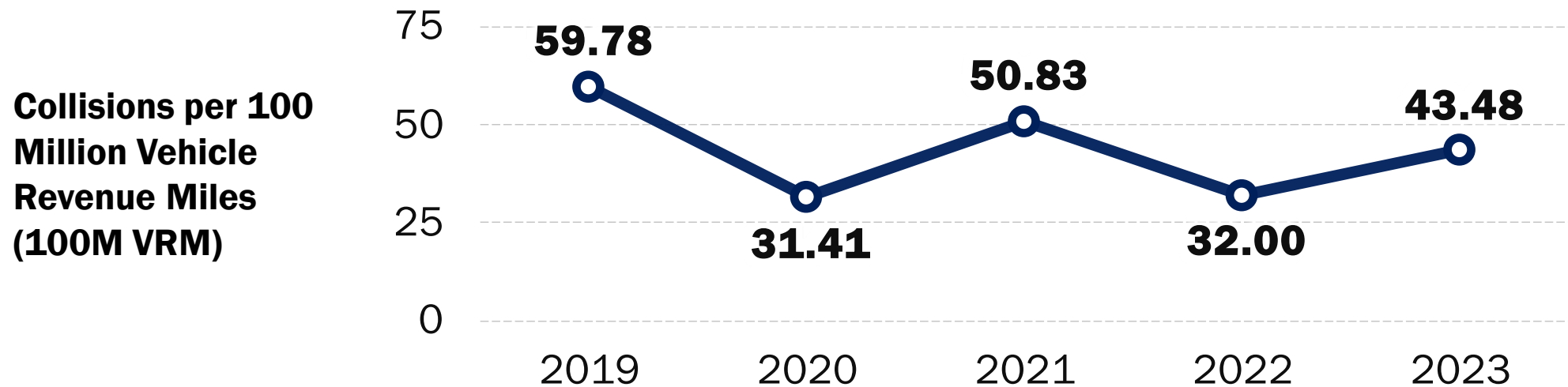
# Street-Running Rail-to-Person Collisions



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Federal Transit Administration

# Street-Running Rail-to-Person Collisions

The high frequency and severity of these collisions continues to persist through CY 2023.

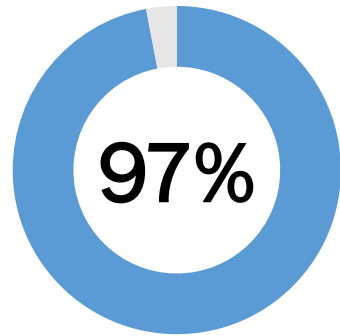


Raw Collision, Fatality, and Injury Counts	Collisions	78	34	56	38	52
	Fatalities	11	2	5	7	7
	Injuries	71	32	53	31	45

Source: NTD, data as of 11/1/24

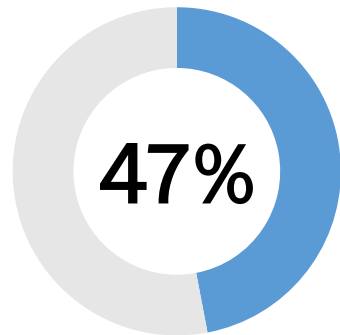
# Rail-to-Person Collisions Causal Analysis

State Safety Oversight Reporting (SSOR) investigation reports from 2020 to 2022 identified:



Of the 64 rail-to-person collisions were due to persons **failure to adhere to the intended roadway design**

NTD reporting data from 2015 to 2021 identified:



Of the 238 rail-to-person collisions at rail grade crossings occurred with **traffic signals as the main traffic control device**

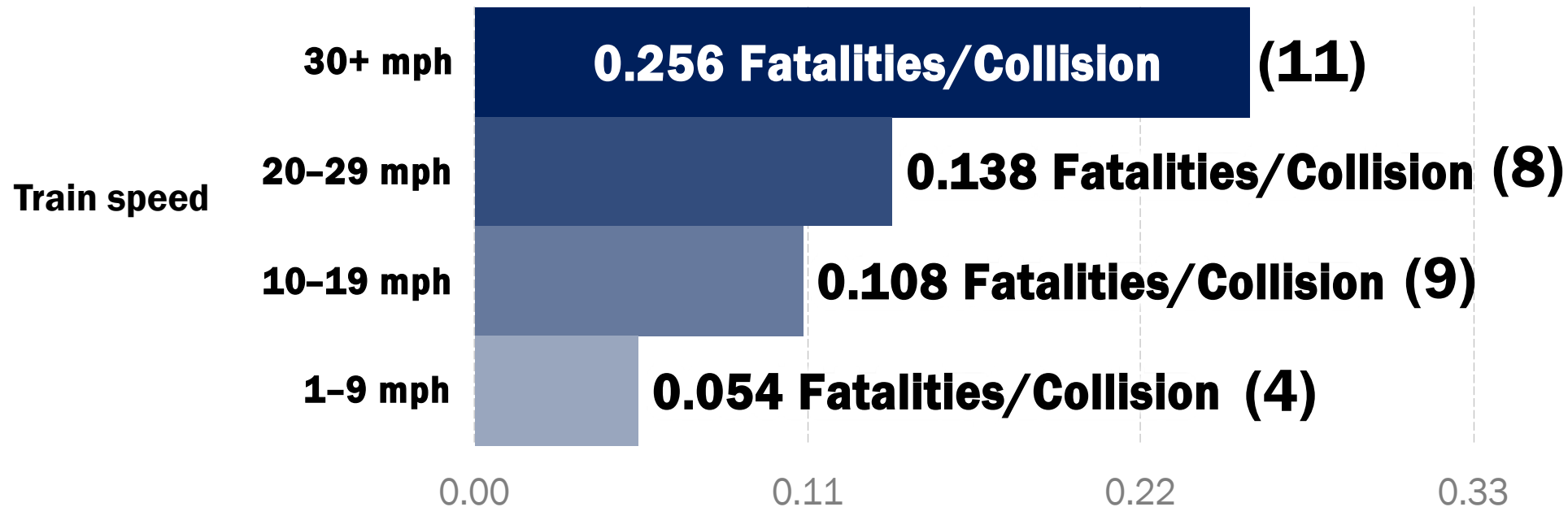




# Rail-to-Person Collision Fatalities by Train Speed

Severity and fatalities increase with increasing train speeds.

