October 7, 2019 Incident at Farragut West

Preliminary Briefing

Safety and Operations Committee
October 10, 2019

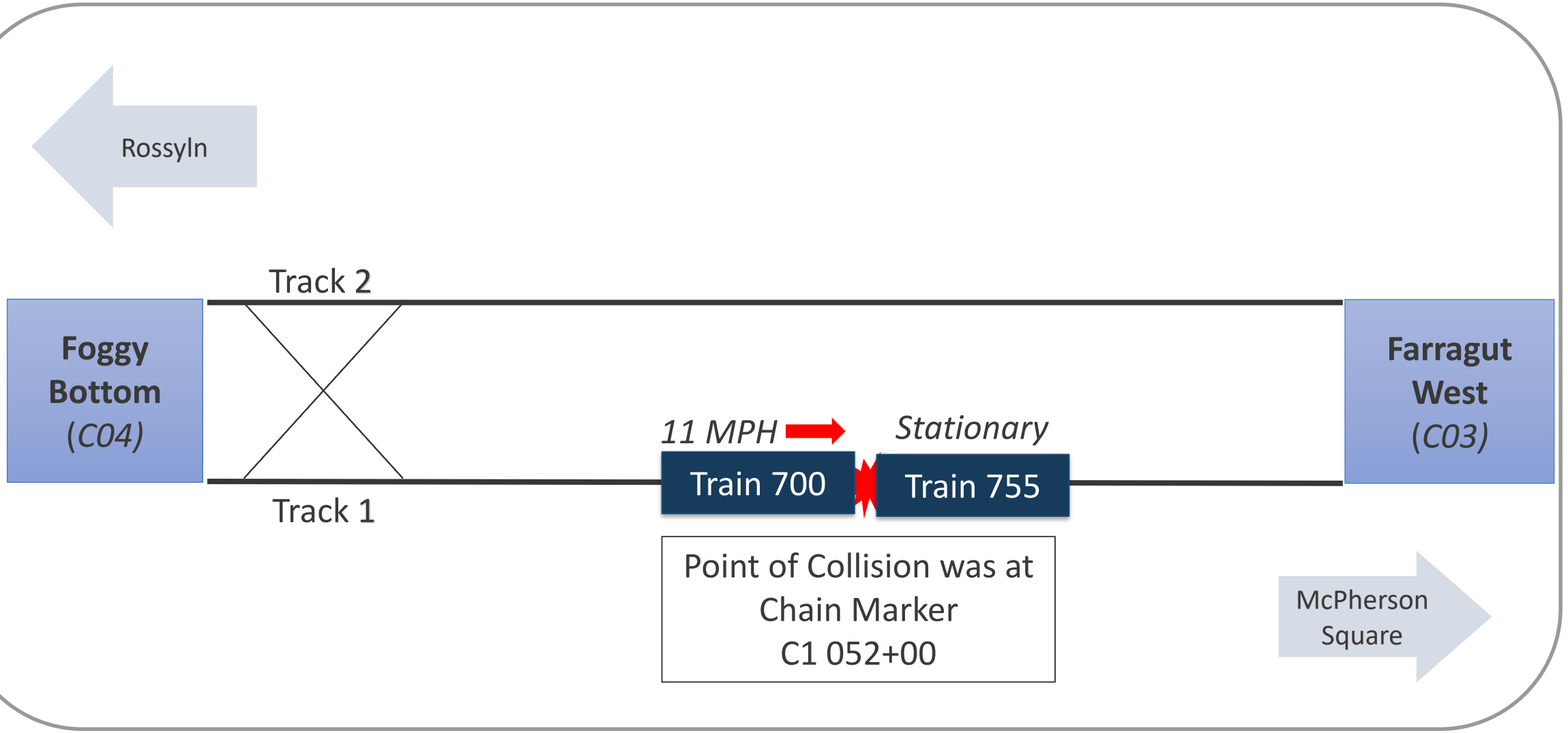
Agenda

- Executive Summary
- Incident Response and Recovery Chronology
- Investigation Process and Preliminary Findings
- Automatic Train Control System Overview
- Next Steps

Executive Summary

- Two trains involved in the collision were out of service with no passengers
- Non-life threatening injuries to two operators who were treated and released
- Damage to rail cars under review
- Investigation ongoing, but preliminary findings established no evidence of systemic causal factors
- Human Factors remain under review as part of ongoing investigation

Track Diagram



Timeline of the Incident Response and System Recovery

*Times are approximate and subject to change

On-Scene Data Collection is performed

MONDAY 12:48AM Outside Farragut West: Train #700 made contact with Train #755 on track #1

12:56 AM-12:58 AM Operators request Medical Attention. ROCC requests DCFEMS via 911

1:00 AM WMATA Supervisors arrive on Scene Additional Personnel / Investigators continued to arrive

1:59 AM Train Operators transported to local hospital

2:32 AM DCFEMS departs scene. On-scene command transferred to MTPD

5:00 AM Orange/Blue Line trains are single tracking between Foggy Bottom and McPherson Square

5:00 AM Silver Line trains are operating between Wiehle-Reston East and Ballston

5:06 AM Third-Rail Power restored on Track 2

TUESDAY 12:44 AM Train removal begins

TUESDAY 4:05 AM Final railcars removed, track inspection begins

TUESDAY 6:45 AM Track inspections completed; normal operations resumed

Time Between the Collision
and return to Normal Operations = 1 day, 6 Hours

Investigation Process

- In accordance with requirements, Metro Officials notified the WMSC of the incident at 1:08 AM and notified the NTSB of the incident at 2:30 AM. Metro has kept NTSB apprised of the progress of the investigation, as they requested.

