Safety and Service Delivery Committee

Information Item IV-A

January 11, 2018

Bus Safety Initiatives

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 201944	Resolution: ○ Yes ◉ No

TITLE:

Bus Safety Initiatives

PRESENTATION SUMMARY:

The Department of Safety and Environmental Management (SAFE) in collaboration with the Office of the Chief Operating Officer (COO) will provide a status of efforts to reduce customer and employee injuries with a specific focus on Bus Services.

PURPOSE:

Staff will inform the Metro Board of recent initiatives designed to improve safety utilizing a holistic hazard management approach. Initiatives are focused on bus hazard management, technology improvements and strategies deployed that specifically focus on a reduction in bus operator assaults. Staff will also provide an update on the reinstatement of the 8000 Series Bus, installation of bus shields, deceleration and pedestrian lights.

DESCRIPTION:

SAFE and COO often collaborate to improve overall bus services by utilizing data, promoting accountability and strategic problem solving to reduce customer and employee injuries. Consistent review of the Safety Key Performance Indicators, sub-measures, and safety initiatives to reduce customers and employees' exposure to hazards. The following discussion highlights the status of on-going and new Bus Safety Initiatives.

Key Highlights:

• A Safety Risk Management process is followed to identify several methods to reduce risk in the system. A hazard assessment of the 8000 series buses resulted in several findings and immediate mitigation efforts.

• Similarly, to reduce bus accidents, technology solutions are being used, such as pedestrian safety lights, deceleration lights, and bus mirror adjustments.

• There are also several initiatives that are being implemented to reduce employee assaults, including bus shields, silent alarms, de-escalation training, and a bus operator humanizing campaign.

Background and History:

Safety Management System/ Hazard Management 8000 Series Bus

Safety Management Systems provide a systematic way to control risk and to provide assurance that the risk controls are effective. Through a Safety Risk Management process, hazards are identified to control risks. The following initiatives are examples of risk management strategies that support the Safety Risk Management Structure.

WMATA removed 105 NABI (2014) buses from revenue service after two buses were involved in separate accidents within three days. Both incidents involved engine shutdowns while in operation. Investigations were conducted on Bus 8043 and 8066. Several deficiencies were found and corrected. The findings and mitigations are found below:

• The engine of Bus 8043 unexpectedly shut down. This failure was due to a loss of electrical power causing the engine to stall followed by a loss of steering power assist. The root cause was an improperly wired master run switch. An immediate inspection of the fleet was conducted to check for potential workmanship related issues. All identified issues have been addressed.

• The engine of Bus 8066 unexpectedly shut down. The engine overheated which caused the engine to stop, followed by a loss of steering power assist. The investigation revealed; while the red Stop Engine light was illuminated, there was a program error that did not activate the audible warning buzzer. When functioning properly, the buzzer would have alerted the operator of the pending engine failure and provided the operator with the opportunity to bring the bus to a controlled stop prior to the shutdown occurring. New Flyer has identified the root cause of the audible alarm not sounding to be a software related issue. New Flyer has repaired this program, installed and validated the proper operation of this alarm on all buses.

• Finally, the MGM E-Stroke brake monitoring system sensors were cross connected, which can result in a brake fault indicating on the wrong wheel end. New Flyer has committed to conducting an inspection, correcting and proper labeling the MGM sensor wiring.

Technology Improvements
Pedestrian and deceleration light initiatives, as well as the bus mirror adjustment campaigns were implemented to prevent rear-end and pedestrian incidents. The installation of pedestrian lights was a phased approach initiative:

• **Phase 1**

  o 100 buses had lights installed in 2010

  o MD and DC only

  o Equipped buses trended down, compared to the remainder of the fleet

  o Based on the pilot's positive trend, lead the effort to change the VA statute to allow transit vehicles to display flashing amber lights

• **Phase 2**

- o 30% reduction in pedestrian/cyclist strike rate since initial install of lights
- o 756 currently installed; 50% of fleet
- o June 2019 expected completion

Pedestrian lights reduced pedestrian / cyclist accidents 100% on buses with pedestrian lights; the lights have been installed on 43% of the feet, anticipated completion is June 2019.