Average Number of Fatalities per Rail-to-Person Collision  
by Train Speed, CY 2019–23



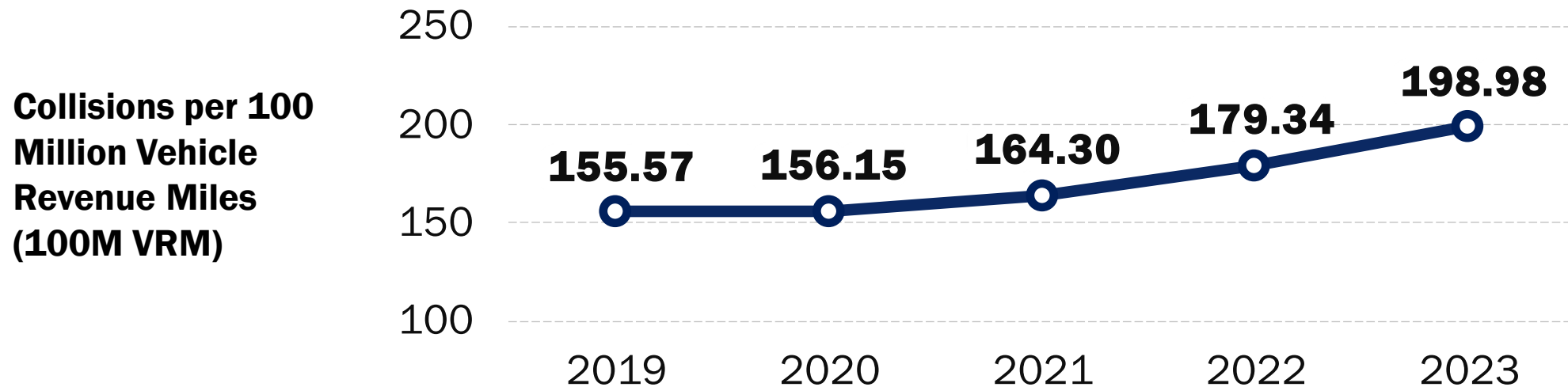
Source: NTD, data as of 11/1/24  
Total fatalities in parentheses

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# Street-Running Rail-to-POV at RGX Collisions

# Street-Running Rail-to-POV at RGX Collisions

These collisions became more frequent per vehicle revenue mile in each of the last 5 years.

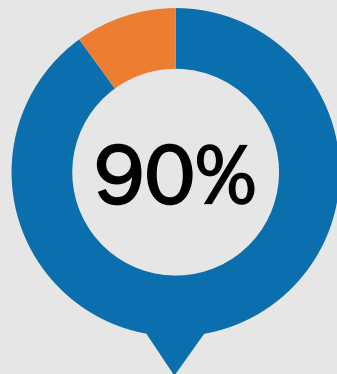


Raw Collision, Fatality, and Injury Counts	Collisions	203	169	181	213	238
	Fatalities	2	4	4	2	3
	Injuries	138	113	91	111	145

Source: NTD, data as of 11/1/24

# Rail-to-POV at RGX Collisions Causal Analysis

SSOR review from 2020-2022 identified 214 events that had supporting reports allowing for causal investigation.



193 events (90%)  
were due to POV  
failure to adhere  
signs or signals

Of those 193 events where POVs failed to adhere to intended signs and signals:



165 (77%) POVs failed to adhere to street-running traffic signals



20 (9%) POVs failed to adhere to crossing gates



8 (4%) POVs failed to adhere to stop signs, yield signs, or flashing lights only

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# Street-Running Rail Shared Hazards



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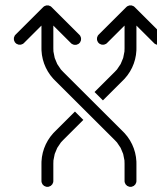
# Street-Running Rail Vehicle Collision Hazards

Rail-to-person collisions and Rail-to-POV at RGX collisions share a similar set of hazards related to shared access to ROWs and reliance on interpretation of signage and signals.

## Rail-to-Person Collision Hazards

Movement patterns intersect, overlap, are shared, or are close together causing collision, regardless of ROW.

Signage, signals, markings, and safety measures are not noticed, comprehended, properly functioning, or are simply ignored.



## Rail-to-POV at RGX Collision Hazards

POV have access to rail ROW at **street intersections and conventional RGX**, both of which have a variety of signaling devices and design.

Traffic signals and signage at RGX are ineffective.



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# Street-Running Rail Recommendations & Next Steps



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# Recommended Actions (1 of 2)



FTA recommends SSOAs direct RTAs to conduct an analysis of street-running rail collisions through the RTA's Safety Risk Management process

FTA requests SSOAs obtain RTA analyses and return to FTA via SSOR, within 180 days of publication of SA 24-2

Within 30 days of publication **12/26/2024**

Within 180 days of publication **05/26/2025**

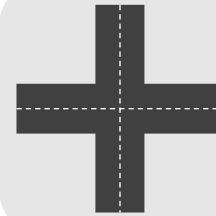


# Recommended Actions (2 of 2)

FTA recommends that SSOAs direct RTAs to consider the factors below when developing safety risk assessments:



Higher risk locations



Roadway and intersection design



Queueing space for both POVs and persons



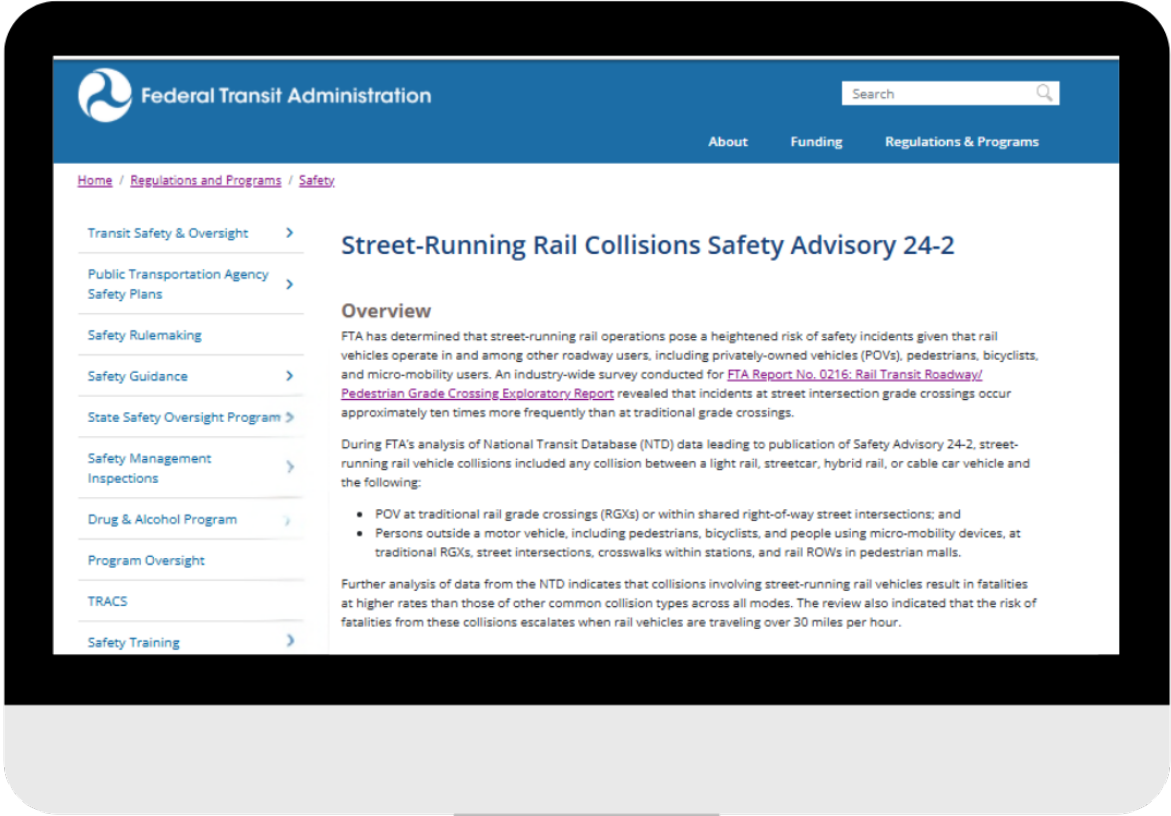
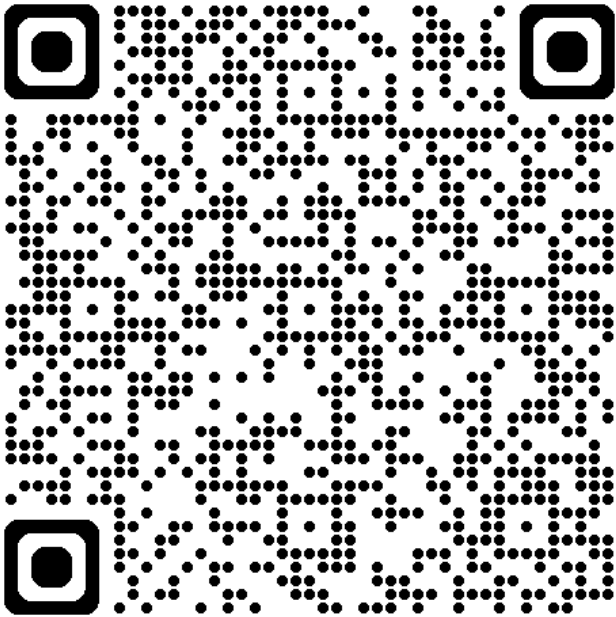
Roadways and intersection traffic control devices



Factors that may cause signals and other warning methods to be ineffective in encouraging safe behavior at shared ROWs and RGX

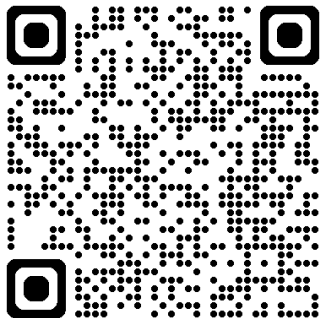
# Safety Advisory 24-2 Resources

Visit FTA's Dedicated Street-Running Rail Collisions Webpage 

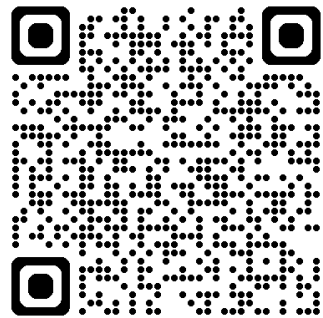


# FTA-Sponsored and Industry Research

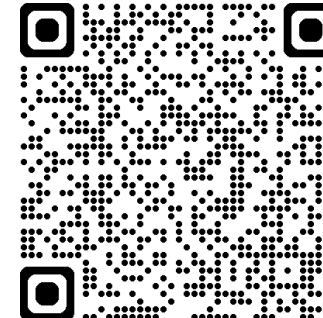
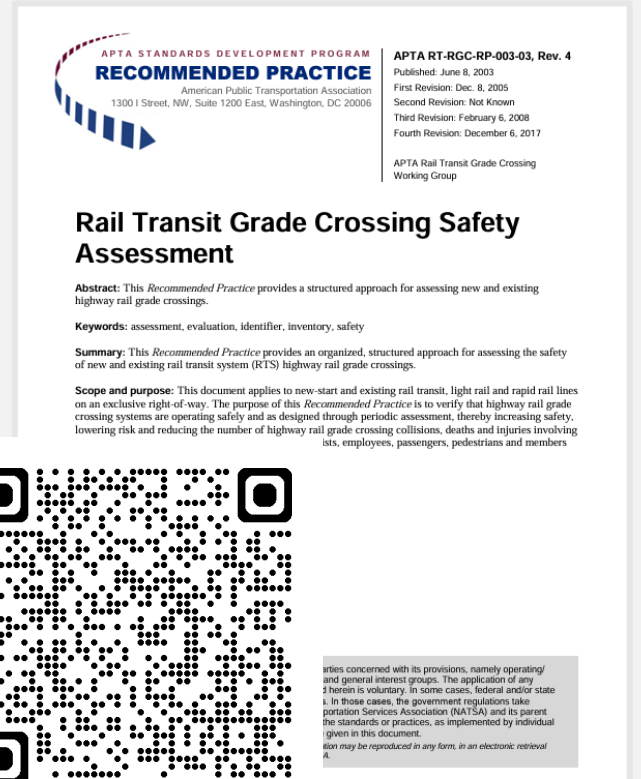
## FTA Standards Development Program



