FTA

FEDERAL TRANSIT ADMINISTRATION

Transit Advisory Committee for Safety (TRACS)

February 25-26, 2020
Day 1

Kara J. Waldrup
Office of System Safety
Policy and Promotion (TSO-12)

U.S. Department of Transportation
Federal Transit Administration

FTA and FTA Support Introductions

Designated Federal Official (DFO):

Henrika Buchanan

Associate Administrator,

Office of Transit Safety and Oversight

Program Coordinator:

Kara J. Waldrup

Safety Policy and Promotion

Office of System Safety

Additional FTA Support

- TSO System Safety Division
- Guidehouse

Committee Members

1. **Chairperson**: **Scott A. Sauer**, Assistant GM, Operations, Southeastern Pennsylvania Transportation Authority, Philly, PA
2. **Vice Chairperson**: **Pamela Fischhaber**, PhD, Chief, Rail/Transit Safety, Colorado Public Utilities Commission, Denver, CO
3. **Herman Bernal**, SSO Manager, Arizona Department of Transportation (ADOT), Phoenix, AZ
4. **Elayne Berry**, Former Assistant GM Management of Safety and Quality Assurance, Metropolitan Atlanta Rapid Transit Authority (MARTA), Atlanta, GA
5. **David Harris**, Transit and Rail Division Director, New Mexico Department of Transportation (NMDOT), Santa Fe, NM
6. **James Hickey**, Former SSO Program Manager, Illinois Department of Transportation (IDOT), Chicago IL
7. **Jeffrey Lau**, Chief Safety Officer, Bay Area Rapid Transit (BART), San Francisco, CA
8. **Eric Muntan**, Chief, Office of Safety and Security, Miami-Dade Transit, Miami, FL
9. **Ronald Nickle**, Former Chief Safety Officer, Massachusetts Bay Transit Authority (MBTA), Boston, MA
10. **Karen E. Philbrick**, PhD, Executive Director, Mineta Transportation Institute, San Jose State University, San Jose, CA
11. **Joyce Rose**, Principal Consultant, Transit and Rail Safety, WSP-Parsons Brinckerhoff, Baltimore, MD
12. **Brian Sherlock**, Safety Specialist, Amalgamated Transit Union (ATU), Silver Spring, MD
13. **Victor B. Wiley**, Former Chief Safety Officer, Memphis Area Transit Authority, Memphis, TN

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Transit Advisory Committee for Safety (TRACS)

Task and Workplan Review

Kara J. Waldrup
Office of System Safety
Policy and Promotion Division (TSO-12)

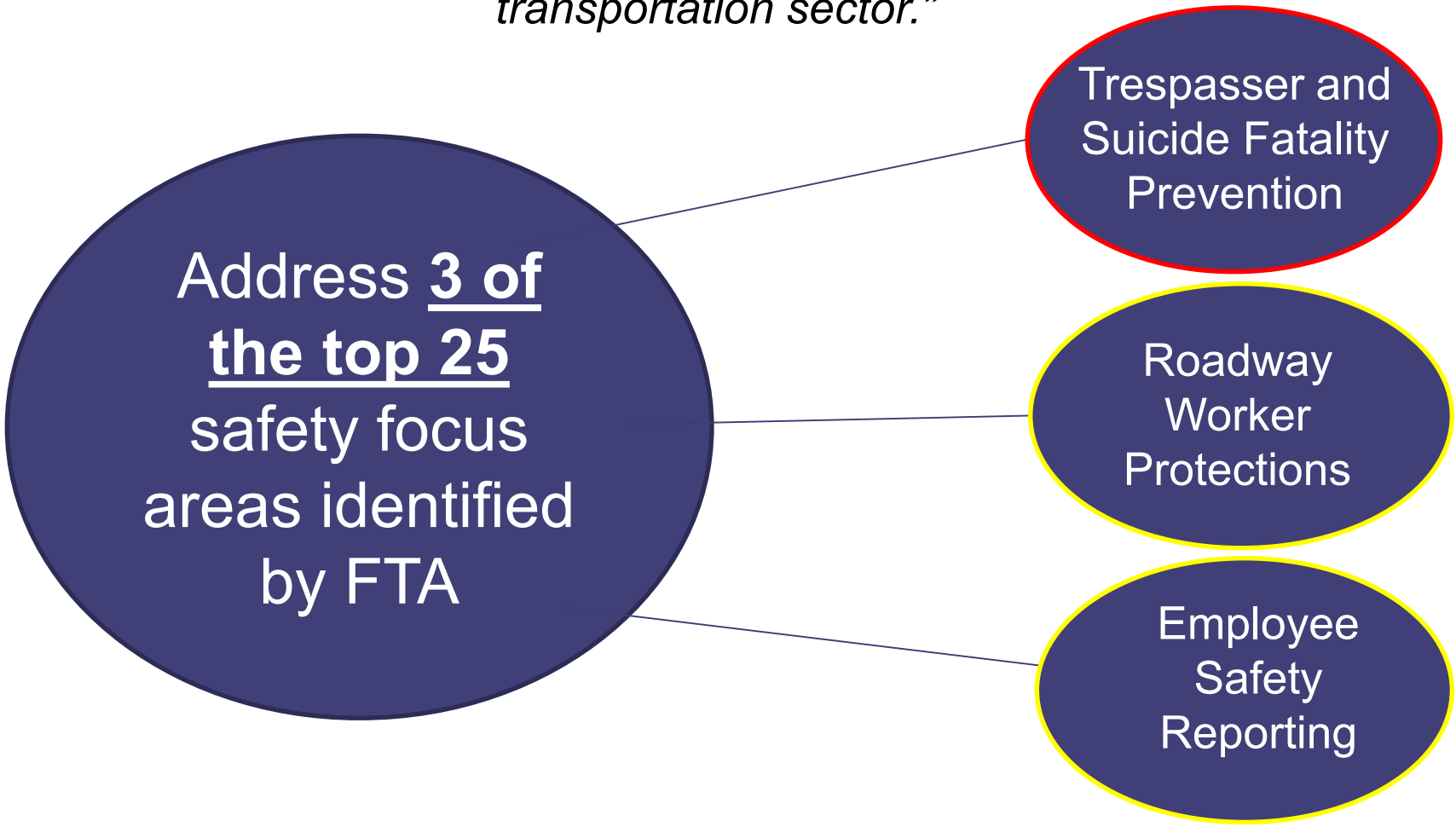
February 25, 2020

U.S. Department of Transportation
Federal Transit Administration

TRACS Meeting Objectives & Activities

Committee's Task

"To review emerging technologies and recommend public transportation innovations in safety that FTA can implement in support of the public transportation sector."



TRACS Task - Criteria

Extent to which the technology improves safety in rail transit nationwide

- Potential to significantly reduce fatalities
- Potential to significantly reduce injuries
- Potential to reduce safety events
- Potential to improve system reliability

Extent to which the technology is feasible and practical

- Cost
- Availability of technology (nationwide)
- Operational ease of use
- Upkeep/Maintenance
- Interoperability

TRACS may consider implementation of the technology under SMS (optional)

- Policy Development/Leadership commitment
- Promotion
- Risk Management
- Safety Assurance

February Conference Outcomes

List of current technologies and innovations for each safety focus area

List of emerging technologies, processes, methodologies

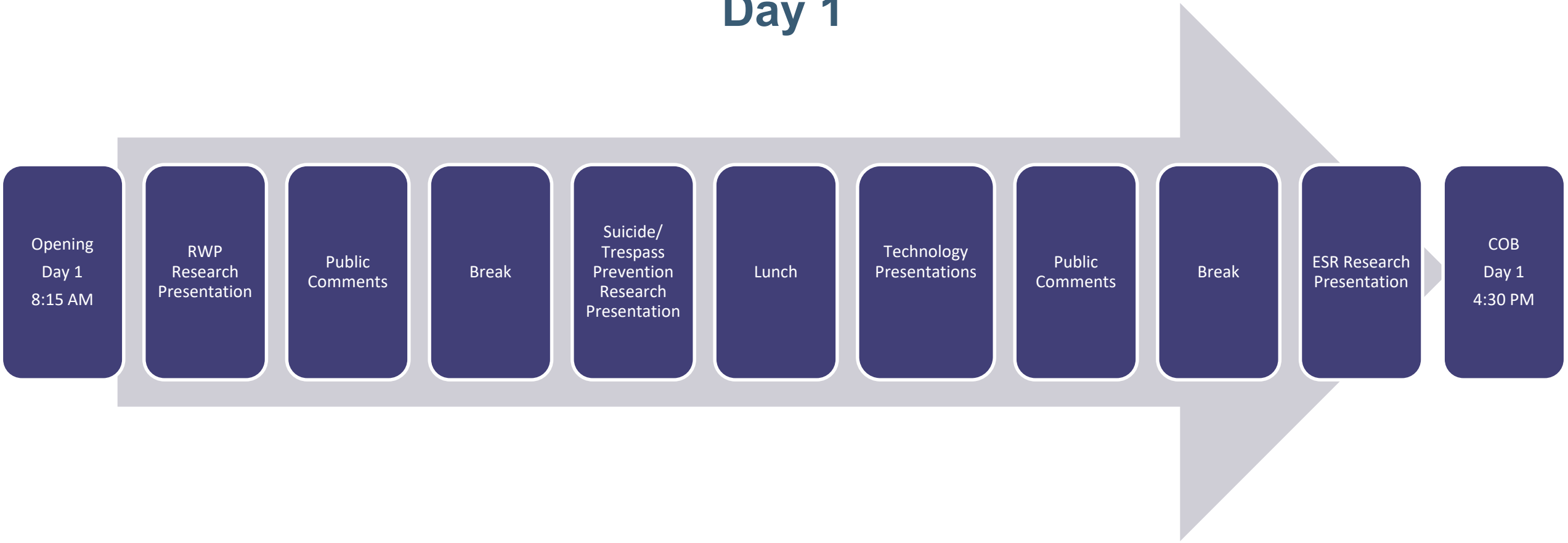
Begin subcommittees' analysis of emerging technologies, processes, and methodologies against the technical evaluation criteria

Refine subcommittees' 6-month workplan

(March through September 2020)

TRACS February Conference Meeting Flow

Day 1



TRACS February Conference Technology Presentations (Day 1)

Metrom	RWP - Rick Carlson (AURA Train Control System & Integrated Worker Protection Function)
Miller Ingenuity	RWP - Matt Edmonds (ZoneGuard System)
Bombardier	RWP - Paul Carey, Pawel Waszczur (Tracksafe System)
EmTrac	RWP - Brett Lievers (EMTRAC System)
Trapeze Group	RWP - Jamie Rossignoli (GPS-prohibitive technology)
Protran Technology	RWP - Jaime Maguire (ProAccess System)
Protran Technology	STP - Jaime Maguire (Track Intrusion Alert System)
Hotrail Group	STP - Rich Gent (UAVs)
Motorola Solutions / Avigilon Video Security & Analytics	STP - Ryan Bach (AI and Video Analytics)

TRACS February Conference Meeting Flow

Day 2

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FEDERAL TRANSIT ADMINISTRATION

Transit Advisory Committee for Safety (TRACS)

Roadway Worker Protections Research Presentation

Benjamin Bakkum
Transportation Technology Center, Inc

February 25, 2020

U.S. Department of Transportation
Federal Transit Administration

Overview

- **Objective**
  - Develop findings that can be used to reduce incidents and accidents within roadway work zones
- **Tasks**
  - Advisory Group (AG) collaboration
  - Literature review and industry survey
  - Risks and hazards analysis and incident data review
  - Development of CONOPS and GAP analysis
- **Deliverables**
  - Summary report of findings

Advisory Group (AG) Collaboration

- AG members:
  - Transit Standards WG
    - AJ Joshi, Vijay Khawani, Jim Fox, Ed Watt
  - Additional members from 7+ different agencies
- Second call on 1/23/2020 to update progress of TTCI work
- Looking ahead: progress calls to continue as work progresses through 2020

Literature Review

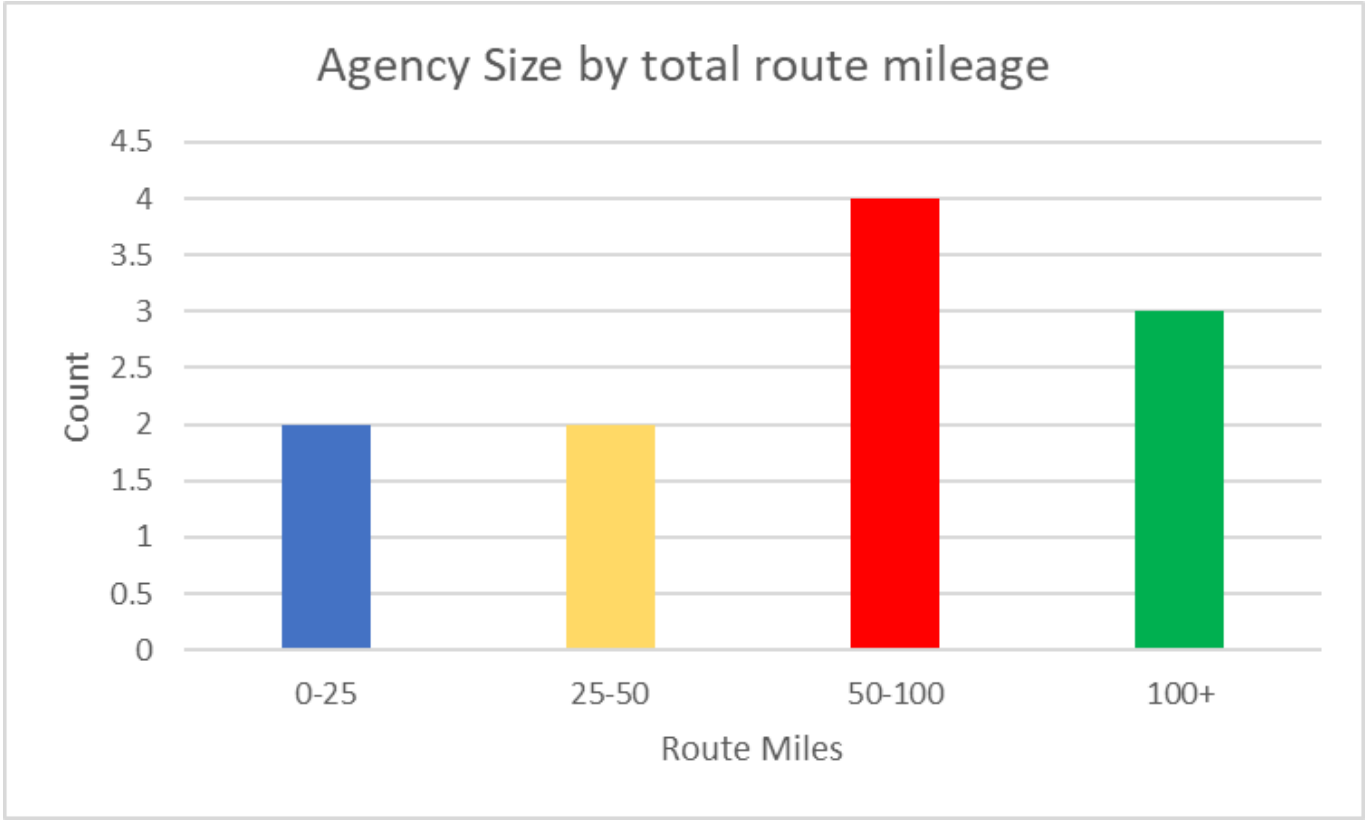
- Top two findings from literature review:
  - In many incidents, issues with job briefing details/quality were found to be contributing cause (policies/procedures)
    - Incomplete
    - Not fully understood
    - Not fully communicated
  - Based on incident reporting, as the complexity of jobs (people and equipment involved) and traffic increase, the likelihood of an incident increases (technologies)

Industry Survey

- APTA sent out and collected completed surveys on behalf of TTCI
  - Responses from **12 agencies**
    - APTA is going to follow-up with those that have not responded to see if we can get any more responses
  - Several responding agencies also provided copies of RWP procedures and operating rules to assist TTCI's efforts!

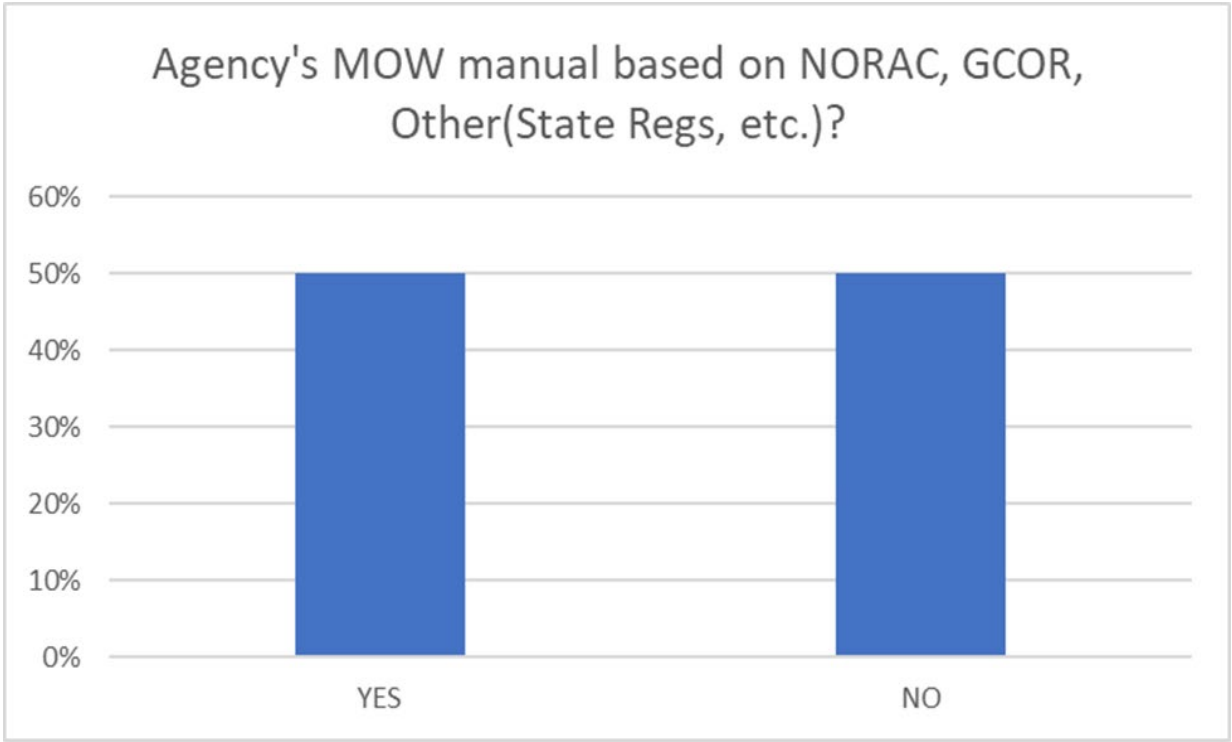
Responding Agencies

- Of the agencies who responded:
  - 73% light rail
  - 24% heavy
  - 3% street/trolley
- Size of agencies by mileage varied
- Sample size appears to cover agencies of differing type and size well



Survey Results

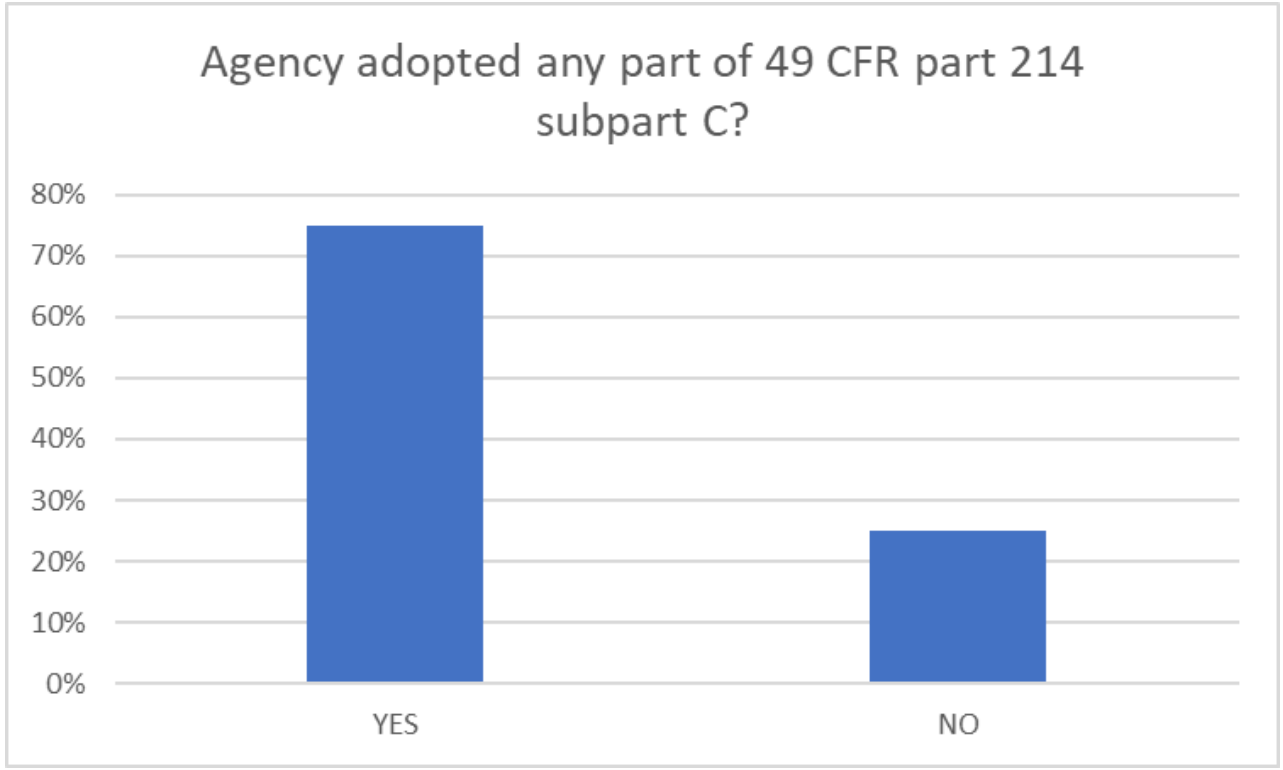
- Operating Rules based on GCOR, NORAC or other rules?
- TTCI is going to look at which is most used (NORAC, GCOR, etc.) for rules and why
- For those who responded No:
  - why and what are they using instead?



Survey Results Continued

- Have you adopted any parts of 49 CFR part 214 subpart C - RWP?

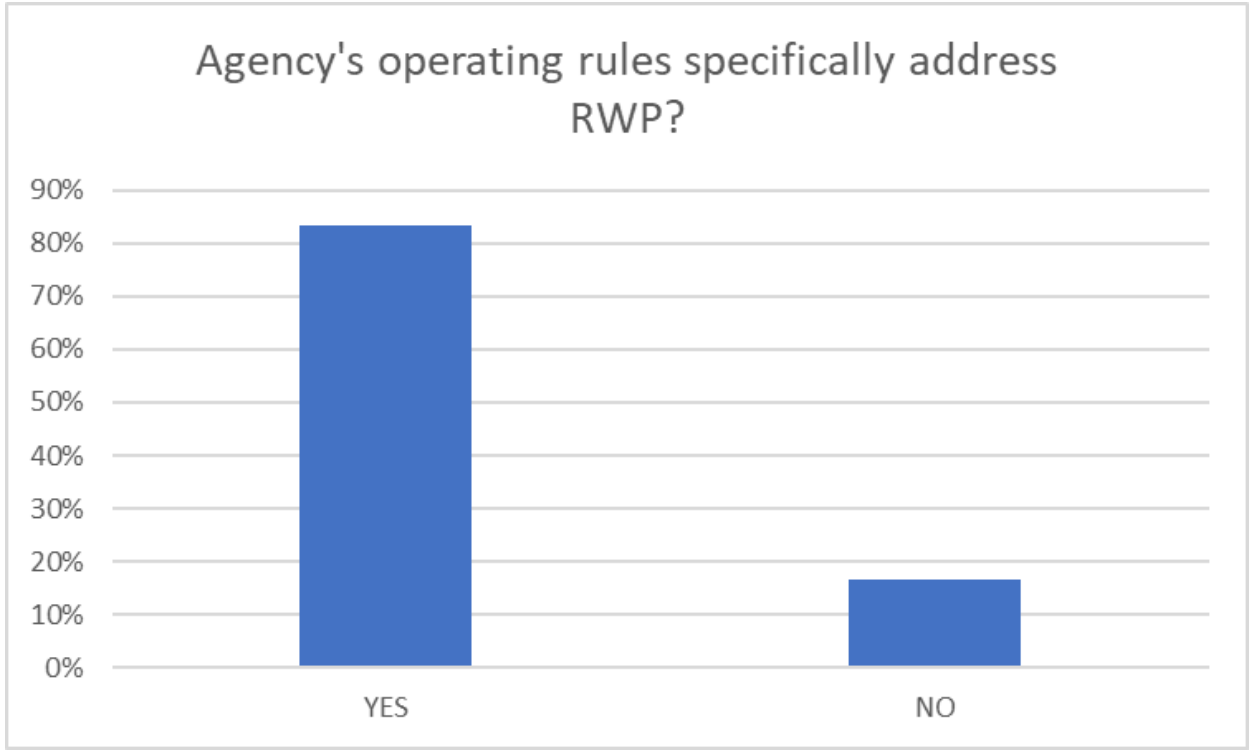
- TTCI is going to investigate which specific parts of 214 are most adopted



Survey Results Continued

- Does your agency's operating rules contain a specific section covering RWP?

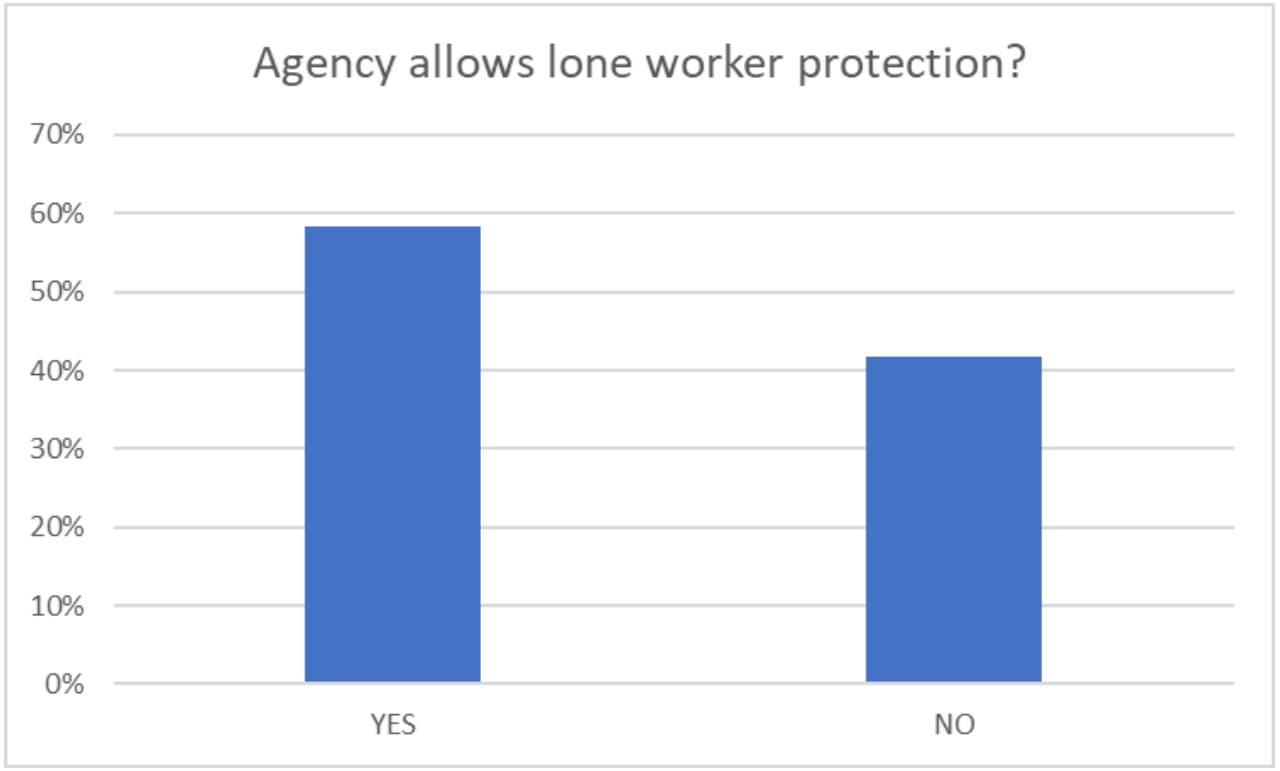
- If not, how is that covered?



