



**Massachusetts Bay  
Transportation Authority**

## Safety Initiatives: KPI Update

---

Fiscal and Management Control Board

February 24, 2020

Kelly Chronley and Jen Elise Prescott

# Overview

---

- Peer-to-peer benchmarking and literature reviews conducted on KPIs
- Our progress on creating reporting dashboards
  - Reporting and monitoring next steps
- Draft Safety Key Performance Indicators and Draft Targets
  - Federally mandated
  - Additional KPIs for internal monitoring

Scope for current discussion: Rail/Transit, Bus, Paratransit

- Commuter Rail and Ferry are excluded from this presentation because they are not governed by the same federal reporting requirements currently being discussed.
  - This work is in progress. Some is already incorporated in our annual reporting in Tracker.



# Peer Agency and Literature Review of KPIs

---

- Reached out to 9 agencies, 6 responded. Agency list: CTA, TTC, SEPTA, MARTA, WMATA, LA Metro, SFMTA, King County, NY MTA
  - Reports received were mostly executive reports (quarterly and monthly), some departmental. MBTA monthly Ops was given as an example report
- Literature Review conducted (TCRP, APTA and academic databases were scanned)
  - 6 articles have been kept as a reference for this project and process



# Major Takeaways from both processes

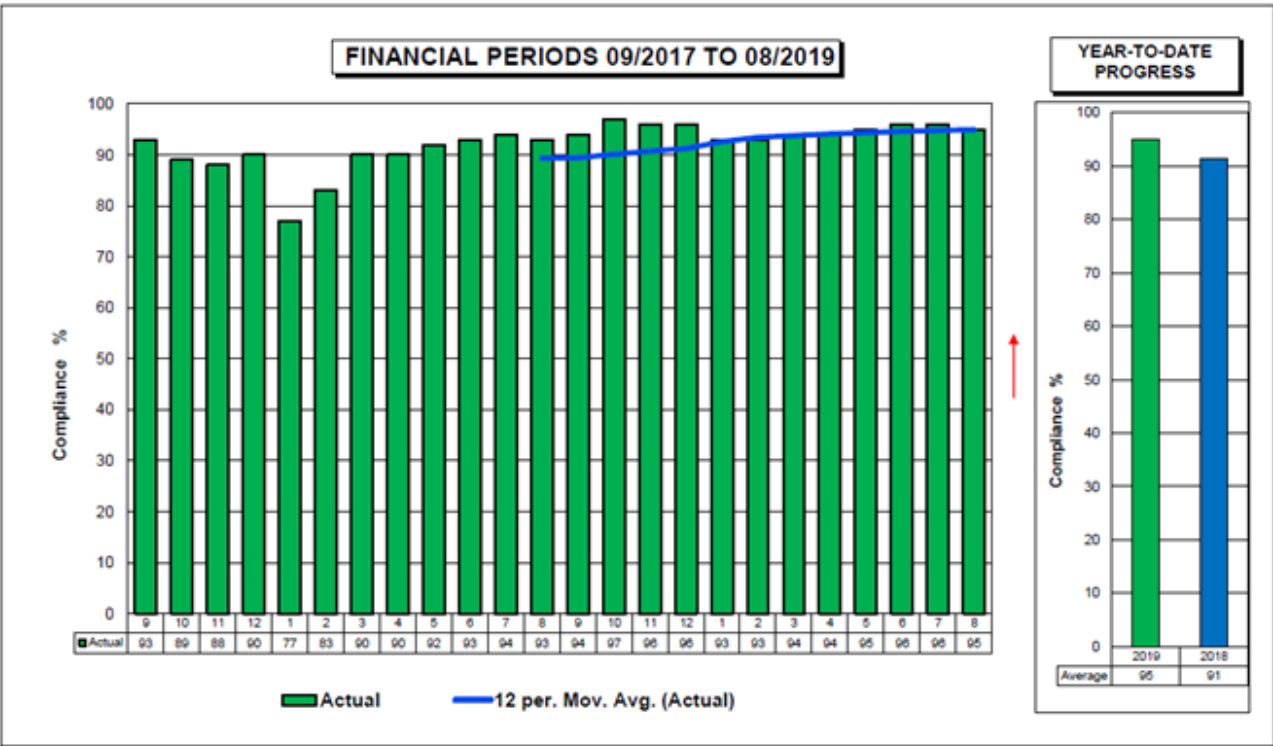
---

- All KPI themes or areas of focus presented in others' reports or discussed in the literature are current, ongoing efforts measured and captured at our agency.
  - Best practices include a higher emphasis on % of preventative maintenance and inspections completed
  - All KPIs should be normalized as rates (e.g., injuries per 100,000 passenger boardings)
- Based on the reports provided, most other agencies reviewed do not separate out safety as a concern separate from Engineering and Maintenance or Operations, safety metrics are embedded throughout all of those reports.
  - Most highlight employee injuries and collisions as the major safety KPI
  - Two agencies had training metrics in the reports provided



# Peer Agency Safety Reporting Sample

## Subway/SRT Rulebook Training



Commentary: Actual compliance criteria is based on course completion date lesser or equal within 365 days.