Although the deceleration/ servicing light data is not yet mature enough to be conclusive, we are hopeful that this new initiative will have the same favorable results. Six hundred and 57 deceleration lights have been installed (43% of fleet) and the expected completion is June 2019.

These rear mounted lights operate in three circumstances, each designed to communicate a specific hazard:

1. When the bus is decelerating. This is determined when the bus is moving greater than approximately 3-5 miles per hour and the operator releases the accelerator. After a delay of two (2) seconds the light will begin to flash. The two-second delay is to prevent the light from flashing while an operator modulates his or her speed during normal driving.

2. When the bus is servicing a stop. If the bus is stopped and either the front or rear doors are open, the light will flash continuously to alert motorists of the stopped bus during this vulnerable period of loading and unloading our passengers.

3. When the bus is backing. This is a particularly hazardous period in the operation of our buses. When the bus is shifted into reverse, the light will flash continuously, combined with the destination sign exposures of ‘CAUTION BUS IS BACKING’ displayed on all signs will help to draw the attention of pedestrians on the bus lot to the reversing bus, allowing them to position themselves safely.

The Mirror Lowering and Adjustment campaign was the result of a Close Call recommendation. Mirror related incidents contributed to strike collisions. Staff addressed this by retrofitting high mounted mirrors [351 Low Floor Advanced design (LFA) buses; 202 are complete or 58% of 351 LFA buses; expected completion is June 2018.]

Also, modifying the mirror position and visibly identifying the proper parallel alignment of the mirror contributed a 19% decrease in strike collisions compared to CYTD16. Bus Operators are able to adjust their mirror utilizing an electronic knob (older buses are not equipped with this feature)

Employee Assaults
While technology is important, technology alone is not the total solution. WMATA is committed to significantly reducing employee assaults.

Bus Operator Assaults increased 29% (70 to 90) compared to 2016 (as of December

9). In its efforts to protect our employees, Metro Police utilizes targeted deployment of resources, such as High Intensity Targeted Enforcement (HITEs), participates in Bus Division safety meetings, and continues work with youth through the “Respect Your Ride” youth program.

Other initiatives include providing Bus Operators with de-escalation tactics during New Bus Operator and Refresher Training. This class is offered at Bladensburg and Shepherd Pkwy. A total of 167 participants have completed the class as of November 2017.The class focuses on the following conflict resolution objectives:

• Reinforces de-escalation techniques (e.g. Customer boards bus, the bus is late, it’s raining and the customer is late for an interview)

• Informs Operators of their rights according to laws of the jurisdictions

• Provides Operators with opportunities to be heard and share their experiences

The utilization of Bus Shields and the reiteration of how to properly utilize the silent alarm in the event of an emergency are methods also used to keep Bus Operators safe. For shield installation:

• 533 installed; 34% of fleet

• 100 new buses arriving Q3

• 100 midlife overhauls annually

• June 2019 expected completion

Finally, automatic fare announcements are also active on all buses which eliminates potential points of conflict between the operator and potential fare evaders.

Discussion:

Although non-preventable collisions are the primary cause of both employee and customer injuries, there are a number of other factors which impact safety. SAFE and COO are partnering to address concerns of increased employee/customer injuries and the avoidance of hazard management challenges like the 8000 Series manufacturing issues.

Both groups utilize the same data driven analysis via Safety Risk Management to guide management decisions and identify appropriate mitigating actions. Identifying a systematic, collaborative and holistic approach to improving safety.

FUNDING IMPACT:

There is no impact on funding for this information item.	
Project Managers:	Joseph Leader, Patrick Lavin and Robert Potts
Project	Chief Operating Office, Department of Safe and Environmental

Departments/Offices:	Management and Department of Bus Services

TIMELINE:

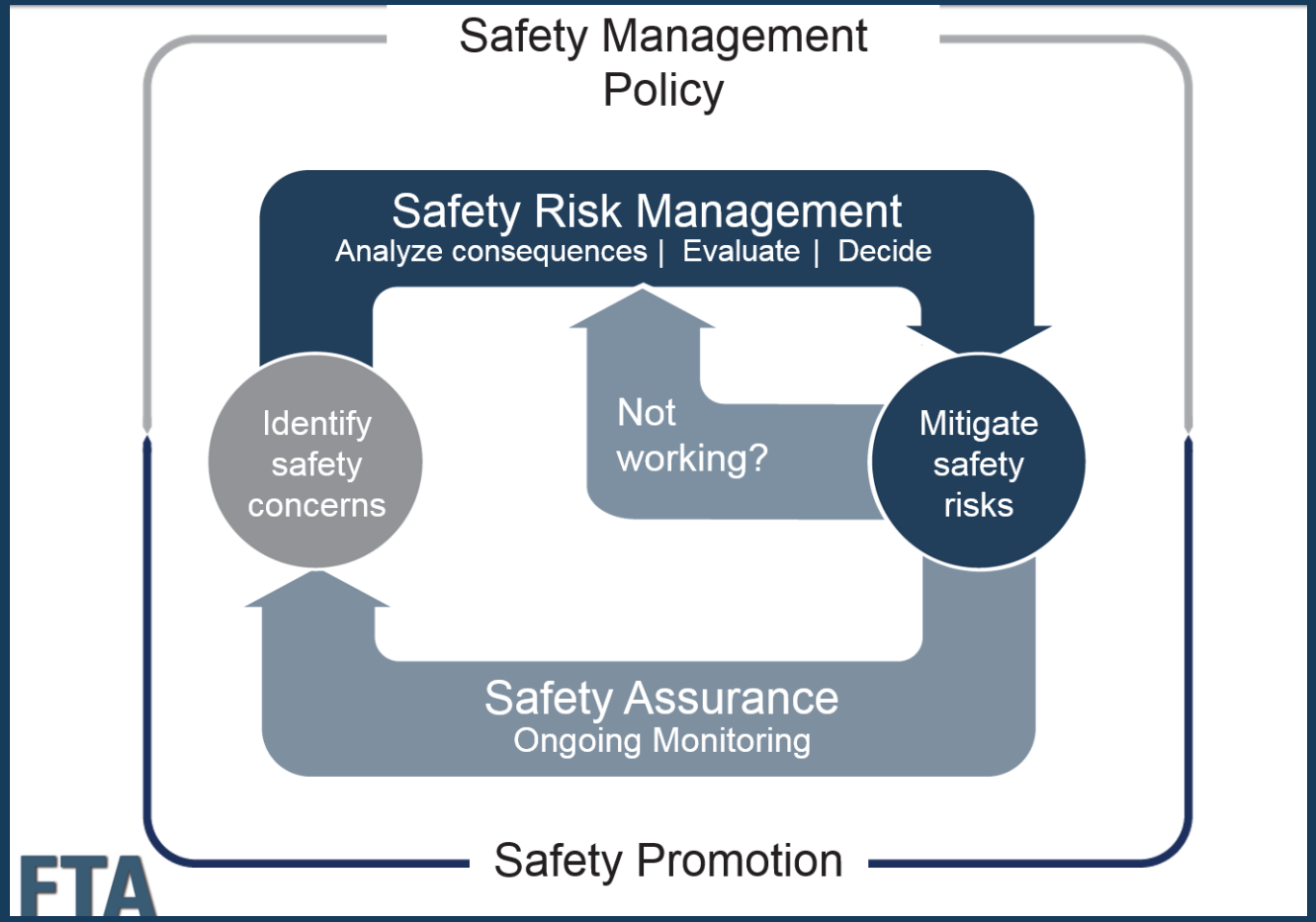
Previous Actions	Safety and Service Committee Meeting, December 14, 2017.
Anticipated actions after presentation	N/A

Bus Safety Initiatives

Safety and Service Delivery Committee
January 11, 2018

Safety Management System
Safety Risk Management

- Safety Management System provides a systematic way to control risk and assurance that risk controls are effective
- Safety Risk Management controls risk thru hazard identification
- The following initiatives are examples of risk management strategies that support the Safety Risk Management structure



8000 Series Buses

- **Engine shut-offs (9/25, 9/28)**
- **All (105) 8000-Series buses removed from service**
- **Three findings were identified during two-month hazard assessment:**

1. Overheating; no audible alarm due to manufacturer software issue
   Mitigation: Fleet-wide software installation and validation