Survey Results Continued

- Does your agency's rules allow for lone workers?

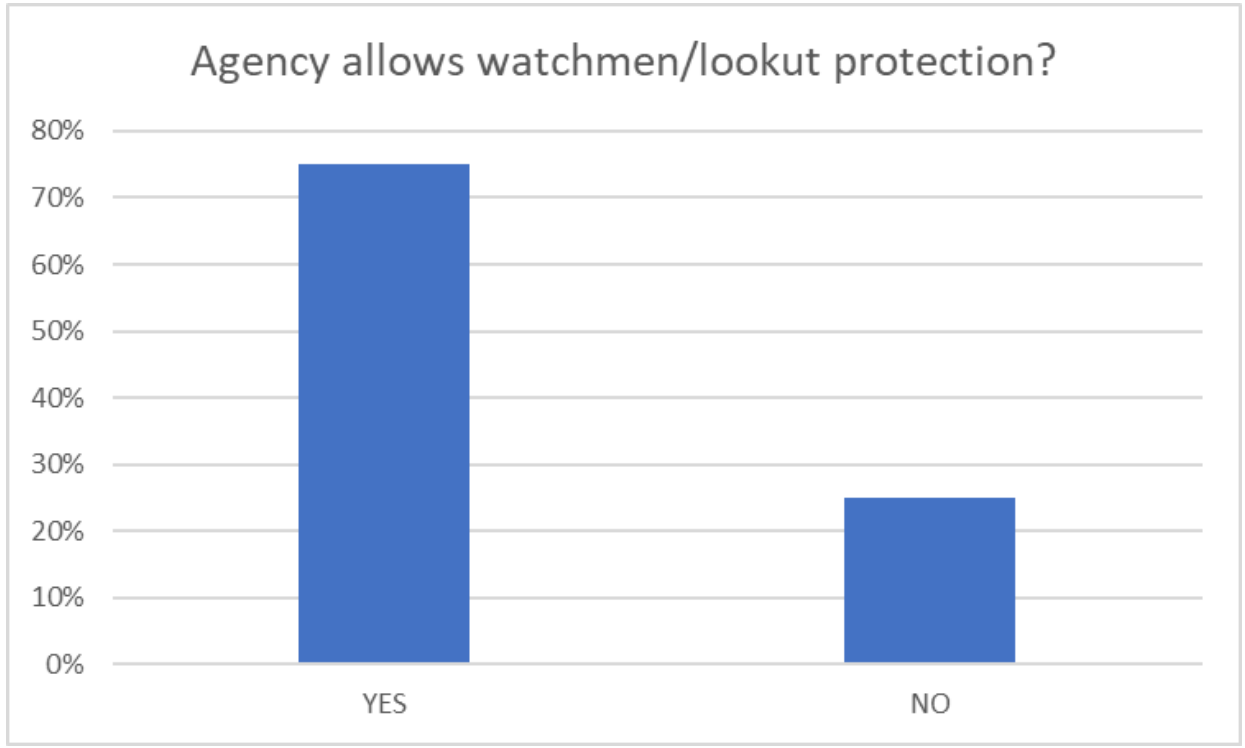
- For those who responded no: what do individual workers use to protect themselves in place of ITD?



Survey Results Continued

- Does your agency's rules allow for watchmen lookout protection?

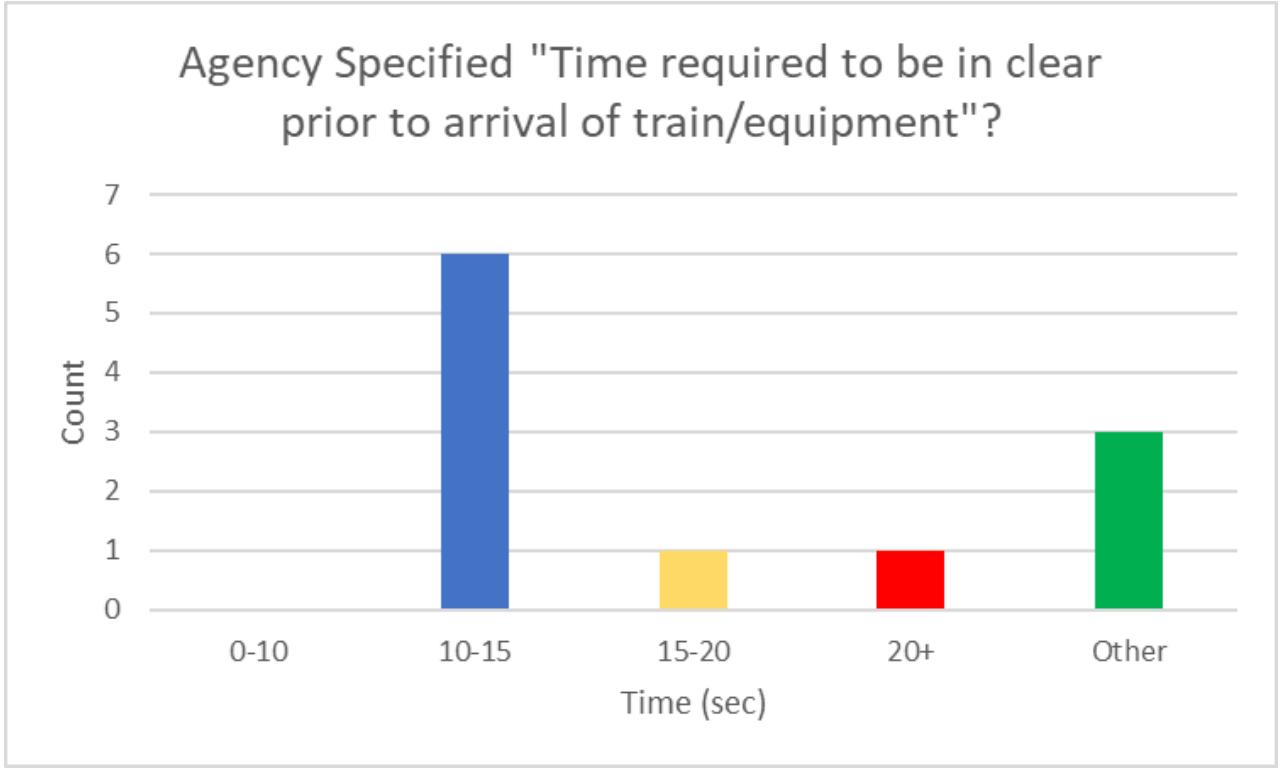
- If no, then how?



Survey Results Continued

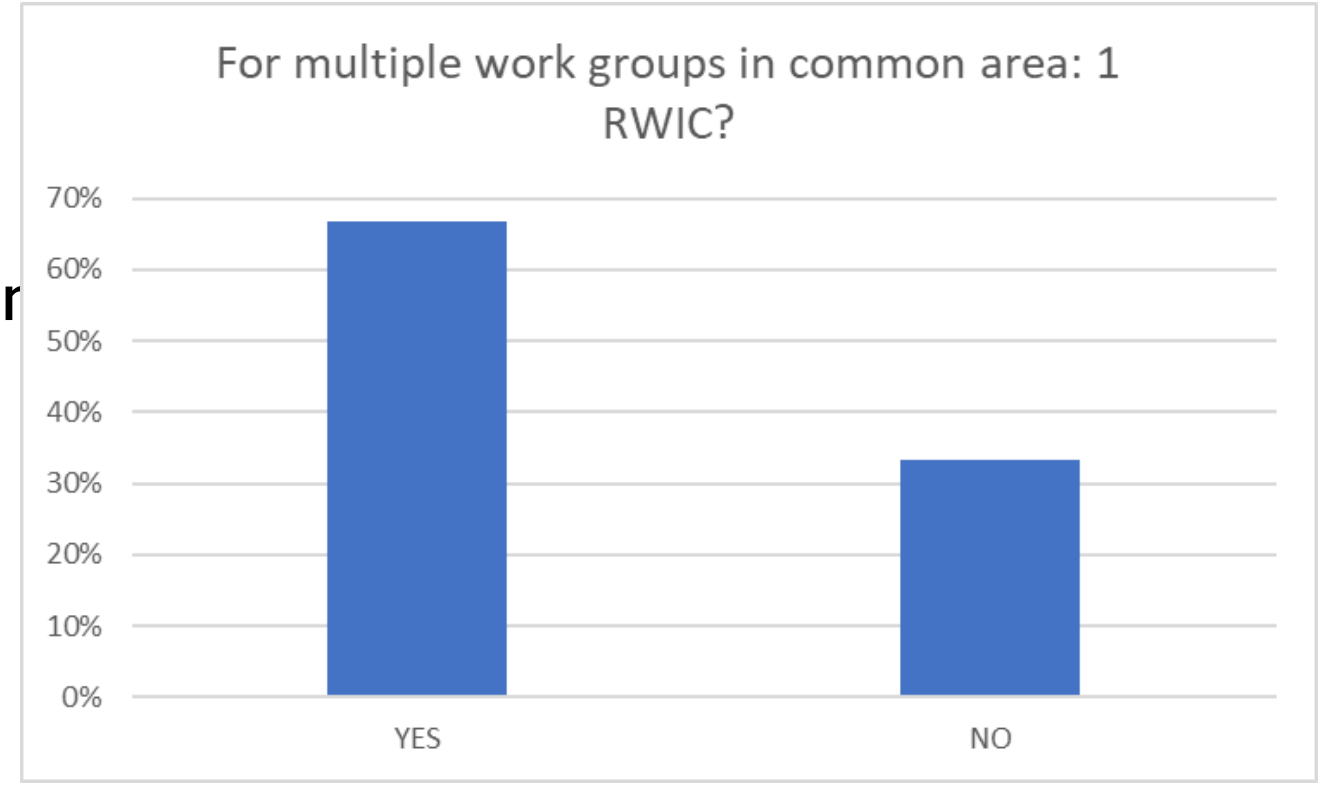
- When clearing, how long are roadway workers required to be in clear before equipment arrives?

- TTCI will investigate what main factors (e.g., train speed) determine time to clear



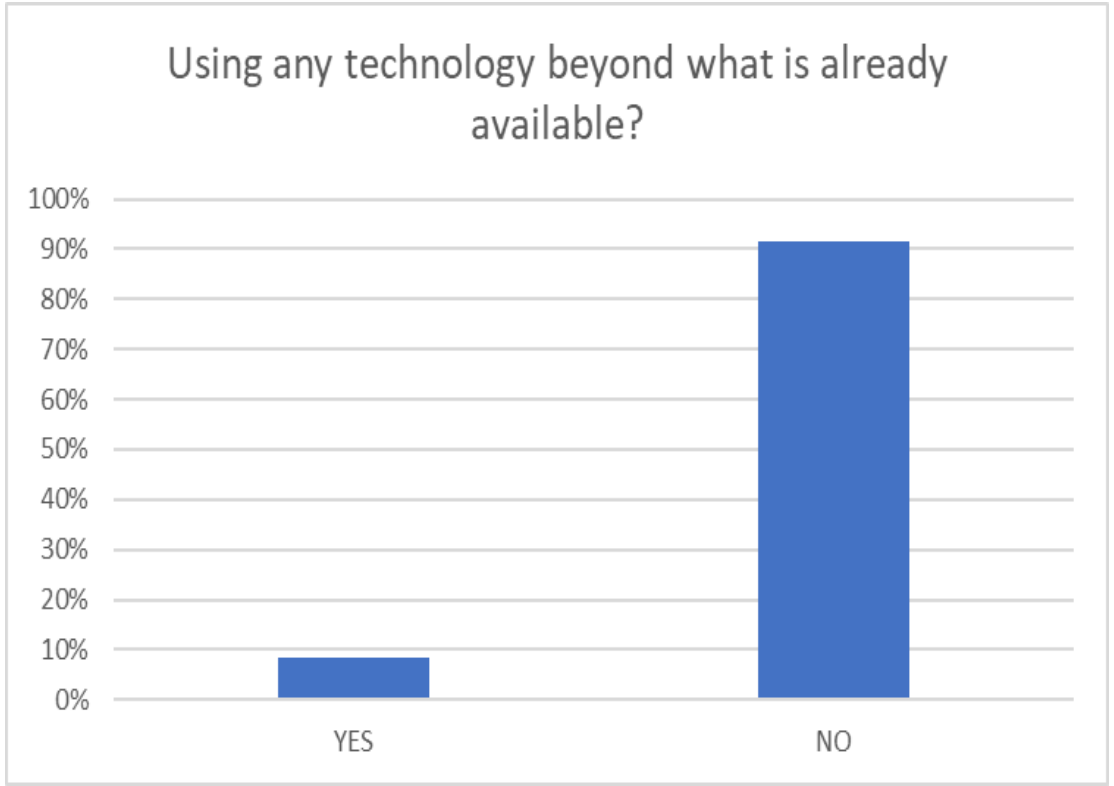
Survey Results Continued

- For multiple work groups working in a common area, is one RWIC used for protection of all groups?
- What are the other arrangements?



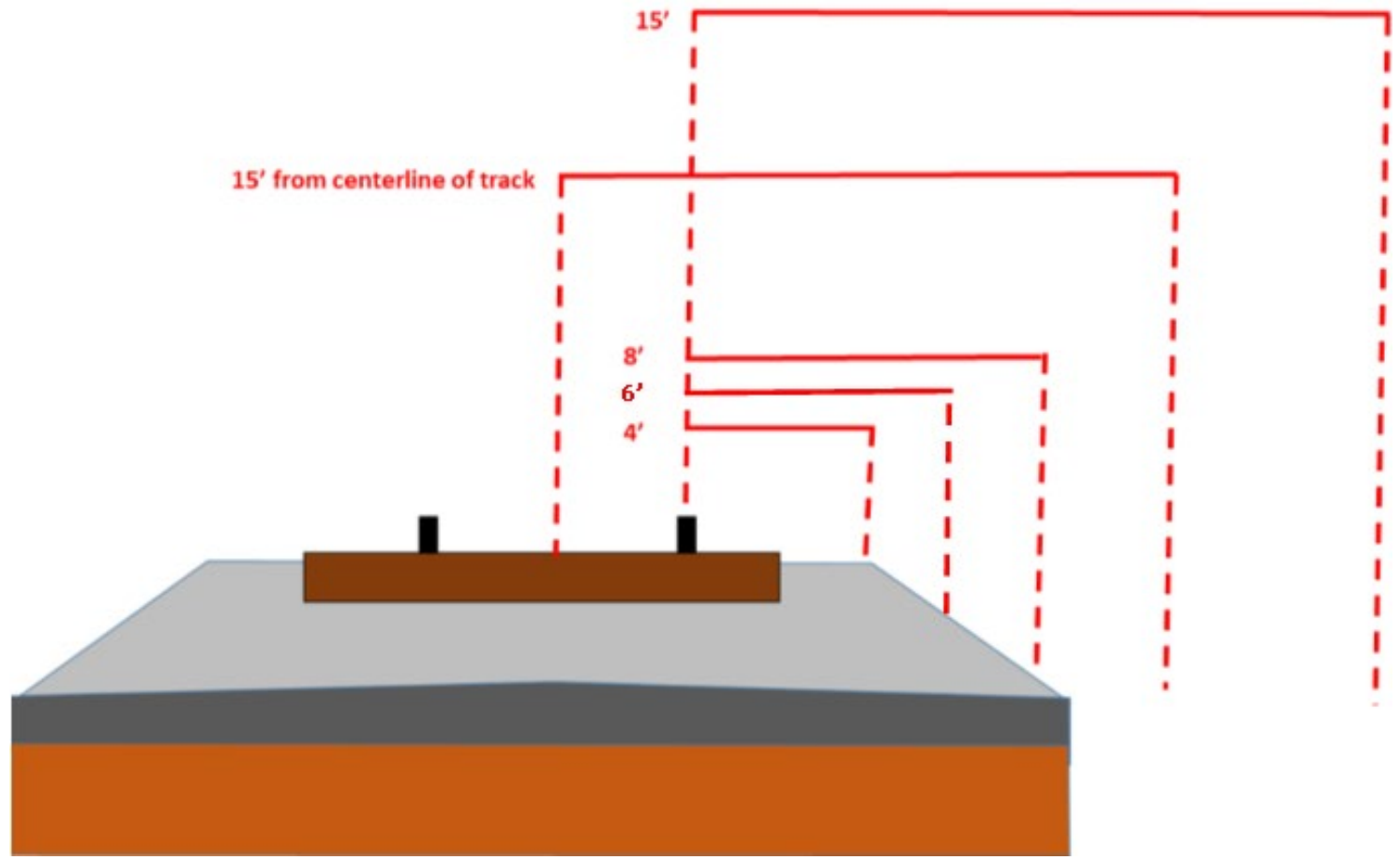
Survey Results Continued

- Agency using any technologies not covered by:
  - Shunts
  - Train control system LOTO
  - Power LOTO
  - Secondary warning alarm systems
  - Positive Stops
  - 3rd rail off verification
- TTCI will study how the primary and secondary systems should be used together



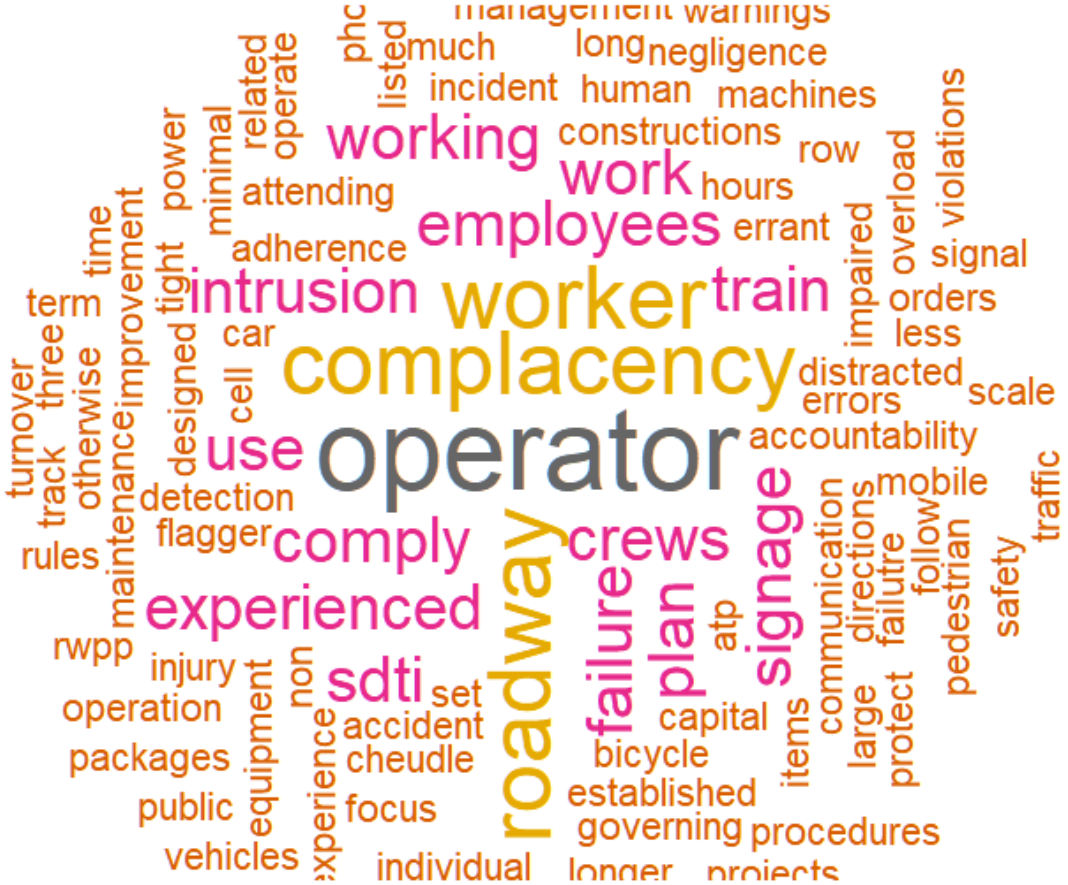
Survey Results Continued

- Distance to foul:
  - Varies depending on agency
- TTCI will investigate fouling distance that could be adopted universally



Survey Results Continued

- Greatest MOW risk?
  - **Operator: 4**
  - **Complacency: 3**
  - **Intrusion: 2**
- TTCI will investigate to better understand how 'operator' response is affected by use cases and risks/hazards



Survey Results Continued

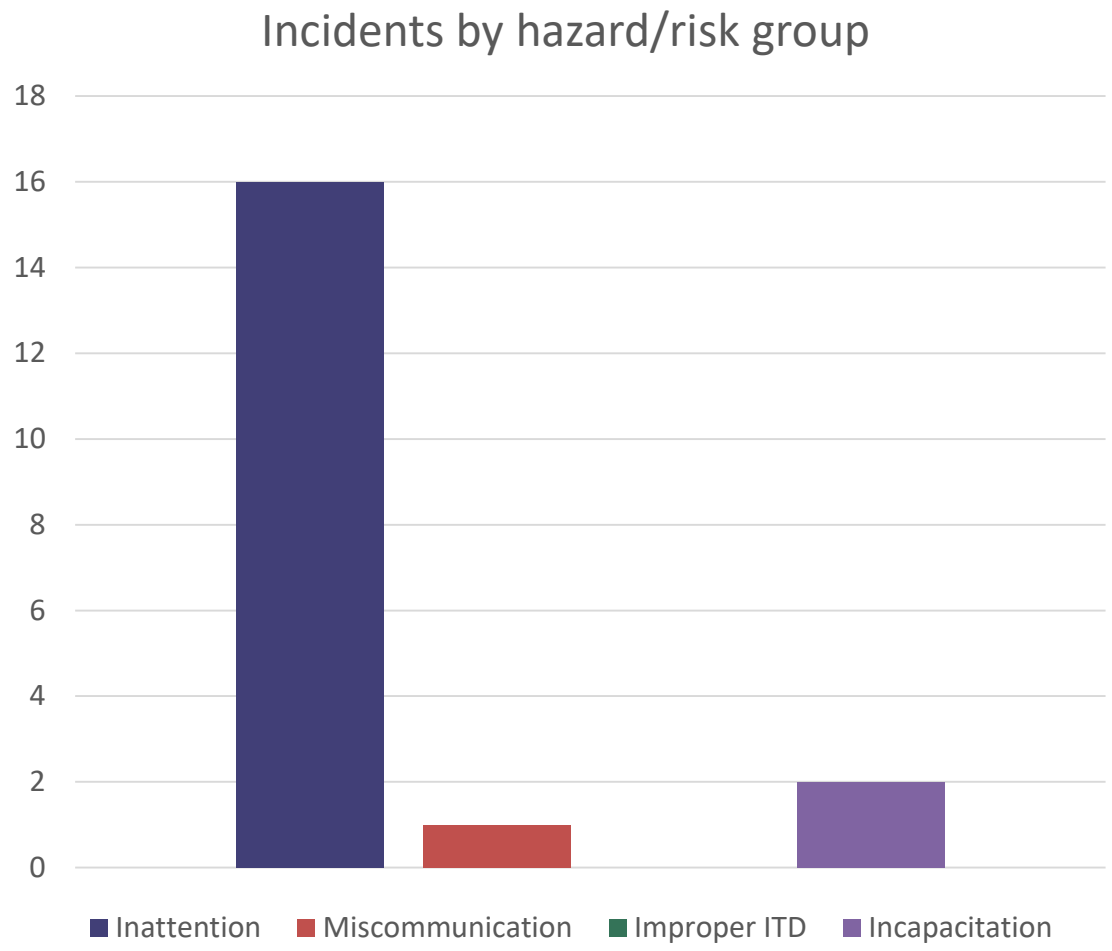
- Best risk mitigation?
  - **Work: 5**
  - **Diligence: 4**
  - **Zone: 3**
  - **Audits: 2**
  - **Flagger: 1**
- TTCI will investigate and clarify responses that appear initially to be unclear
  - "work" is highest response, but what is it referring to specifically?

