Spotlight on Safety: Transit Rail Grade Crossings Webinar

FTA
FEDERAL TRANSIT ADMINISTRATION

September 21, 2023

U.S. Department of Transportation
Federal Transit Administration

Webinar Overview

This webinar will discuss transit rail grade crossing (RGX) safety, review related research on rail grade crossing designs, highlight trespassing research and discuss education, outreach and available resources.

Speakers

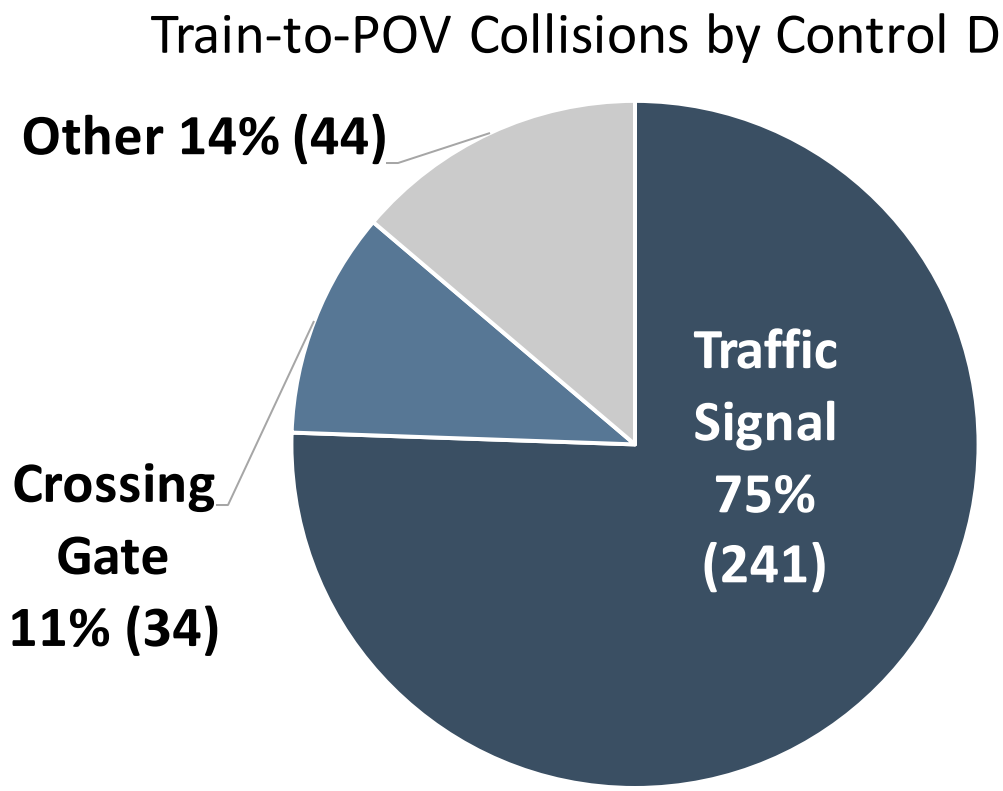
- FTA's Office of Transit Safety and Oversight
- FTA's Office of Research and Innovation
- Center for Urban Transportation Research (CUTR)
- MxV Rail
- Tri-County Metropolitan Transportation District of Oregon (TriMet)
- Operation Lifesaver, Inc. (OLI)

FTA Overview

Elliott Shepherd
Chief, Program Operations Division
Office of Transit Safety and Oversight, Office of Safety Review

Train-to-Privately Owned Vehicle (POV) at Rail Grade Crossings (RGX) Analysis Findings

Analysis Sample 2020 – 2021: 319 Events With Investigation Reports Or Narratives



Source: National Transit Database

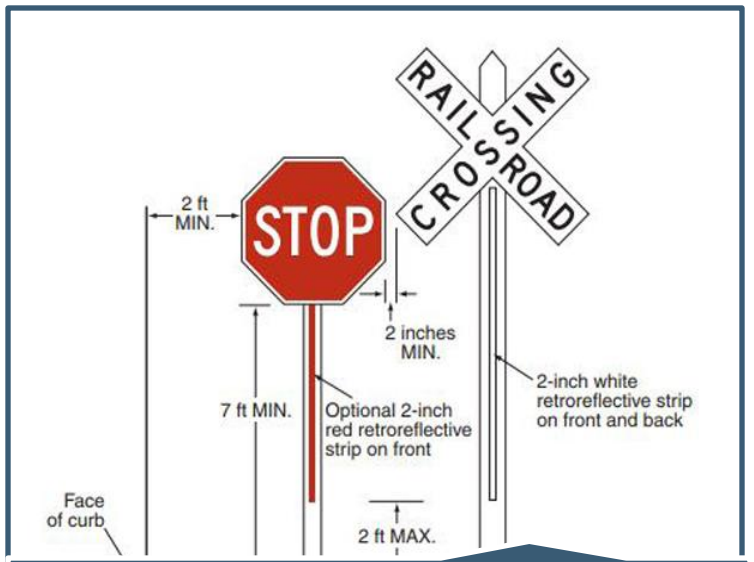
RGX Traffic Control Device Examples

Street Running Traffic Signals

Source: DOT Highway-Rail Crossing Handbook

Rail Crossing Gates

Source: Google Earth

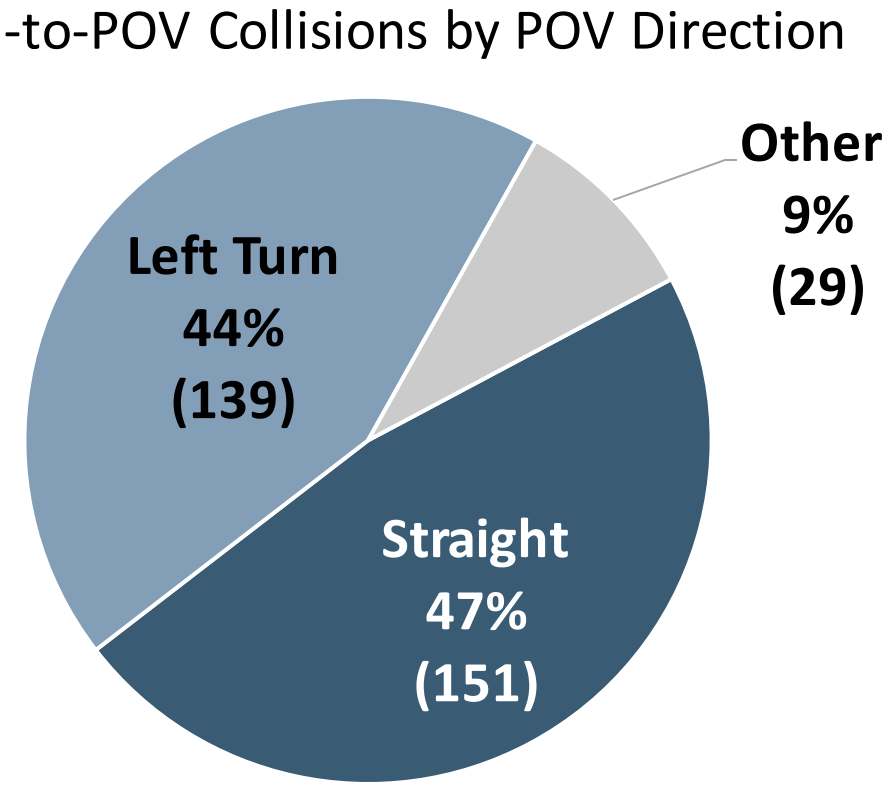


RGX Stop Sign

Source: DOT Highway-Rail Crossing Handbook

Train-to-POV at RGX Analysis Findings

Analysis Sample 2020 – 2021: 319 events with investigation reports or narratives

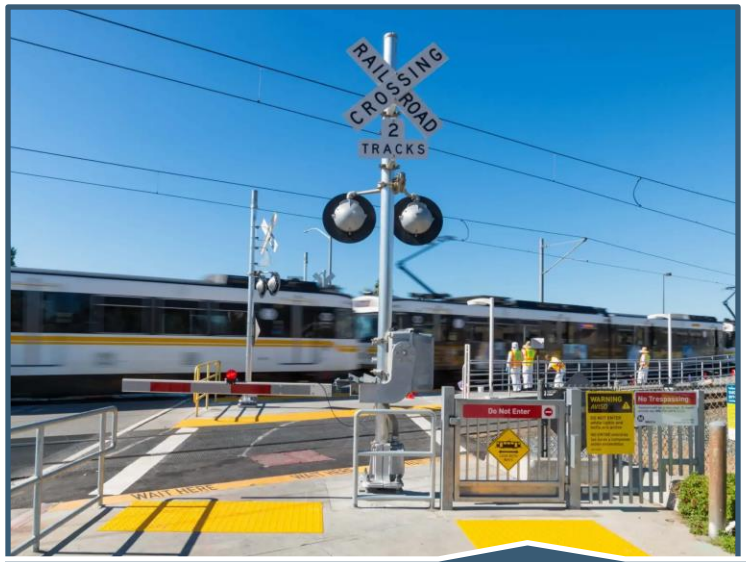


Source: National Transit Database

RGX Collision Control Examples

Transit Only Spaces

Location: San Francisco, CA



Rail Crossing Gates

Location: Los Angeles, CA

Bicycle and Pedestrian Only Spaces

Location: Portland, OR

RGX Safety Resources for Transit Agencies

Rail Grade Crossing Safety Resources for Transit Agencies

Overview

Rail transit grade crossing (RGX) events, fatalities and injuries remain a concern in the transit industry. Most recently in 2022, there were a total of 592 grade crossing collisions that resulted in 19 fatalities and 133 injuries, based on data reported to FTA's National Transit Database Data (NTD). FTA is raising awareness on this important safety concern and supporting the transit industry by providing data to analyze the current safety landscape and historical trends and resources to educate and inform the public. This webpage includes rail grade crossing safety resources to assist transit agencies in making transit safer for all.