2. Improper wiring of vehicle's master run switch
   Mitigation: Fleet-wide inspection and comprehensive testing

3. Cross-wired E-Stroke brake monitoring system sensors
   Mitigation: Fleet-wide inspection and corrections/labeling of the wiring

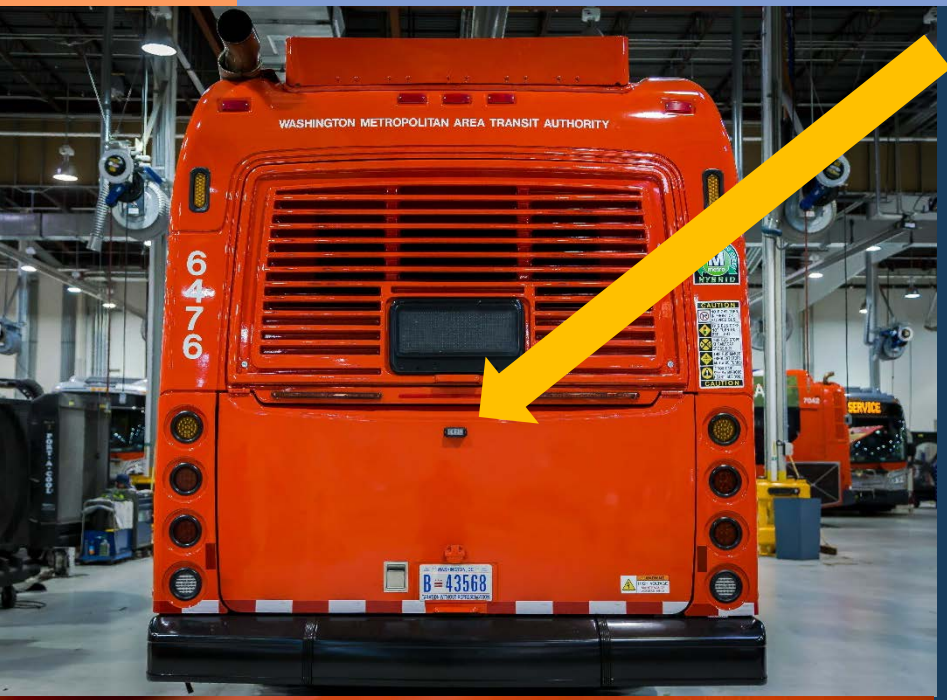
Safety Initiatives: Technology

- **Pedestrian Lights**
  - Phase I
    - 100 buses had lights installed in 2010
    - MD and DC only
    - Strikes trended down on equipped buses
    - Lead the effort to change the VA statute to allow transit vehicles to display flashing amber lights
  - Phase II
    - 30% reduction in pedestrian/cyclist strike rate
    - 756 currently installed; 50% of fleet
    - June 2019 expected completion

*Installation percentages as of December 9, 2017

Video: Pedestrian Lights

Safety Initiatives: Technology



- **Deceleration / Servicing Lights**
  - 657 installed; 43% of fleet
  - June 2019 expected completion
  - Recent initiative, data not mature to support conclusions

*Installation percentages as of December 9, 2017

Video: Deceleration / Servicing Lights

Safety Initiatives: Mirror Lowering

- Retrofitting high-mounted mirrors on Low Floor Advanced design (LFA) buses
- 202 complete; 58% of 351 LFA buses
- June 2018 expected completion

*Completion percentages as of December 9, 2017

Safety Initiatives: Mirror Adjustment Campaign

- 19% reduction in mirror strike collisions
- Ongoing initiative

*Completion percentages as of December 9, 2017

Employee Assaults: MTPD Initiatives

- **Strategies to improve bus safety and security:**
  - Metrobus Enforcement Division targeted deployments
  - High Intensity Targeted Enforcement (HITEs)
  - Bus division safety meetings
  - Bus in MetroStat meetings
  - Overtime to reduce fare evasion
  - Continuation of Respect Your Ride youth campaign
  - Legislation to increase penalty for bus operator assaults