Risks and Hazards and Incident Data Review

- TTCI developing use case scenarios
  - Goal: to address all known and identified roadway work group protection scenarios
- TTCI developed list of risks/hazards roadway workers face that are not addressed by current practices
  - Roadway Worker Risks/Hazards:
    - Inattention
    - Miscommunication
    - Improper ITD
    - Incapacitation

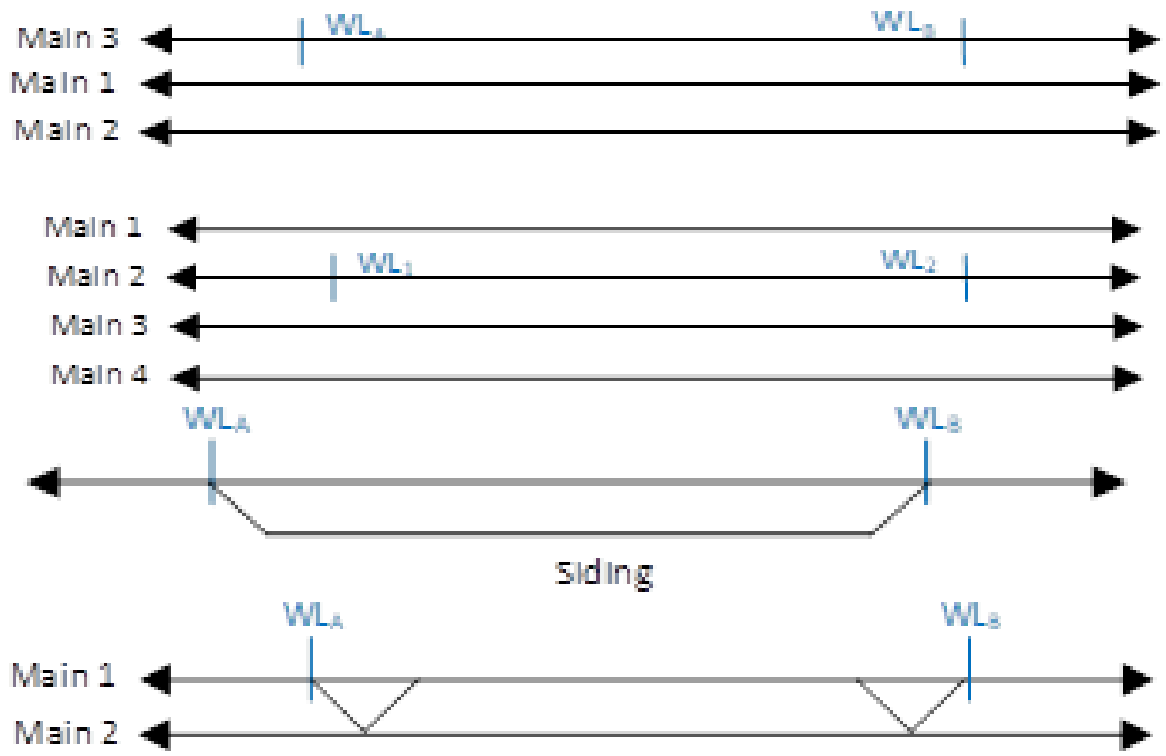
Review of NTD Data

- 11,196 rail related incidents in NTD
- Of those 19 could be classified as MOW/RWP related
  - 18 employee struck by
  - 1 failure to control on track equipment
- From those 19 incidents: 21 casualties
  - 10 fatalities
  - 11 injuries



Use Cases

- Track Configurations:
  - Single Track
    - Single w/ non-controlled spur
    - Single w/ siding
  - Double Track
    - Double w/ crossover(s)
    - Double w/ universal crossovers
  - Triple Track
  - Quad Track



Transit Use Cases

- TTCI has a good framework of operational scenarios
  - Track arrangements, and work group types that could be encountered potentially

- What TTCI needs is an understanding of standard methodology for establishing protection in transit rail
  - TTCI is going to further analyze the operating rules and RWP procedures that were provided as part of the survey effort to understand and identify weaknesses/commonalities between agencies and protection methods

Transit Use Cases

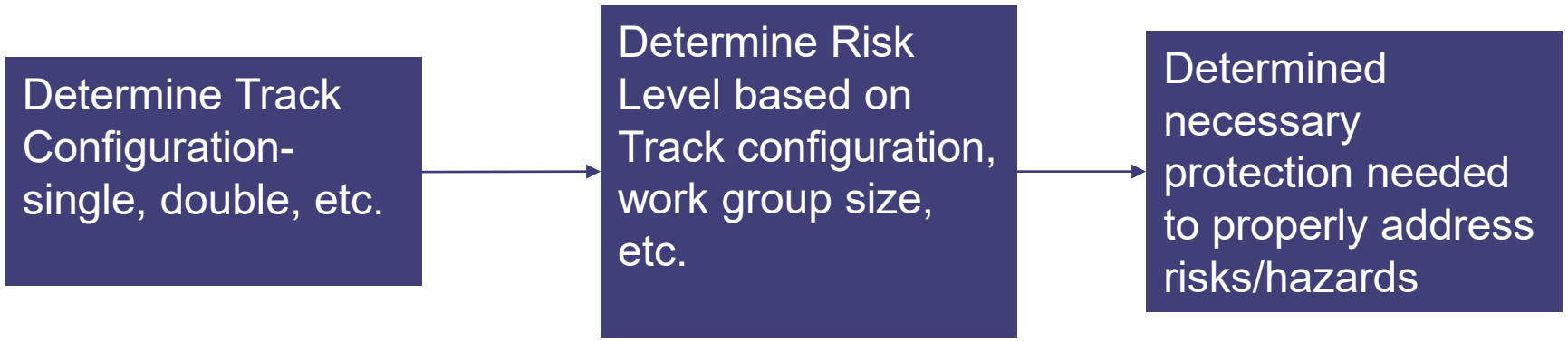
- Use Case Protection (ordered by risk level)
  - Lone Worker
  - Watchman lookout
  - Joint Occupancy/ Use of others' authority
  - Track Occupancy Permit
  - Working Limits under bulletin order

CONOPS and Use Cases

- Without a guiding standard (such as NORAC or GCOR):
  - There could potentially be infinite use cases possible
    - Every set of unique operating rules would require its own set of use cases
    - Current approach: develop generalized use cases that cover all track configurations and methods of protection
  - Next step is to develop CONOPS to cover use cases and track configurations
    - How does technology such as secondary warning devices overlay/interact with this CONOPS?

CONOPS and Use Cases

- Preliminary results of industry survey:
  - Show most agencies use FRA 214 or modified version
  - Use Cases will be keep generalized to enable adaptation
  - CONONPS will be "checklist" of steps to ensure protection



Develop CONOPS and Perform GAP analysis

- TTCI will develop a high-level concept of operations for the following:
  - Roadway worker location and monitoring system
  - Initial application of such a system
- CONOPS will be refined with input from AG and through GAP analysis

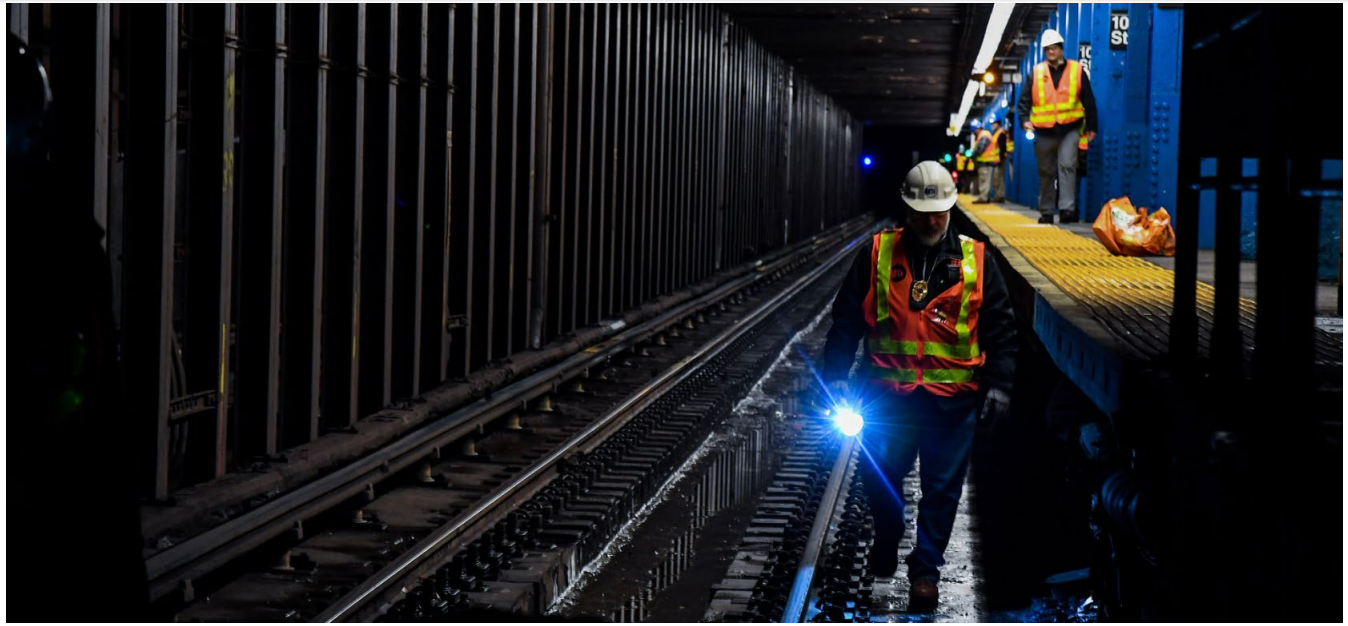


Photo: Marc A. Hermann / MTA New York City Transit

FTA Safety Research Demonstration Program

SECONDARY ROADWAY WORKER PROTECTION SYSTEMS

SRD RWP System Demonstrations

- HARSCO Rail/Protran – at WMATA (Red Line) and SacRT (LR)
- Miller Ingenuity ZoneGuard – at Maryland MTA (LR)
- Metrom Rail (Aura) – at NY MTA (subway)
- Bombardier TrackSafe – at MARTA (Green Line)

WMATA – HARSO Rail/Protran

- Wireless wayside transponders (every 600-800 feet)
- Wearable armband devices – communication via daisy chain configuration (through wireless spread spectrum radio frequency native to the system)
- When present, wayside devices in close proximity to workers display flashing amber strobe lights (lights "follow workers" as they move along the tracks)
- Provides visual signal to approaching train operators – response: deceleration

WMATA – HARSO Rail/Protran

- Optical sensors are mounted on each wayside device, positions to detect trains approaching work zones
- On vehicle approach, worker armbands vibrate, illuminate, and emit a warning sound
- Workers are to clear the roadway
- Back-end software show OC personnel or others monitoring activity to view worker locations, movement, and times when workers entered/exited the roadway

WMATA Project Update

- Installation on WMATA's Red Line began in March 2019
- All system hardware/infrastructure installation, including 514 wayside devices, completed in September 2019
- Project includes 9 months of data collection

SacRT – HARSO Rail/Protran

- Enhanced Employee Protection Warning System (EEPWS) with Dispatcher/Employee in Charge Software Program (D/EICSP)
- D/EICSP – initiates warning and confirmation between all transit workers and employees in charge, including dispatchers and train operators
- Electronic, numeric "handshake" confirms workers are clear of track
- Vehicle mounted devices in cabs of 97 light rail vehicles
- Software installed on handheld mobile devices allows crews to secure and release work zone restrictions on train movement

SacRT – HARSO Rail/Protran

- Vehicle-mounted advanced warning device alerts train operator that the train is approaching a work zone and alerts workers in the zone that a train is approaching
- Volume-adjustable audible alert is issued that ranges from 66 to 94 decibels (measured from three feet of the device) – workers alerted at least 15 seconds prior to train arrival

SacRT Project Update

- Final product installation completed in Fall 2019
- Software updates completed in December 2019
- System is now fully functional
- LR operations is in the training phase – technology and agency policies
- Project includes 9 months of data collection

Maryland MTA – Miller Ingenuity ZoneGuard

- Fixed-location deployment of ZoneGuard
- Entire length of Maryland MTA's at-grade LR mainline
- Designed to provide warning roadway workers 25 seconds prior to LRV arrival
- Alerts train operators when approaching work zones

Maryland MTA – Miller Ingenuity ZoneGuard

- Train Detection Modules (TDMs) @ strategic locations
  - Register LRVs entering/exiting mainline track
  - Sensors for location detection and monitoring all LRVs on the line
  - Strobe up/downstream from workers to notify train operators as they approach the work zone

Maryland MTA – Miller Ingenuity ZoneGuard

- Train Alert Modules (TAMs) – placed between TDMs in close proximity to work crews
  - Generate visual alarms for roadway workers when receiving a "train approach" message from the TDMs
  - Provides reinforcement of train detections provided by the TDMs via LRV on-board sensors

Maryland MTA – Miller Ingenuity ZoneGuard

- Wearables (WArNs) alert workers when TDM signals an approaching train
  - 20 EIC wearables – includes a precautionary test to ensure all workers are protected
  - 40 Watchman/Lookout Wearable (WLW)
  - 100 Worker Wearable (WW) with "confirm" button

Maryland MTA Project Update

- Testing phase began in February 2019
- Installation of train detection units in August 2019
- Fully functional
- Web portal established to collect/maintain performance data
- 9 month data collection and analysis phase

MTA/NYCT – Metrom Rail
Aura System

- Purpose of the demo – to evaluate if the AURA system could provide workers a minimum of 15 seconds advanced warning of oncoming trains in two configurations
  - One wayside module communicating with train
  - Three wayside modules each communicating a work zone to a train

MTA/NYCT – Metrom Rail
Aura System

- Two train antennas provide distance and communication to the wayside
- Safety vest-equipped personnel modules (PMs) activate the work zone
- Wayside module with antennas transmit distance and communication data with train
  - Audible alarm and visual strobe on wayside
  - Audible alerts and visual strobes to PMs
  - Workers must confirm alarm to silence both the personnel and wayside modules

MTA/NYCT – Metrom Rail
Aura System

- User Interface Module informs train operators:
  - Number of workers in work zone
  - Distance of train from workers
  - How many workers confirmed their alarm
  - Train operators must also confirm to silence the alarm
- Control module provides central connection, diagnostic status, and logged event storage for train modules

MTA/NYCT – Metrom Rail
Aura System

Train Antenna

Wayside Module

Train Control Module

Worker Protection Vests

MTA/NYCT Project Update

- Initial system testing in July 2018
- November 2018 – Metrom issued proof of concept demonstration report
- Final project report issued in January 2019
  - Radio-based (ultra wide band) system did provide 15 second warning to workers
  - Rail worker vests need to be equipped with at least two UWB radio-based antenna to ensure sufficient detection and warning capabilities

MARTA – Bombardier TrackSafe II

- Deployed on northern sector of Red Line
- 9 Wayside Access Units (WAUs) – provide authorized access to the wayside by verifying worker identification and qualifications with rail control

MARTA – Bombardier TrackSafe II

20 Tag In Units (TIUs)

- Provide safety and audible alerts to track workers
- Includes self-health monitoring

20 Operator Warning Lights (OWLs)

- Visual and audible alerts to rail and equipment operators about workers on track
- Integrated radar – speed and direction

MARTA – Bombardier TrackSafe II

- Evaluate the effectiveness of the technology in aerial track, tunnel, curved, and those section parallel to highway
- Bombardier training to MOW workers in November 2019
- Demo underway – data collection/evaluation for 6 months (est. June 30, 2020)

Questions? Thank you!

Large Group Discussion

Public Comments

Break

FTA

FEDERAL TRANSIT ADMINISTRATION

Transit Advisory Committee for Safety (TRACS)

FTA Standards Program Research: Mitigations for Trespasser and Suicide Fatalities and Injuries

Dr. Pei-Sung Lin
Center for Urban Transportation Research

February 25, 2020

U.S. Department of Transportation
Federal Transit Administration

Task 1 – Event Examination and Literature Review

Definition of Trespassing

- Trespassers are illegally on private railroad property without permission. They are most often pedestrians who walk across or along railroad tracks as a shortcut to another destination. (FRA)
- Some trespassers are loitering; engaged in recreational activities such as jogging, hunting, bicycling, snowmobiling, or operating off-road, all-terrain vehicles (ATV).

Snapshot – Magnitude of Trespassing

The U.S. Railroad System

775
Railroads

140,000
Route Miles of Track

209,000
At-Grade Railroad Crossings

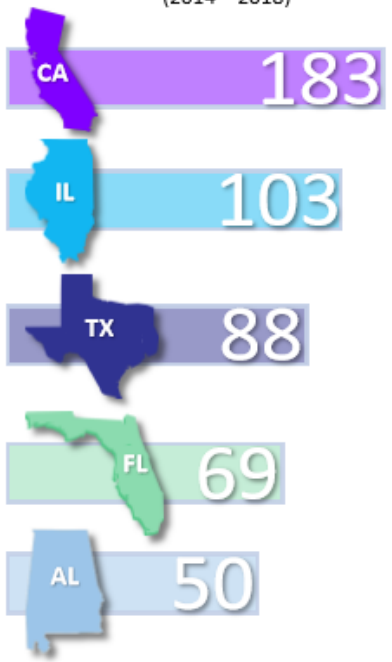
Source: FRA – Railroad Crossing Safety and Trespass Prevention

5-Year Crossing Trends

Fatalities

262 (2014) → 270 (2018)

Top 5 for Crossing Fatalities
(2014—2018)

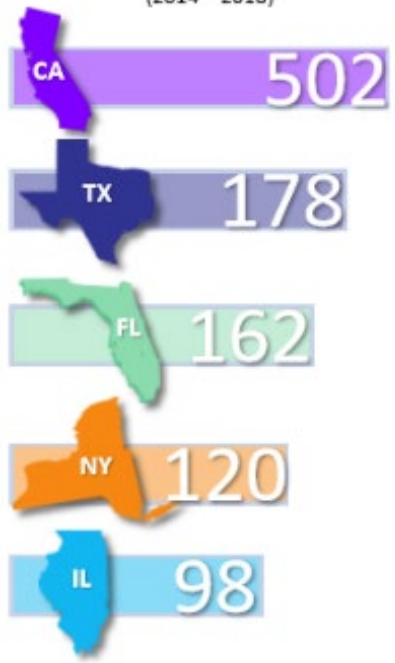


5-Year Trespassing Trends

Fatalities

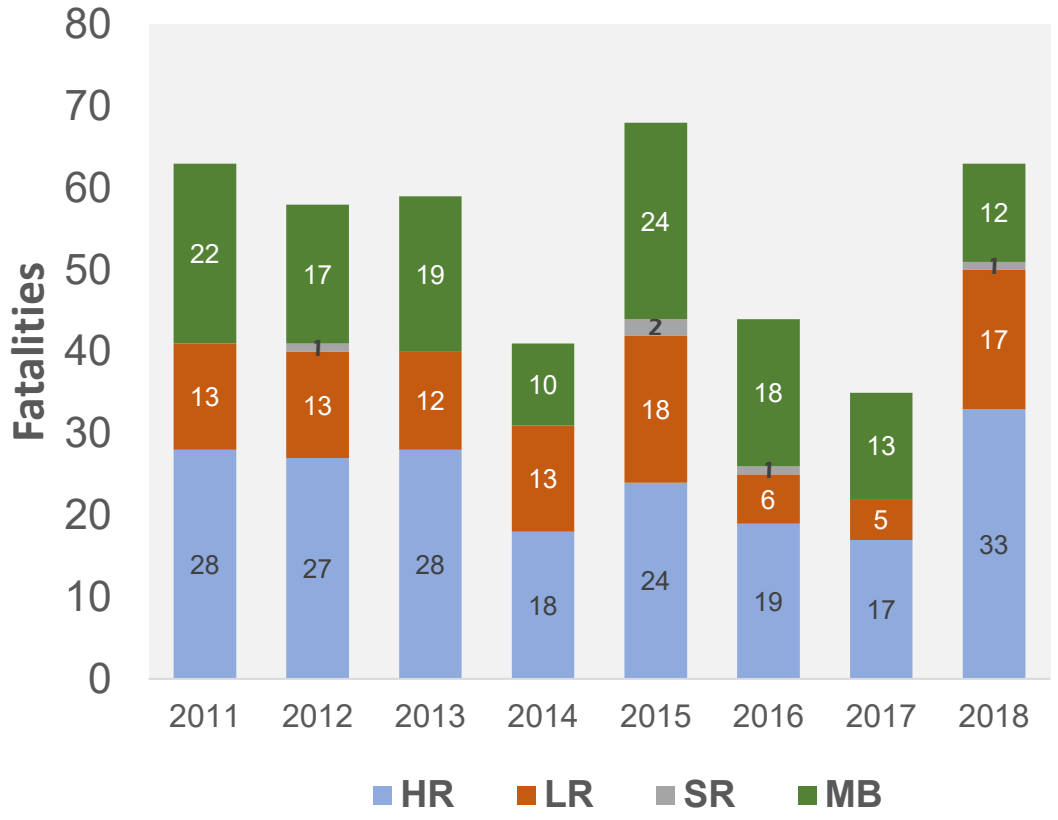
470 (2014) → 570 (2018)

Top 5 for Trespassing Fatalities
(2014—2018)



Trespasser and Suicide Fatalities

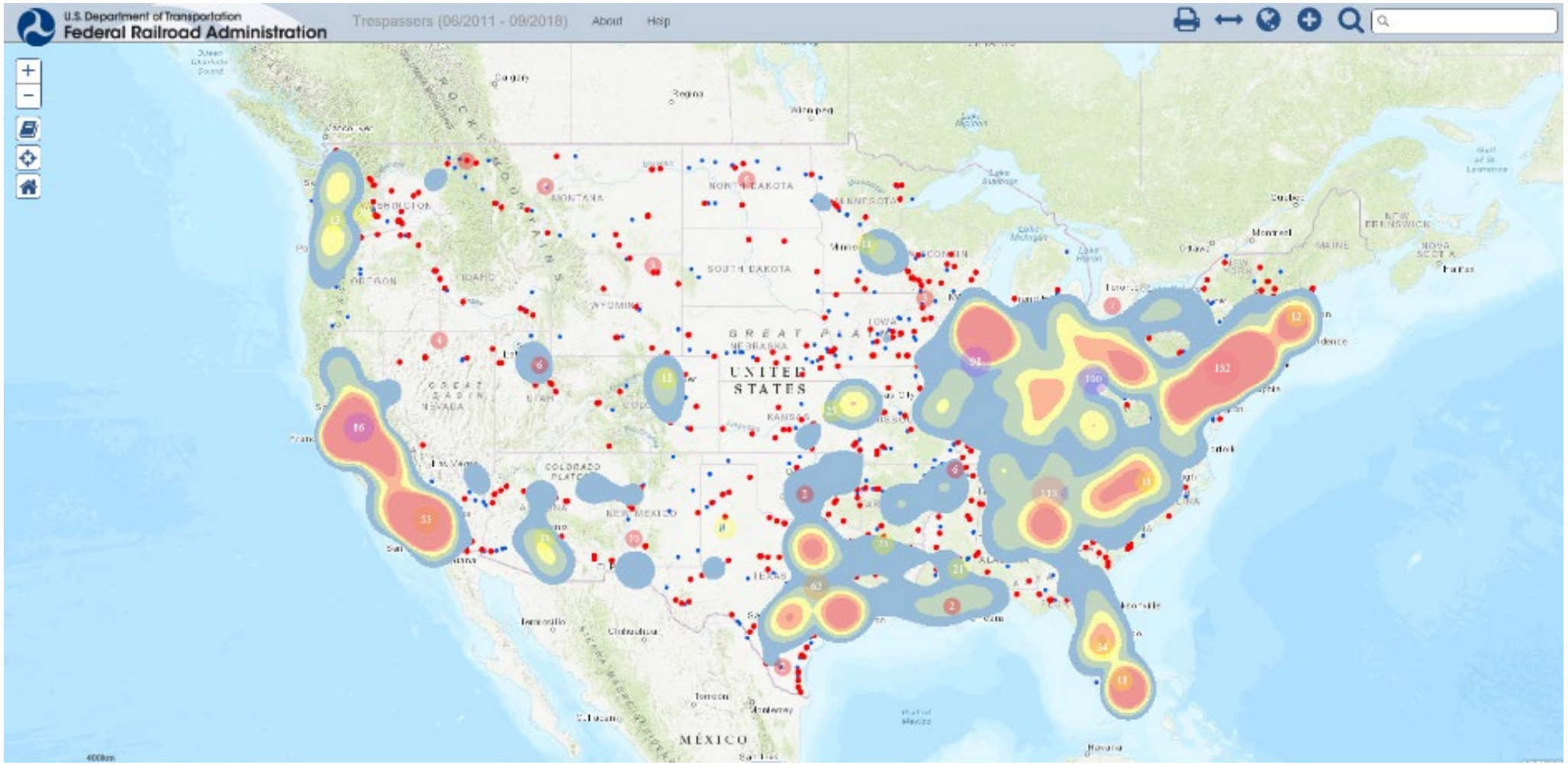
Trespasser Fatalities: 2011 – 2018



Suicide (Fatalities): 2011 – 2018

Source: FTA Database: SSTimeSeries-May 2019-MajorOnly-190905.xlsx

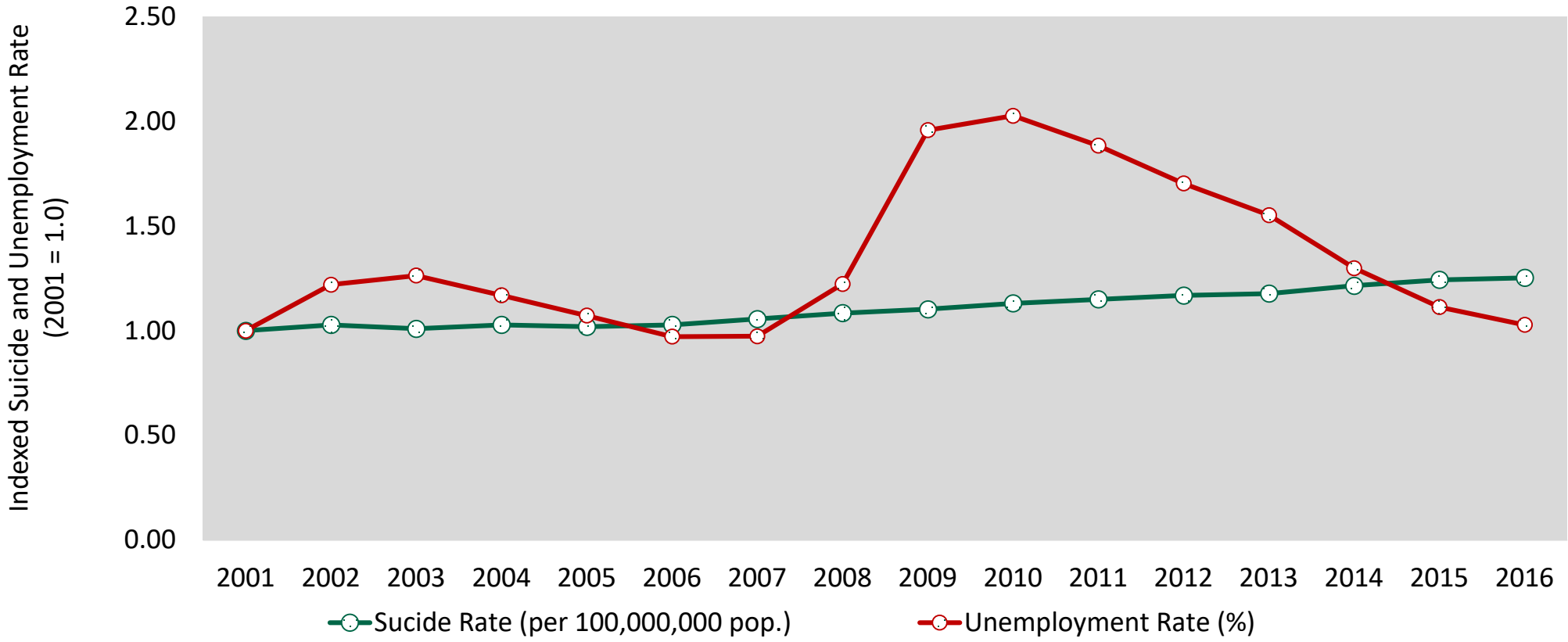
FRA Trespassing and Suicide Heatmap



Overall Trespass and Suicide Fatality and Injury Trend

- Rail suicide rates vary widely among countries: 1.3% in Canada,12% in the Netherlands, and less than 1% in the US.
- Each day, on average, in the US, 3 people are killed or injured while trespassing on railroad property, including more than 1,100 pedestrians in 2017.
- Approximately 70% of all railroad-related deaths in the US are the result of trespassing and suicide.
- 30% of fatalities that occur on the rail system result from an intentional act of suicide, similar to trespass casualties on segments of railroad ROW other than grade crossings.
- Male-to-female rail suicide ratios are 3:1 to 3.5:1, which closely parallels the gender ratios for overall suicide statistics.
- The mean age of railroad suicide victims was somewhat consistent over several studies: 39 - 45 years old.
- Saturdays and Sundays had the highest number of fatalities, at around 3:00 AM, followed by 1:00 – 2:00 AM, and the highest number of injuries (around 4:00 AM, followed by 1:00–3:00 AM), followed by Fridays. Time of day and day of week showed some possibility of drinking at the time of trespassing/ suicide.