Rail Safety Week

Rail Safety Week is an annual observance event in mid-September spearheaded by Operation Lifesaver, Inc. (OLI) and rail safety partners across the U.S., Canada and Mexico. The goal is to raise awareness for multiple audiences on ways to Stop Track Tragedies. FTA has long supported OLI to spread this important safety message during Rail Safety Week and beyond.

What's New

Spotlight on Safety: Transit Rail Grade Crossings Webinar

This webinar will discuss transit rail grade crossing safety from both operational and public education and outreach perspectives. FTA will provide an overview and the Center for Urban Transportation Research and MxV Rail will highlight research on engineering aspects related to rail grade crossing safety, as featured in the FTA Standards Development Program Rail Transit Roadway and Pedestrian Grade Crossings Exploratory Report, and discuss trespassing research results. The webinar will also feature guest speakers from TriMet who will talk about their experiences with rail grade crossings and the non-profit, Operation Lifesaver Inc., who will discuss safety education and outreach to transit riders and available transit agency resources.

- Thursday, September 21 at 2 p.m. ET, Register Here

2023 Rail Safety Week Videos

- 2023 Rail Safety Week Videos

Operation Lifesaver Safety Pledge

- OLI Transit Safety Pledge

Rail Safety and Resource Library

Click below to see list of resources

FTA Resources | Industry Resources | FTA Presentations | Data and Reports

https://www.transit.dot.gov/RGX

Available Resources

FTA Safety Advisory 22-04	FTA Safety Bulletin 19-03	FTA Research
Recommends transit agencies use suicide prevention signage best practices to reduce events and encourage mental health intervention bit.ly/3VUBdPo	Includes Federal actions taken, data analysis and resources http://bit.ly/3A0wja6	FTA Rail Transit Roadway/Pedestrian Grade Crossing Exploratory Report http://bit.ly/3ErldfJ

RGX: Safety Project Overview

Raj Wagley
FTA Office of Infrastructure, Safety and Asset Innovation

Project Background

- In FY2016, FTA began Standards Development Program https://www.transit.dot.gov/research-innovation/standards-development-program to meet the requirements of Section 3020 of the FAST ACT
- FAST act required USDOT to
    1. Compile a Compendium of transit safety standards and protocols https://www.transit.dot.gov/regulations-and-guidance/safety/compendium-transit-safety-standards
    2. Review and evaluate existing safety standards https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/58291/fta-report-no-0103.pdf
    3. Provide recommendations to FTA
- Standard Development Project performed literature review, data collection and industry stakeholder interactions to do a risk-based analysis and produced a list of safety issues for further research and safety standards development
- FTA worked with Center for Urban Transportation Research (CUTR) and MxV Rail to perform a project, titled 'Transit Rail Roadway/Pedestrian Grade Crossing' and produced the report https://www.transit.dot.gov/sites/fta.dot.gov/files/2022-05/FTA-Report-No-0216.pdf in May 2022

Report Highlights

- Objective:
  - Develop findings to reduce incidents and accidents at rail highway/pedestrian grade crossing,
  - Help develop safety standards
- Examples of findings:
  - No. of incidents at street intersection grade crossings 10x more than conventional rail grade crossings
  - Majority of transit agencies have more street intersections
  - Street intersections have more challenges and limitations
  - Most standards and recommended practices apply to rail grade crossings, not street intersections
  - New and emerging technologies are available that can improve grade crossing safety
  - Etc.
- Additional details will be provided by CUTR, MxV Rail and TriMet

(Courtesy of wlrn.org)Carl Juste / Miami Herald

CUTR
CENTER FOR URBAN TRANSPORTATION RESEARCH

(Source: Operation Lifesaver, Inc.)

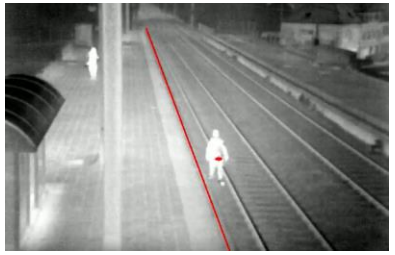
Mitigation of Railroad Trespasser Fatalities and Injuries
Spotlight on Safety: Transit Rail Grade Crossings

(Courtesy of FRA, USDOT)

Achilleas Kourtellis, Ph.D.

Assistant Program Director

ITS, Traffic Operations and Safety



(Source: FLIR System)

Background

The U.S. Railroad System

775
Railroads

140,000
Route Miles of Track

209,000
At-Grade Railroad Crossings

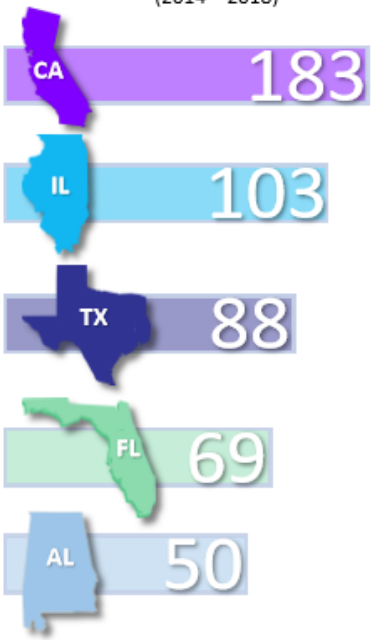
5-Year Crossing Trends

Fatalities

262 (2014) → 270 (2018)

3%

Top 5 for Crossing Fatalities
(2014—2018)



5-Year Trespassing Trends

Fatalities

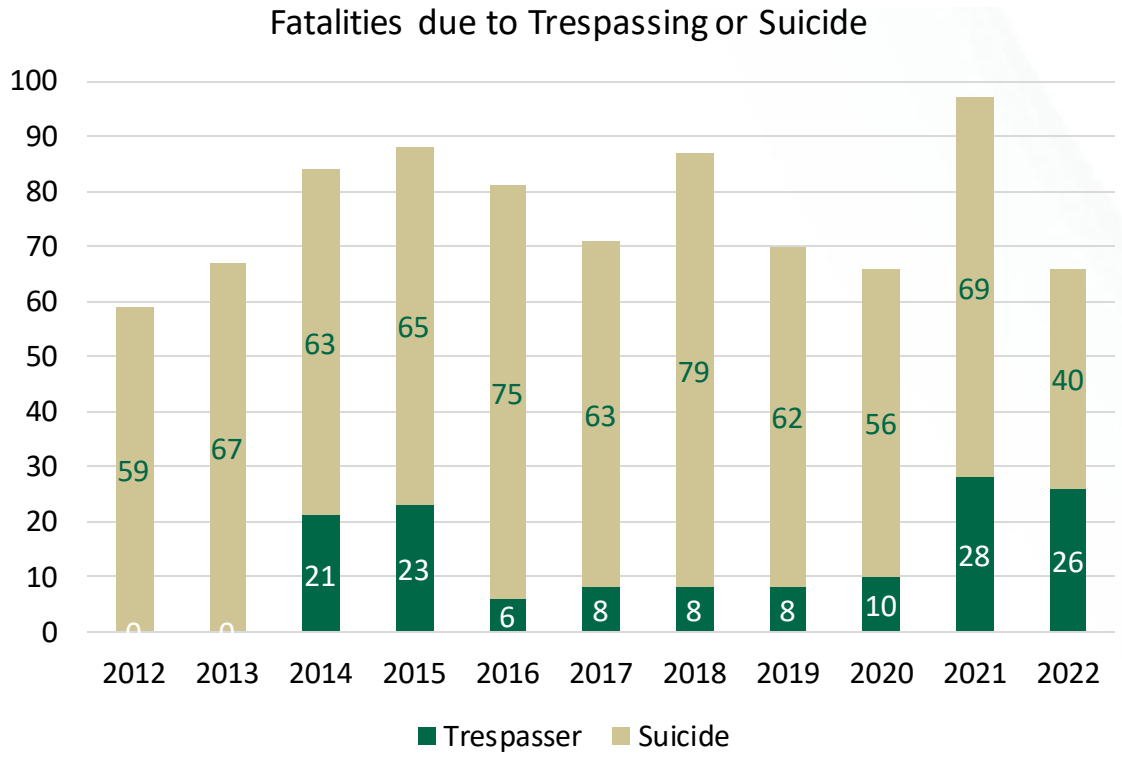
470 (2014) → 570 (2018)

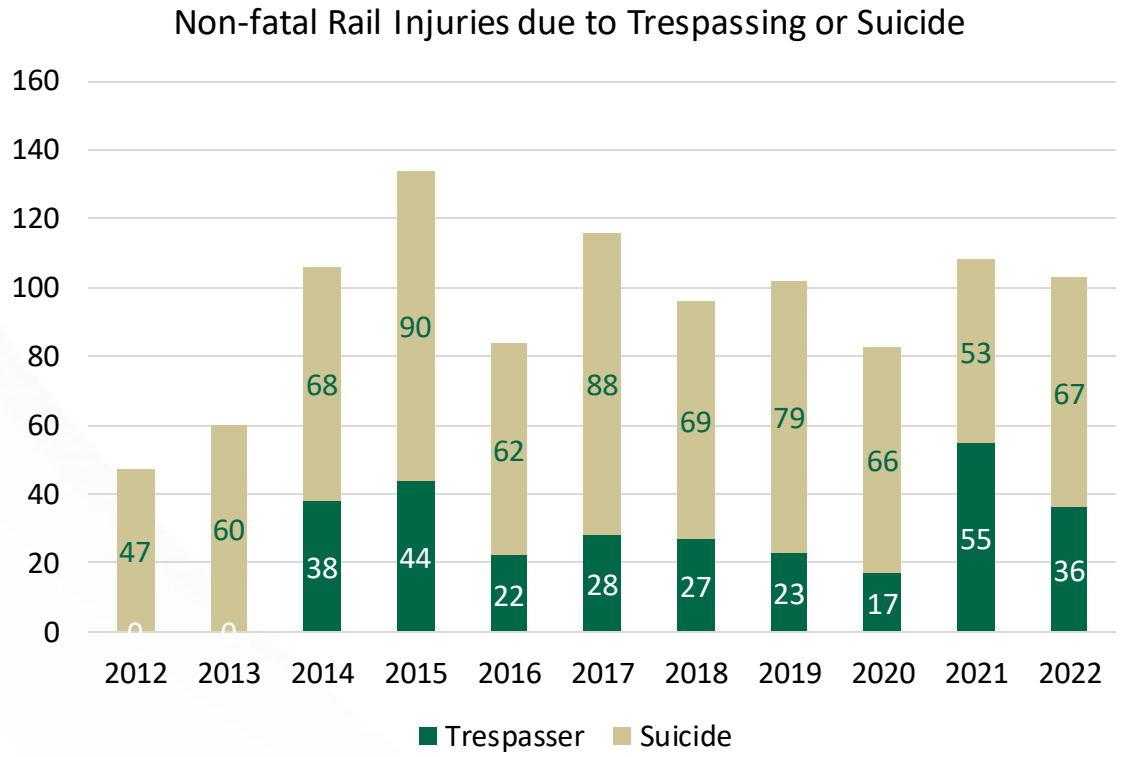
21%

Top 5 for Trespassing Fatalities
(2014—2018)

