

FINAL REPORT OF INVESTIGATION A&I E19539

October 7, 2019

Collision

W-0030

Adopted by the Washington Metrorail Safety Commission at its meeting on June 18, 2020.

Washington Metrorail Safety Commission
777 North Capitol Street, NE, Suite 402
Washington, DC 20002



FINAL REPORT OF INVESTIGATION A&I E19539

SMS 20191007#83450

Date of Event:	October 7, 2019
Type of Event:	Collision
Incident Time:	00:48 hrs.
Location:	Farragut West, Track 1
Time and How received by SAFE:	00:56 hrs. via Email
Safety Officer Response:	Yes, SAFE 201, SAFE 803, SAFE 208, SAFE 70, SAFE 701
Time of Safety Officer Arrival:	01:04 hrs.
Time of Safety Officer Departure:	03:50 hrs. (10/8/2019)
Train Consist:	Train ID 700 - T3018-3019x3011-3010x3009- 3008L Train ID 755 - T3207 -3206x3120-3121x3140-3141L
Injuries:	Both Train Operators (T/O #1 Train ID 755, T/O #2 Train ID 700)
Damage:	Extensive damage to Vehicle components
Emergency Responders:	SAFE, MTPD, OEM, RTRA, TRST, ATCM, CMNT, PWR, CENV and ATCE

Executive Summary

At approximately 00:48 hrs., on October 7, 2019, an inbound six (6) car non-revenue train, Train ID 700, collided with a stationary six (6) car non-revenue train, Train ID 755 at Chain Marker C1-052+00, Track 1. The event occurred within the underground segment of the Blue/Orange/Silver Line during a Sporting Event Special event operation. The Lead car (Car 3008) of Train ID 700 collided with the Trailing car (3207) of Train ID 755, approximately 600 feet outside of the Farragut West station limits.

There were two (2) reported injuries that involved both Train Operators (T/O) aboard the affected trains. There were no other customers or passengers aboard the accident trains.

Following the report of the accident, Rail Transportation (RTRA) Supervision was dispatched to the accident scene. DC Fire Department (DCFD) was notified by the Rail Operations Information Center (ROIC) at 00:54 hrs., and arrived at the Farragut West

Station at 01:10 hrs. Metro Transit Police Department (MTP), Safety and Environmental Management (SAFE) and other Rail Operation responders were notified and subsequently responded shortly thereafter. The ROCC remotely de-energized 3rd rail power at 00:53 hrs.

A responding Rail Supervisor (R/S) was instructed by the ROCC to perform a ground walk around inspection of both trains. The ground walk around inspection revealed that all wheels of both trains were resting on the running rails, and no apparent derailment had occurred; however, the 2nd car (3140) of Train ID 755, had separated from the 3rd car (3121) of the consist. There was visual damage to both train consists involved in the accident. Lead car 3008 sustained the most damage. The total cost to repair cars 3010, 3011, 3018, 3019, 3140 & 3141 is \$135,188.00. Three (3) married pairs (3008-3009, 3206-3207 and 3120-3121) have not been recommended for repair due to cost and age prohibitive.

Both T/Os were transported to George Washington Hospital and after release from hospital were transported to the Jackson Graham Building (JGB) for required post-incident testing. T/O #1 and T/O #2 arrived for post-incident testing at the Jackson Graham Building (JGB) at 06:02 hrs., and 07:06 hrs., respectively. Although both employees arrived at JGB testing site after the two (2) hour window, both were within the required eight (8) hour window to be administered both Drug and Alcohol testing under 49 Code of Federal Regulations Part 655.44 (Post-incident Testing).

During the early morning hours of Tuesday, October 8, 2019, both affected rail vehicles were transported from Farragut West, Track 1 to Brentwood Yard for Rail Car Engineering (CENV) and Rail Car Maintenance (CMNT) for post-incident inspection and analysis of damages.