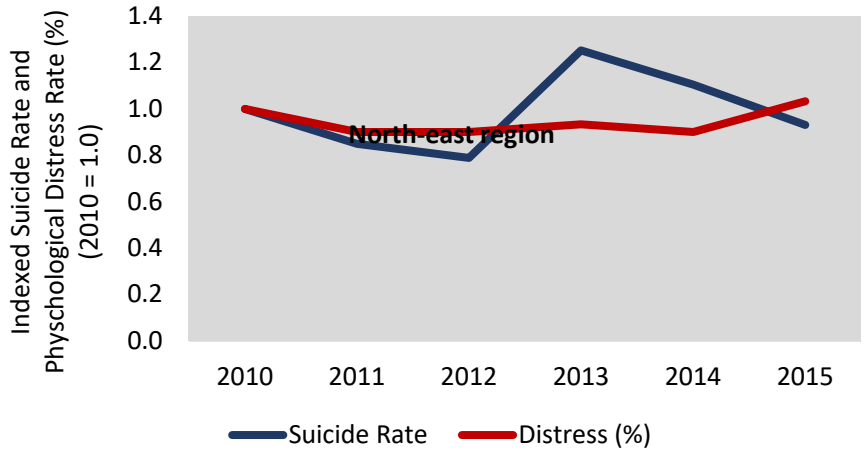
Correlation with Economic Condition and Suicide Trend

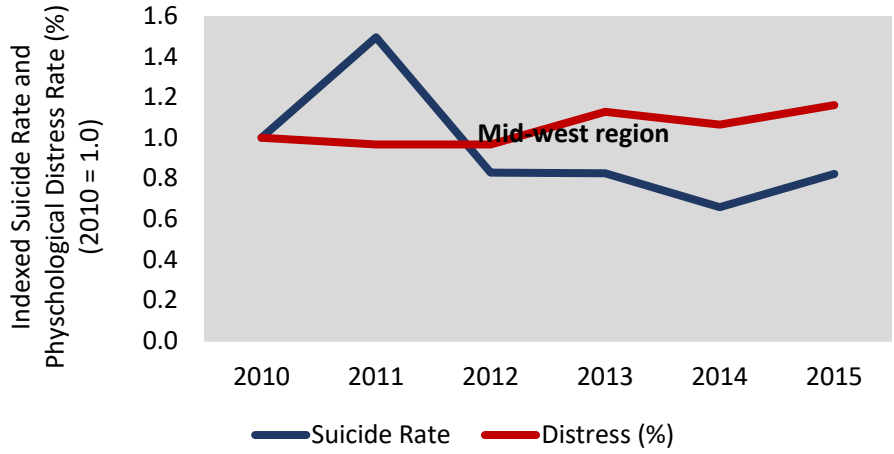


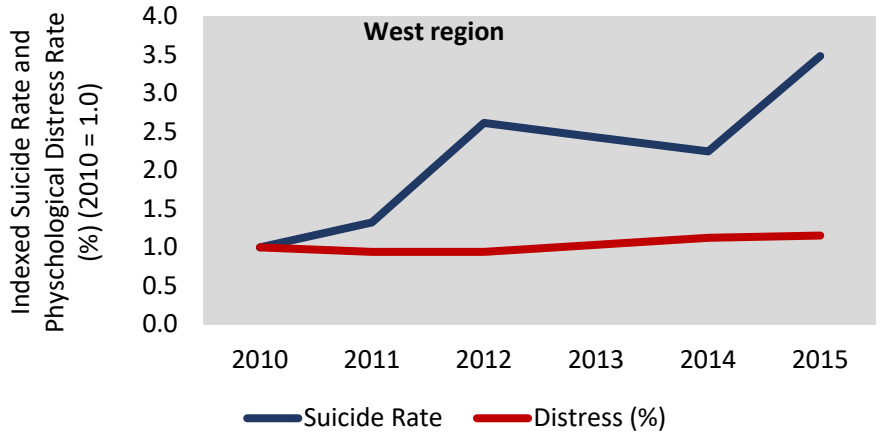
Indexed Suicide Rate per 100,000,000 population and Employment Rate (%) over Time (2001 to 2016)

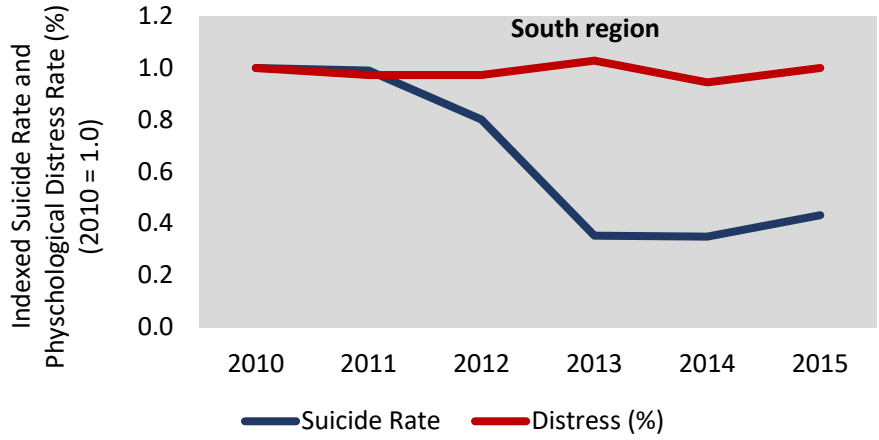
Sources: Bureau of Labor Statistics and Centers for Disease Control and Prevention (CDC), 2019.

Correlation with Mental Distress and Suicide Trend









Sources: CDC

Trespassing Prevention Approaches

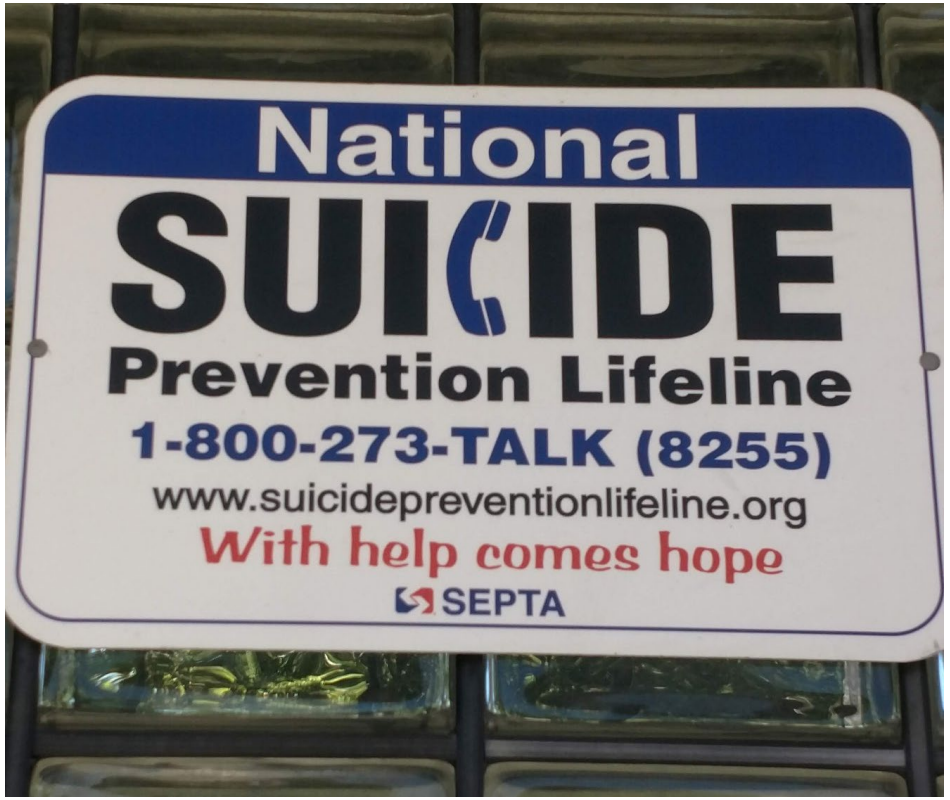
- Community outreach
- Infrastructure modifications
- Procedural modifications
- Signage
- Driver training
- Existing and emerging technologies

Suicide Prevention Approaches

- Community-based collaboration on reduction/prevention of suicidal ideation
- Reduction of perceived viability of railroad ROW as a means for suicide
- Prevention of access to ROW via physical barriers
- Increased ability to avoid a train-person collision
- Reduction of lethality of train-person collision

Suicide Prevention Approaches

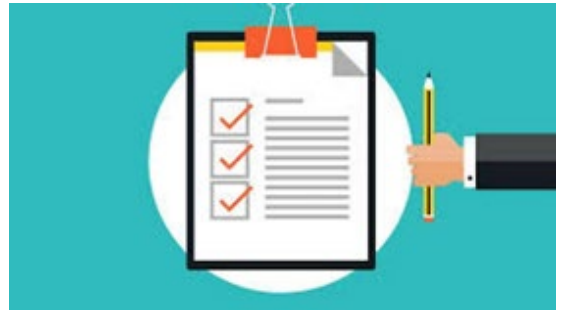
- Use of suicide prevention hotlines/ signage
- Coordination with social service and crisis intervention centers
- Examination of potential technologies or countermeasures to detect or deter suicide attempts
- Improvement of data collection (as part of assessment of the preventive techniques)



Task 2 – Rail Transit Agency and Commuter Rail Case Studies

The research team utilized CUTR Transit Standards Working Group rail transit agencies and commuter rail agencies to learn about the programs they have in place to address trespasser and suicide injuries and fatalities

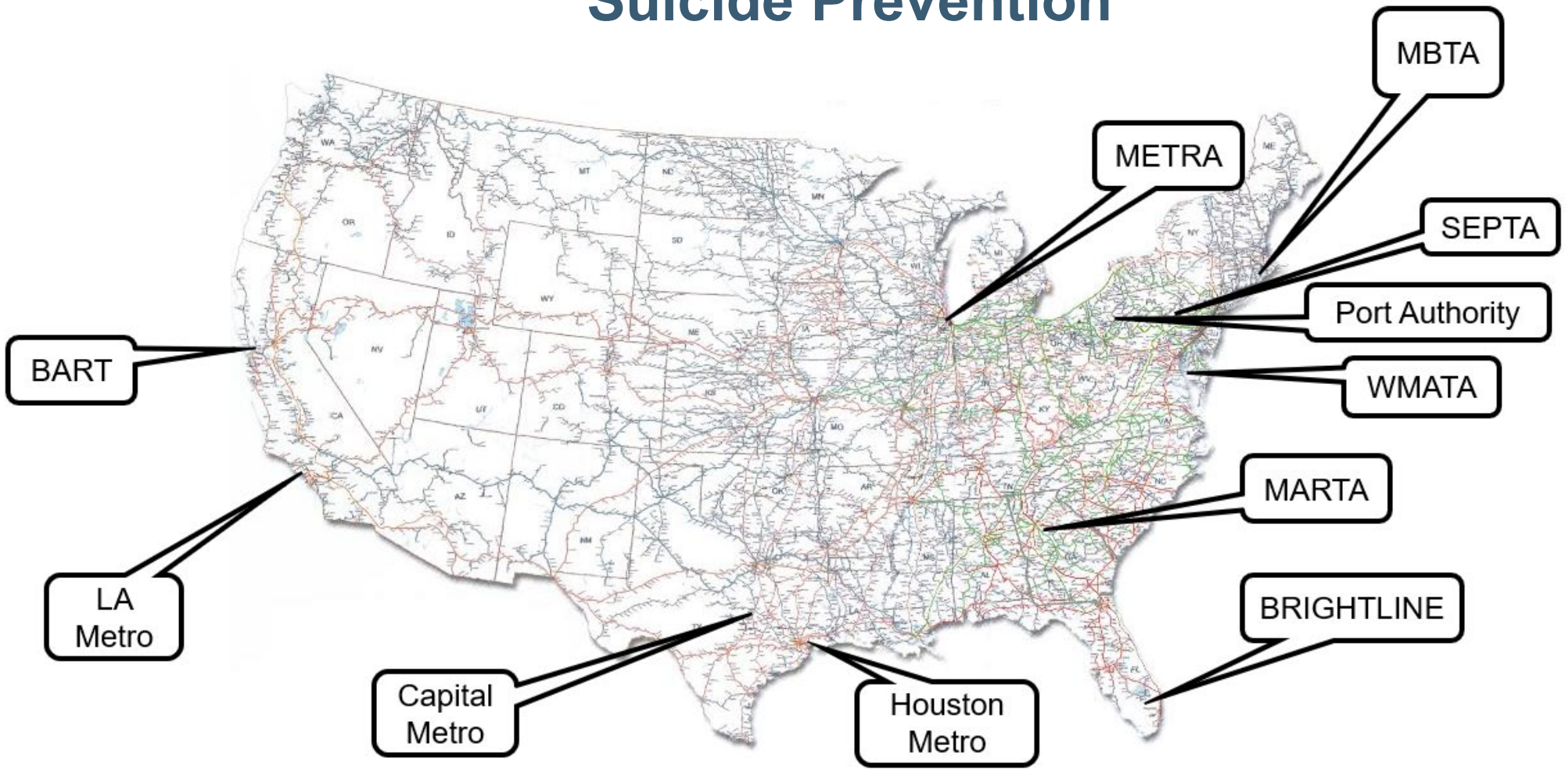
- These case studies included baseline data (as defined by each agency) and the current status of trespasser and suicide injuries and fatalities
- The survey identified **(1) community outreach efforts, (2) infrastructure modifications, (3) procedural modifications, (4) signage, (5) driver training, (6)coordination with social service and crisis intervention centers, (7) new technologies,** and other related activities
- Any self-identified successes were reported in the surveys



Timelines for Online Survey and Teleconference Call

- Contacted and provided advance notification on online survey to **11 rail agencies** as part of CUTR's Transit Standards Working Group
- Designed and tested the survey internally prior to distributing to the agencies
- Distributed the surveys to the 11 rail agencies on **December 5, 2019**
- Set up follow-up teleconference calls with the agencies in **January 2020**
- Gathered and summarized the agency experiences through these surveys
- Completed summarizing the survey and the follow-up teleconferences by the **1st week of February**

Survey Participants for Railroad Agencies on Trespass and Suicide Prevention



Agency Information

Historical Information & countermeasures or programs to prevent trespassing and suicides

- Community Outreach
- Infrastructure Modifications
- Procedural Modifications
- Operator Training
- Signage
- Social Services
- New Technologies

Follow-up Meeting Call

Results – Trespassing Incidents Over the Years

Definition of trespasser varies by agency

- SEPTA, WMATA, and MARTA – highest trespassing incidents
- Data retention policies in some agencies only retain post-2016 data
- Port Authority and Houston METRO – least trespassing incidents (Houston METRO has no defined "no trespassing" laws due to their operating environment)
- METRA, MBTA, and SEPTA – highest trespasser fatalities
- METRA – trespasser fatalities pose a challenge
- Port Authority – zero trespasser fatalities
- MARTA, WMATA, and METRA – highest trespasser injuries
- Port Authority – zero trespasser injuries

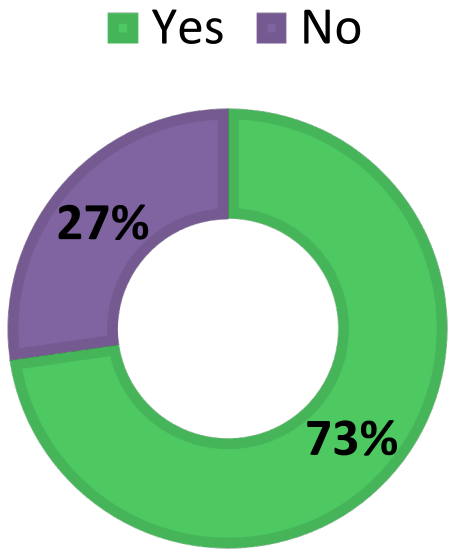
Results – Suicide Incidents Over the Years

Determination of suicide/suspected suicide varies by agency

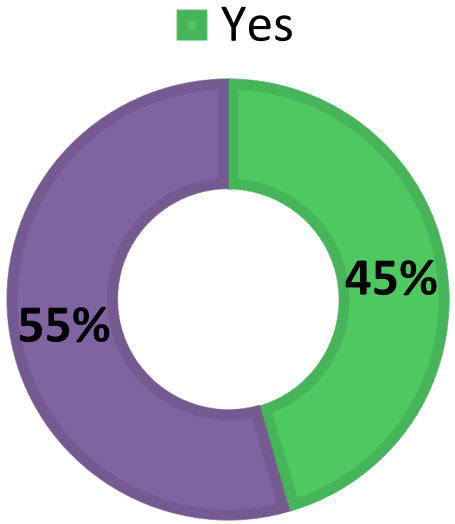
- MARTA – highest suspected suicide attempts
- SEPTA, MBTA, and Capital Metro do not track suspected suicide attempts
- Port Authority and Houston METRO – fewest suspected suicide attempts
- METRA, MBTA and BART – highest suicide/suspected suicide fatalities
- Capital Metro did not track suicide/suspected suicide fatalities
- Port Authority – fewest suicide/suspected suicide fatalities
- MARTA, WMATA, and BART – highest numbers of unsuccessful suicidal attempts
- SEPTA, MBTA, and Capital Metro do not track unsuccessful suicidal attempts
- Brightline – least numbers of unsuccessful suicidal attempts

Results – Summary of Interventions to Prevent Trespassers and Suicide Attempts

COMMUNITY OUTREACH PROGRAMS (N=11)

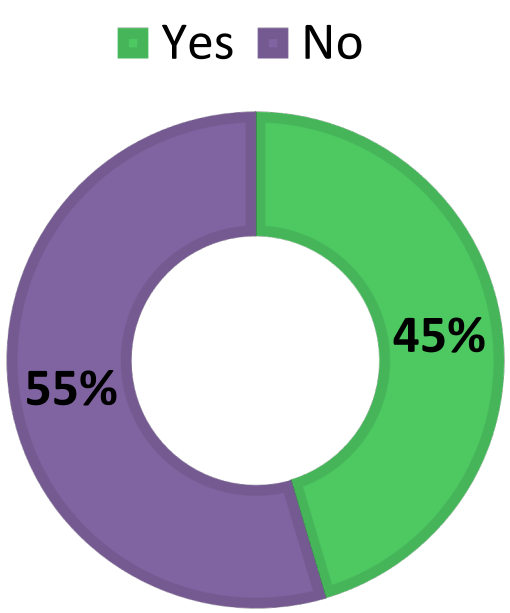


RAIL INFRASTRUCTURAL MODIFICATIONS (N=11)

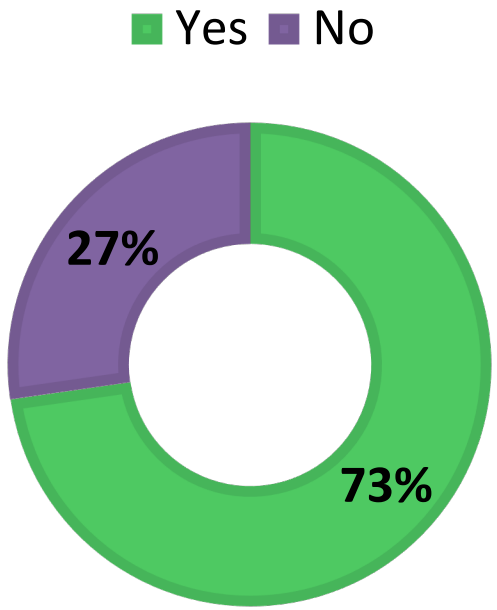


Results – Summary of Interventions to Prevent Trespassers and Suicide Attempts

PROCEDURAL MODIFICATIONS (N=11)

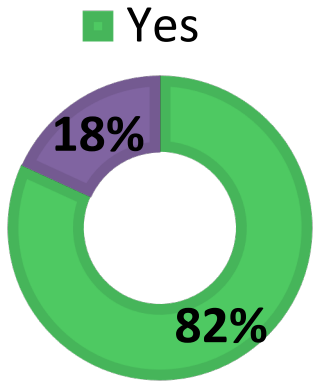


RAIL OPERATOR TRAINING MODULES (N=11)

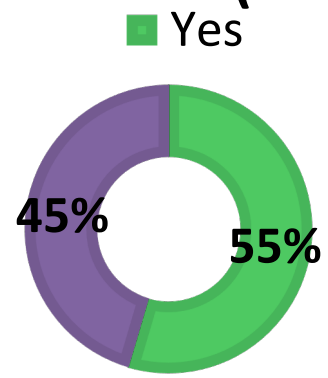


Results – Summary of Interventions to Prevent Trespassers and Suicide Attempts (cont'd)

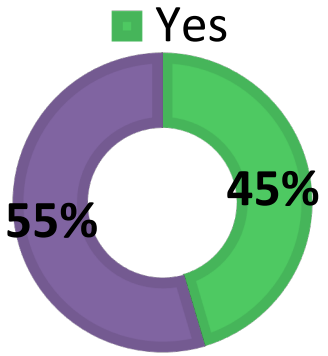
SIGNAGE INSTALLATIONS (N=11)



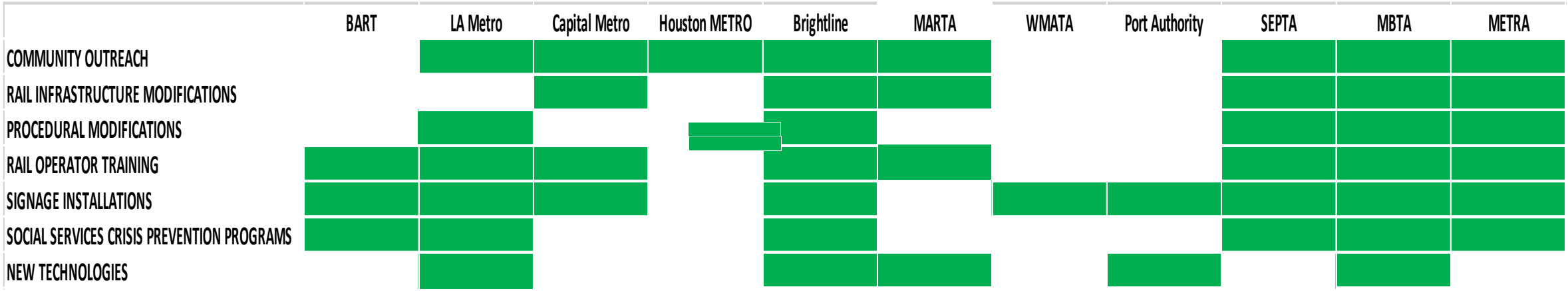
SOCIAL SERVICES/CRISIS INTERVENTION PROGRAMS (N=11)



NEW TECHNOLOGIES INTRODUCED OR DEPLOYED…



Results – A Snapshot of Interventions Across Agencies

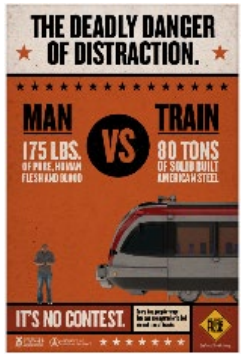


- 2 out of 11 agencies (Brightline and MBTA) have instituted all possible types of interventions to reduce trespassers and prevent/reduce suicides.
- In some cases, agencies do not institute multiple interventions as they have not been faced with a significant number of trespass/suicide incidents.
- **Top 3 adopted strategies for reducing trespassing and suicides** – (1) signage installations; (2) community outreach programs, and (3) changes to rail operator training.
- 5 out of 11 agencies surveyed had introduced or deployed new technologies aimed at reducing trespassing and suicides.

Results – Community Outreach Programs

	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
COMMUNITY OUTREACH		■	■	■	■	■			■	■	■

- Most agencies are utilizing **Operation Lifesaver Programs and Tools** as part of their community outreach efforts
- **Other community outreach efforts** – Respect the Train (SEPTA), Samaritans (MBTA), Watch Their Step (SEPTA), BuzzBoxx (Brightline)
- **Targeted campaigns** – Rail Safety Week (September); other targets – Community Safety Day (May, SEPTA)
- **Target demographics** – age/income groups, school children, transient population, mentally distressed groups



Operation Lifesaver Campaigns

Samaritans (MBTA)

BuzzBoxx (Brightline) Mobile Barber Shops

Results – Rail Infrastructure Modifications

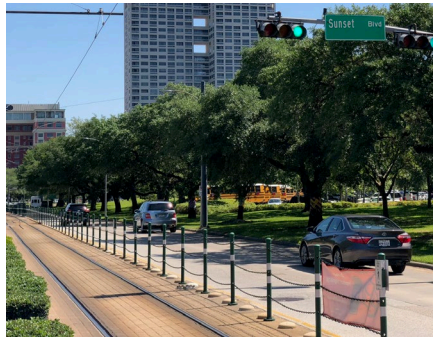
	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
RAIL INFRASTRUCTURE MODIFICATIONS			■		■	■			■	■	■

- Some agencies have deployed **fencing** (MBTA, MARTA, SEPTA, METRA, Houston METRO and Capital Metro) to prevent crossing tracks at non-designated areas
- **Gate upgrades** meeting FRA standards
- Extension of **audible bells** to continue while gates are down (Houston METRO)
- Other current modifications:
  - **Gates** at the end of platforms (SEPTA)
  - **Refuge space** under platforms (anti-suicide pits) (MARTA)
  - **Power control** if someone falls down (MARTA)
  - Platform screen doors (future project – BART)

Fencing (SEPTA)

Mid platform fencing

Refuge pits (MARTA)
Photo Source: AJ Joshi, MARTA



Fencing (Houston METRO)
Photo Source: Kane Sutton, TTCI

Results – Procedural Modifications

	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
PROCEDURAL MODIFICATIONS		■		■	■				■	■	■

- Operator **reporting** requirements (SEPTA)
- **Near Miss Reports** (METRA)
- Commuter Rail Accident Reduction **Committee** (MBTA)
- Transitioned from sounding the bell to **sounding the horn** when entering the station to avoid pedestrian contact (Houston METRO)
- Increased **patrolling** along right of way (Brightline)
- Speed reduction along grade crossings has been discussed but not implemented – pilot tests did not show much benefit

Metra says new speed policy adopted after near-miss at Mokena rail crossing

The new rule…requires that in situations where engineers are given permission by dispatchers to pass a "stop" track signal, they must now proceed at a restricted speed of 20 mph or less until the train reaches the next track signal that indicates the train can proceed at the maximum authorized speed, no matter what cab signal they receive, Metra said. The reduction in speed, Metra said, will decrease the stopping distrance required for a train in the vent of a gate malfunction at a grade crossing or other emergency.

Source: Chicago Tribune

Inspections – Brightline

Source: SEPTA

Results – Rail Operator Training

	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
RAIL OPERATOR TRAINING	■	■	■		■	■			■	■	■

- Most agencies have developed operator training modules (for new and existing hires) that outline procedures for
  - reporting trespassing (MARTA, SEPTA)
  - suicide awareness (MARTA)
  - responding to incidents involving death, injury and suicide (BART)
  - noticing and reporting errant behavior on rail tracks (LA Metro)
- Other initiatives: Metra "QPR" – question, persuade, refer
- Upcoming Initiatives: Capital Metro (via Herzog)

Errant behavior - METRA

Incident response

Source: Herzog

QPR For Suicide Prevention
Ask a Question, Save a Life

Results – Signage Installations

	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
SIGNAGE INSTALLATIONS	■	■	■		■		■	■	■	■	■

- Most agencies have installed trespassing/suicide-specific signage on their property
  - NO TRESPASSING
  - Samaritan Signs (MBTA)
  - National Suicide Prevention Lifeline
- Signages along railroad tracks, crossings (Brightline, Capital Metro), entrances to tunnels (Port Authority), end of platforms (Authority, BART, METRA, WMATA), and areas where there is no fencing (Capital Metro)
- Documented increase in calls to Hotlines after signage installed (LA Metro, BART)

LA Metro

Samaritans signs MBTA

Source: Volpe

Trespass signs SEPTA

TriMet

SEPTA

Results – Social Services/Crisis Intervention Programs

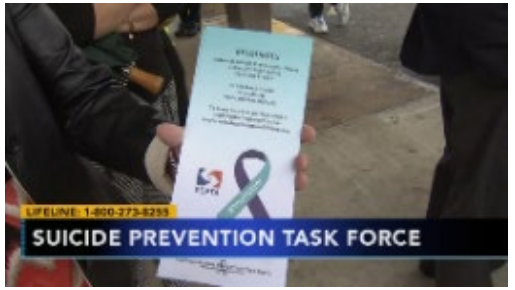
	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
SOCIAL SERVICES CRISIS PREVENTION PROGRAMS	■	■			■				■	■	■

- **Suicide Prevention Hotline** – station poster and signage directing troubled persons to seek help (BART, MBTA)
- Regional Suicide Prevention Task Force of Southeastern Pennsylvania (SEPTA)
- **Mental Health Suicide Awareness Training** and outreach (METRA)
- Training classes for service attendants (LA Metro)

Results

- Increase in the number of calls received at the Hotline (BART, MBTA)

BART paper tickets – Suicide Hotline message



Source: SEPTA

NATIONAL SUICIDE PREVENTION LIFELINE
1-800-273-TALK (8255)
suicidepreventionlifeline.org

CALL 211 HELPLINE

Results – New Technologies

	BART	LA Metro	Capital Metro	Houston METRO	Brightline	MARTA	WMATA	Port Authority	SEPTA	MBTA	METRA
NEW TECHNOLOGIES		■			■	■		■		■	

- **Technologies Deployed**
  - Laser Intrusion Detection System for tunnels (Port Authority)
  - See say app to report trespassing (MARTA)
  - Camera analytics to focus patrolling in critical areas (MARTA)
  - Digital billboards (MBTA)
- **Technologies Evaluated/Considered for Deployment**
  - Drones with IR sensors – assist patrolling (Brightline)
  - PlatformSafe (MARTA)
- **Technologies Interested**
  - On–board detection (Brightline)
  - Video analytics (Brightline)
- Most advanced technologies not yet mature for deployment
- Cost concerns

Digital Billboards (MBTA)

Blue Light Platforms - Japan

Drone Technology

South Florida Desperate for Ways to Stop Train Suicides

Brightline will test infrared sensors and drones in efforts to prevent suicide by train. Since the beginning of operation, there have been more than one death per month, and "about one for every 29,000 miles the trains have traveled."