Source: FRA – Railroad Crossing Safety and Trespass Prevention

Trend of Trespasser Fatalities and Injuries





Source: FTA, https://data.transportation.gov/Public-Transit/Major-Safety-Events/9ivb-8ae9
Data includes only rail modes (HR, LR, MG, YR, SR, CC, IP) and the following measures: pedestrians walking along tracks, pedestrians crossing tracks, pedestrians not in crosswalk.

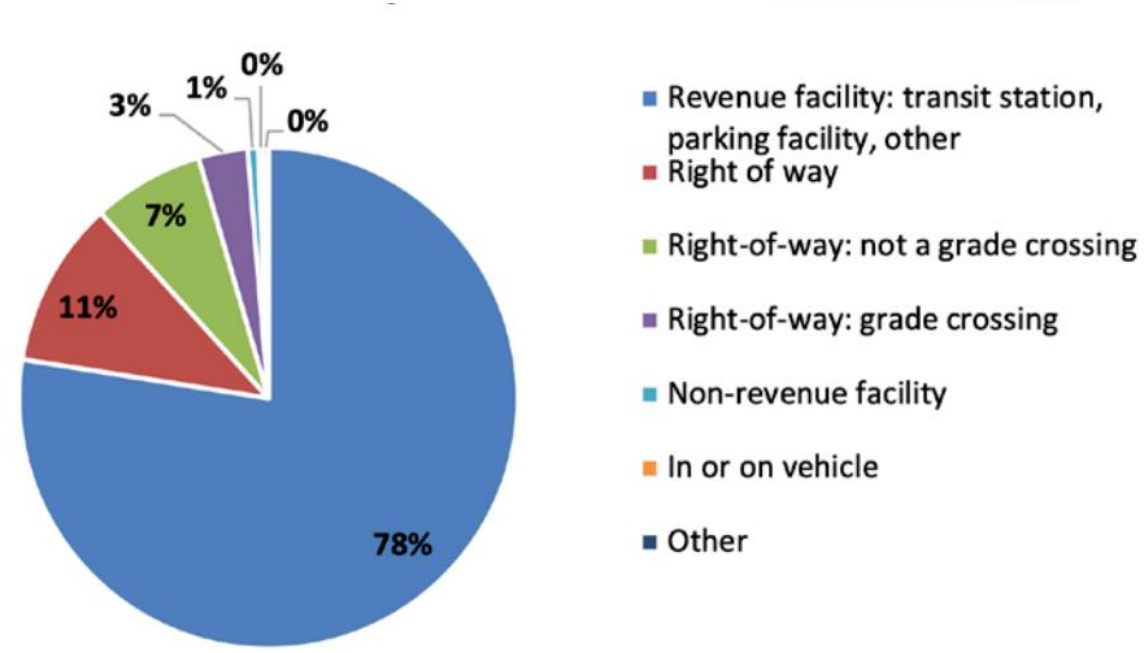
Statistics of Railroad Trespassing Fatalities

- Based on the analysis of FTA's NTD data from 2012 to 2022, transit rail fatalities due to trespassing account for **15%** of all transit rail fatalities.
- Based on the analysis of FTA's NTD data from 2012 to 2022, transit rail fatalities due to suicide account for **40%** of all transit rail fatalities.



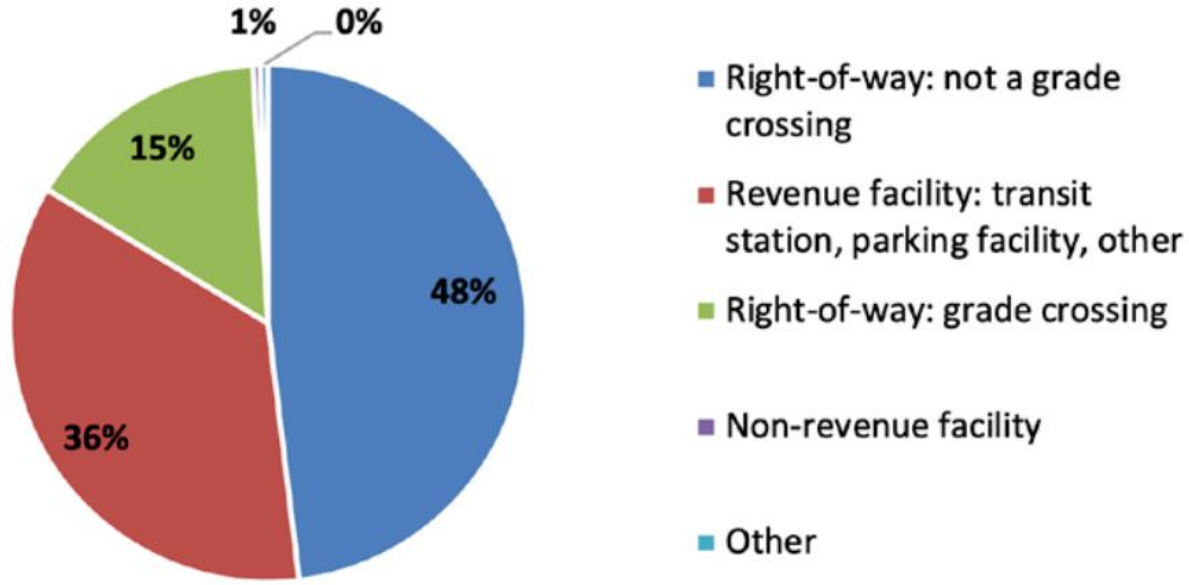

Suicide vs. Trespasser fatality percentage by location

Suicide fatalities by location type for RTAs, 2011–2019



Source: NTD Safety and Security Time-Series Data

Trespasser fatalities by location type for RTAs, 2011–2019



Source: NTD Safety and Security Time-Series Data

Effective and Promising Practices

- **Fencing** railroad ROW especially at trespassing hotspot locations using cameras for monitoring
- Installing **no trespassing signage** at strategic locations
- Conducting **community educational outreach** activities via collaboration with Operation Lifesaver, rail safety campaigns, and targeted campaigns to vulnerable populations.
- Including **training for rail operators** on how to properly handle various trespassing scenarios

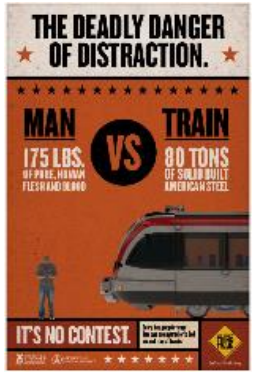
(Courtesy of restrail.eu)

Fencing at hotspot locations

Mid platform fencing

(Source: TrainBoard.com)

No Trespassing sign



Operation Lifesaver educational campaigns

Training for rail operators

Effective and Promising Practices (Cont'd)

- Deploying **See Say or similar apps** to encourage trespassing reporting
- Collaborating with **rail transit police or local law enforcement agencies** to respond to reported trespassing
- Installing **flashing lights at train stations** to indicate train arrival and warn people
- Using **audible bells** at train stations to indicate train arrival and warn people
- Applying **technologies** to detect trespassers

MARTA See & Say Apps

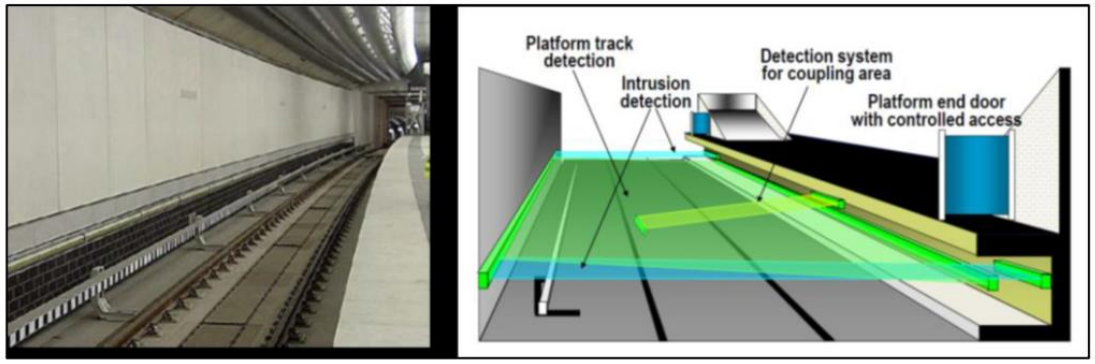
Response of local law enforcement to reported trespassing

Flashing lights at a METRO station to warn train arrival

Audible bell used at Houston METRO stations to warn train arrival

Existing Technology Applications Identified for Trespassing Detection and Prevention