The accident event occurred after the normal scheduled revenue service closing time of 00:00 hrs., therefore there was no impact to revenue service; however, at the start of revenue service on Monday, 10/07/2019, at 05:00 hrs., Orange, Blue and Silver Lines terminals extended their headways to fifteen (15) minutes to support single track operation between Foggy Bottom and McPherson Square stations utilizing Track 2. Silver line service operated between Wiehle-Reston East and Ballston Stations only. This service plan remained in operation until the end of revenue service on Monday, October 7, 2019, and the start of revenue service on Tuesday, October 8, 2019. Normal service was restored at 06:46 hrs., after a successful riding track inspection performed by WMATA Maintenance personnel.

Notification:

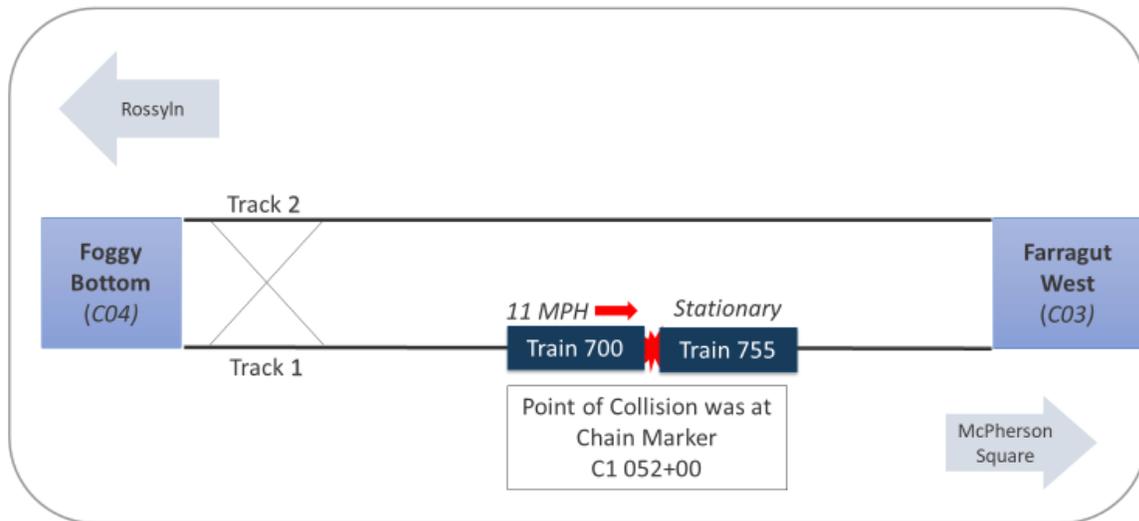
Title	Time	Comment:
Date: 10/7/2019 Final Report Collision C03 Rev.12 E19539	Time: 00:48 hrs.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Drafted By: SAFE 70 – 10/10/2019 Reviewed By: SAFE 701 – 10/10/2019 Approved By: SAFE 70 – 10/10/2019 </div>

WMSC Representative	01:08 hrs.	WMSC Representative contacted via Phone
WMSC Email	02:10 hrs.	WMSC Email Distribution
FTA Email	02:10 hrs.	CMC-01@dot.gov
NTSB	02:30 hrs.	NTSB #1260422

Investigation

Field Sketch/Schematics:

Track Diagram



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WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY



Incident Location:

The collision accident occurred between the Foggy Bottom and Farragut West Stations, Track 1 and the point of impact (POI) was at Chain Marker C1-052+30. The type of structure is within an underground subway with direct fixation track consisting of continuous welded rail.

Weather and Visibility:

At the time of the incident, the temperature was 70 degrees Fahrenheit and cloudy. SAFE has determined that weather was not a factor in this incident. (Source: National Oceanic Atmospheric Administration (NOAA) for Washington, DC).