- WMSC has participated in the interview process and accompanied Metro staff while conducting on-scene and follow-up data collection activities.

On-Scene Investigation

- Examination of the trainsets in the positions at which they came to rest, indicated that all wheels of both trains were resting on the running rails.
- The second car of Train 755 (stationary train) had separated (18”) from the third car of the consist.
- There was visual damage to both train consists involved, with the lead car of Train 700 sustaining the most damage.

Preliminary Findings- Engineered Systems

The investigation is currently in the data collection and fact-finding phases. As such, these preliminary findings are subject to change as additional or new information is secured.

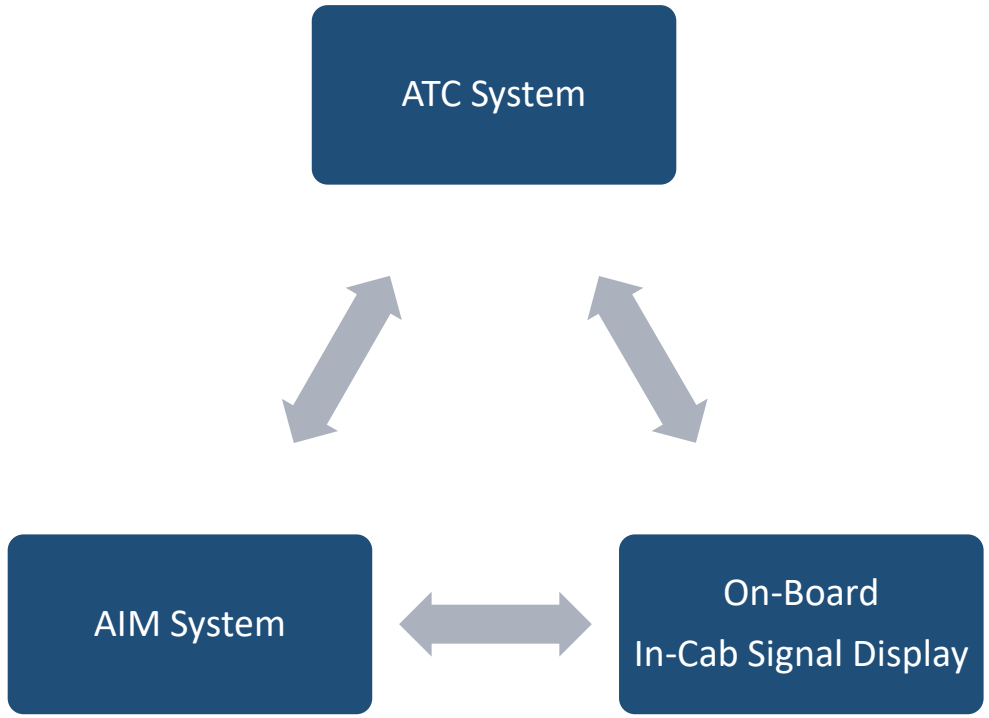
Track	Power	Communications	Signal System	Trainset	ROCC
• Inspections conducted on-scene did not identify anomalies or conditions which were out of tolerance • Review of inspection history is in-progress • Tunnel Lighting was fully illuminated	• Inspections conducted on-scene did not identify anomalies or conditions which were out of tolerance • Review of inspection history is in-progress	• Communication systems were operational and performing as designed per inspections and testing conducted on-scene and review of communications logs • Review of system history is in-progress	• Inspections and testing conducted on-scene did not identify anomalies or conditions which were out of tolerance • Review of data recorders did not indicate a failure of the system. • Review of system history is in-progress	• Inspections conducted on-scene did not identify anomalies or conditions which were out of tolerance • Review of data recorders did not indicate a failure of the on-board signal displays. • Testing of the trainset is in-progress • Detailed damage assessments and a review of the trainset kinematics is underway.	• System playback review does not identify anomalies or other irregular conditions • Review of radio communications does not indicate any issues with transmission or reception • Communication quality appears clear. • All emergency protocols appear to have been followed

Preliminary Findings- Operations and Human Factors

- Initial reviews observed normal operating conditions at the time of the incident.
- Initial reviews of operator personnel records indicated that the operators were up-to-date in all required qualifications and training.
- Initial interviews have taken place with both train operators. Follow-up interviews are planned.
- Required toxicology test samples were secured for both operators. Results are pending.
- Additional interviews with ROCC and supervisory staff are planned.