JEFF OSTROWSKI, THE PALM BEACH POST | DECEMBER 5, 2019

Trespassing/Suicide Mitigation – Successes

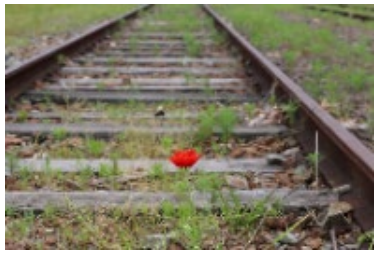
- **Mitigation Measures**
  - Community outreach efforts (MBTA, SEPTA, METRA)
  - Signages (SEPTA, METRA)
  - Operator Training (BART, Brightline)
  - Suicide Prevention Hotlines (BART)
  - Social Service and Crisis Intervention Programs (MBTA, SEPTA)
- **Recommendations**
  - Cultural, educational shift, mental health support
  - Install fencing, where critical/practical
  - Partnerships with suicide prevention agencies/hotlines
  - Social Media campaigns

Source: BNSF Railway

Source: Volpe

Suicide Prevention Resources

Source: Volpe



Mental Health Support

Task 3 – Identification of Effective Existing Systems and Potential Technologies

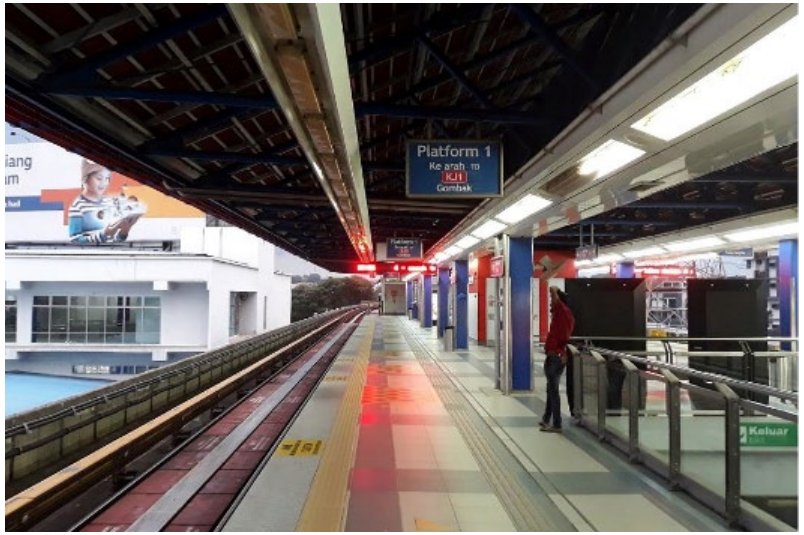
- **Trespassing Detection and Prevention**
  - Guideway Intrusion Detection Systems
  - On-Board Detection – SeeFar
  - On-Board Detection – Shift2Rail
  - On-Board Detection – Rail Vision
  - Crossing Obstacle Detection System – Mermec
  - Real-time Obstacle Detection for Railroad Crossing
  - Rail Side Detection – FLIR
  - Rail Side Detection – IK4 TEKNIKER
  - Long-Range Radar – Spotter RF
  - Long-range Acoustic Device (LRAD)
  - Aerial Drones
- **Suicide Prevention**
  - Platform Screen Doors
  - Suicide Pits
  - Blue Lights

Guideway Intrusion Detection Systems – Purpose

- Guideway Intrusion Detection Systems used to support the public and operational safety of the System
- Primarily at the platform edge where Platform Screen Doors are not used:
  - Not generally used for Manual or Semi-automatic Train Operations (GOA1 or GOA2) although some agencies now considering for supporting drivers (London, NYCT)
  - No known examples on GOA3, Driverless Train Operation –e.g. London Docklands
  - Most often used on GOA4, Unmanned Train Operation –e.g. Vancouver SkyTrain
- Intrusion detection systems also deployed at other potential access points to the guideway:
  - Tunnel entrance/exit
  - Level Crossings
  - Facilities such as yards

Guideway Intrusion Detection Systems – Existing

Platform Intrusion Emergency Stop (PIES) System



Source: KLIA2

Kuala Lumpur Kelana Jaya Line

- Unmanned Train Operation / Grade of Automation. Level 4 (UTO / GOA4)
- Motion/mass detection system - Monitored by CBTC system to stop train
- CCTV monitoring of platforms
- Roving Attendants

Detection based on:

- Mass dropped
- Person walking

False positives

- Garbage, Skateboards…
- Shock/vibrations

Guideway Intrusion Detection Systems – Existing (cont'd)

Optical Sensors

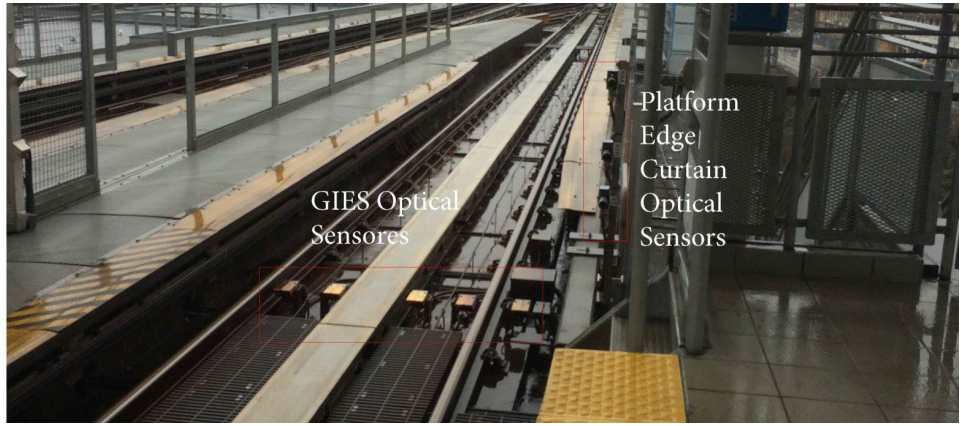
Vancouver SkyTrain–Millennium Line

- Unmanned Train Operation (UTO / GOA4)
- Optical intrusion detection systems
- CCTV monitoring of platforms
- Roving Attendants

Similar system on Canada Line, downtown to Airport and Richmond

False positives or nuisance alarms:

- Birds, animals
- Garbage, plastic bags, etc.



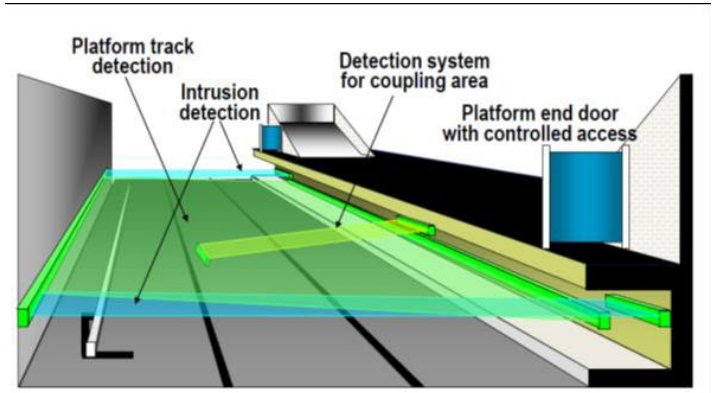
Any GIES obstruction of 1 second AND platform edge curtain trigger = Intrusion
GIES obstruction of > 10 seconds = Intrusion
Monitored by CBTC system to stop train

Guideway Intrusion Detection Systems – Existing (cont'd)

Optical and Radio Frequency (RF) Sensors

Nuremburg U-Bahn Radar Detection, Germany

- Unmanned Train Operation (UTO / GOA4)
- Laser light barriers / Honeywell RF Barriers
- CCTV monitoring of platforms

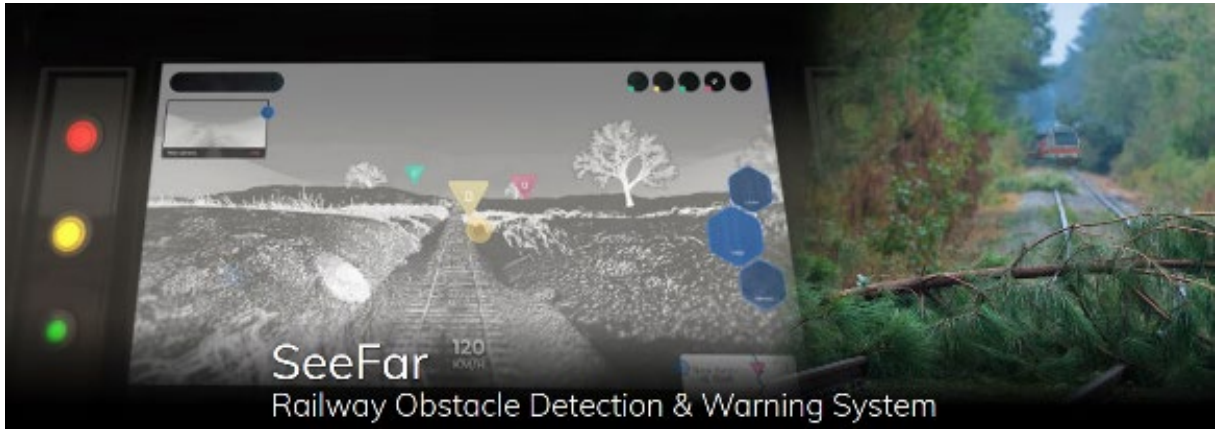


Emerging Technologies being Deployed

- Radar
- Video Analytics with Artificial Intelligence (AI) algorithms
- LIDAR (Laser Imaging Detection and Ranging)
- Use of Drones

On-Board Detection – SeeFar

- SeeFar Railway Obstacle Detection and Warning System



https://www.youtube.com/watch?v=LBxp7Gv1oDk

Source: IAI

On-Board Detection – Shift2Rail

- Integrated on-Board Obstacle Detection System for Railways
- Combination of sensors:
  - Stereo vision,
  - Thermal vision,
  - Night vision,
  - Laser scanner

https://www.youtube.com/watch?v=hUZDTHwNj3k Source: Shift2Rail

On-Board Detection – Rail Vision, Rail Safe

- Sensor integration and AI
- Automated early-warning system also being tested in Germany and Italy

https://vimeo.com/378487921 Source: RailVision LLC

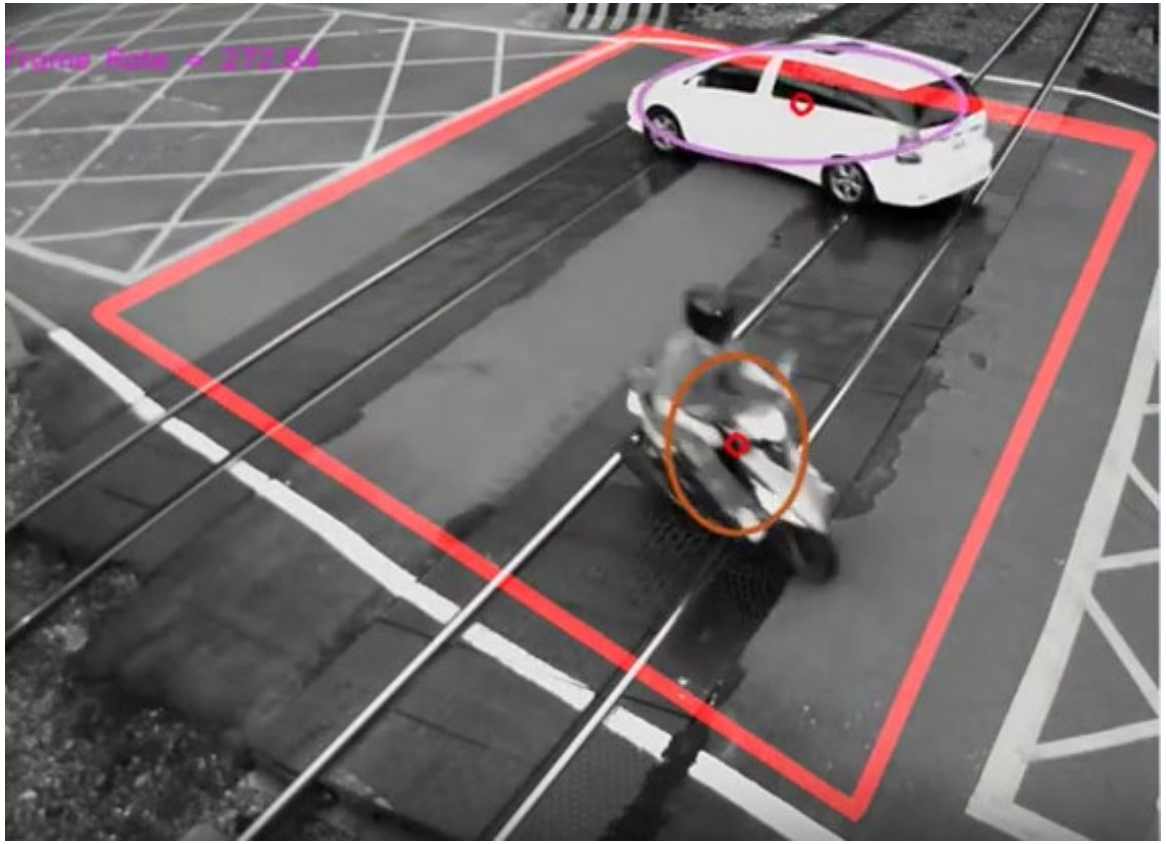
Crossing Obstacle Detection System – Mermec

Advantages and Benefits

- Ease of installation and adaptation to the area morphology
- Number of sensing units per installation reduced to the minimum compared to other technological solutions, e.g. micro-wave radar monitoring systems
- Simple configuration for the specific geometry of level crossing
- Reliability of performance in harsh weather conditions such as rain, snow and fog
- Composite fail-safe architecture based upon SIL4 principles
- Integration with level crossing protections systems and communication to the Interlocking

Source: Mermec Group

Real-time Obstacle Detection for Railroad Crossing



https://www.youtube.com/watch?v=K6eoQ0dwzN4

Rail Side Detection – FLIR

- Detect people on metro, tram, railway tracks and grade crossings
- Detect people in tunnels, regardless of the surrounding illumination
  - Detect people on tracks
  - Prevent damage to infrastructure
  - Enhance safety
- Prevent collisions between trains and vehicles at level crossings

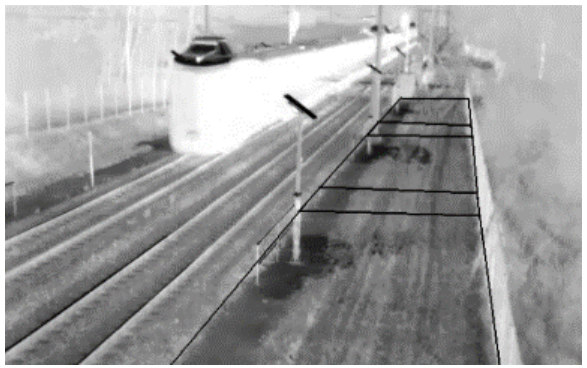
Source: FLIR Systems

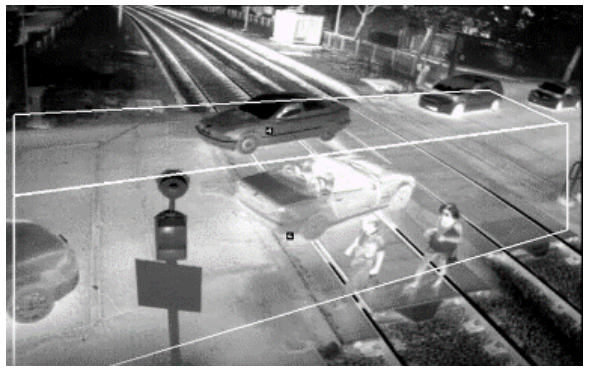
Rail Side Detection – FLIR (cont'd)

Examples of Automated Detection via FLIR Thermal Detection Systems

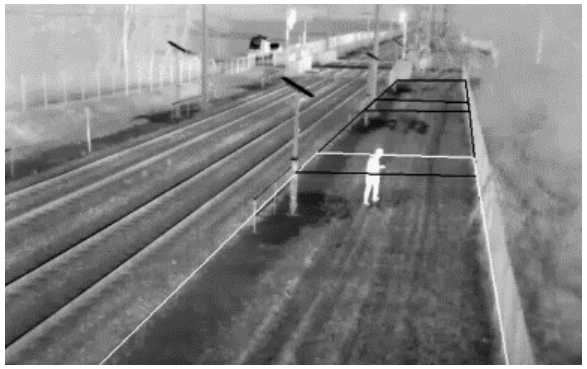
Videos:

- FLIR Rail Detection - Track Intrusion
- FLIR Rail Detection - Stopped Vehicle on Crossing
- FLIR Rail Detection - Platform

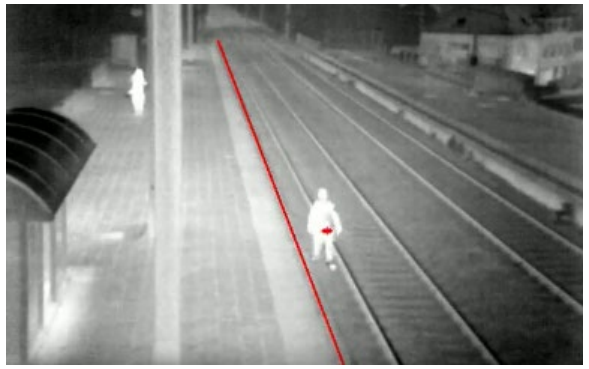




FLIR Rail Detection - Stopped Vehicle or Pedestrians on Crossing



FLIR Rail Detection - Track Intrusion



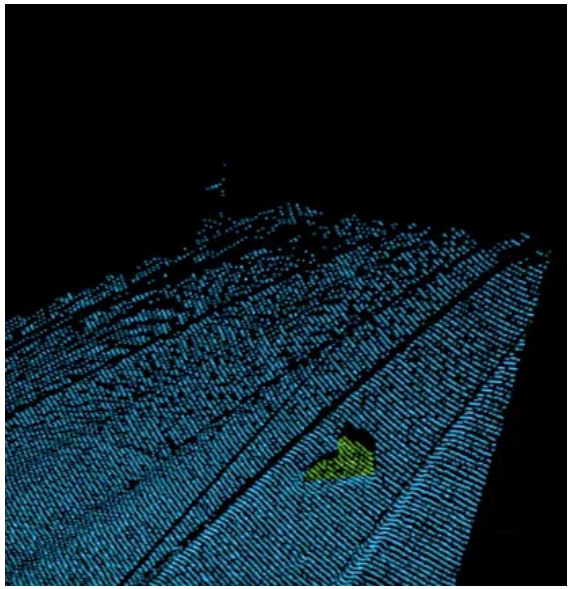
FLIR Rail Detection - Platform

Rail Side Detection – IK4 TEKNIKER

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

Source: IK4-TEKNIKER

- Lidar scanning of tracks at hotspot
- Detects objects/people
- Alerts

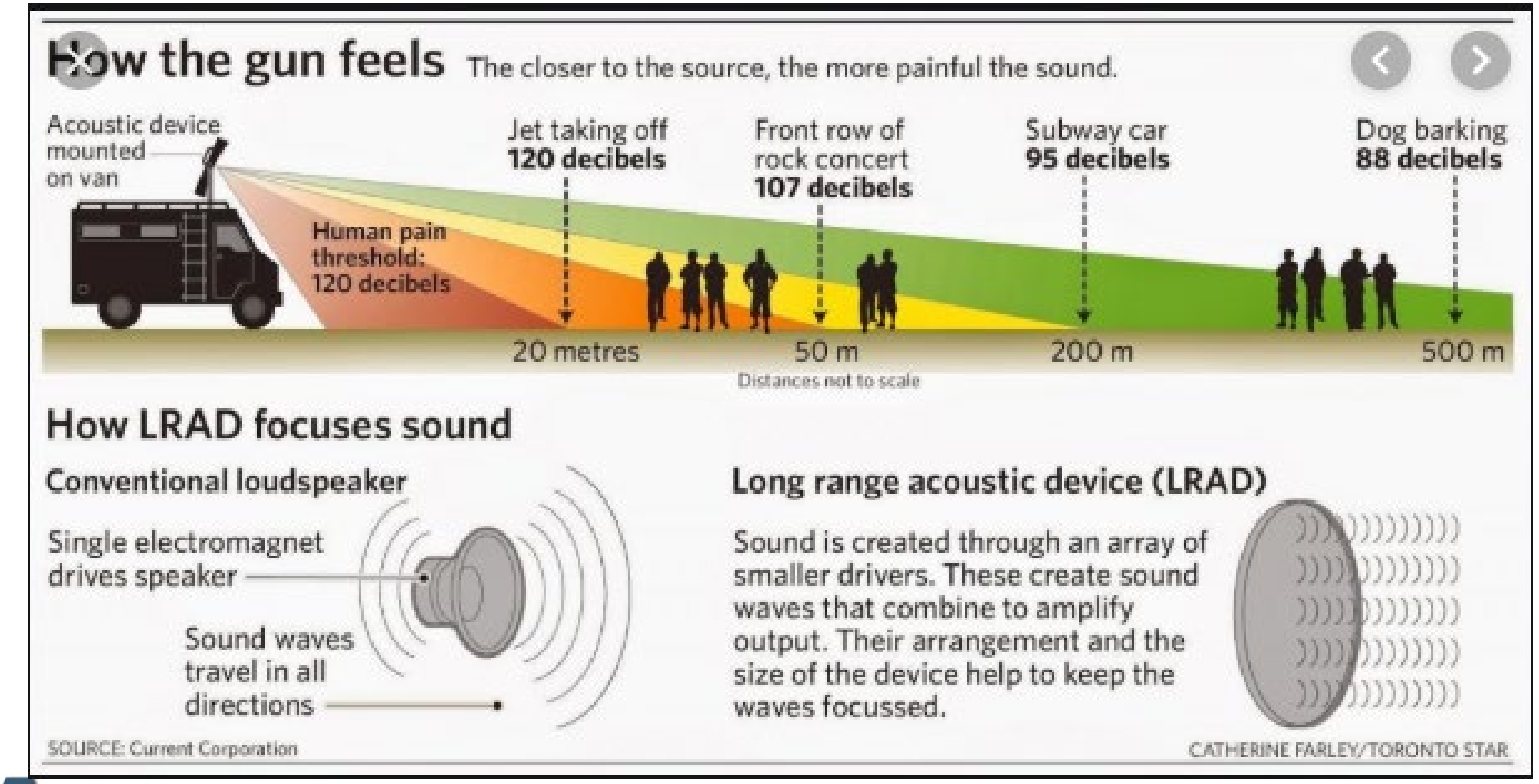


Long-Range Radar – Spotter RF

- Currently used in qualified applications:
  - Power Utility and Substation Security (NERC CIP-014 Compliant)
  - Military Installation Security and Intruder Detection
  - Water Reservoir Security
  - Airport Security and Intruder Detection
  - UAS (Drone) Detection
- Trainable Target Classification
  - People
  - Birds
  - Small Animals
  - Vehicles
  - Small Aerial (Drones)

Source: ByStep LLC https://www.youtube.com/watch?v=UL7Novhf7V0#action=share

Long-Range Acoustic Device (LRAD)



Aerial Drones

- Use of drones to detect incidents of trespassing

- Currently used in:
  - Germany, France, India, Netherlands, Israel, UK
  - CBP, BNSF UAS program, USA

Source: Network Rail

Platform Screen Doors

- Very effective in deterring both suicide and trespassing
- Application is limited to areas where access is tightly controlled and usually not at street level
- Expensive to procure and install

Rouse Hill Station on the Sydney Metro, Sydney

Taipei Main Station of the Taipei Metro is fitted with automatic platform gates

A SkyConnect Station at the Tampa International Airport

Suicide Pits

- Trenches below the rails of a train line
- Provide a space where a person on the tracks can avoid contact with the approaching train
- Conflicting evidence of effectiveness for this countermeasure

https://www.youtube.com/watch?v=_RAeLR7hpj4

Blue Lights

- Can induce calm, and is a color often associated with authority, particularly the police
- Seems to encourage people to rethink before committing unwanted behavior
- Satisfactory results from an initial trial in U.K. to reduce suicides
- An **84%** reduction of railway suicides in a Japanese study at 71 train stations between 2000 and 2010 for the introduction of blue lights at the edges of stations

(Can blue lights prevent suicide at train stations?)

The most visible of the government's anti-suicide efforts can be found in Tokyo's train stations. Photo credit: Janne Moren via Flickr

Blue Lights (cont'd)

- Subsequent studies indicated that the effectiveness was **overstated** and applications were not generalizable
- It could potentially be a relatively cost-effective countermeasure
- Most pilot tests may be encouraged

The blue lights were installed on all 29 stations of the Tokyo Loop (Yamanote) Line in 2008 (Credit: Damon Coulter)

Questions?