## Transit Cooperative Research Program (TCRP)



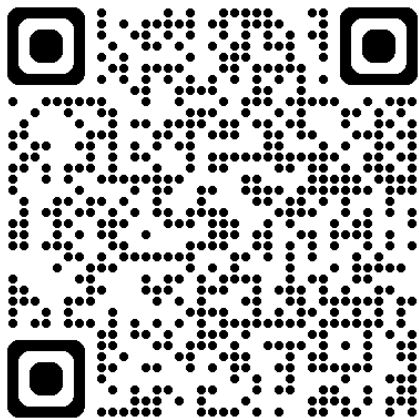
## American Public Transportation Association (APTA) Rail Transit System Voluntary Standards



# Public Transportation Agency Safety Plan Technical Assistance Center Resources

## PTASP TAC Resource Library

- Safety risk assessment technical assistance tools and samples
- PTASP general requirements
- ASP development, review, and certification



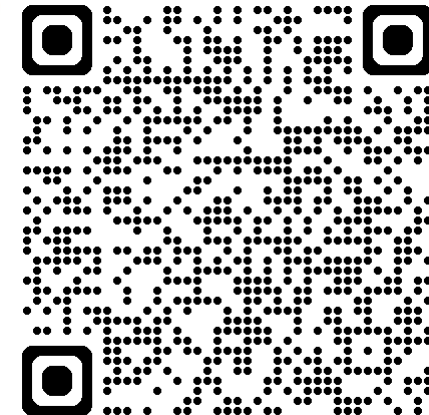
RISK ASSESSMENT MATRIX			
Severity \ Likelihood	(1) Catastrophic	(2) Serious	(3) Marginal
(A) Frequent	High (1A)	High (2A)	Medium (3A)
(B) Occasional	High (1B)	Medium (2B)	Low (3B)
(C) Remote	High (1C)	Medium (2C)	Low (3C)

# FTA's Commitment to a Safe System Approach

## US Department of Transportation's National Roadway Safety Strategy

### FTA's focus:

1. Implementing transit/bus-only lanes
2. Improving pedestrian/bicycle access to rail/bus stations
3. Using collision avoidance technology to reduce collisions
4. Other projects to help reach zero roadway fatalities

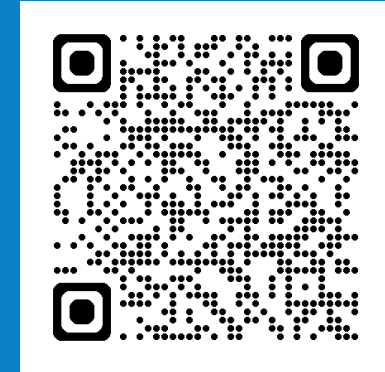


# FTA's Support for Public Outreach Campaigns



## Operation Lifesaver, Inc. (OLI)

- FTA has supported OLI through an ongoing cooperative agreement for the past 20+ years
- OLI develops resources, conducts outreach, and runs a competitive grant program for transit agencies to get important safety messages out to the public



## See Tracks? Think Train!® Week

- Annual observance event in mid-September
- FTA provides funding for transit outreach initiatives and leadership videos
- FTA promotes safety messages to transit industry partners



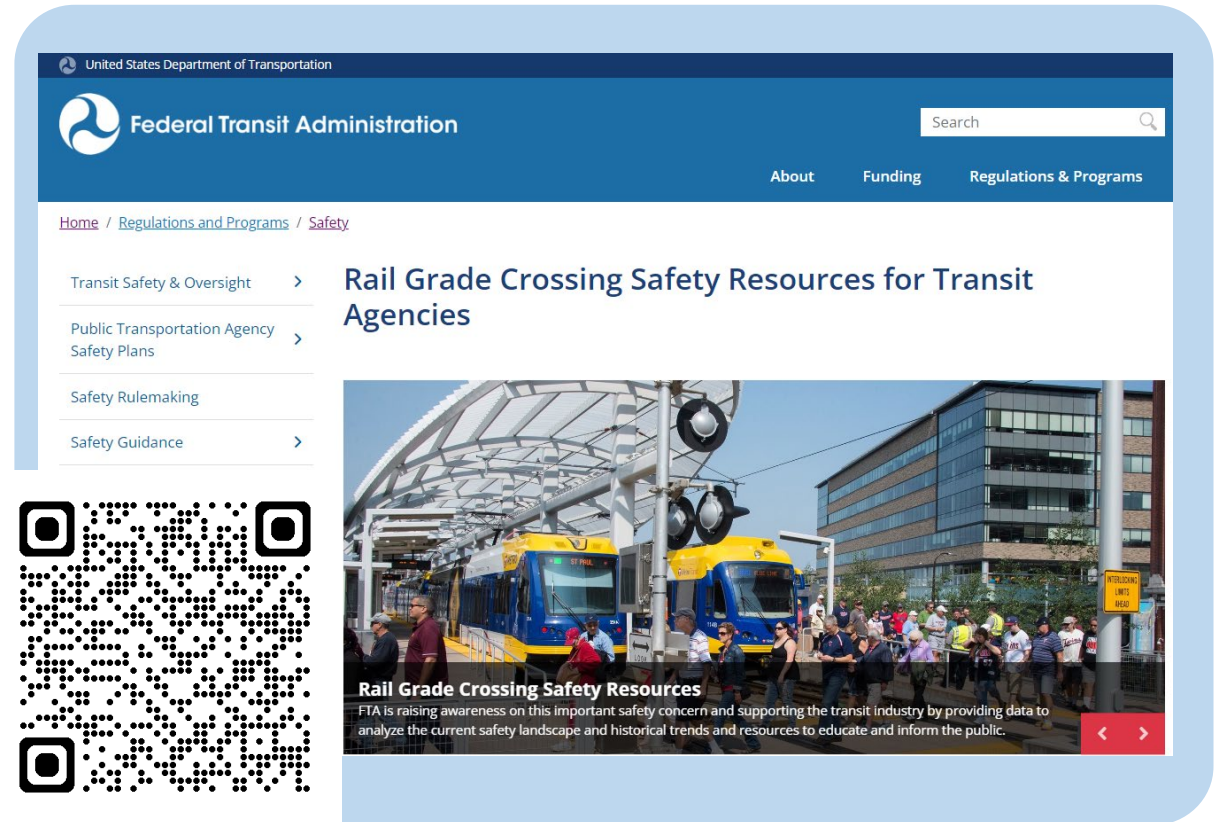
# FTA's Rail Grade Crossing Safety Webpage

## [RGX Safety Resources Webpage](#) provides:

- OLI Transit Materials
- Transit Safety Pledges
- FTA presentations
- Transit Advisory Committee for Safety (TRACS) Reports
- FTA Research

## Spotlight on Rail Transit Safety webinar:

- Spotlight on Safety: Transit Rail Grade Crossings
- Featured guest speakers from the Center for Urban Transportation Research, MxV Rail, TriMet and Operation Lifesaver, Inc.