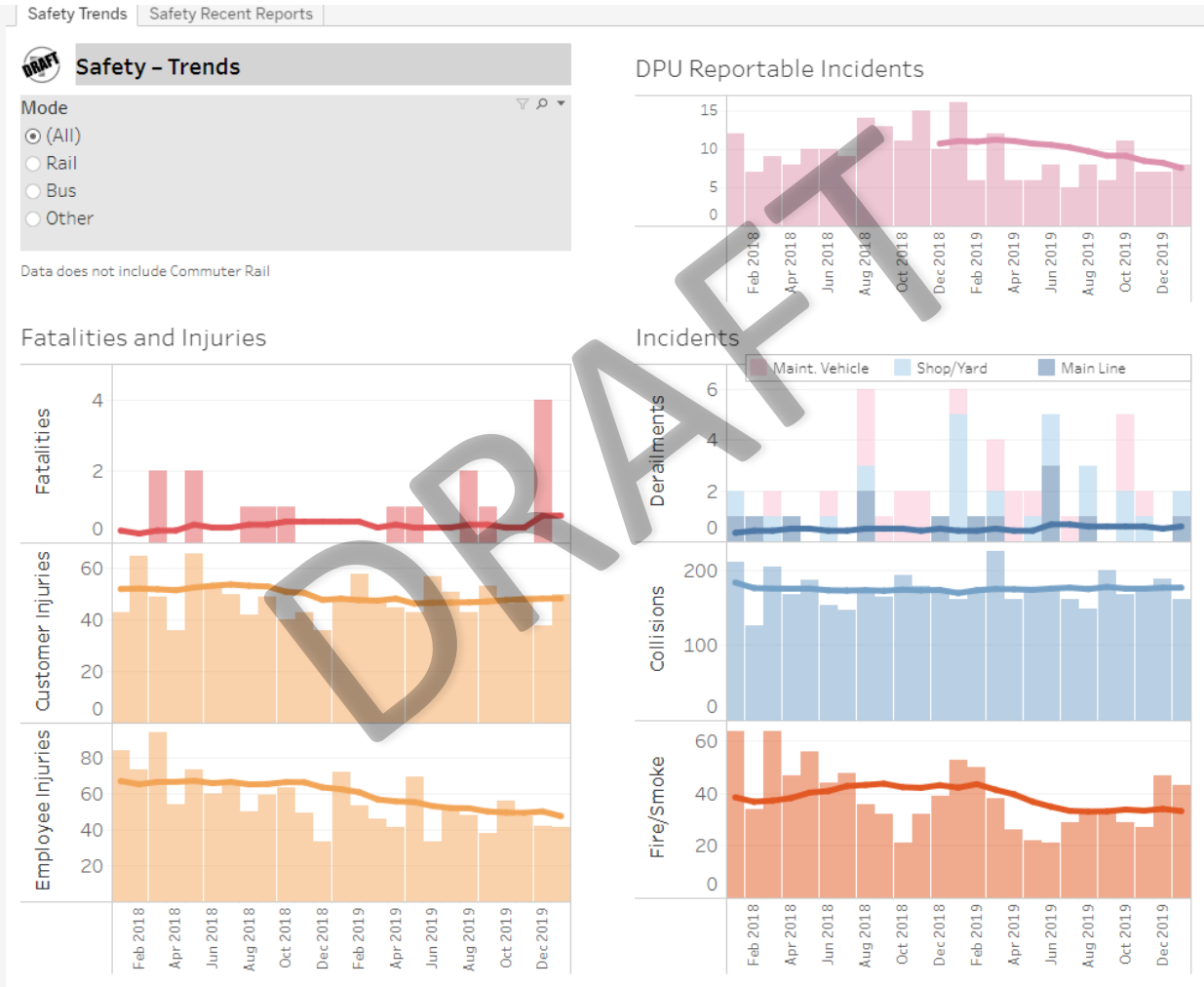
# Our Progress

---

- Using our existing data sources, we have been working to take best practices learned from the peer and literature review for monitoring safety indicators
- Have Monthly, Weekly, and Daily dashboards currently in progress
  - Will be working to transition our Monthly Operations report to include information that incorporates the lessons learned from the peer and literature review



# Reporting Dashboards



# Reporting and Monitoring Next Steps

---

- We will be identifying and monitoring leading indicators
  - Employee training completion
  - Preventative maintenance and inspection schedule and completion
  - Employee reports of safety concerns (looking for an increase)
- Kicking off several projects focused on improving our data quality and ensuring we empower our staff to be able to provide information that is useful and necessary for reporting purposes without increasing or changing their workloads
- We are building an executive dashboard for regular monitoring of key indicators





# Measuring Safety Performance

- FTA Public Transportation **Agency Safety Plan** Rule (49 CFR 673) requires transit agencies to set targets for the following four KPIs:
  - **Fatalities** – all deaths on our property (including intentional) w/in 30 days excluding death due to illness and other natural causes
  - **Injuries** – harm on our property resulting in immediate medical transport from scene
  - **System Reliability** – mean distance between major mechanical failure
  - **Safety Events** – incidents (including accidents and derailments) meeting NTD major reporting thresholds for transit rail, bus, and paratransit

*NOTE: 49 CFR 673 excludes Commuter Rail and Ferry*



# Safety Performance – Target Setting for Initial Rollout

- FTA requirements and guidance:
  - 49 CFR 673 references the National Safety Plan (NSP) for required safety performance indicators, metrics, and targets
  - Indicators are based on NTD reporting requirements