ROCC:

On Monday, October 7, 2019 at 00:48 hours, the ROCC AIMS system displayed a momentary loss of third rail power between the Foggy Bottom and Farragut West Stations, Track 1. Several minutes later at 00:51 hours, the T/O of Train ID 755 reported to the ROCC via Rail Operations Control Center Console Desk #2 (Ops #2) radio channel that the rear section of their train was struck by an unknown source and their current position was within the underground section of the Metrorail Blue/Orange/Silver line. The ROCC instructed Train ID 755 T/O to key down the consist, perform a radio check on their hand-held portable radio and investigate the rear section of the train for any anomalies. At 00:52 hours, ROCC contacted the train positioned behind Train ID 755, Train ID 700 via radio and inquired about the condition of their train. Train ID 700 T/O informed ROCC that the train they were operating collided with the train ahead. ROCC then instructed Train ID 700 to secure their train and perform a ground walk around inspection. Train ID 700 informed ROCC that he would secure the train and perform a ground walk around. At 00:53 hours, Rail Transportation (RTRA) Supervision was dispatched to the accident scene. DC Fire Department (DCFD), Metro Transit Police Department (MTPD), Safety and Environmental Management (SAFE) and other Rail Operation responders were notified and subsequently responded shortly thereafter.

At approximately 00:55 hours Train ID 755 T/O stated that their train was in close proximity to the Farragut West station platform and that they required medical attention due to back pain. Additionally, Train ID 700 T/O contacted ROCC and stated being unable to perform a ground walk around inspections due to sustaining injuries as a result of the collision accident. At 00:56 hours., ROCC remotely de-energized 3rd rail power on Track 1 surrounding the affected area of track.

At 00:54 hours, personnel from the Rail Operations Information Center contacted DC 911 and requested emergency medical personnel due to T/Os reported injuries.

At 01:00 hours, a responding Rail Supervisor (R/S) was instructed by the ROCC to continue the ground walk inspection of both trains. The ground walk around inspection revealed that all wheels of both trains were resting on the running rails, and no apparent

derailment had occurred; however, the 2nd car (3140) of Train ID 755, had separated from the 3rd car (3121) of the consist, approximately 18 inches. There was visual damage to both train consists involved in the accident. Lead car 3008 of Train ID 700 sustained the most damage.

The DCFD medics arrived at 01:10 hrs. and transported the injured T/Os accompanied by Rail Supervision to George Washington Hospital for further medical evaluation. The T/Os were evaluated by medical staff and released. After their release, both T/O #1 and T/O #2 were escorted by Rail Supervision to the Jackson Graham Building (JGB) for required post-incident testing at 06:02 hrs. and 07:06 hrs. respectively and subsequently interviewed by SAFE. Both post-incident test results discounted drug/alcohol use as a contributing factor in this accident event.

In addition to RTRA Supervision, WMATA first responders included representatives from MTPD, SAFE, TRST, ATCM, CMNT, CTEM and POWR Departments. All representatives met at the MTPD command post located at 18th Street NW and I Street NW. SAFE Management coordinated developing a Safety investigation team comprised of the operating departments mentioned above. The 3rd Rail Power was verified de-energized by the assigned Roadway Worker In-Charge (RWIC) when they checked the 3rd Rail utilizing an hotstick. ROCC then granted permission to the RWIC to set up a Warning Strobe and Alarm Devices (WSAD) and work mats defining the limits of the investigation area (working limits) in accordance with current Roadway Worker Protection (RWP) Procedures as defined within the Metrorail Safety Rules Procedures Handbook (MSRPH). Prior to entering the roadway, a Safety Briefing was performed by the RWIC and the Safety Investigation team entered the controlled roadway. The tunnel lighting was sufficient on Track 1. where no blown, defective, or missing lighting components were identified. The area was dry and clean.

From the response time of the accident through revenue service operation on Monday, October 7, 2019, SAFE and other Rail Operations personnel continued working jointly while investigating the accident, assessing damage and developing a subsequent plan of action to transport the involved rail vehicle equipment to Brentwood Yard for post-accident inspections and continued investigation.

CMNT/CTEM personnel prepared Cars for movement by removing windows to use ratcheting straps to secure undercar equipment to the car body Car when necessary. Hazards due to protruding metal on affected cars were removed by cutting, grinding and reforming sharp protruding metal. By 21:40 hrs., CMNT personnel had performing ground walk around and verified trains were ready for movement.