# Future Campaigns

If you have any questions or examples of successful implementation of a safety risk assessment or the development and implementation of safety risk mitigations for street-running rail vehicle collisions that you would like to share, please send them to the FTA Public Transportation Agency Safety Plan Technical Assistance Center (PTASP TAC) by email at [PTASP-TAC@dot.gov](mailto:PTASP-TAC@dot.gov).



FTA is committed to reducing incidences of street-running rail vehicle collisions. **Future campaigns** to support the safety of drivers, riders, and persons **are underway.**





# Thank you!

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# **CPUC Rail Safety Division**

## **Rail Transit Safety Branch**

### **Street-running Rail Collision Mitigations**

**FTA Safety Advisory 24-2 Webinar**  
**December 12, 2024**  
**Daren Gilbert, Program Manager**



**California Public  
Utilities Commission**

# RTAs in CA with Street-running operations

- Los Angeles County Metropolitan Transportation Authority (LACMTA or Metro)
- Orange County Transportation Authority (OCTA or OC Streetcar) (currently under construction)
- San Francisco Municipal Transportation Agency (SFMTA or Muni) – includes Muni Cable Cars
- Sacramento Regional Transit District (SRTD)
- San Diego Trolley, Inc. (SDTI)
- Santa Clara Valley Transportation Authority (VTA)

**Similar collision concerns exist with lines operating in the center median in semi-exclusive ROWs.**

# CPUC has State authority over all rail crossings

- CPUC approval to establish new crossings
- Staff level approval to alter existing crossings
- Includes traffic signal controlled intersections but not typically driveways
- Transit/commuter rail crossings in urban settings are the most effectively treated at-grade crossings in the state
- RTAs establish their own crossing standards
- The most effective configuration of warning devices to address pedestrian compliance includes pedestrian automatic gates with flashing light signals in combination with emergency egress swing gates and channelization



# Pedestrian Crossing Safety

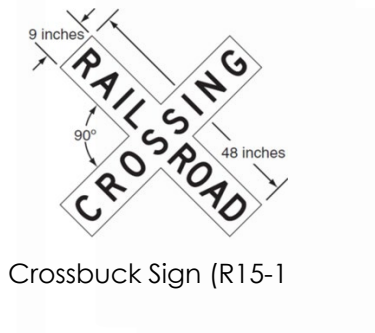
- Primary considerations for pedestrian safety at crossings should include:
  - Accessibility laws and regulations
  - Gates, fencing, and channelization
  - Crossing angle and alignment - sightlines
  - Pedestrian pathway width and continuous smooth surface
- Evaluation factors
  - Pedestrian use – Numbers/types
  - Number of tracks and train operations
  - Preemption?

# Identifying high risk locations

- Safety events such as collisions with pedestrians and vehicles has typically been the driver of corridor risk assessments and deployment of additional treatments to mitigate them.
- Lessons-learned are then used when considering similar locations and designing new lines with similar configurations.
- CPUC Rail Crossings and Engineering Branch oversight and diagnostic review process assures comprehensive review of gated crossings and traffic signal-controlled alignments.
- Corridor reviews identified by specific inspections or event reviews. Should involve RTA, SSOA, roadway authority, potentially others.

# Risk Mitigation Measure Signage and Pavement Marking Examples

- MUTCD standard Signage



R15-8



W82-1(CA)



W10-12



No Pedestrian Crossing Sign – R9-3

- Pavement Markings



# Risk Mitigation Measure Examples at crossings on exclusive or semi-exclusive ROWs

- Detectable warning tactile strips on each pedestrian approach.





# Risk Mitigation Measure Examples at crossings on exclusive or semi-exclusive ROWs

- Auto-closing pedestrian swing gates and emergency exit swing gates.



# Risk Mitigation Measure Examples at crossings on exclusive or semi-exclusive ROWs

- Modified approaches that force pedestrians to face the direction of trains approaching as they near the tracks and flashers.



# Risk Mitigation Measure Examples at crossings on exclusive or semi-exclusive ROWs

- Active Pedestrian gates with channelization and emergency exit swing gates.
- May include hanging bar where there is history of peds ducking under the gate arm.



# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Train activated blank out signs
- Traffic signal programming to arrange queue-jumper timing for the train in advance of signal indications for non-conflicting movements
- Installation of left turn gates that deploy on train approach to prevent conflicting illegal turns from unseen trains approaching from behind.
- Train or vehicle speed modifications on alignment.

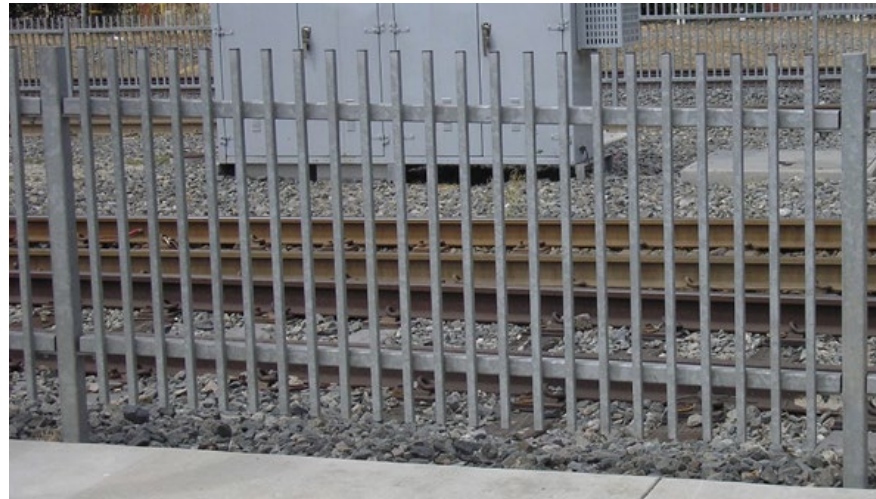
# Risk Mitigation Measure Examples on all Alignment Classifications