Dr. Pei-Sung Lin, P.E., PTOE, FITE

lin@cutr.usf.edu

Large Group Discussion

Public Comments

Lunch

FTA

FEDERAL TRANSIT ADMINISTRATION

Transit Advisory Committee for Safety (TRACS)

Employee Safety Reporting Research Presentation

Lisa Staes
Center for Urban Transportation Research

February 25, 2020

U.S. Department of Transportation
Federal Transit Administration

Presentation Outline

- Research Objectives/Workplan
- Literature Review/Background Research Summary
- FTA ESR Program Requirements – PTASP and SMS
- Case Studies
- Findings

Research Goal and Objectives

Goal: to assist transit agencies with developing their programs

The ***primary objective*** – *produce a compilation of the leading/common practices used in non-punitive employee reporting programs*

Secondary objective – *identify technologies, tools, and applications used by implementers (supports TRACS tasking)*

Project Work Plan Review

- Literature Review
- Interviews and Survey of Public Transit Agency Representatives
- Outcomes:
  - Identify elements of non-punitive ESR systems
  - Identify "common" and "leading" Practices
  - Identify technologies, tools, and applications
  - Final Report
  - Provide input to TRACS

LITERATURE REVIEW/ BACKGROUND RESEARCH

Examples of Non-Punitive ESR System Structures

- Aviation Safety Reporting System (ASRS)
- Bureau of Safety and Environmental Enforcement – SafeOCS
- Federal Railroad Administration (FRA) C^3RS
- Federal Transit Administration (FTA)
- National Air Traffic Controllers Association (NATCA)
- Occupational Safety and Health Administration (OSHA)
- U.S. Nuclear Regulatory Commission (NRC)

Characteristics and Elements

- Stakeholder Engagement
- Strategies for Collecting/Managing Data
- Use of Third Parties
- Ensuring Procedural Fairness for Employees
- Scalability

Stakeholder Engagement

- Engage Early and Often – Prescribed Input Process
  - Local collective bargaining unit representative (or other employees)
  - Organizational management
  - Transit agency unit representatives
  - State and/or Federal oversight agencies
  - An independent third party (where applicable)
  - Other external parties

Strategies for Collecting/Managing Data

- Collecting the Right Information
- Addressing Data Gaps
- Conducting Interviews
- Providing Feedback
- Ease of Reporting
- Use of Data
- Data Protections

Technology and Information Management

- Support structure for collecting/managing data
  - Data collection and release protocols
  - Limit data access
- Use of vendor or internally created platforms/ mobile applications
- Trend analyses
- Report generation and dissemination
- CAP/mitigation measures monitoring

Utilizing 3rd Party Reporting System

- Workers perceive greater degree of confidentiality/ anonymity
- Increase employee reporting
- Option for agencies with less mature safety cultures
- Evidentiary protections (in some cases)
- National systems can educate the industry on risks/hazards
- Case studies – C^3RS (MBTA, SEPTA), BTS (WMATA), Navex Global (TriMet uses for anonymous reporters)

Procedural Fairness – Research Team Definition

"The systematic development of processes and procedures, employees' understanding of the process, and management's compliance with and execution of those processes and procedures without prejudice to the individual or the process, ensuring effective and fair outcomes."

Strategies for Promoting Procedural Fairness

- The ability to provide input through the investigation and determination of outcomes
- Well-defined feedback loops
- Written policy or procedural statement - protects employees from punitive actions or retribution, except for those situations that involve a blatant disregard of agency policies, procedures, or operating practices
- Notification of investigation findings and follow-up actions
- Written policy or procedural presentation of the steps that a reporter can take to challenge or appeal an investigation outcome or mitigation strategy use
- Management adoption and consistent exercise of the process/procedures

Scalability

- Scaled – agency-appropriate
- Large agencies versus smaller
- Multi-modal versus single transit mode
- Other operational considerations/local needs
- Procedural heavy versus simple policy statement
- Reporting methods (3rd party, online portal, comment box, direct engagement with supervisors)
- Training/employee outreach

Framework – Program Design and Elements for Continuous Improvement

FTA ESR PROGRAM REQUIREMENTS – PTASP AND SMS

Employee Safety Reporting – PTASP and SMS

- SMS framework as the basis for the National Public Transportation Safety Program (49 U.S.C. Section 5329)
- ESR program – included in Safety Management Policy requirements
- ESR – key element in Safety Assurance and Safety Risk Management functions and is elemental in the implementation of an effective SMS and PTASP
- FTA recently release guidance

FTA ESRP Requirements 49 CFR § 673.29(b)

- Safety Management Policy
  - Establish and implement a process that allows all employees to report safety conditions to senior management
  - Specify protections for employees
  - Describe employee behaviors that may result in disciplinary action
- Safety Assurance
  - Monitor information reported
- Safety Promotion
  - Inform employees of safety actions taken in response to reports

FTA Guidance – "Good ESRP"

- Management's commitment
- Safety is everyone's responsibility
- Clear safety roles for each individual
- Empowered employees
- Staff involved in ESRP planning process
- Culture of learning from past mistakes

FTA Guidance – "Good Safety Culture"

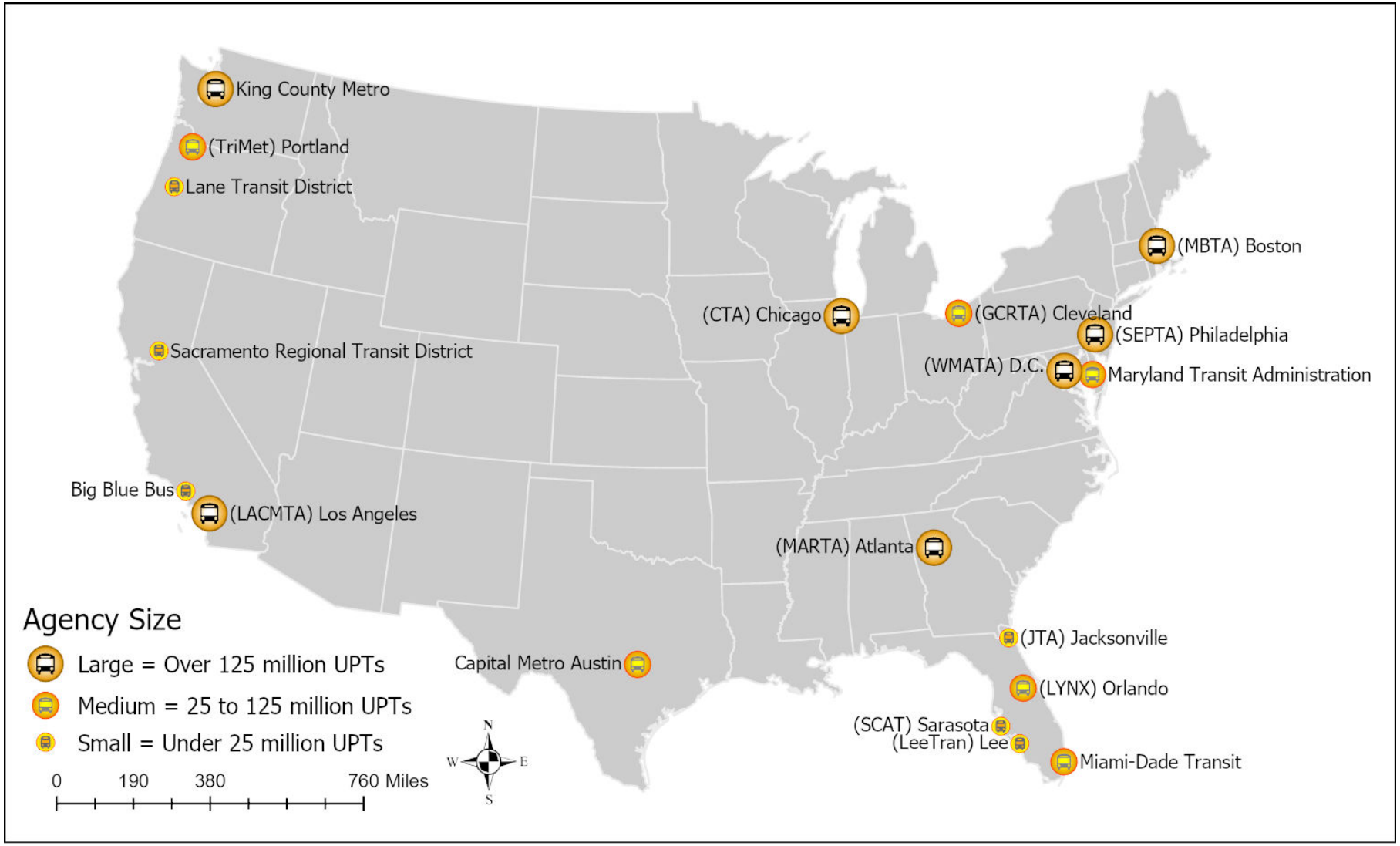
- Culture of learning
- Flexible/adaptable
- Flexible organizational structure
- Both managers and operators should be informed
- Organizational factors
- Trust is essential

CASE STUDIES

Case Study Transit Agencies

Big Blue Bus	Santa Monica, California
Capital Metro Transportation Authority	Austin, Texas
Central Florida Regional Transportation Authority, d.b.a. LYNX	Orlando, Florida
Chicago Transit Authority (CTA)	Chicago, Illinois
Greater Cleveland Regional Transit Authority (GCRTA)	Cleveland, Ohio
Jacksonville Transportation Authority (JTA)	Jacksonville, Florida
King County Metro	Seattle, Washington
Lane Transit District	Springfield, Oregon
Lee County Transit (LeeTran)	Ft. Myers, Florida
Los Angeles County Metropolitan Transportation Authority	Los Angeles, California
Maryland Transit Administration	Maryland
Massachusetts Bay Transportation Authority	Boston, Massachusetts
Metropolitan Area Regional Transit Authority	Atlanta, Georgia
Miami Dade Department of Transportation and Public Works	Miami, Florida
Sacramento Regional Transit District	Sacramento, California
Sarasota County Area Transit (SCAT)	Sarasota, Florida
Southeastern Pennsylvania Transportation Authority (SEPTA)	Philadelphia, Pennsylvania
Tri-County Metropolitan Transportation District of Oregon (TriMet)	Portland, Oregon
Washington Metropolitan Area Transportation Authority (WMATA)	Washington, DC

Case Study Agencies



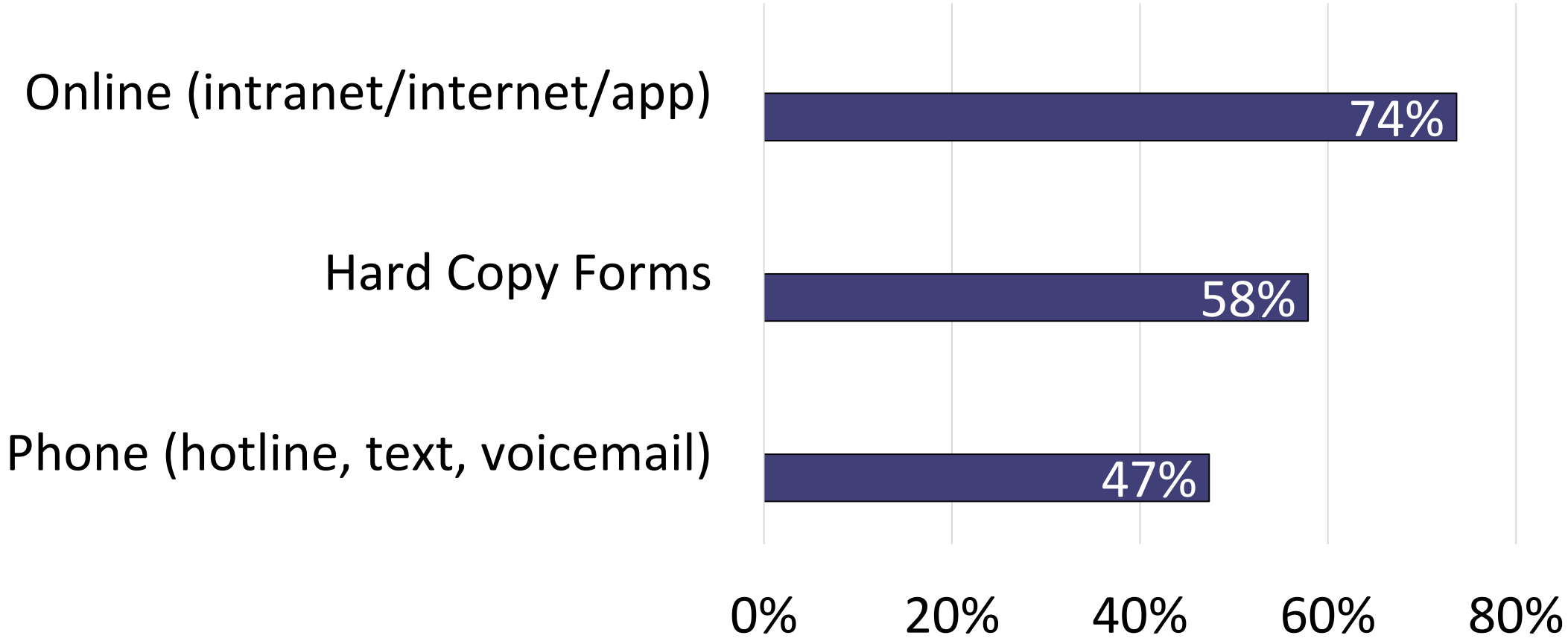
Additional Case Study Transit Agencies – FTA SMS Pilot Locations

- FTA's SMS Pilot Sites in Maryland
  - Frederick County, MD – *TransIT Services of Frederick County*
  - Montgomery County, MD – *Ride On*
  - Charles County, MD – *Charles County Transit Division*

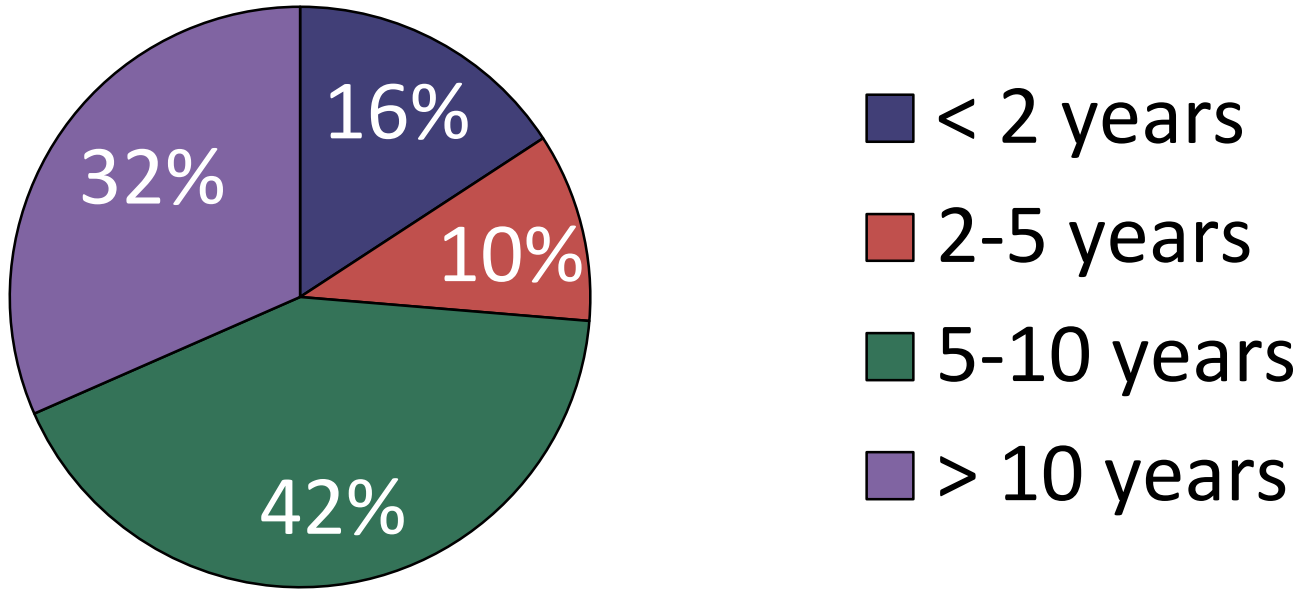
Survey Responses

- Methods of Report
- System Age
- Confidentiality versus Anonymity
- Policies and Reviews
- Training
- CBU Involvement in ESR System Design
- Employee Input/Acceptance
- Familiarity with FTA SMS Pilot

Reporting Methods

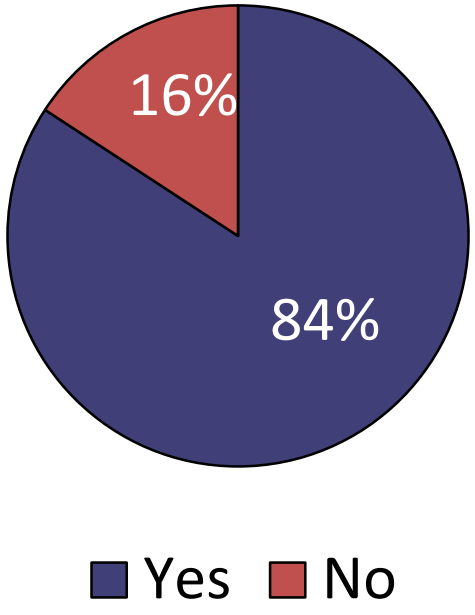


System Age

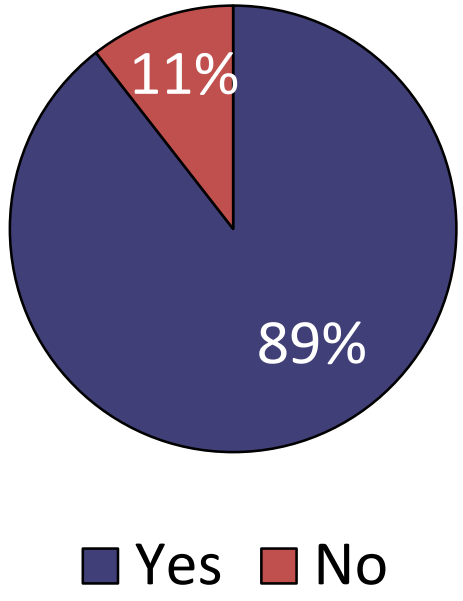


Confidential versus Anonymous

Is reporting considered confidential?

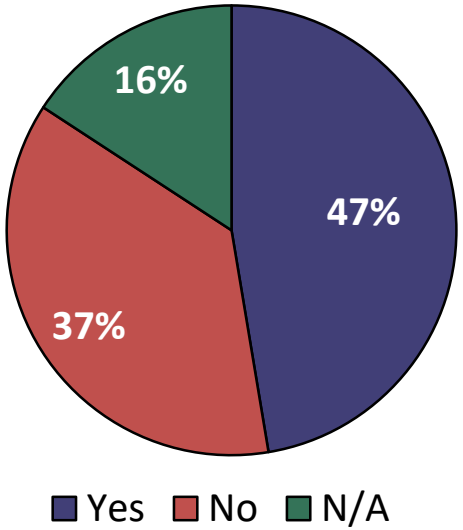


Can reports be made anonymously?

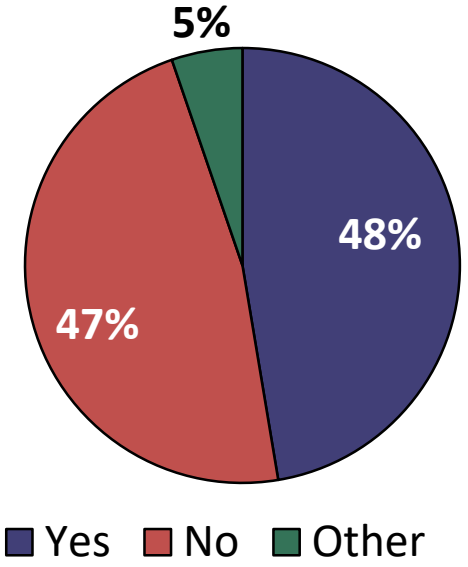


Non-Punitive Policies and Investigations

Does your policy identify areas that would negate the non-punitive aspects of the reporting system?

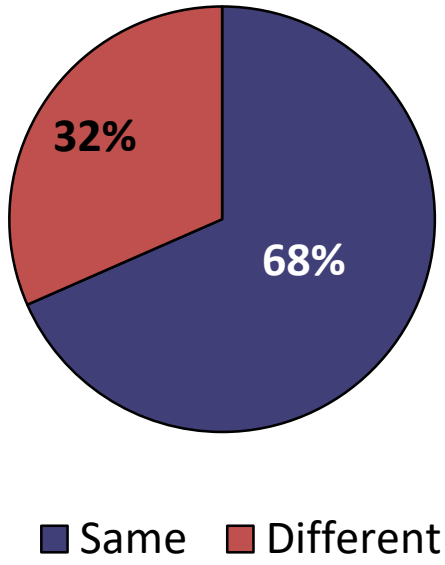


Is there a pre-established team or assigned personnel who review the data?

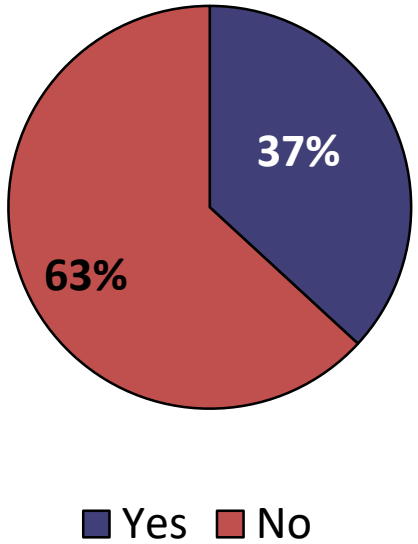


Training

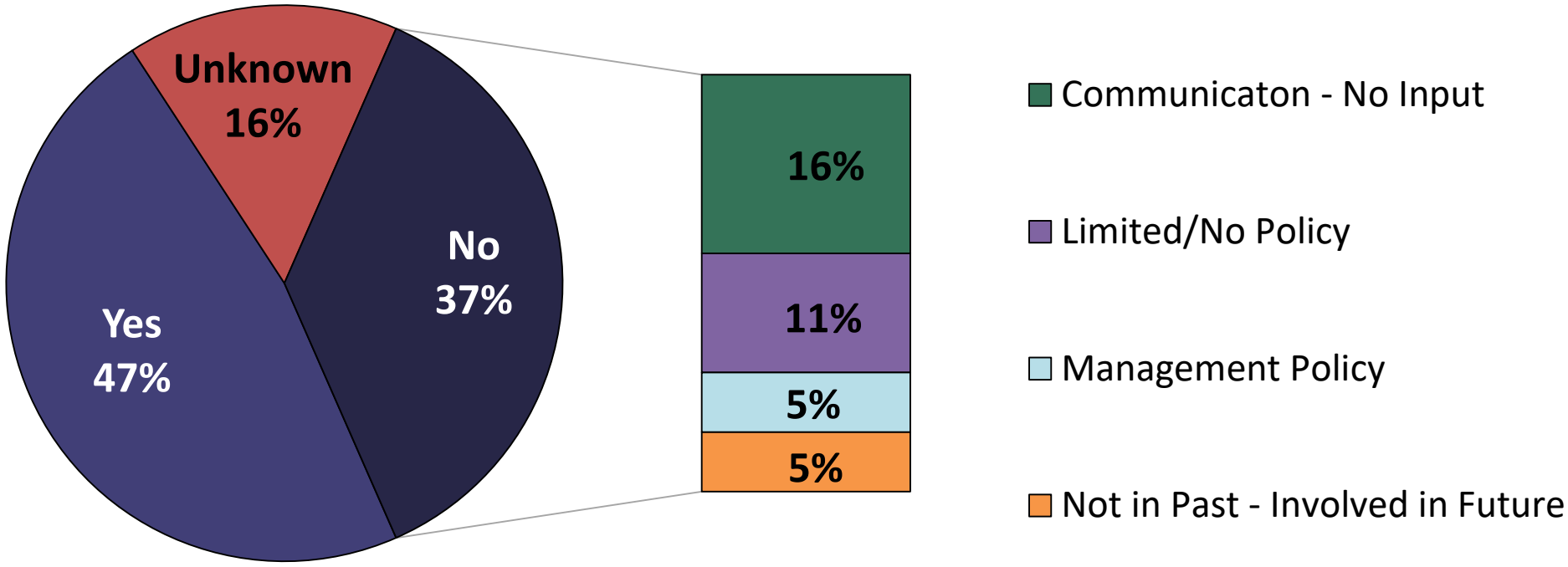
Do supervisors and front line employees receive the same training, or is training tailored by employment position?



Do you provide any training to others, in addition to agency personnel (e.g. contractors)?

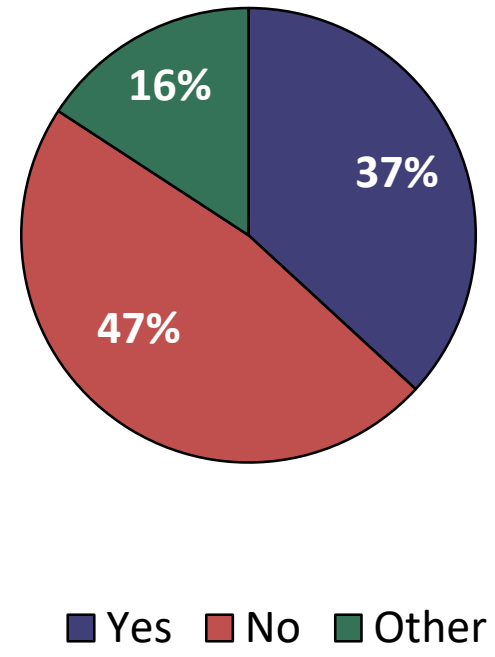


CBU Involvement in Reporting Program Design



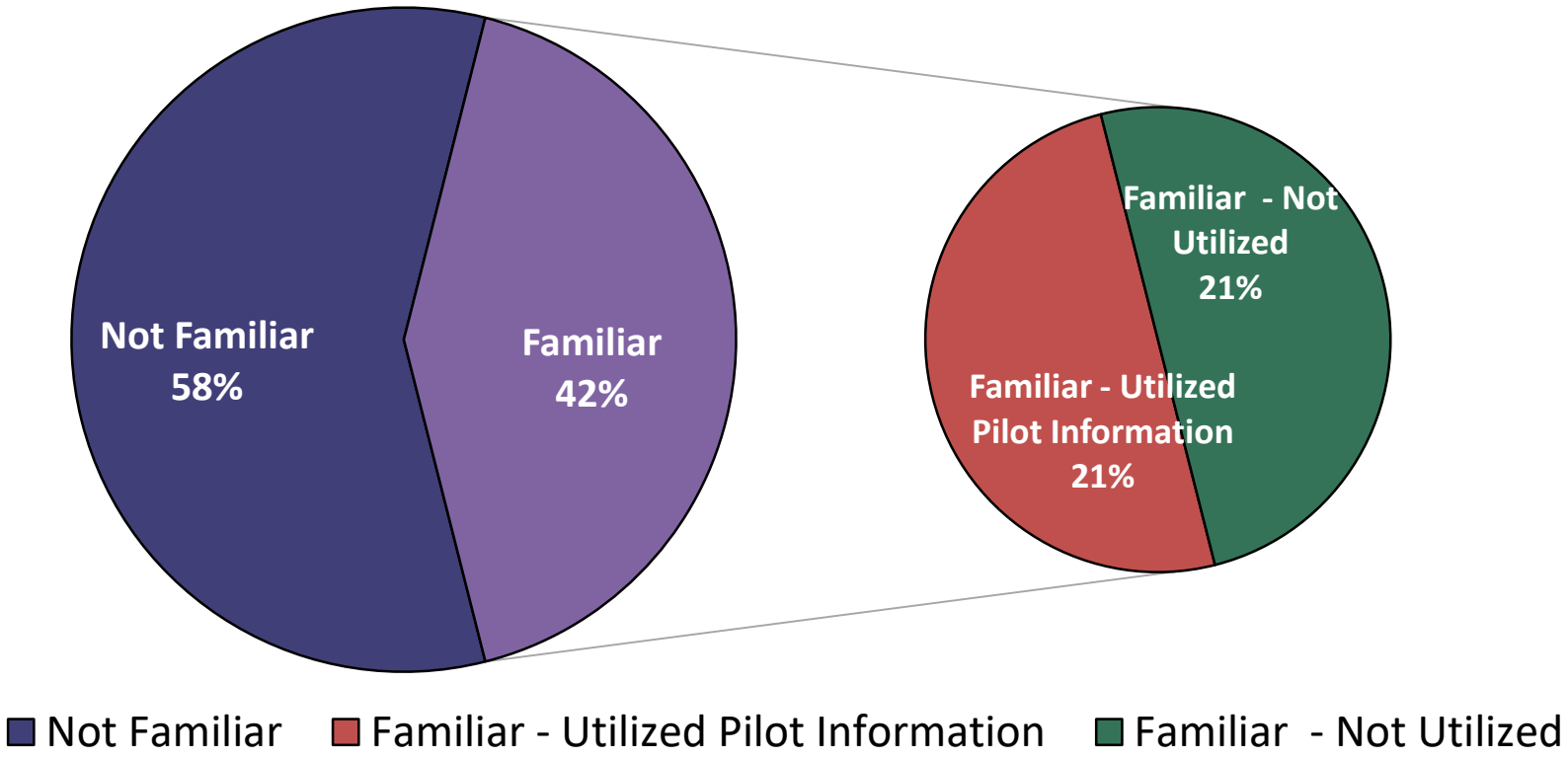
Performance Measures

Do you have performance measures to track the efficacy of your system? If so, what are the measures used?