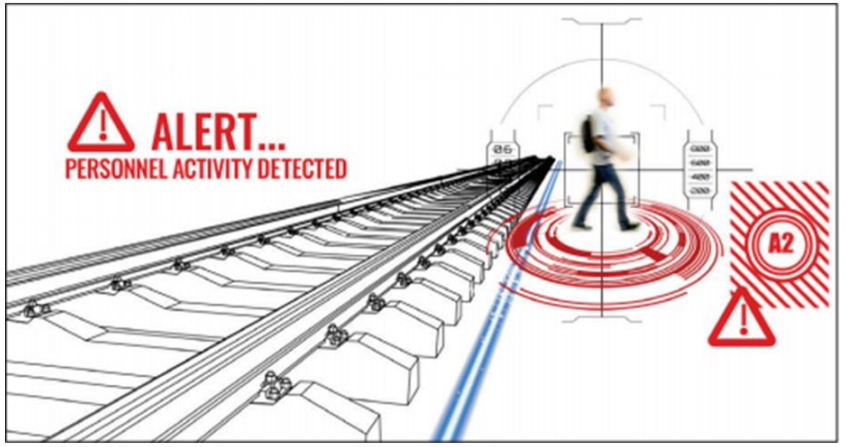
- Guideway Intrusion Detection Systems
- Anti-Trespass Guards or Grids
- Infrared and Thermal Detection
- Buried Sensors



Optical and RF sensor-based Guideway Intrusion System, Nuremberg, Germany

Thermal detection using FLIR thermal camera

Trespasser detection – anti-trespass grids



Trespasser detection using a fiber-based sensor device

Emerging Technology Applications Identified for Trespassing Detection and Prevention

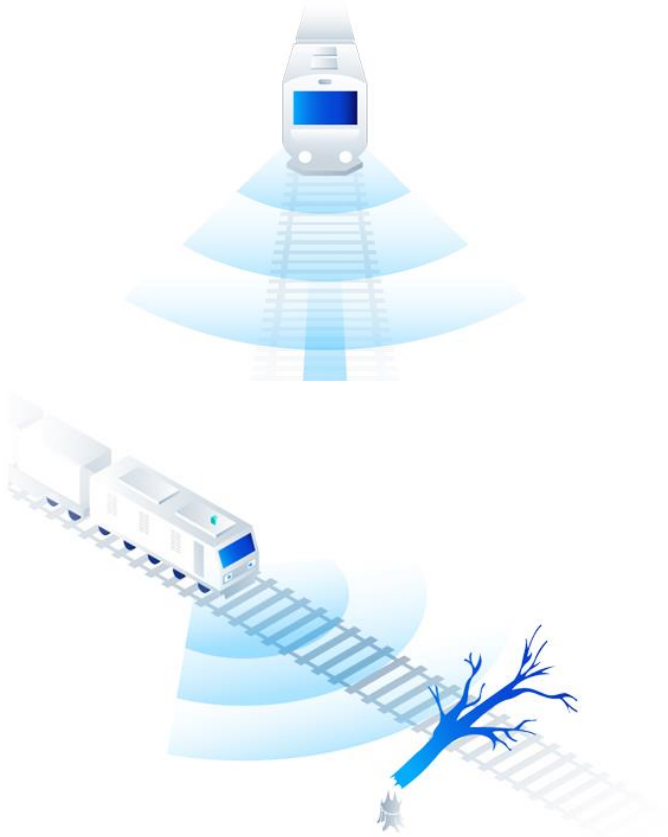
- Applications of AI and Video Analytics on Trespasser Detection
- Unmanned Aircraft Systems (UAS) - Drones
- Long-Range Radar Applications

Trespasser detection – aerial drones

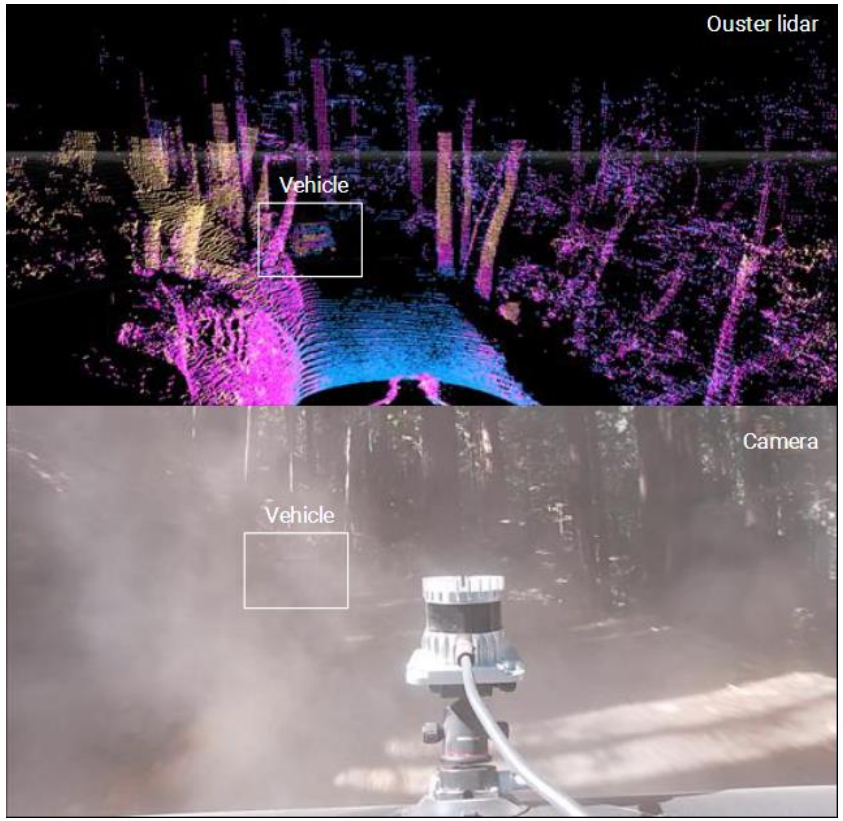
Trespasser detection – obstruction on railroads using AI-based detection algorithms

Trespasser detection – long range radar

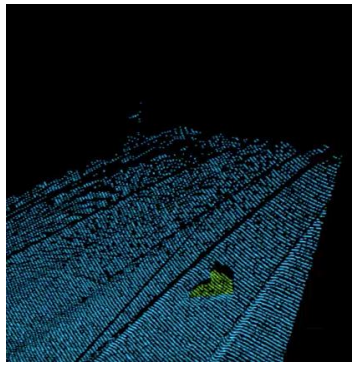
Emerging Technology Applications Identified for Trespassing Detection and Prevention (Cont'd)



Source: 4Sight™ Lidar for Rail (Aeye)



Source: Ouster Lidar



https://www.youtube.com/watch?v=JGw6QpYShgY

Source: IK4-TEKNIKER

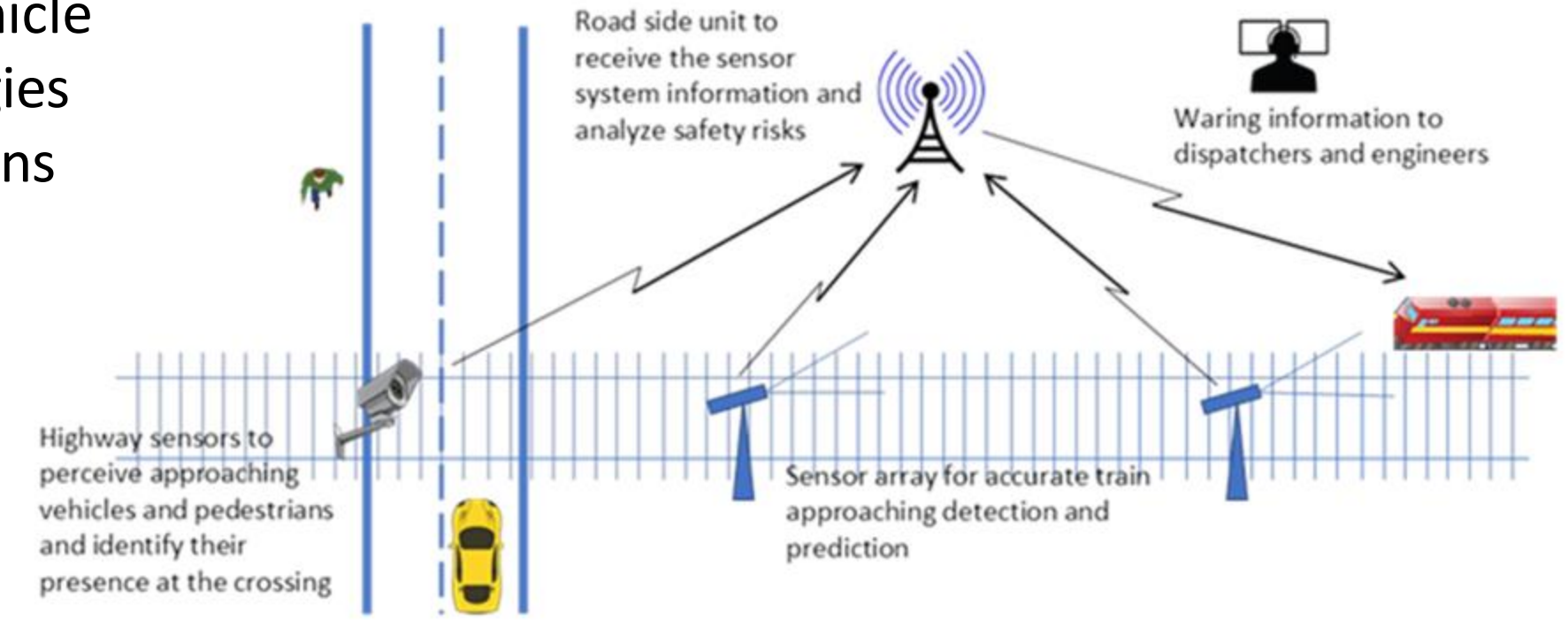
Onboard Detection Systems

On-board detection system - Rail Vision

Onboard detection system – SeeFar

Emerging Technology Applications Identified for Trespassing Detection and Prevention (Cont'd)