- Pedestrian channelization treatments to guide peds along the appropriate desired paths of travel
- Railings
- Discouraging surface textures



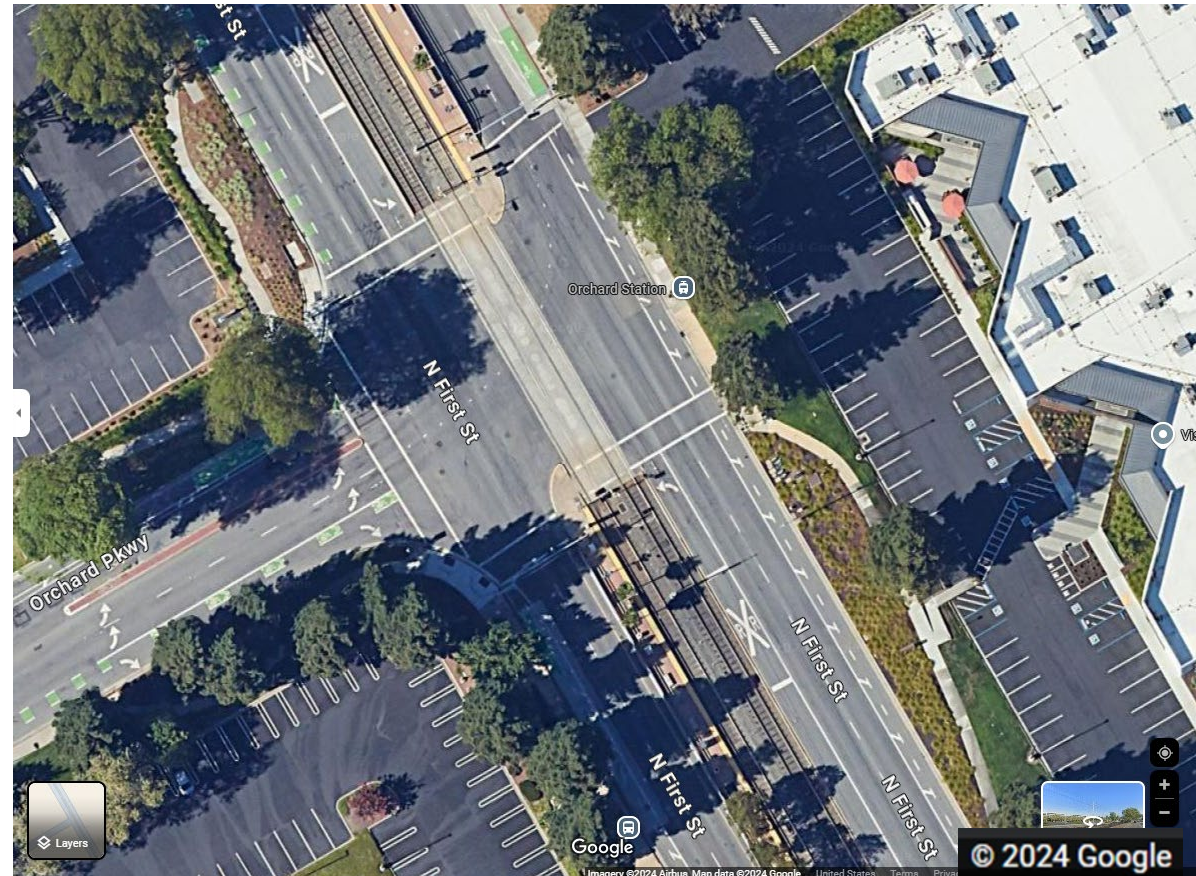
# Risk Mitigation Measure Examples at crossings on exclusive or semi-exclusive ROWs or separating rail alignments from adjacent traffic lanes.

- Fencing alternatives



# Risk Mitigation Measures at traffic signal-controlled intersections on semi and non-exclusive ROWs

- Queue-Jumper Signal configuration.
- Train gets proceed indication 3 seconds before traffic signal allows non-conflicting movements.
- Allows train to begin moving through intersection before vehicles are given any proceed indications.



# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Train-activated blank out signs
- Activated on train approach.
- Standard MUTCD iconic signage