	2016 CYTD	2017 CYTD
Operator Assaults	**70**	**90**

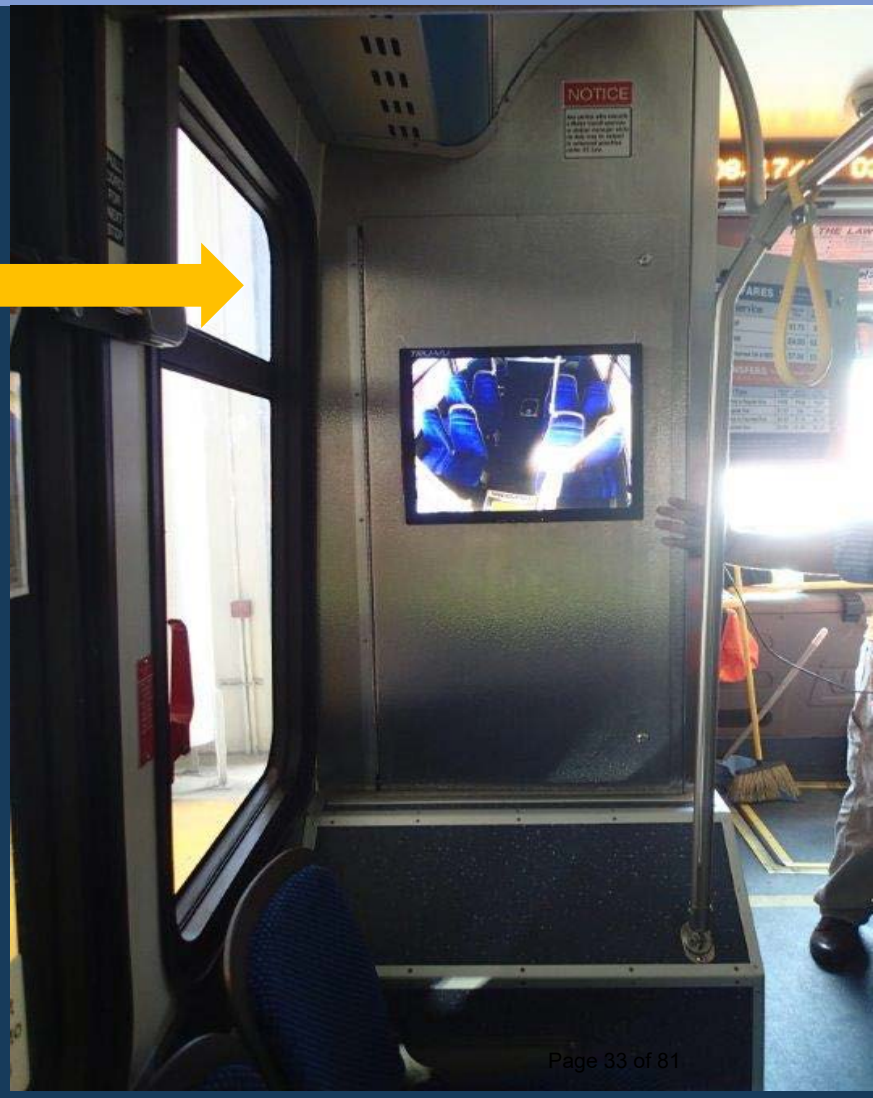
Predominant causes:

- No Known Reason – 36%
- Verbal Altercation – 27%
- Fare Dispute – 23%

*Calendar-year-to-date (CYTD) data as of December 9, 2017

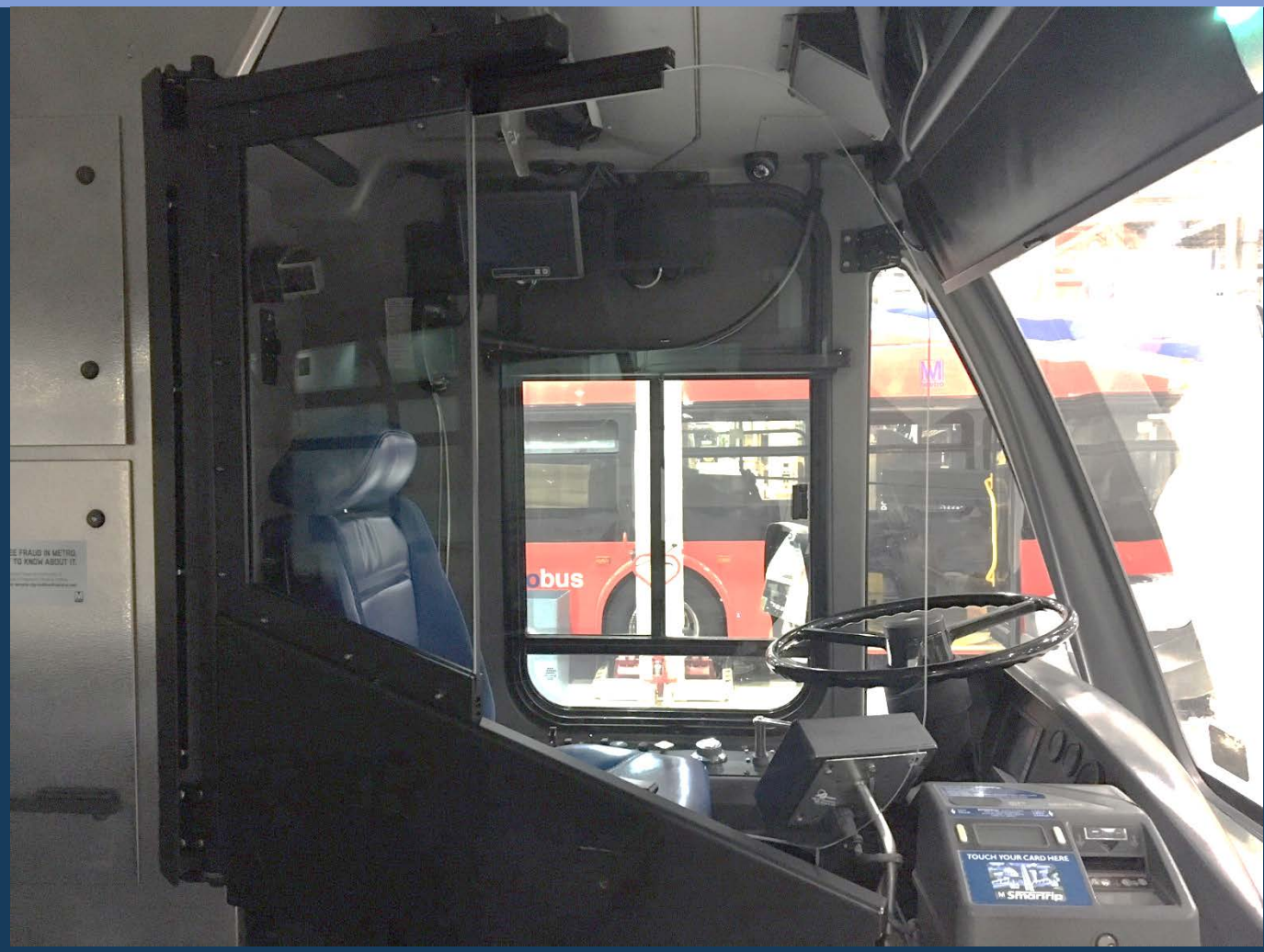
Employee Assaults: Automatic Fare Announcement and Bus Operator Training

- **Automatic Fare Announcement**
  - Active on all buses
- **On-board Video Displays**
  - CCTV feeds remind customers their actions are recorded
- **Bus Operator De-Escalation**
  - Bus operator training and refresher training
- **Conflict Resolution Training**
  - New scenario-based training teaches de-escalation techniques
  - Informs operators of rights according to laws of the jurisdictions
  - Provides operators with opportunities to be heard and share experiences



Employee Assaults: Bus Compartment Protective Shield

- 533 installed; 33% of fleet
- 100 new buses arriving Q3
- 100 midlife overhauls annually
- June 2019 expected completion



*Installation number as of December 9, 2017

Employee Assaults: Bus Silent Alarm

- **Active on all buses:**
  - Sends a Silent Radio Call to BOCC requesting immediate police assistance
  - Opens Covert microphone
  - Marks DriveCam event
  - Marks CCTV event
  - Activates “CALL POLICE” sign
  - Activates Roof Marker/Clearance Lights

Employee Assaults: Bus Operator Humanizing Campaign

- **Launched November 2017**
- **Amplified internally and externally through:**
  - Print
  - Digital
  - Radio