- Connected Vehicle (CV) Technologies and IoT solutions



(Source: USF)

General illustration of highway and grade-crossing sensors on train arrival

Thank you

kourtellis@cutr.usf.edu

MxV RAIL

Rail Transit Roadway and Pedestrian Grade Crossings Exploratory Report

Duane Otter / Ben Bakkum / Dingqing Li

FTA Grade Crossing Webinar

September 21, 2023

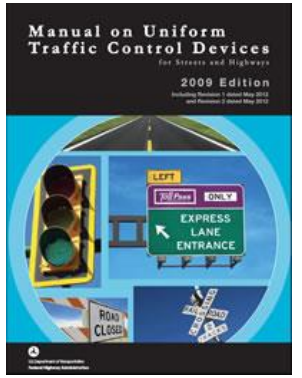
MxV RAIL

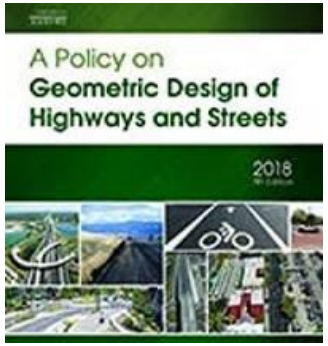
Rail Transit Roadway and Pedestrian Grade Crossings

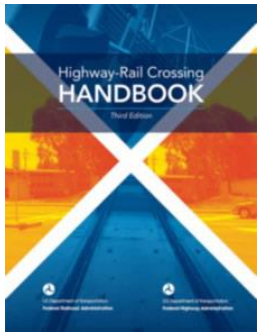
- Overview of presentation – highlights from study
  - Literature review
  - Survey results
  - Case studies findings
  - Summary

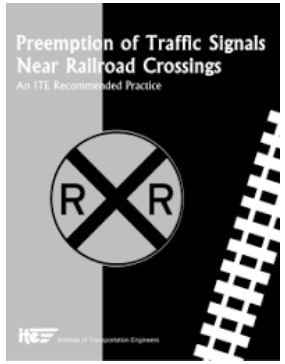
Grade Crossing Guidance Documents & Agencies

- Manual on Uniform Traffic Control Devices (MUTCD)
- 49 CFR Parts 234 (FRA) and 222 (Quite Zones)
- Highway-Rail Crossing Handbook (FHWA & FRA)
- AASHTO “Green Book”
- ITE – Preemption of Traffic Signals Near Railroad Crossings
- AREMA C&S Manual Vol 1, Section 3
- APTA Rail Transit Grade Crossing Documents
- NACTO Transit Street Design Guide
- State DOTs and PUCs



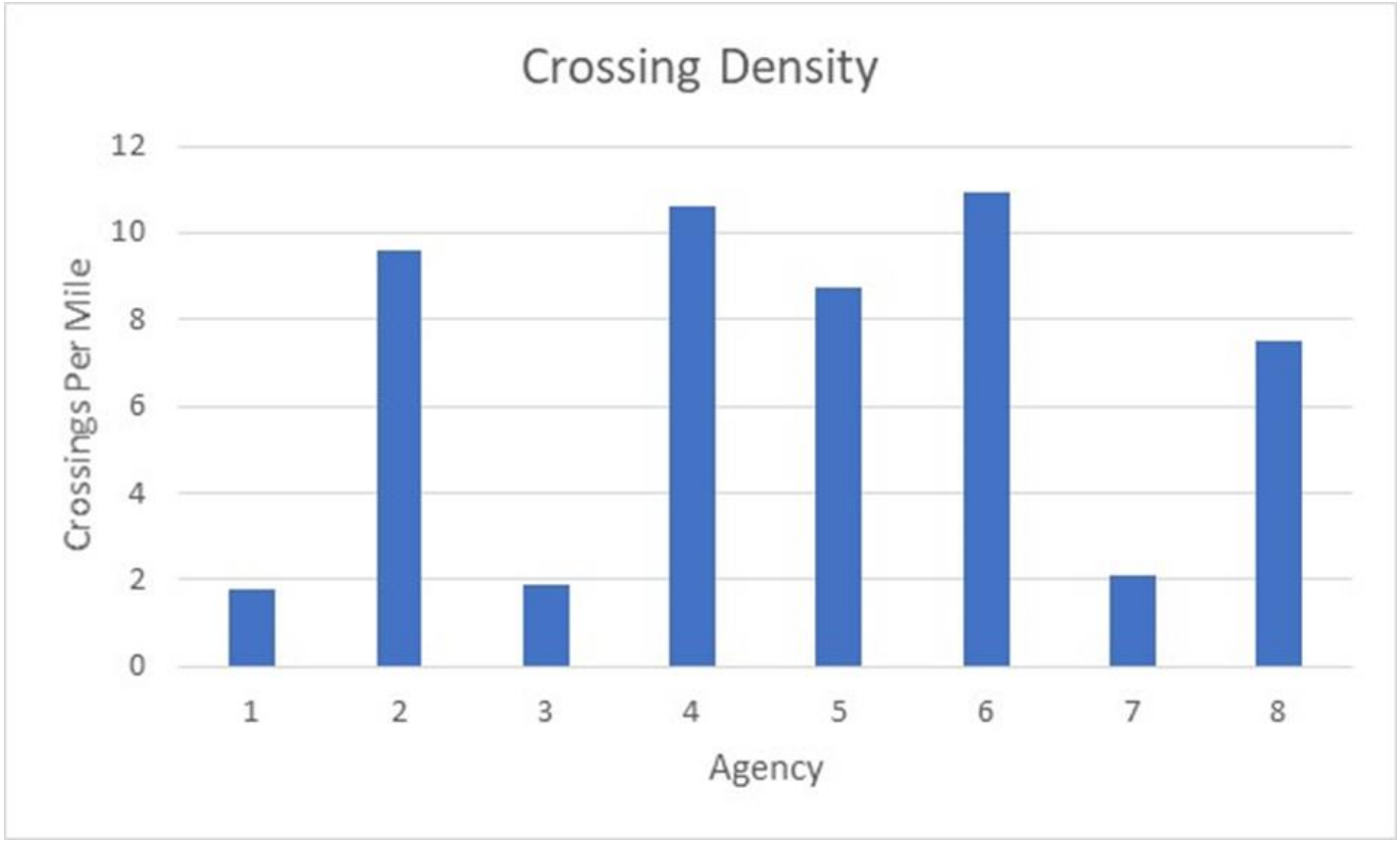






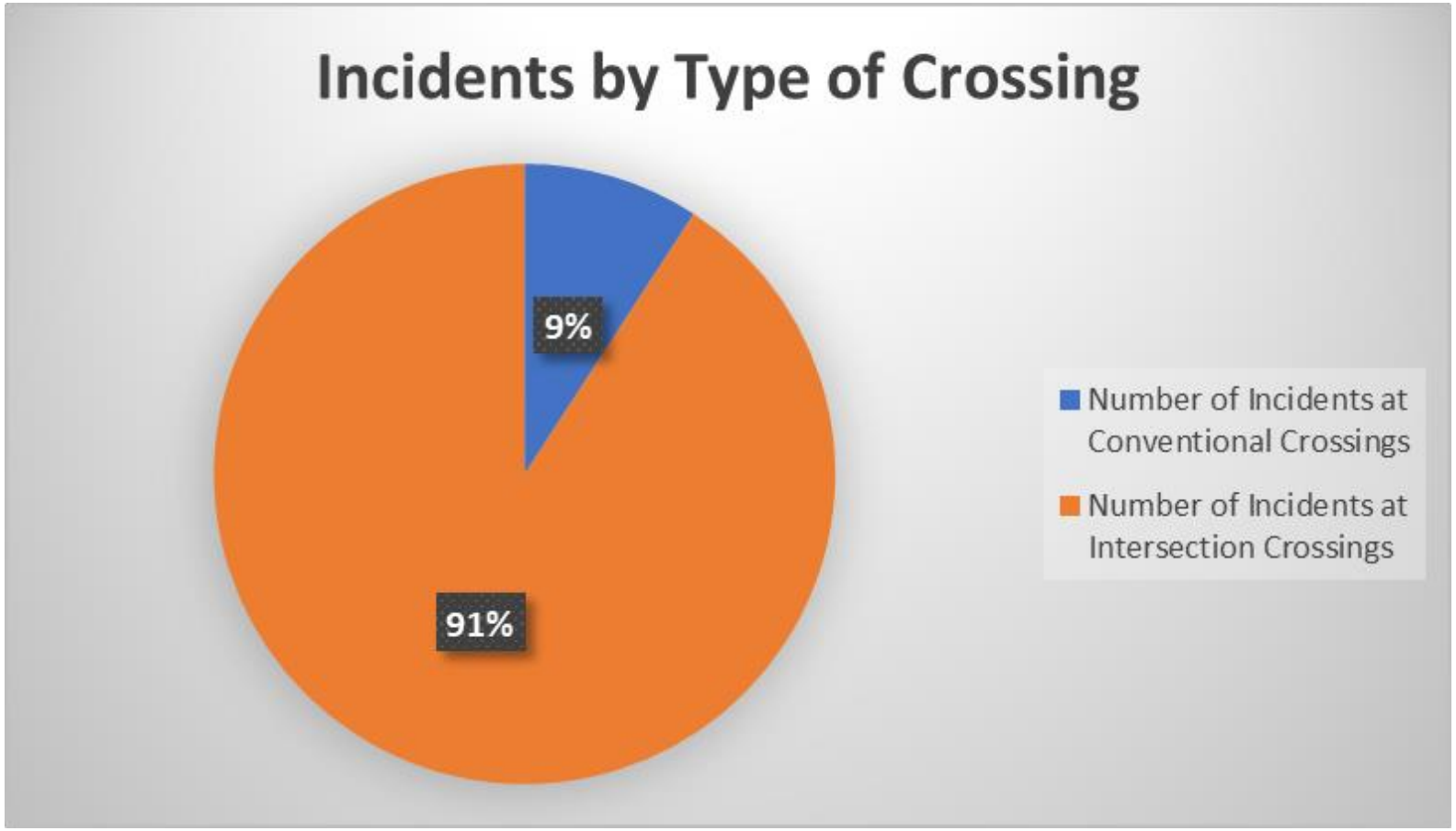
Industry Survey – Network Information

- More crossings per mile for agencies with a significant portion of routes as street running.
- Much fewer crossings per mile for agencies with significant portion of routes on dedicated right of way.