  - “moving toward zero” for fatalities and improving the annual performance of other KPIs by 2% to 5% are acceptable targets in this initial year
- MBTA Target Basis:
  - MBTA safety performance indicators and targets for 2020 are based FTA webinar guidance, past performance, industry best practices, and related discussions
  - 5% reduction based on historical performance for safety events and injuries is an acceptable target for the initial rollout of safety targets
  - In cases where previous years of performance exceeded 5% reduction, the targets were set at the lowest annual performance in last 3 years
  - Based on improvements in data collection in recent years, MBTA is using the past 3 years of data to set targets (2017-2019)
- Initial target setting completed this year will provide a baseline on safety performance and targets that will be re-evaluated annually



# Mandated Performance Targets - Fatalities

A fatality meets the threshold for reporting if it occurs on our property and is confirmed within 30 days.

Fatalities – Rate per million vehicle revenue miles			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
Heavy Rail	0.11	0	Move to zero
Light Rail	0.11	0	Move to zero
Bus	0.11	0	Move to zero
The RIDE	0.02	0	Move to zero



# Mandated Performance Targets - Injuries

An injury (of customer, employee, or member of the public) meets the threshold for reporting if it requires transport away from the scene for medical attention for one or more persons.

NTD Reportable Injuries – Rate per million vehicle revenue miles			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
Heavy Rail	12.13	11.52	5% reduction
Light Rail	19.36	18.39	5% reduction
Bus	17.75	16.86	5% reduction
The RIDE	2.43	2.3	5% reduction



# Mandated Performance Targets – System Reliability

Reliability is measured as the mean distance between major mechanical failure by mode. Major mechanical system failures prevent a vehicle from completing or starting up a scheduled revenue trip because actual movement is limited or because of safety concerns.