- Date reported/due date
- Average days to closure
- Open versus closed reports
- Reports by area (facility, equipment, system, security)
- Reports by mode (rail, bus)
- Reports per month
- Hazard/hazard classification
- Root cause
- Lost time and non-lost time injury rates per 200,000 work hours
- Vehicle accident rates per 100,000 miles
- Workers' compensation claims and payouts
- Customer complaints

Familiarity with FTA SMS Pilot Program



Comparative Characteristics – Case Study Agencies

Transit Agency	Location	Agency Size	Methods by Which Reporting Can Occur							Age of Employee Reporting System (years)	Anonymous	Confidential	CBU Involvement
			Hard Copy/ Paper Form	Online Employee Portal	Email	Hotline	Mobile Application	In Person	Third Party System				
Big Blue Bus	Santa Monica, CA	Small	✓	✓	✓			✓		4	✓	✓	✓
Capital Metro	Austin, TX	Medium		✓		✓				2	✓	✓	✓
LYNX	Orlando, FL	Medium								6		✓	
CTA	Chicago, IL	Large				✓				5	✓	✓	✓
GCRTA	Cleveland, OH	Medium	✓							8	✓	✓	
JTA	Jacksonville, FL	Small					✓			2		✓	
King County Metro	Seattle, WA	Large	✓							20+	✓		
LTD	Springfield, OR	Small	✓							20+	✓		
Lee Tran	Ft. Myers, FL	Small		✓						1	✓	✓	
LA Metro	Los Angeles, CA	Large		✓						20+	✓		
MTA	Baltimore, MD	Medium	✓		✓	✓				10		✓	
MBTA	Boston, MA	Large	✓		✓	✓			✓	15+	✓	✓	
MARTA	Atlanta, GA	Large		✓				✓		6	✓	✓	✓
Miami Dade	Miami, FL	Medium	✓	✓			✓	✓		15+	✓	✓	✓
SacRT	Sacramento, CA	Small	✓							8	✓	✓	✓
SCAT	Sarasota, FL	Small	✓	✓						1+	✓	✓	✓
SEPTA	Philadelphia, PA	Large	✓	✓	✓	✓		✓	✓	20+	✓	✓	✓
TriMet	Portland, OR	Medium		✓		✓				7	✓		
WMATA	Washington, DC	Large		✓	✓				✓	6	✓	✓	✓

Agency Size Legend – Large: Over 125 million UPTs; Medium: 25-125 million UPTs; Small: under 25 million UPTs

Interview Questions for Case Studies

- System Description
- Policies and Procedures
- Reporting Practices
- Follow-up Activities
- Data Collection and Analysis
- Stakeholder Input
- Training
- Challenges or Barriers to Implementation
- Benefits or Successes
- Technologies/tools utilized

Case Study Agencies – Elements of Non-Punitive ESR Systems

- Policies/procedures
- Elements that Promote and Support Employee Reporting
- Training
- Stakeholder Input
- Program evaluation and Improvement

Policy/Procedural Elements

- Defines terms
- Identifies who can report
- Identifies method(s) of reporting
- Defines reportable events
- Delineates events that may lead to punitive outcomes
- Provides method of receipt/confirmation to reporter
- Identifies report investigation and follow up processes
- Identifies method(s) used to notify the reporter of the outcome

Elements that Promote and Support Employee Reporters

- Procedural fairness is promoted and ensured
- Opportunities to provide input through the investigation and determination of outcomes
- Well-defined feedback loops
- Employee protections are granted through written policy or procedural statement
- Reporters are notified of investigation findings and follow up actions
- Ability to challenge or appeal an investigation outcome or mitigation strategy used

Training and Stakeholder Input Elements

- Training program – process and procedural knowledge and internal/external communication strategies/protocols
- Stakeholder input:
  - Initial program design
  - Program modifications – including development and use of new tools
  - Employee feedback methods – routine and post-reporting follow-up
  - Success of mitigation strategies
  - Identification of unintended consequences

Process Improvement

- Routine and periodic process improvement strategies – employee/stakeholder feedback surveys, evaluation outcomes, safety trends
- Data collection – longitudinal analyses
- Evaluation of mitigation strategies (success in addressing the risk/hazard and no unintended consequences)
- Performance measures – develop, track, modify, evaluate

Performance Measures – What to Track

Report Volume/Status

- Number of reports
- Open versus closed status
- Average days to investigate
- Average days to closure
- Target closure dates

Hazard Contributing Factors

- Hazard/event classification
- Reports by area
- Mode
- Responsible section
- Root cause/contributors

Performance Measures – What to Track

Program Efficacy

- Workers' compensation claims/costs
- Claims/litigation costs
- Lost time/non-lost time injury rates per work hours
- Vehicle collision rates per # of miles
- Success of corrective actions
- Employee feedback

TECHNOLOGIES AND TOOLS

Use of Technologies and Tools

- Online employee portal/intranet (BBB, Capital Metro, LAMetro, LYNX, MARTA, MDT, SCAT, SEPTA, TriMet)
- Elerts – See Something/Say Something (JTA, LYNX, MARTA, MBTA, SEPTA)
- Origami – cloud-based data management system (King County Metro)
- Accela Automation – cloud-based platform (Lee Tran)
- MDT Tracker – agency created, proprietary smartphone application
- Safety Hotlines – developed and managed by agency or through 3rd party
- 3rd Party Reporting Platforms (C^3RS for SEPTA/MBTA CR, BTS for WMATA – rail and bus, and Navex for TriMet)

Online Reporting/Employee Portals

- BBB – online employee portal using Microsoft SharePoint "Myinfoblue" (may submit anonymously)

SHARP
Safety Hazard & Analysis Reporting Program

- Please use this form to report any safety concerns, hazards, or near-miss incident.
- SHARP Report Form may be submitted to Dispatch, your supervisor, via MyInfoBlue, or directly to the Safety & Training Division in person or via email at BBBSafety@smgov.net.
- Form may be submitted anonymously.

SHARP Report Form Date Submitted: _____

TO BE COMPLETED BY EMPLOYEE

Date of Incident:_____ Time of Incident: _____

Name of Employee: _____ Employee No. _____

Dept./Div./Section: _____ Job Title: _____

Description of Hazard/Near-Miss/Safety Concern: _____

Location of Reported Issue: _____

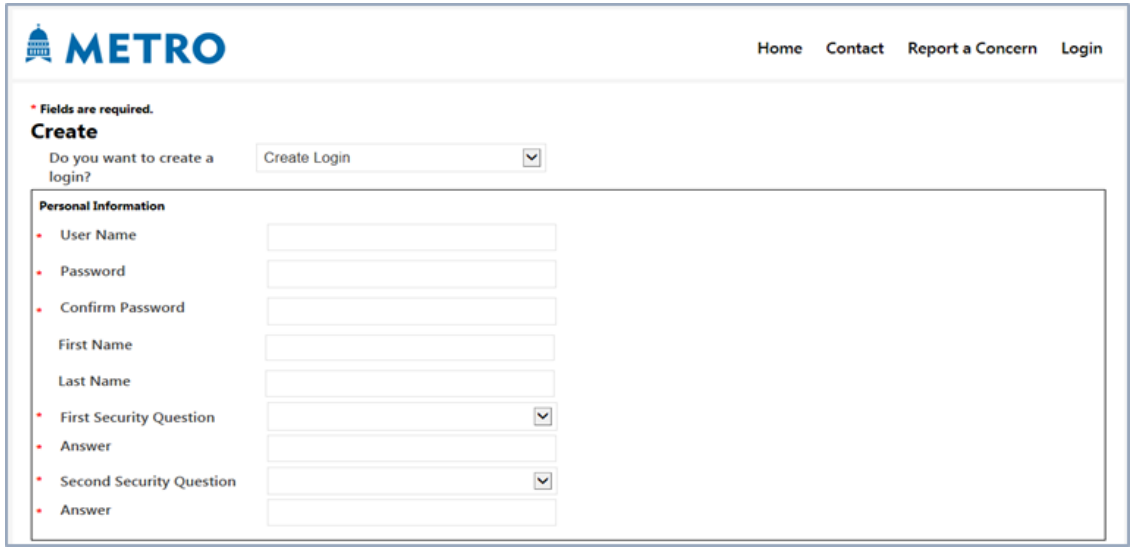
Employee Recommendation(s): _____

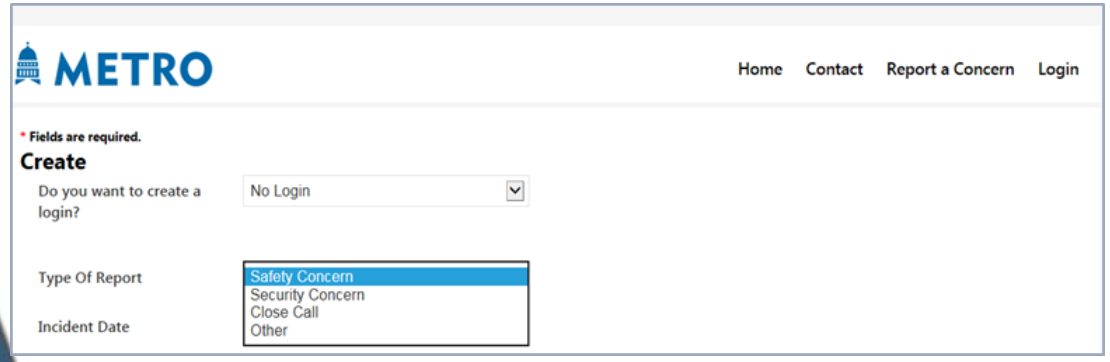
Once form is completed by employee, forward to Safety and Training Division

Attachment A-1

Online Reporting/Employee Portals

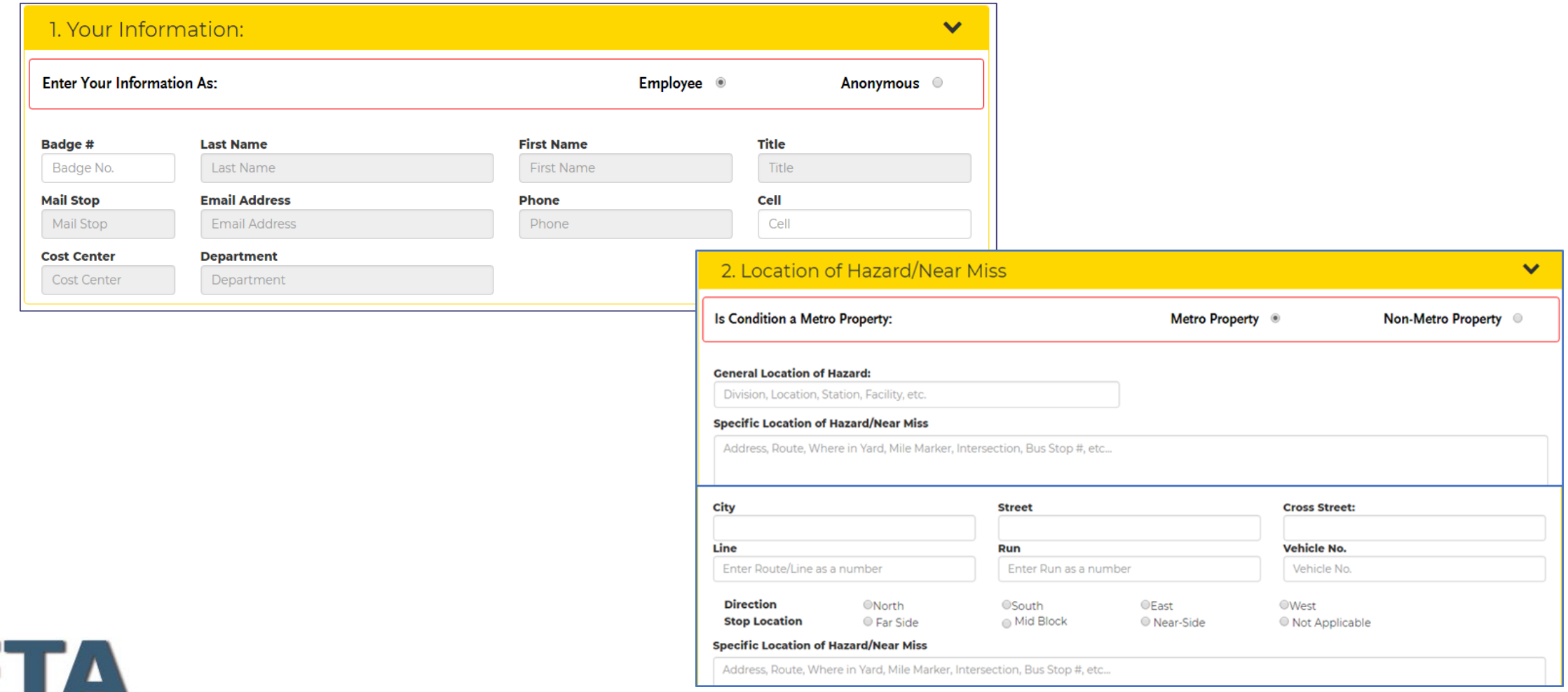
Capital Metro – intranet site development $13,000
Improvements underway ESR 2.0





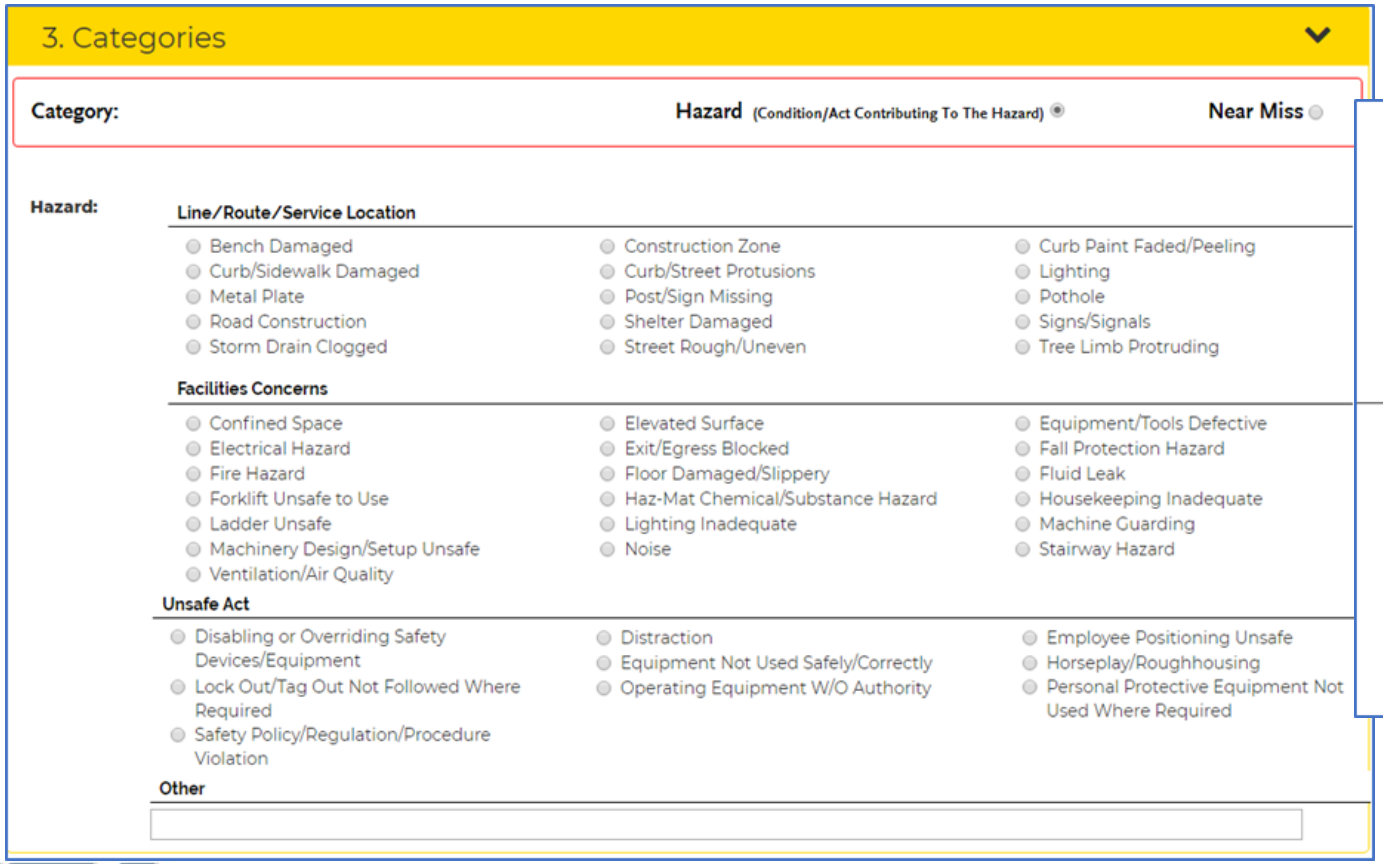
Online Reporting/Employee Portals

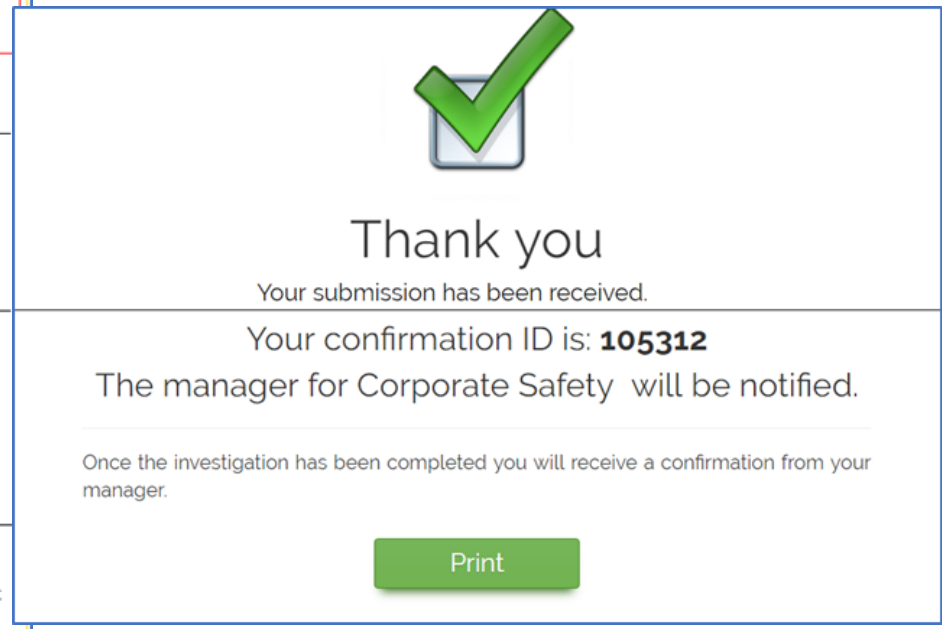
LA Metro – SAFE-7 (agency intranet site)



Online Reporting/Employee Portals

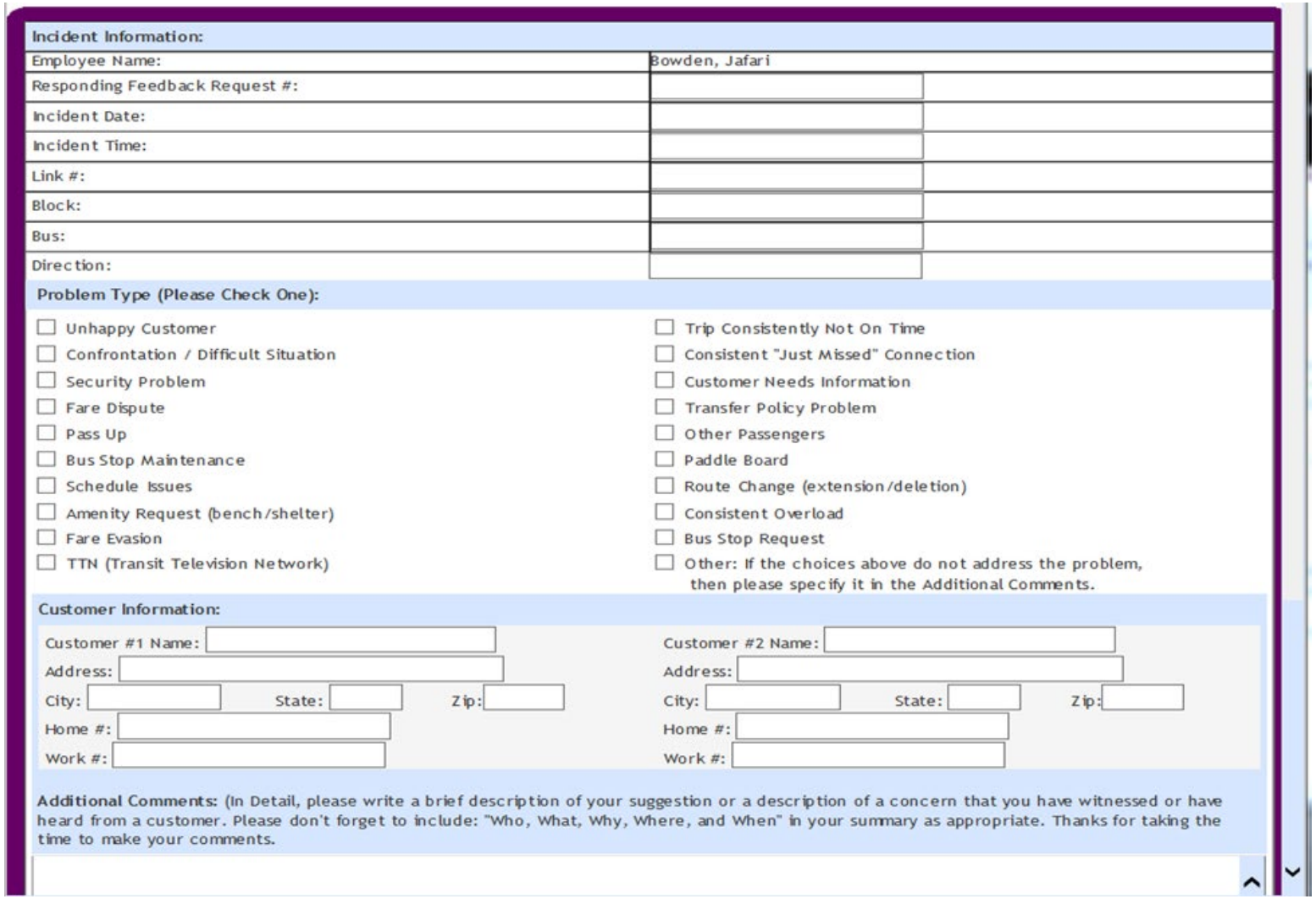
LA Metro – SAFE-7 (agency intranet site)





Online Reporting/Employee Portals

- LYNX
  - Intranet portal "INLYNX"
  - Nip-it-in-the-Bud Program



Incident Information:

Employee Name:	Bowden, Jafari
Responding Feedback Request #:	
Incident Date:	
Incident Time:	
Link #:	
Block:	
Bus:	
Direction:	

Problem Type (Please Check One):

- ☐ Unhappy Customer
- ☐ Confrontation / Difficult Situation
- ☐ Security Problem
- ☐ Fare Dispute
- ☐ Pass Up
- ☐ Bus Stop Maintenance
- ☐ Schedule Issues
- ☐ Amenity Request (bench/shelter)
- ☐ Fare Evasion
- ☐ TTN (Transit Television Network)
- ☐ Trip Consistently Not On Time
- ☐ Consistent "Just Missed" Connection
- ☐ Customer Needs Information
- ☐ Transfer Policy Problem
- ☐ Other Passengers
- ☐ Paddle Board
- ☐ Route Change (extension/deletion)
- ☐ Consistent Overload
- ☐ Bus Stop Request
- ☐ Other: If the choices above do not address the problem, then please specify it in the Additional Comments.

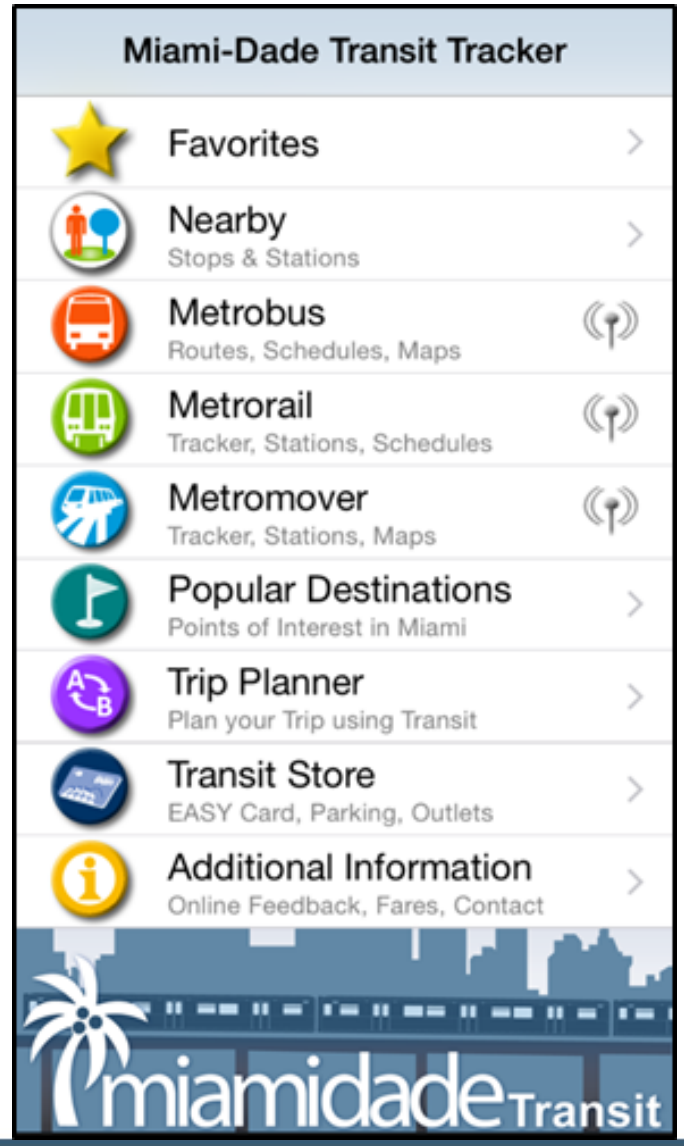
Customer Information:

Customer #1 Name: | Customer #2 Name:
Address: | Address:
City: State: Zip: | City: State: Zip:
Home #: | Home #:
Work #: | Work #:

Additional Comments: (In Detail, please write a brief description of your suggestion or a description of a concern that you have witnessed or have heard from a customer. Please don't forget to include: "Who, What, Why, Where, and When" in your summary as appropriate. Thanks for taking the time to make your comments.