Conventional vs Street Intersection Crossings

- Data from over 1100 incidents over 5 years, 6 agencies

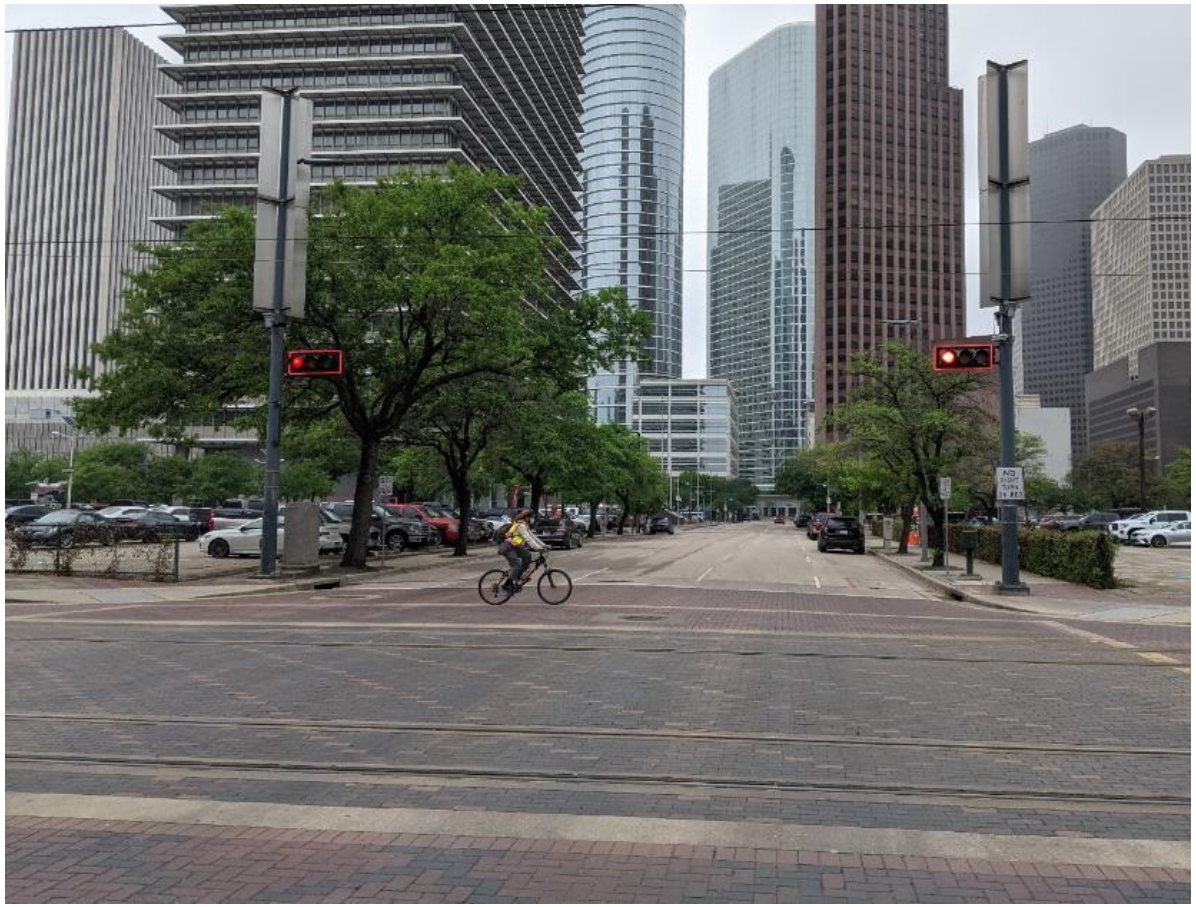


Case Study Experience: Some general findings

- All visited agencies have some street running in their light rail operations
- Challenging areas:
  - Left turns across tracks
  - Right turns across tracks
  - Transitions from street running to dedicated right of way
- Dynamic signage used by all visited agencies
- 4-quad gates common on 2 of 4 agencies visited

Conventional vs Street Intersection Crossings

- Many differences



Street Intersection Crossings

- Conventional vs Street Intersection crossing incidents not separated in NTD data
- Street intersection crossings are limited in terms of engineering solutions
- Significant paperwork & bureaucratic burden for agencies

Conventional vs Street Intersection Crossings

- Engineering challenges for street intersection grade crossings
  - Traffic running parallel to rail in addition to crossing the rail
  - Motor vehicles turning across tracks
  - Traffic signals and dynamic signs instead of flashing lights, gates, and bells

Conventional vs Street Intersection Crossings

- Engineering limitations for street intersection grade crossings
  - Limited in terms of traffic islands, bollards, etc.
  - Limited in terms of pavement treatment and markings
  - Shared lanes present additional challenges
  - Bar signals typically needed for transit

Pedestrian Crossing Treatments

- Example: Pedestrian treatment at corner with station
- Flashing lights and gate arms
- Swing gates
- Pavement treatment
- Signage and fencing
- Dynamic signs

Problem Behavior – Motorists and Pedestrians

- Driving around gates
- Trapped by gates
- Motor vehicles merging into shared lanes ahead of LRVs
- Stalled vehicles
- Improper turns
- Trying to beat gates/trains

Remediation Methods

- Methods used to address both motorist and pedestrian problem behaviors include:
  - Quad gates, swing gates, gate skirts
  - Channelization devices
  - Photo-enforcement with stiff fines (word gets around)
  - Fencing and anti-trespass devices
  - Dynamic signage
  - Supplemental warning systems
  - WAZE smartphone app (?)

Craig McDonald
Director, Safety and Environment
TriMet Risk Ranking Tool and Data Validation for Grade Crossing Safety

FTA Safety Research Demonstration (SDR)
Cooperative Agreement Project

TRIMET

TriMet is using video analytics along part of its rail alignment in Portland, Oregon, to better understand at-grade crossing risks and incidents.

<u>Purpose of Project</u>:

- **Develop a grade crossing safety Risk Ranking Tool.**
- **Share guidelines for using Video Analytic Data in risk ranking.**
- **Video analytics software**

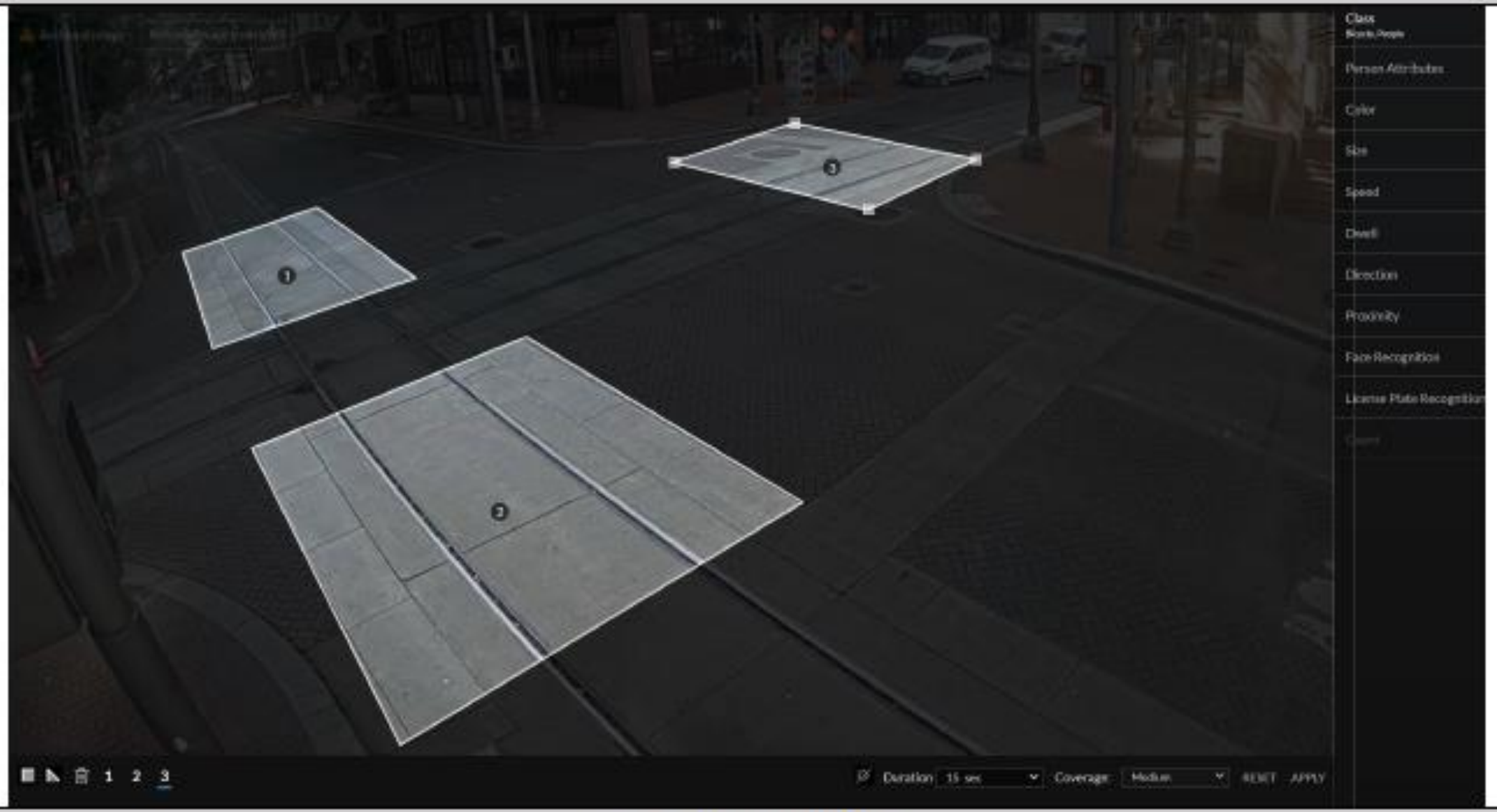
July 2021-June 2025

6PC03b - SW 6th-Pioneer Courthouse Transit Station (SW 6th / SW Yamhill)
CAMERA VIEW