On October 8, 2019 after the accident event, starting at 01:42 hrs. to 04:59 hrs., the accident rail cars were coupled to prime movers and transported to

Brentwood Yard for Rail Car Engineering (CENV) and Rail Car Maintenance (CMNT) post-incident inspection and damage assessment. The transport operation to Brentwood Yard was performed at a restricted speed of no more than 10 mph while operating under an absolute block authority granted by ROCC.

At 06:29 hrs., a Automatic Train Control Maintenance (ATCM) Supervisor boarded the Test Train ID 811 and performed a track test between the Foggy Bottom and the McPherson Square Stations, Track 1. At 06:46 hrs. ATCM Supervisor reported a good track inspection on Track 1 between the Foggy Bottom and the McPherson Square stations. Normal service was restored with residual delays.

The wayside Track, Automatic Train Control (Signal), and Radio (Communication) systems were checked, and no anomalies were identified. Tunnel Fan Operation was not requested during the event due to no reported smoke or fire event.

Based on review of radio communication and interviews with ROCC Staff, SAFE concludes that ROCC personnel followed established procedures related to *Command, Control and Coordination of Emergencies on the Rail System* as defined in SOP #1A and managing a mainline train collision in compliance with *Train Collision - Mainline* (SOP #11). The actions of ROCC personnel were determined to not be a contributing factor in this incident.

The ROCC Timeline Summary:

00:51 – The Train 755 T/O reported to ROCC that their train was struck from the rear by an unknown source

00:52 – The Train ID 700 T/O confirms striking Train ID 755

00:53 – The ROCC dispatched Rail Supervisor (R/S) #1 and R/S #2 (Student Rail Supervisor)

00:54 – Notified DCFD Dispatcher (ROIC)

00:56 – The ROCC remotely de-energized 3rd rail power Track 1 (AIMS Playback and Event Log data)

00:58 – The Train ID 755 T/O requested medical attention for neck pain and could not perform the ground walk around. The Train ID 700 T/O also requested medical attention stating back pain and could not perform the ground walk around.

01:00 – The R/S #1 reported being on location, and the ROCC assigned the Rail Supervisor as the On-Scene Commander, and SOP 1A was now in effect.

01:06 – The ROCC instructed the R/S #1 to perform a ground walk around.

01:06 – The R/S #1 along with R/S #2 arrived on lead car 3141 (Train ID 755) and reported T/O #1 was laying on the floor with back pain. The ROCC instructed R/S #2 to stay with T/O #1 until medical arrived. R/S #1 was instructed by ROCC to continue with the ground walk around of both trains.

01:07 – The R/S #1 reported some damage, and they had to use the safety walk to get to the lead car where T/O #2 was located. The R/S #1 reported a pull apart between cars 3140 and 3121 on Train ID 755. The R/S #1 applied hand brakes on both cars.

01:10 – The R/S #1 also reported visible damage to cars 3120 and 3121, and they were unable to board the train due to the damage.

01:10 – DCFD Engine arrived on the scene

01:14 – DCFD Medic arrived on scene

01:15 – The R/S #1 was finally able to board Train ID 700 and applied hand brakes to cars 3008 and car 3207 of Train ID 755. The R/S #1 found T/O #2 on lead car 3008 sitting in the operator's seat. The T/O #2 complained of neck pain. The ROCC instructed the R/S #1 to stay with Train ID 700 T/O until medical arrived.

01:18 – Both R/S #1 and R/S #1 confirmed no cars had derailed.

01:26 – TRST and SAFE personnel arrived on location.

01:56 –T/O #1 and T/O #2 were transported to George Washington hospital with non-life threatening injuries.

02:32 – The Fire Department turned the scene back over to WMATA (MTPD).

02:40 – MTPD relinquished event scene to ATC Personnel who took over the scene with an emergency red tag.

05:00 – All terminals extended their headways to 15 minutes to support single-tracking between Foggy Bottom and McPherson Square stations utilizing Track 2. The Silver line service only operated between Wiehle-Reston East and Ballston stations.