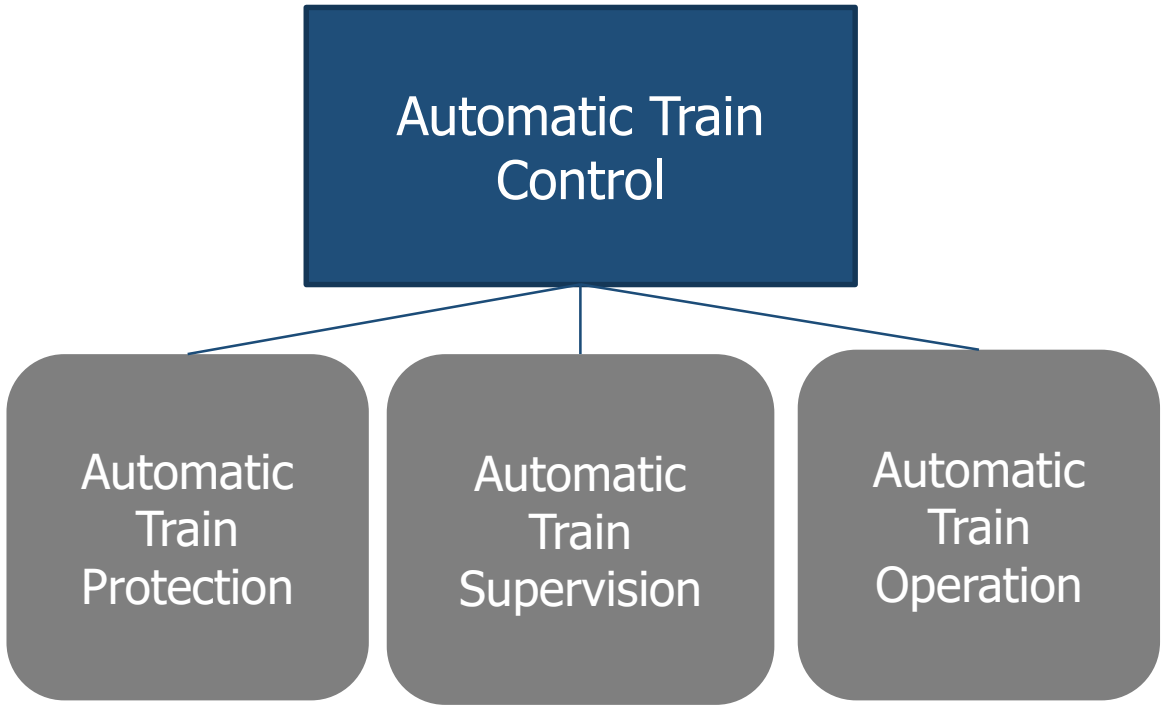
Preliminary Findings- Engineered Systems

- System Data Recorder logs were secured and reviewed for each element of the train control system. No anomalies or system failures were observed.
- An integrated review of the three systems is in progress to confirm the initial findings.



Automatic Train Control

- ATC provides for the safe and efficient movement of trains through a series of track circuits and integrated logic for train routing and speed controls
- Includes:
  - Automatic Train Protection (ATP)
  - Automatic Train Supervision (ATS)
  - Automatic Train Operation (ATO)
- Preliminary findings do not indicate a failure of the ATP system occurred.



ATP System Functionality

- The ATP system is designed to transmit “speed commands” from wayside equipment to a train. These codes govern or limit the speed of a movement of the train.
- Initial observations of data recorder logs indicate that both train 700 and train 755 received a “Zero Speed Command” from the ATC system.
- Zero speed commands indicate that the track ahead is occupied (or otherwise obstructed) and require the trainset come to a stop. In the event the train does not come to a stop, the system is designed to engage the trainset braking system to arrest movement of the train.
- After the trainset comes to a stop, the train can be moved at a reduced speed (up to a maximum of 15 MPH). Such movement requires authorization from ROCC.
- This is standard system design in the transit industry and accounts for density and capacity in terminals and yard areas as well as operational needs in the event of system interruptions (i.e., disabled train recovery, system outages, etc.).

FTA CAP

- In 2016, Metro received a CAP from FTA (FTA-RED-16-003-B) which required a review of options available for implementation of a “positive train stop” (PTS) function which would reduce the likelihood of a red signal overrun.
- Metro has identified a solution and is working with vendors to implement the solution on the 6000 and 7000 series fleets. PTS functionality has been included in future equipment specifications.
- Metro has been working with the WMSC to coordinate the implementation of the CAP. On September 17, 2019 WMSC issued approval of an implementation date of 2020 for the system modifications.
- Metro is performing an evaluation of the proposed system in concert with the investigation.

Next Steps-Investigation Ongoing

- Complete additional interviews with staff
- Review results of pending tests and data
- Perform analysis of data and interviews
- Identify probable cause and contributing factors
- Review current operational protocols and technological systems to identify potential modifications or improvements to processes and system
- Participate in the WMSC Engineering Summit to review available technology options to improve safety
- Develop corrective actions plans to implement any identified modifications or improvements
- Submit finalized report to the WMSC- Estimated Timeframe 60 days

Questions