CAMERA LOCATION

TRIMET

RULE – PEDESTRIAN DWELL



RULE – VEHICLE DWELL

162ND08 – 162ND AVE TRANSIT STATION

CAMERA VIEW

CAMERA LOCATION

TRIMET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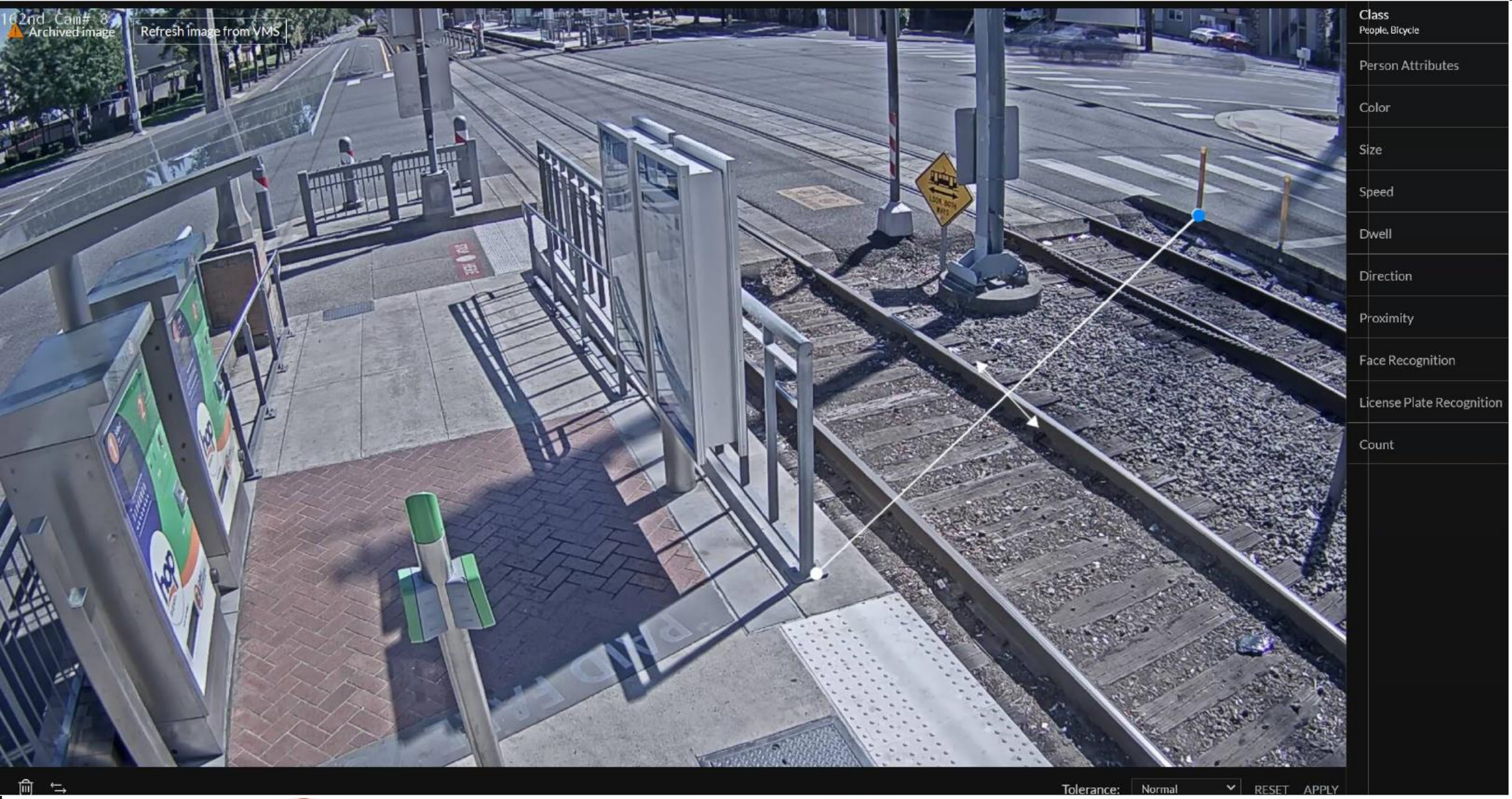
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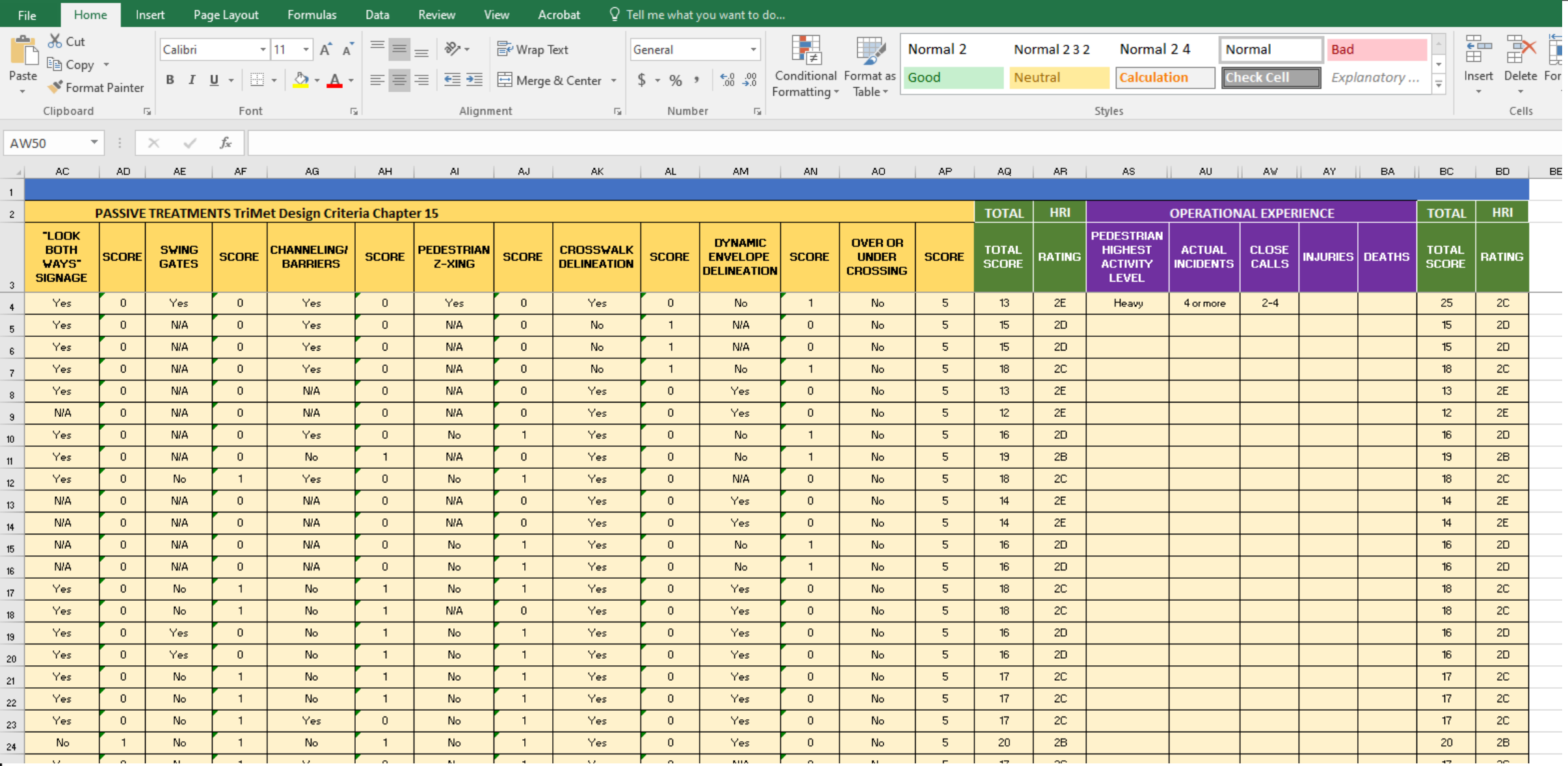

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PASSIVE TREATMENTS TriMet Design Criteria Chapter 15

"LOOK BOTH WAYS" SIGNAGE	SCORE	SWING GATES	SCORE	CHANNELING/ BARRIERS	SCORE	PEDESTRIAN Z-XING	SCORE	CROSSWALK DELINEATION	SCORE	DYNAMIC ENVELOPE DELINEATION	SCORE	OVER OR UNDER CROSSING	SCORE	TOTAL TOTAL SCORE	HRI RATING	OPERATIONAL EXPERIENCE PEDESTRIAN HIGHEST ACTIVITY LEVEL	ACTUAL INCIDENTS	CLOSE CALLS	INJURIES	DEATHS	TOTAL TOTAL SCORE	HRI RATING
Yes	0	Yes	0	Yes	0	Yes	0	Yes	0	No	1	No	5	13	2E	Heavy	4 or more	2-4			25	2C
Yes	0	N/A	0	Yes	0	N/A	0	No	1	N/A	0	No	5	15	2D						15	2D
Yes	0	N/A	0	Yes	0	N/A	0	No	1	N/A	0	No	5	15	2D						15	2D
Yes	0	N/A	0	Yes	0	N/A	0	No	1	No	1	No	5	18	2C						18	2C
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N/A	0	N/A	0	N/A	0	No	1	Yes	0	No	1	No	5	16	2D						16	2D
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Yes	0	No	1	No	1	No	1	Yes	0	Yes	0	No	5	18	2C						18	2C
Yes	0	No	1	No	1	N/A	0	Yes	0	Yes	0	No	5	18	2C						18	2C
Yes	0	Yes	0	No	1	No	1	Yes	0	Yes	0	No	5	16	2D						16	2D
Yes	0	Yes	0	No	1	No	1	Yes	0	Yes	0	No	5	16	2D						16	2D
Yes	0	No	1	No	1	No	1	Yes	0	Yes	0	No	5	17	2C						17	2C
Yes	0	No	1	No	1	No	1	Yes	0	Yes	0	No	5	17	2C						17	2C
Yes	0	No	1	Yes	0	No	1	Yes	0	Yes	0	No	5	17	2C						17	2C
No	1	No	1	No	1	No	1	Yes	0	Yes	0	No	5	20	2B						20	2B