21:53–The Red Tag was turned in to MOC to energize 3rd rail power to for train transport efforts

October 8, 2019 - Incident Trains Transport to Brentwood Yard Operation

01:42 – The PM42 retrieved the Train ID 755 cars and stored in Brentwood Yard on the wash track.

02:12 – PM49 coupled to car 3008-3009 (Train ID 700) for transport to Brentwood Yard. The transport to Brentwood yard was completed at approximately 04:12 hrs.

03:15 – The Train ID 810 was given permission to enter the work location to couple up to cars 3018-19 and 3010-11 (remaining four cars from Train ID 700 consist).

03:25 – Car 3137 was added to car 3018 and prepared to be transported to Brentwood Yard.

03:41 – The Train ID 810 moved under a 10-mph speed restriction pushing the four cars to Brentwood Yard.

03:50 – The ATC Personnel requested a supervisory power outage to reconnect the High Current bonds.

04:12 – PM49 coupled to 3008-3009 entered Brentwood Yard.

04:29 – ATC Personnel granted ROCC permission to restore third rail power. One (1) minute Power restoration warning announcements were made.

04:32 – The 3rd rail power was restored. The ATC personnel required additional time to verify track circuits.

04:59 – The Train ID 810 entered the Brentwood Yard with cars 3018-19 and 3010-11.

05:00 – Single Tracking operations continued via Track 2 from Foggy Bottom to McPherson Square stations.

06:26 – The ATC Personnel reported all personnel and equipment clear of the roadway Track 1 at Farragut West station and standing by awaiting the test Train ID 811.

06:29–The ATC Personnel boarded the test Train ID 811 to perform a track test between Foggy Bottom and McPherson Square stations, Track 1.

06:46 – The ATC reported a good track inspection between Foggy Bottom and McPherson Square Station, Track 1. Normal Service restored; residual delays continued in both directions.

RTRA:

RTRA Interviews with SAFE

On October 7, 2019, SAFE personnel interviewed the Operators of Train ID 755 and Train ID 700 at the Jackson Graham Building after both Train Operators requested and received medical attention at GW Hospital for neck and back pains. Note: On October 17, 2019, a 2nd interview was conducted for T/O #2. Additionally, on

Train Operator #1 (Train ID 755)

T/O #1 Background Info

Reporting Division: West Falls Church

Assigned Days Off: Tuesday/Wednesday

Assignment: Works Day Off Relief Run

Assignment During Accident Event: Baseball Special requiring extra service

RWP: Level 2

Fatigue: No concerns reported from T/O

Post-incident Testing: Compliant

Former Titles: Bus Operator

Last Certification: March 2019

T/O #1 Interview

Train Operator #1 is assigned to the West Falls Church Division and was initially hired as a WMATA Bus Operator in April 2017. T/O was hired into the position of Train Operator in September 2018. T/O reported during interview that there were no concerns with the rail training received prior to certifying as a Train Operator.

T/O #1 was checked for operating compliance during ride checks performed by West Falls Church Division Rail Supervisors eleven (11) times between July and October of 2019 with the last ride check performed on October 5, 2019. No adverse reports of noncompliance related to train operation were documented concerning the T/O's operation during that time.

Accident Event

Note: T/O #1 (Train ID 755) refused interview at George Washington Hospital with SAFE personnel.

Based on interview with T/O #1 held at JGB approximately at 0700 hrs. on Tuesday October 7, 2019, the following information was communicated:

Just prior to the accident event, T/O #1 was instructed to support Baseball Special (Train ID #755 – non-revenue 6 car consist) after their last scheduled run of the evening and off duty time where they would be governed by a Rail Supervisor's instructions at Metro Center, Track 1. Train ID 755 originated from the Spring Hill Interlocking behind N04-02 Signal, Track 1 (Silver line). T/O #1 stated performing a visual inspection of the operating cab prior to operating and reported no adverse conditions. Additionally, T/O#1 stated when "keying up" train consist to operate inbound, the train console indicated 6 cars. Finally, T/O#1 stated operating the same consist the previous round trip and reported no mechanical or radio communication concerns with the 6 car consist that included favorable condition of the headlights associated with their train for which they operated from both operating positions.