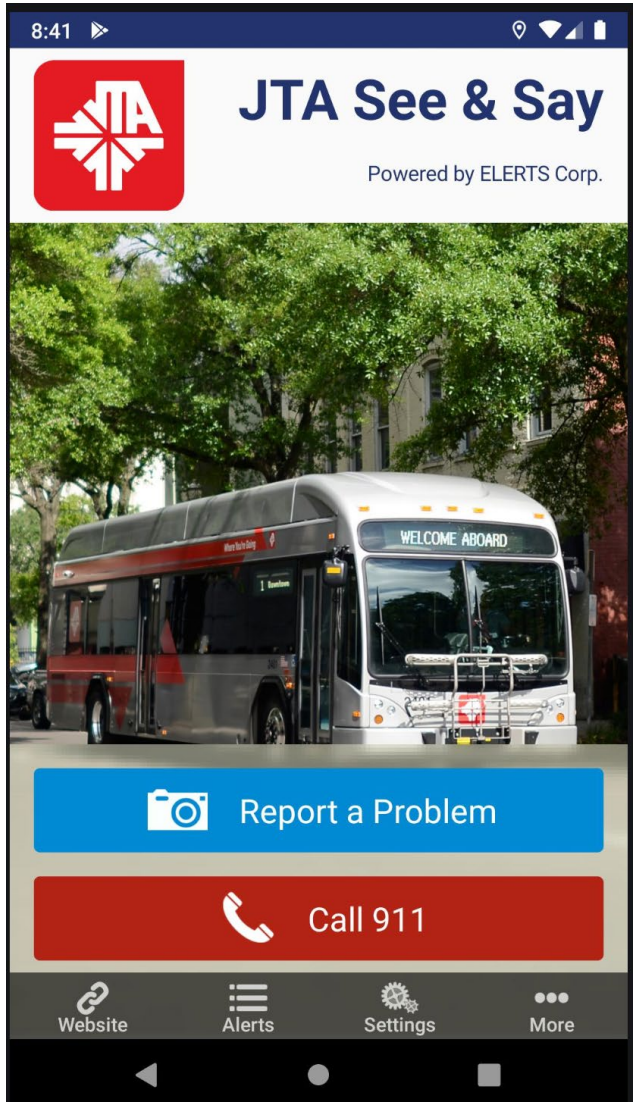
Online Reporting/Employee Portals

- MARTA Safety 1st
  - Online/intranet site
- MDT
  - Online application (open miamidade.gov site)
  - MDT Tracker – internally developed smartphone application



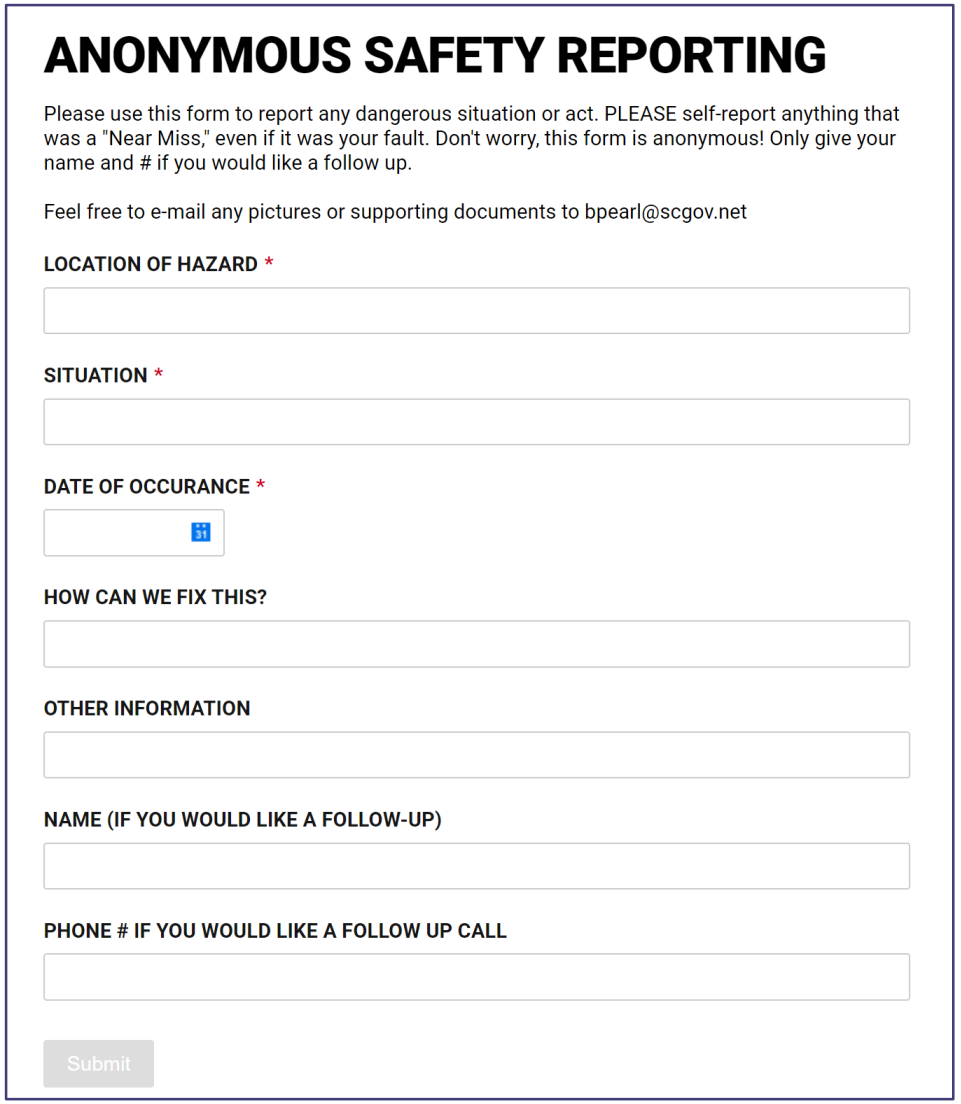
Online Reporting/Employee Portals

- ELERTS – See & Say
  - JTA
  - SEPTA
  - MARTA
  - SacRT
  - BART
  - MBTA
  - LYNX



Online Reporting/Employee Portals

- SCAT
  - Online reporting form via Smartsheet cloud platform application link on SCAT work computers that can also be accessed via personal computers or smartphones



ANONYMOUS SAFETY REPORTING

Please use this form to report any dangerous situation or act. PLEASE self-report anything that was a "Near Miss," even if it was your fault. Don't worry, this form is anonymous! Only give your name and # if you would like a follow up.

Feel free to e-mail any pictures or supporting documents to bpearl@scgov.net

LOCATION OF HAZARD *

SITUATION *

DATE OF OCCURANCE *

HOW CAN WE FIX THIS?

OTHER INFORMATION

NAME (IF YOU WOULD LIKE A FOLLOW-UP)

PHONE # IF YOU WOULD LIKE A FOLLOW UP CALL

Submit

Online Reporting/Employee Portals

- SEPTA
  - Online form at SEPTANow intranet site
  - Some employee reports made through VERITAS Customer Service Tracking System
  - CR reports through FRA's C3RS

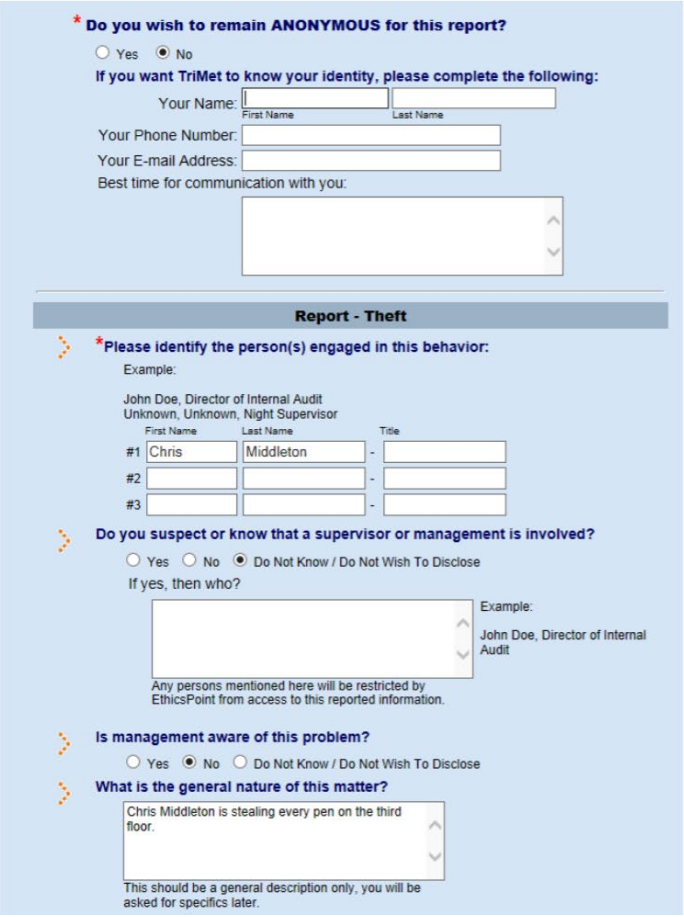
Online Reporting/Employee Portals

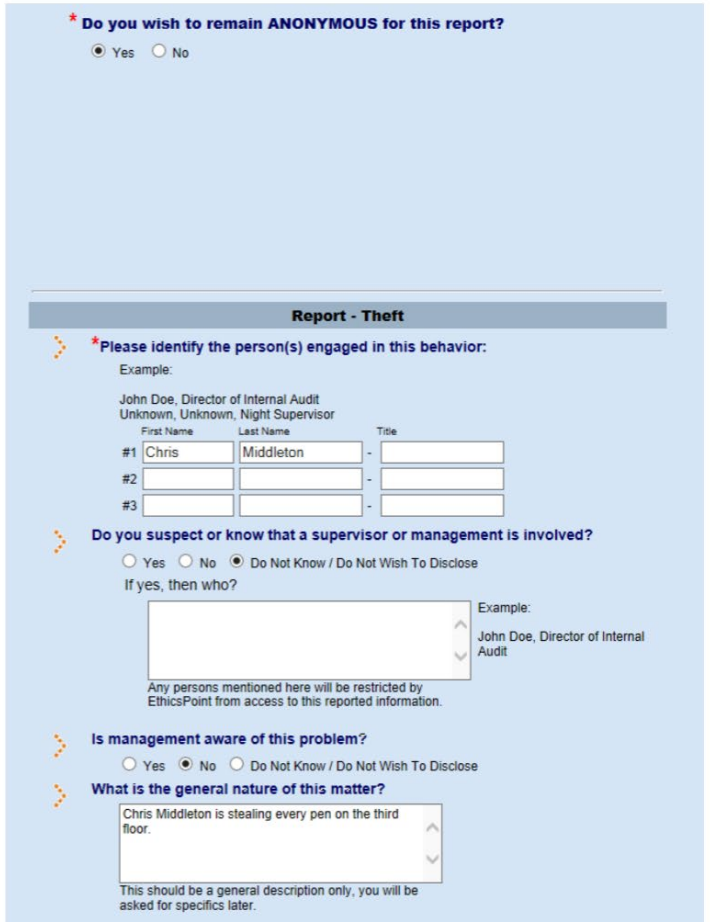
- TriMet
  - Request for Safety Assessment (RSA) may be made via agency's intranet site
  - If they want to remain anonymous, the employee routed to NAVEX Global an integrated risk and compliance management platform (serves as 3rd party administrator – collects, evaluates data, and routes to relevant TriMet departments, and responds to the employee)

Online Reporting/Employee Portals

TRIMET

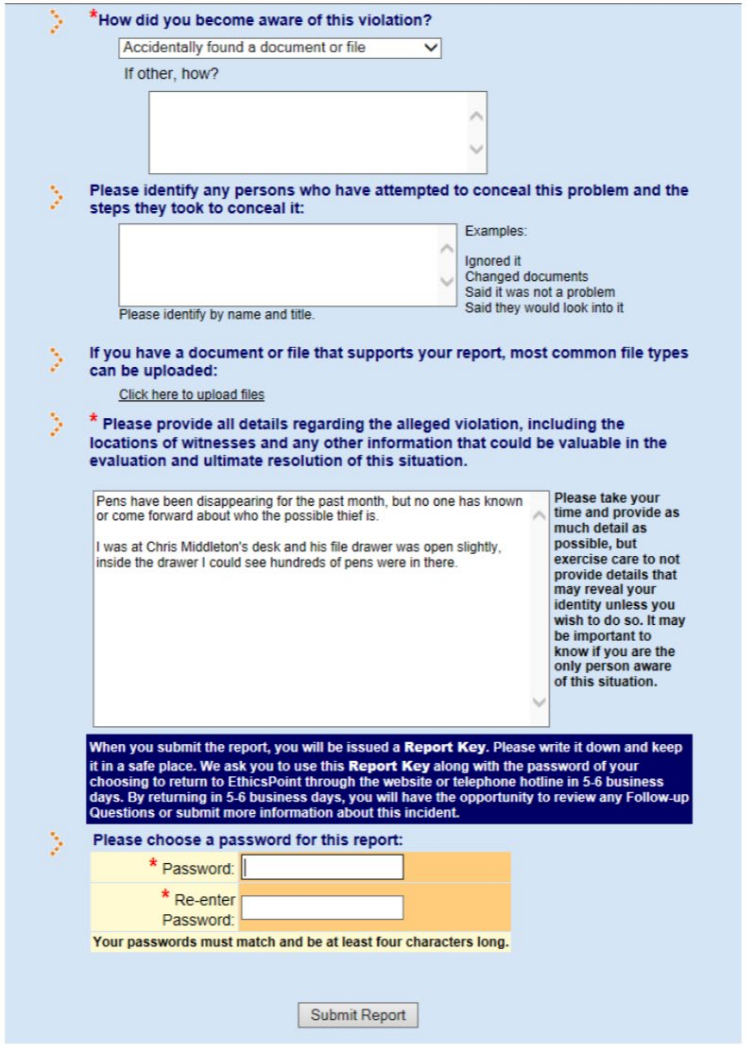
What happens when you make a report?





Online Reporting/Employee Portals

TRIMET



*How did you become aware of this violation?

Accidentally found a document or file

If other, how?

Please identify any persons who have attempted to conceal this problem and the steps they took to conceal it:

Examples:

Ignored it
Changed documents
Said it was not a problem
Said they would look into it

Please identify by name and title.

If you have a document or file that supports your report, most common file types can be uploaded:

Click here to upload files

* Please provide all details regarding the alleged violation, including the locations of witnesses and any other information that could be valuable in the evaluation and ultimate resolution of this situation.

Pens have been disappearing for the past month, but no one has known or come forward about who the possible thief is.

I was at Chris Middleton's desk and his file drawer was open slightly, inside the drawer I could see hundreds of pens were in there.

Please take your time and provide as much detail as possible, but exercise care to not provide details that may reveal your identity unless you wish to do so. It may be important to know if you are the only person aware of this situation.

When you submit the report, you will be issued a **Report Key**. Please write it down and keep it in a safe place. We ask you to use this **Report Key** along with the password of your choosing to return to EthicsPoint through the website or telephone hotline in 5-6 business days. By returning in 5-6 business days, you will have the opportunity to review any Follow-up Questions or submit more information about this incident.

Please choose a password for this report:

* Password:

* Re-enter Password:

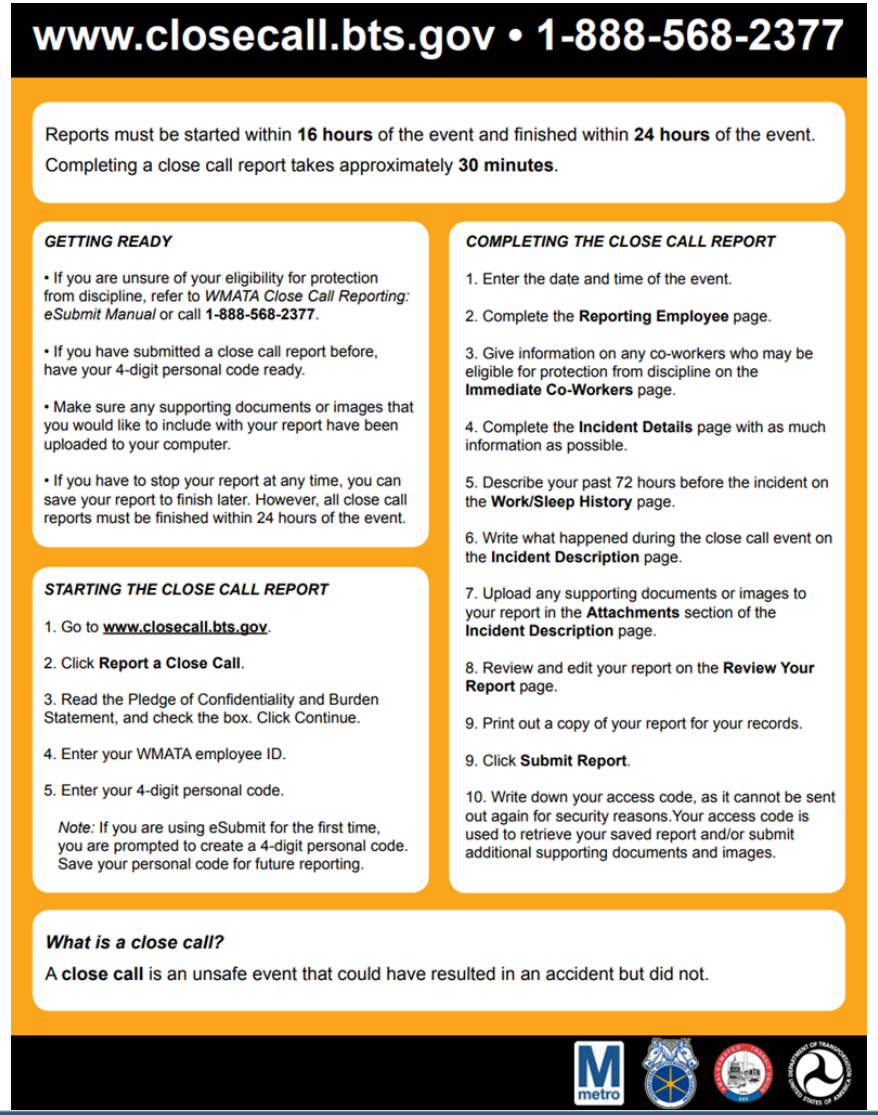
Your passwords must match and be at least four characters long.

Submit Report

FTA
FEDERAL TRANSIT ADMINISTRATION

Online Reporting/Employee Portals

- WMATA – BTS for both rail and bus
  - Follow-up actions/ outcomes shared and posted on WMATA's intranet site
  - CIPSEA* covered reporting – protects employee's identify and from FOIA or subpoena requests



www.closecall.bts.gov • 1-888-568-2377

Reports must be started within **16 hours** of the event and finished within **24 hours** of the event.
Completing a close call report takes approximately **30 minutes**.

GETTING READY

• If you are unsure of your eligibility for protection from discipline, refer to *WMATA Close Call Reporting: eSubmit Manual* or call **1-888-568-2377**.

• If you have submitted a close call report before, have your 4-digit personal code ready.

• Make sure any supporting documents or images that you would like to include with your report have been uploaded to your computer.

• If you have to stop your report at any time, you can save your report to finish later. However, all close call reports must be finished within 24 hours of the event.

STARTING THE CLOSE CALL REPORT

1. Go to **www.closecall.bts.gov**.
2. Click **Report a Close Call**.
3. Read the Pledge of Confidentiality and Burden Statement, and check the box. Click Continue.
4. Enter your WMATA employee ID.
5. Enter your 4-digit personal code.

Note: If you are using eSubmit for the first time, you are prompted to create a 4-digit personal code. Save your personal code for future reporting.

COMPLETING THE CLOSE CALL REPORT

1. Enter the date and time of the event.
2. Complete the **Reporting Employee** page.
3. Give information on any co-workers who may be eligible for protection from discipline on the **Immediate Co-Workers** page.
4. Complete the **Incident Details** page with as much information as possible.
5. Describe your past 72 hours before the incident on the **Work/Sleep History** page.
6. Write what happened during the close call event on the **Incident Description** page.
7. Upload any supporting documents or images to your report in the **Attachments** section of the **Incident Description** page.
8. Review and edit your report on the **Review Your Report** page.
9. Print out a copy of your report for your records.
9. Click **Submit Report**.
10. Write down your access code, as it cannot be sent out again for security reasons.Your access code is used to retrieve your saved report and/or submit additional supporting documents and images.

What is a close call?

A **close call** is an unsafe event that could have resulted in an accident but did not.

Benefits of Online Employee Reporting

- As reported by case study agencies and through literature review
  - Streamline tracking and trending of hazards
  - Increase the likelihood of reporting
  - Improved document control (no lost or incorrectly routed forms)
  - Automates the process
  - Employees greater degree of trust that reports will be confidential and in some cases anonymous

Data Management

- Trackit Manager and Assessment (tablet based reporting and data management)
  - Includes safety module
  - Houston METRO
  - JTA
  - LYNX
- Accela cloud-based data and asset management
  - LeeTran (Lee County government)

Data Management

- Industry Safe (safety management software)
  - Port Authority of Allegheny Co. (provided by PennDOT)
  - HART
  - MBTA
  - SEPTA
  - TriMet
- King County Metro
  - Switching to cloud-based "Origami" platform for reporting to WSTIP and data collection/analyses, trending exercises

REPORT FINDINGS

Common and Leading Practices

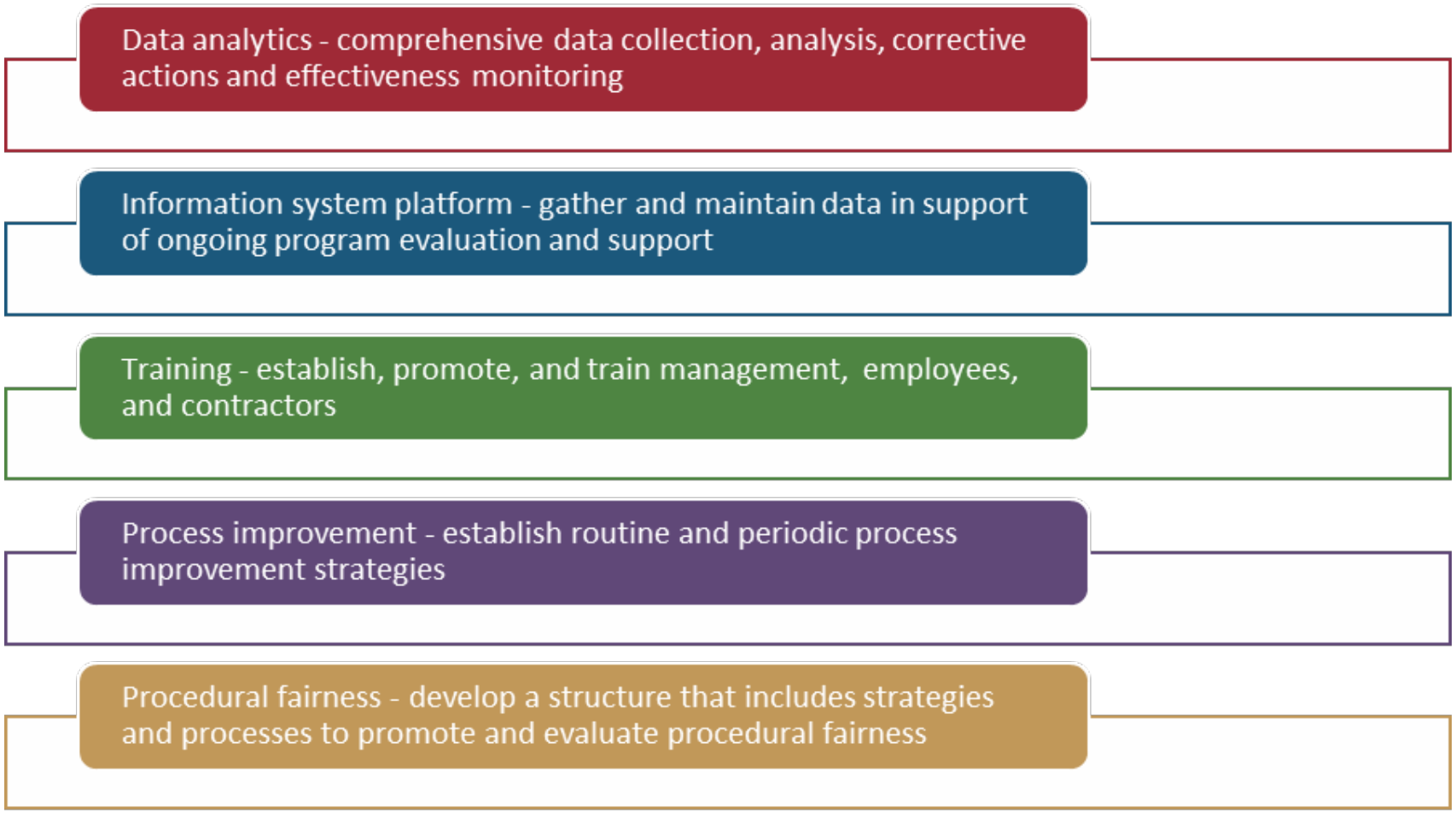
- Common practices were those found across case study transit agencies and identified by the transit agencies as integral to the program success
- Leading Practices were those deemed integral to the success of the programs discussed in the literature review (or case studies), supported by demonstrated benefits

Common Practices

Leading Practices

- **Investigation and corrective actions** – structured and comprehensive examination of reported hazards or near-misses based on defined reporting parameters and CAPs
- **Notification of hazard and dissemination** – a formal approach to dissemination of reported hazards, close call events and mitigation strategies
- **Online reporting system** – online reporting systems provide greater access to affected employees and provide both perceived, and is some cases, real anonymity
- **Protection from punitive actions** – successes achieved when employees are protected from punitive actions, reflected in significant growth in national ESR systems.

Success Factors for Program Improvement



Finding 1

A central repository of public transportation industry reported hazards, close calls, and near miss information may present an opportunity to improve the safety of the nation's public transportation industry, and establish the effectiveness of the National Public Transportation Safety Program and the SMS framework. **Research to examine the options available to develop this data portal or produce aggregated national reports would be beneficial.**

Finding 2

There are benefits to utilizing a third party to administer and manage an ESRS, which includes increasing the likelihood that employees will report safety events and reducing the likelihood that there will be associated punitive or retaliatory consequences. A centralized national third party ESRS (or option), would improve the effectiveness of close call reporting for all public transportation agencies, and may lead to better safety outcomes. **This presents a research opportunity to develop a strategy for examining opportunities for a national employee safety reporting system for the public transportation industry and the steps that the industry can take to institute such a system.**

Finding 3

The industry would benefit from a "Non-Punitive Employee Safety Reporting" toolkit or online resource repository, which could be built upon the sample policy statements, marketing/outreach materials, sample procedures, and sample CBA or MOU language included as a part of this TCRP research project, that public transportation agencies could use as they develop and implement their systems.

Finding 4 – Employee and Transit Agency Protections

Is it is important that employees who report and public transportation agencies collecting, analyzing, and maintaining safety data in support of SMS are assured that the data can remain confidential. **Without evidentiary protections, the ability of an agency to protect employee submitted data or accident/incident data is limited. The more protections granted to employees, including industry evidentiary protections, will ensure greater reporting and in turn, safer public transportation systems.**

Statement on Data/Evidentiary Protections

TRB Special Report 326 –

Admissibility and Public Availability of Transit Safety Planning

> *"Congress should prohibit, by establishing an admissibility bar, the introduction of the records generated by public transit agencies in fulfilling the safety planning requirements of MAP-21 into legal proceedings. This bar should apply only to data, analyses, reports, and other similar information prepared in response to or used in support of the MAP-21 mandate and FTA's corresponding safety program requirements."*

Large Group Discussion

Employee Safety Reporting

Public Comments

Day 1 - Close of Business


THANK
YOU!