TRIMET

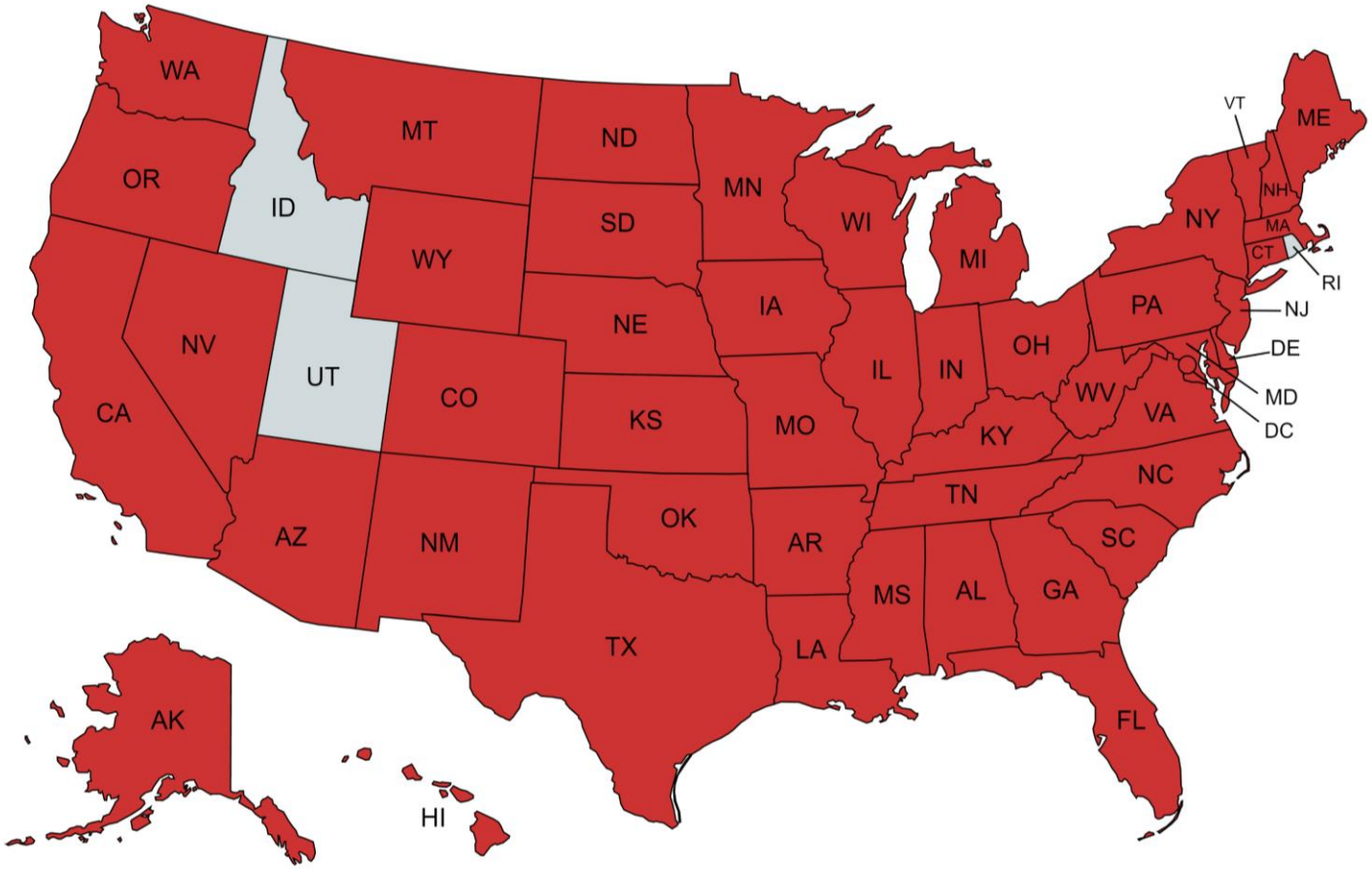
Operation Lifesaver, Inc. and Transit Safety

Spotlight on Safety: Transit Rail Grade Crossings Webinar

Rachel Maleh
Executive Director

OPERATION LIFESAVER®
Rail Safety Education

Operation Lifesaver Programs – 47 States and DC



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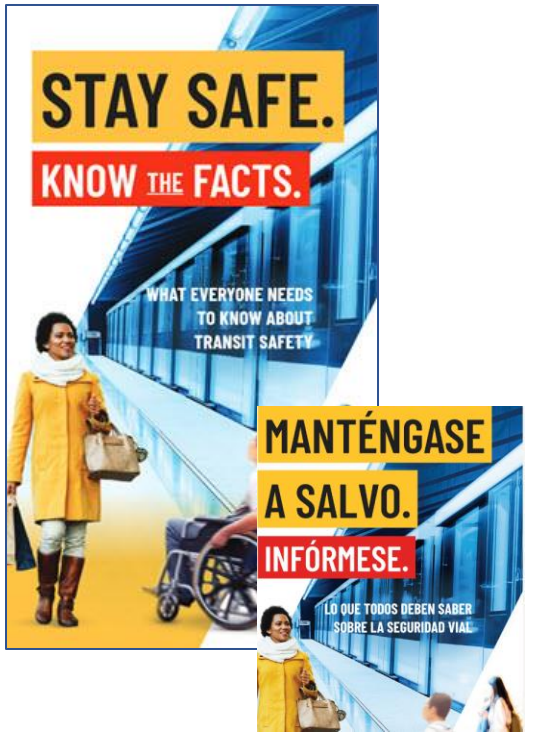
How OLI Partners with FTA and Transit Agencies

- OLI works with FTA to provide annual Competitive Transit Safety Public Awareness grants to transit agencies
- Through other FTA grants, OLI also develops free resources and assets for transit agencies to use in public safety outreach efforts

Competitive Grant Awards Announcement



Materials in English and Spanish

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Competitive Rail Transit Safety Education Grants

U.S. Department of Transportation

Federal Transit Administration

Brightline Digital Ad

- Latest round of grants are going to **8 transit agencies in 6 states (FL, MA, NY, NC, TX and VA)**
- Thank you to APTA and FTA partners for your ongoing support!
- **Total of over $140K** in grant funds from FTA for rail transit safety education and public awareness efforts

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Transit Assets: 3 PSAs in English and Spanish

Safety Around Streetcars and Light Rail
https://vimeo.com/738767009

Rail Transit Crossing Safety
https://vimeo.com/738766138

Safety at Rail Transit Stations
https://vimeo.com/738764633

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Find these PSAs and more at oli.org/passenger-rail-safety

Transit Assets: Transit Posters

Social Media Graphics

- Additional transit safety social media graphics
- Eight short excerpts of the video Public Service Announcements (PSAs) in English and Spanish for social media posting

Video PSA Excerpts for Social Media Channels

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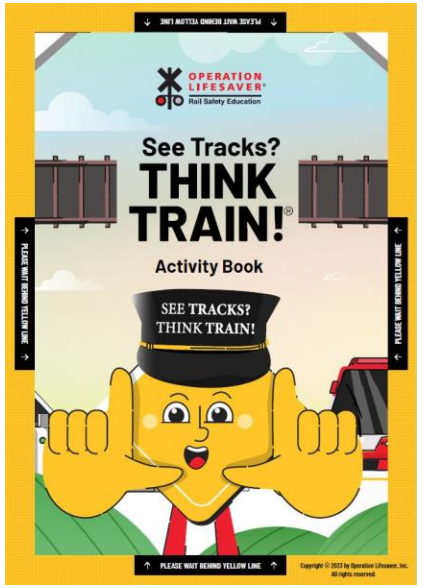
Transit Assets: Brochure, Kids' Coloring and Activity Books

- Transit brochure in English and Spanish
- Coloring Book and Kids Activity Book

Brochure



Kids' Coloring Book, Activity Book

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New Transit Safety PSA for kids

OLI's safety mascot, ST3, teaches kids how to stay safe as transit riders!

Find it at: oli.org/info/kids

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Transit Rail Safety Pledge

Transit Rail Safety Pledge

- Pre-Readers
- Ages 6-12
- Adults

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Rail Safety Week – Transit Safety Thursday

Rail Safety Week - September 18-24, 2023

- Sept. 21 theme - Transit Safety Thursday
- Sept. 22 theme - #RedOutForRailSafety Day

Video Message 2023 – FTA Deputy Administrator Veronica Vanderpool

Video Message 2023 – FTA Associate Administrator for Transit Safety & Oversight Joe DeLorenzo

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Details: oli.org/rsw

Rail Safety Week – Red Out for Rail Safety, 9/22

It’s not too late to join us!

- Send #RedOutForRailSafety photos to news@oli.org

RTA Louisiana

DC Streetcar

Rio Metro Rail Runner Express

SAVE THE DATE: Rail Safety Week - Sept. 23-29, 2024

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TOGETHER, WE CAN
#STOPTrackTragedies

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Q&A

Thank you!

https://www.transit.dot.gov/TSOWebinars

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