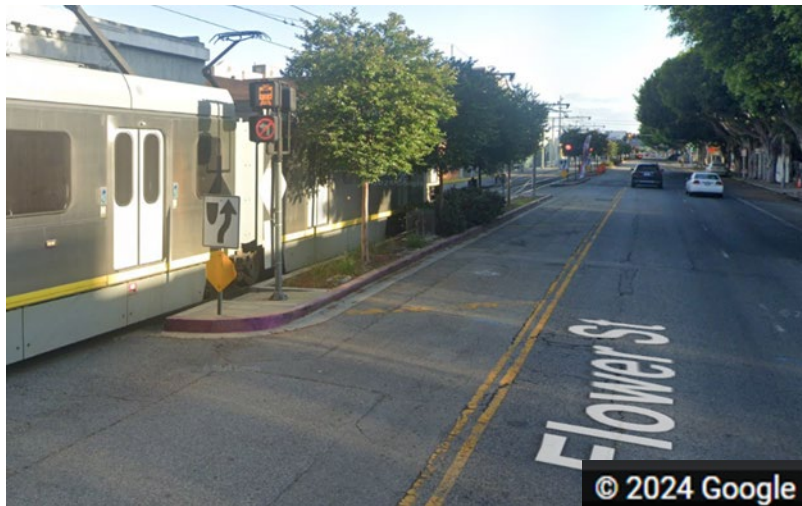
W10-7  
Activated  
Blank-Out





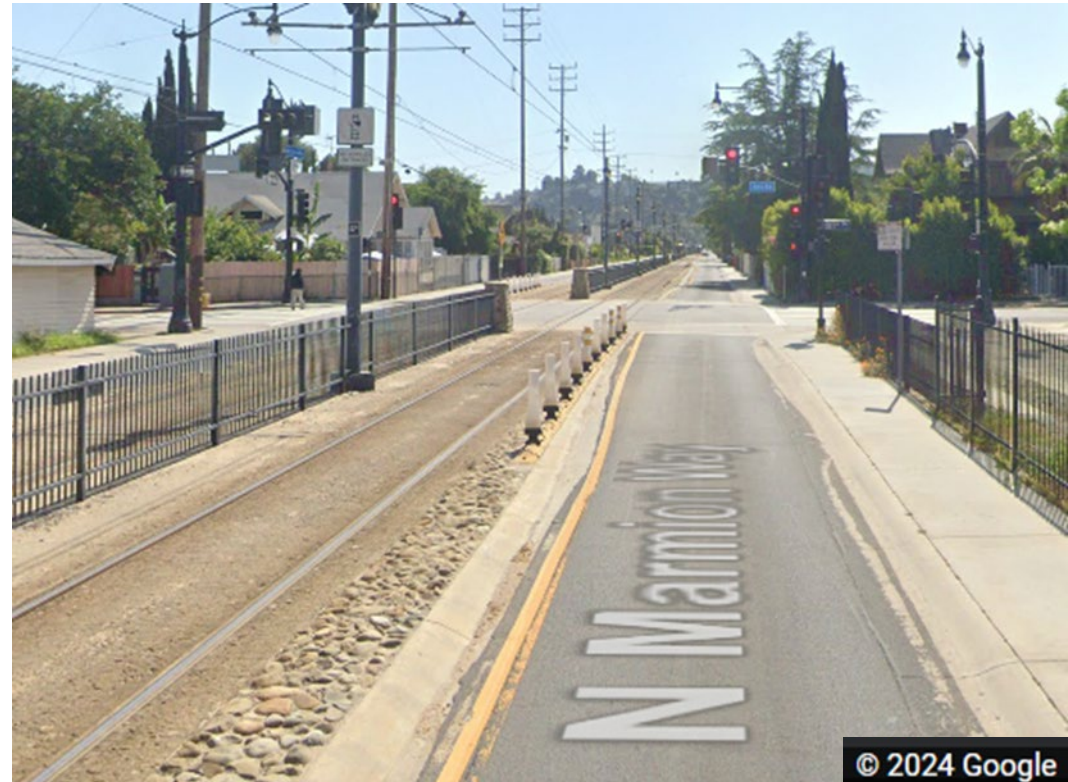
# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Train-activated signage-
- Activated on train approach.
- Can be use in conjunction with traffic signals or for non-signalized intersections, such as these driveways.



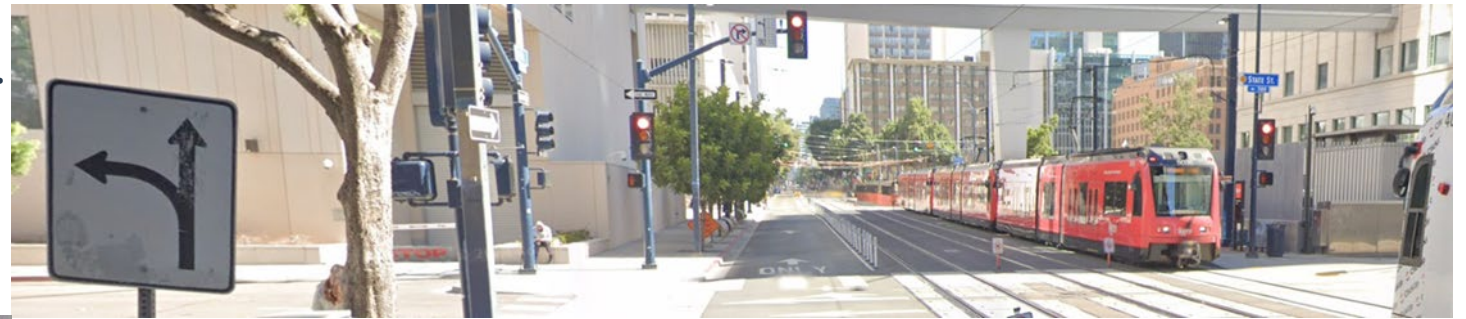
# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Inter-track fencing-
- Discourages pedestrians from crossing at uncontrolled locations.
- Bollards near intersection-
- Keep motorists off the rail alignment.



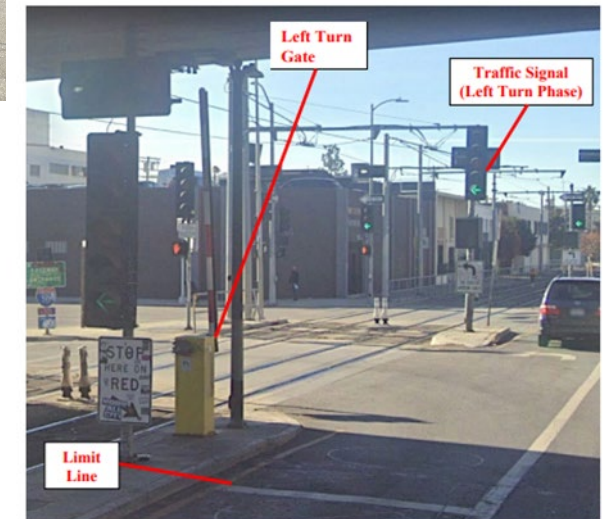
# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Bollards/Delineators to separate motorist from the rail alignment-
- Inter-track signage at intersections.