T/O#1 stated losing speed commands on approach to the Farragut West Station due to visible train traffic positioned ahead within the Farragut West Station limits. At no time prior to the accident event did T/O#1 re-establish speed commands. The T/O #1 further stated that the tail lights of the train positioned in front of their train were still visible. T/O reported that while their train was stationary with zero speed commands, they heard the impact of the collision with their train. T/O further stated that they were unsure if they "blanked out" but remembers the train console screen going dark. "Everything went dark on the train" replied T/O #1. T/O #1 stated that their stationary train consist lunged forward upon impact from the following train and did not experience a rollback event prior to or post-accident event. T/O #1 finally stated that the train was "keyed up" and the master controller was in a full brake position (B5) at the time of collision event.

With carborne radio being inoperable, T/O #1 stated that they used the hand-held radio to contact ROCC to ask "is something going on? Did something run into the back of me?" **Note:** T/O #1 reported at no time did the striking T/O#2 initiate a report to ROCC over the radio that the train they were operating collided with the train in front of theirs. T/O #1 stated "after some time went by" ROCC gave them an instruction to perform a ground walk around; However, T/O #1 reported being unable to perform ground walk due to back pain.

T/O #1 stated that they requested medical assistance when responding Rail Supervision arrived to train. At that time, T/O laid on the ground and awaited medical responders.

Additional statements from T/O #1 during SAFE Interview

- No other personnel were on their train at the time of the event
- T/O #1 stated that they contacted ROCC approximately 3 minutes after initial impact with their train because they were processing what had occurred due to the strong collision impact from the following train (Train ID 700)
- No visual anomalies identified from the lead car's window of the train or roadway (wayside) components
- A piece of metal flew in front of them within the confines of the operating cab; however, T/O #1 was unable to identify the item
- Lights were off inside the train due to it being out of service (non-revenue)
- T/O #1 did not observe any issues/concerns with any roadway components when traveling between the Foggy Bottom and Farragut West Station, Track 1 just prior to the event and previous weeks leading up to the event.

Train Operator #2 (Train 700)

T/O #2 Background Info

Reporting Division: Largo

Assigned Days Off: Wednesday/Thursday

Assignment: Yard Operator assigned to support special event

Assignment During Accident Event: Baseball Special requiring extra service

RWP: Level 2

Fatigue: See FRMS Fatigue Risk Management System Analysis below

Post-incident Testing: Compliant

Former Titles: Bus Operator, Station Manager

Last Recertification: August 2018. No adverse comments from RTRA QA Department

Completion of Stop and Proceed CBT Training: Completed the Stop and Proceed CBT on 7/25/2019

Note: T/O #2 was/is not in OHAW's sleep disorders treatment (compliance monitoring) program, nor were they evaluated for sleep disorders by OHAW as a part of a post-incident fitness-for-duty evaluation.

T/O #2 Interview

At the time of the accident Event, Train Operator #2 was assigned to the Largo Division and was initially hired as a WMATA Bus Operator in November 5, 1999. T/O #2 was hired into the position of Train Operator originally in August 2005. In September 2006, T/O #2 was disqualified from the position for a period of no less than eighteen months due to their involvement in several infraction related RTRA operational events during the period between 2005 and 2006. T/O #2 reported during interview that they were not involved in any operational incidents in 3 years; however, involved in a derailment in 2013.

T/O #2 was checked for operating compliance during ride checks performed by Largo Division Rail Supervisors nine times (9) times between July and October of 2019 with the last ride check performed on October 5, 2019. No adverse reports of noncompliance related to train operation were documented concerning the T/O's operation during that time.