System Reliability - Revenue miles traveled per major mechanical failure			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
Heavy Rail	49,732	47,000	Improvement over 2019 performance with move toward 3 year avg.
Light Rail	7,660	7,000	Improvement over 2019 performance with move toward 3 year avg.
Bus	19,451	22,000	12% improvement over 2019 performance
The RIDE	66,134	66,00	Move to 3 year average



# Mandated Performance Targets – NTD Reportable Safety Events

An event is considered a **safety event** if it meets the reporting thresholds for collisions, derailments, fire, hazardous material spill, act of nature (Act of God), evacuation, or Other Safety Occurrence Not Otherwise Classified occurring on a transit right-of-way, in a transit revenue facility, in a transit maintenance facility, or involving a transit revenue vehicle and meeting a NTD Major event threshold.

NTD Reportable Safety Events– Rate per million revenue miles			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
Heavy Rail	1.06	1.00	5% reduction
Light Rail	6.13	5.83	5% reduction
Bus	6.32	6.0	5% reduction
The RIDE	2.34	2.22	5% reduction



# Additional Proposed KPIs

---

- **Additional Proposed Measures and Targets by Mode and Line** *not required by 49 CFR 673*
  - Customer Injuries
  - Derailments
    - Mainline Revenue Passenger Train Derailments
    - Mainline Non-revenue Passenger Train Derailments
    - Yard/Shop Passenger Train Derailments
    - Maintenance Vehicle Derailments
  - Transit Vehicle Collisions
  - Reportable Fire/Smoke Incidents
  - Incorporating Commuter Rail and Ferry



# Proposed Additional Measures and Targets (not required by FTA)

Rail - Additional Metrics and Targets			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
<b>Customer Injuries</b> (per million passenger trips)	1.3	1.2	5% reduction
<b>Main Line Train Derailments</b> (total)	5	0	Move to zero
<b>Yard Train Derailments</b> (total)	9	9	Reduce to average
<b>Collisions</b> (per million revenue miles)	1.8	1.7	5% reduction or reduce to average
<b>Reportable Fire/Smoke Incidents</b> (total)	194	170	5% reduction from 2019 performance





# Proposed Additional Measures and Targets (not required by FTA)

Bus - Additional Metrics and Targets			
	3 Year Average (2017-2019)	Annual Performance Target	Basis for Proposed Target
<b>Customer Injuries</b> (per million passenger trips)	2.5	2.4	5% reduction from average
<b>Collisions</b> (per million revenue miles)	87.5	87.5	Reduce to average
<b>Reportable Fire/Smoke Incidents</b> (total)	24	15	5% reduction from 2019 performance



# Next Steps

---

- Data Collection
  - Continue to improve data collection processes
- Data Evaluation
  - Identify trends and assess performance based on targets
  - Data will be a source for Safety Risk Management
  - Develop leading indicators and associated targets
- Communication
  - GM updates on safety performance
  - Internal monthly safety reports
  - Continue Safety dashboard initiative and internal communication process and platform development



## Appendix: SMS and Safety Performance

---

- Public Transportation Agencies are required to implement a Safety Management System (SMS).
- The **Agency Safety Plan** documents the framework of the SMS.
- SMS is a formal data-driven process for managing safety risk and assuring the effectiveness of a transit agency's safety risk mitigation.
- **Safety performance management** is a critical tool in SMS that will identify safety trends and monitor progress in safety improvements.
- **Measuring and communicating** safety performance is critical to assessing and improving safety outcomes.



# Appendix: Measuring Safety Performance

---

- *Defined terms:*

- Safety performance: an organization's safety effectiveness and efficiency, as defined by safety performance indicators and targets, measured against the organization's safety objectives.
- Safety performance measure: a quantifiable indicator of performance or condition that is used to establish targets related to safety management activities, and to assess progress toward meeting the established targets.
- Safety performance target: a quantifiable level of performance or condition expressed as a value for the measure related to safety management activities to be achieved within a set time period.



# Appendix: Federally Required Safety Reporting

---

- FTA-focus
  - Safety performance management is a critical tool that will support transit providers and FTA in identifying safety concerns and monitoring progress in safety improvements.
  - Performance management requirements are intended to facilitate more effective investment of Federal transportation funds by refocusing attention on national, regional, and local transportation goals, increasing the accountability and transparency of the Federal transit and Federal-aid highway programs, and improving project decision-making through performance-based planning and programming.
  - Measuring safety performance is imbedded in SMS.