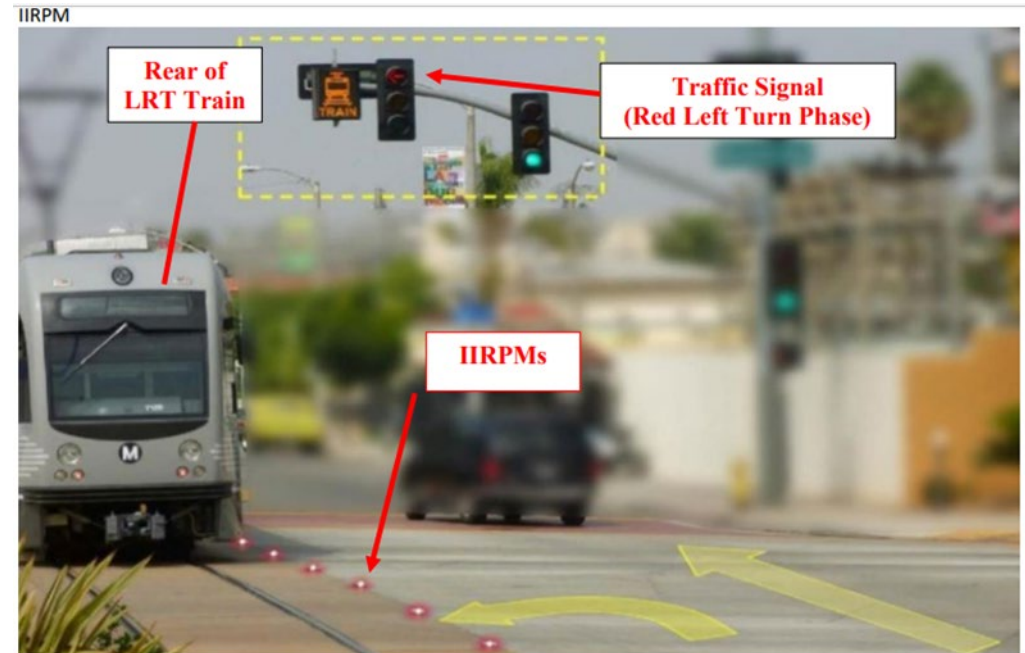
# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

- Left turn lane gates -
- Gates activated on train approach.
- Allows train to proceed through intersection before gate rises.
- Mostly addresses illegal turns when motorist perceive no traffic approaching.
- Addresses accident history with only traffic signals.



# Risk Mitigation Measures at traffic signal-controlled intersections and along semi and non-exclusive ROWs

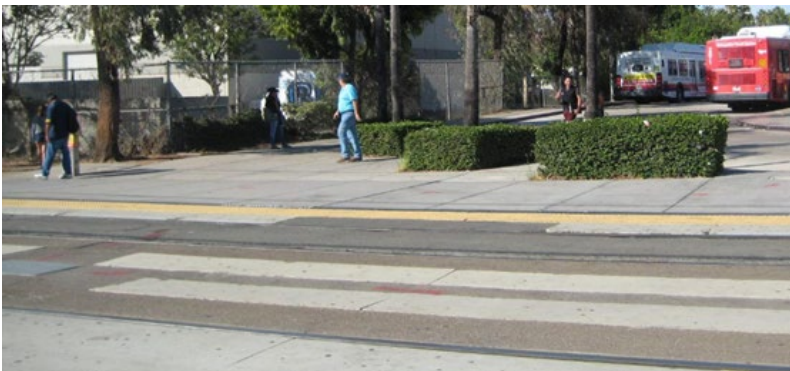
- In-roadway lights-
- Activated on train approach.
- Can increase conspicuity of approaching train.
- Typically involves other treatments such as a flashing train symbol or flashing iconic NO LEFT TURN sign.



*Exhibit 4 – Similar IIRPM Application for LACMTA Gold Line Train*

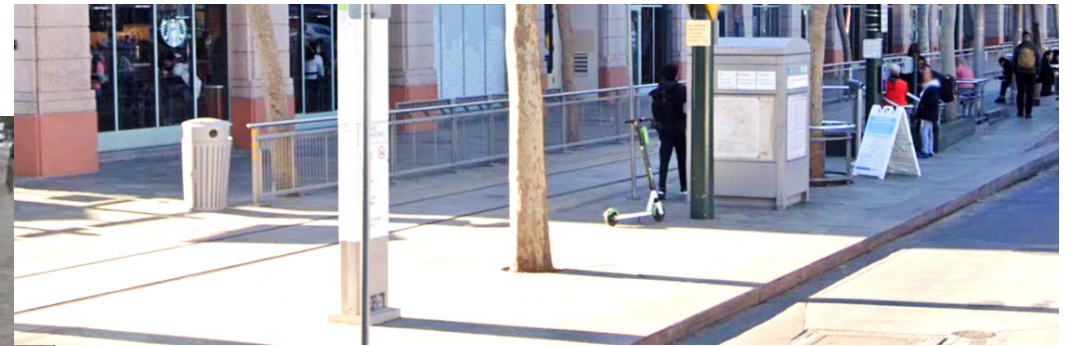
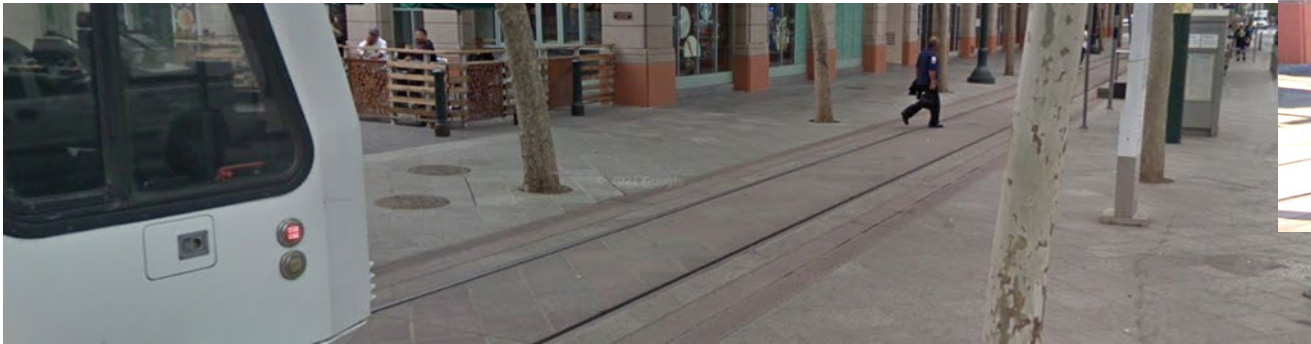
# Risk Mitigation Measures at Pedestrian Mall configurations

- Max Speed is 20 MPH at Pedestrian Mall configurations
- Detectable Warning Tactile Strips.



# Risk Mitigation Measures at Pedestrian Mall configurations

- Pedestrian Mall before and after fencing/channelization mitigations.
- 10 MPH max speed





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# Q&A and Resources



**Safety Advisory 24-2 Webpage**



**TSO Webinars**