Accident Event

SAFE performed an initial interview at 05:15 hrs. with T/O #2 at George Washington Hospital. Both Train Operators were sent to JGB upon release for required post-incident Testing and Safe Interview. The initial statement by T/O #2 to SAFE responders are summarized below:

1. Had a 40-mph speed code
2. Was traveling at 25 mph
3. The train ahead of their train did not have any lights on it
4. Didn't attempt to stop because there were no lights
5. Was reportedly very sore

Note: WMSC Representative was present during SAFE JGB Interview #1

Based on SAFE JGB interview #1 with T/O #2 held at JGB approximately at 0700 hrs. on Tuesday October 7, 2019, the following information was communicated:

T/O #2 stated that the majority of task performed on the day of the accident event involved relaying trains from the Largo Tail Tracks to the station and operating in customer service to Franconia Springfield Station from the Largo Town Center Station. Prior to the time of the accident event, T/O #2 was supporting the Sporting Event Special departing from Franconia Springfield Station (Non-Revenue) and reported having a good train with no anomalies. T/O #2 reported performing a pre-trip inspection of train that involved walking through the train and making sure all doors were open. T/O #2 further stated checking all emergency door handles for proper seals and making certain that end car bulkhead doors were locked.

Upon leaving Foggy Bottom Station, Track 1. T/O #2 stated they didn't see Train ID 755 when making contact with it. When asked if they were alert, T/O #2 stated being very much alert. It wasn't until hitting the train that T/O stated realizing that the train was there.

Additional statements from T/O #2 during SAFE JGB Interview #1

- Operated 27-25 miles per hour operating through Foggy Bottom
- Immediately after making contact with Train ID 755, T/O had to "collect" himself

- Informed "Central" ROCC that contact was made with Train ID 755 and application of hand brakes was made to lead car
- Wasn't certain of distance between Train ID 700 and Train ID 755 after the event
- External headlights were operable at time of event; high beams were working but weren't on at the time of the event
- No report of radio communication concerns
- Heard the Operator of Train ID 755 report the collision over the radio
- Stated not losing speed commands at any time leaving Rosslyn to Farragut West on approach to Farragut West
- Did not check inside ATP compartment but further stated that the train was ATP protected based on ATP cutout not displayed on the console
- Heard overspeed alarm various times during trip from Franconia Springfield to Farragut West
- Did not see illuminated tail lights or head lights on Train ID 755
- Doesn't recall when hearing last overspeed alarm
- Operated train in customer service two (2) round trips prior to event\No reported concerns with train consist
- Lights were illuminated in the tunnel
- Could see Train ID 755 once making contact with it
- Reported not being sight impaired and doesn't wear corrective lenses
- No issues with night vision
- Was sitting upright and facing forward before collision event
- Upon impact with Train ID 755, the area was dusty and dark. Observed buckled seats and flooring in operating car.

T/O #2 Written Incident Report

The following written statement was produced by T/O #2 the day of the Collision Event, 10/7/2019. **Note:** Based on discussion with RTRA Division Management, it is most probable that T/O #2 created written statement upon leaving JGB after interview with SAFE and returning to Division administrative offices:

I was operating Train ID # 700 from Franconia Springfield alighting to Largo. After non-revenueing through Foggy Bottom Track #1 my lead car made contact with train sitting outside of Farragut West. While coming around the curve I was unable to see the train ahead of me due to no marker or tail lights indication, also my train had no overspeed protection indication at the time of the collision. Train ID # 700 was moving approximately 25 mph at the time of impact.

Statements from T/O #2 during SAFE JGB Interview #2

SAFE Investigators held a 2nd interview on October 17, 2019 at JGB with T/O #2 with the objective to receive clarification on initial statements made in first interview and gain a better understanding of the circumstances that lead to the collision event and what occurred after the collision took place. Additional statements from this interview is as follows:

- Received call from Largo Clerk at 12:00 hrs. to work an assignment starting at 17:00 hrs. T/O #2 was asleep at the time of the call
- Dropped speed commands but unsure of the speed leaving Foggy Bottom Station; however, speed did not go to zero (0)
- Dropped speed commands only once and came to a stop while leaving Foggy Bottom and positioned in the tunnel
- Gained speed commands right after losing them and continued moving
- Observed 25 mph speed command upon moving
- Stated 25 mph speed command was on the console when train collided with Train ID 755
- Brakes were not applied
- After the collision, "looked around, shook it off and made contact with Central (ROCC)"
- ROCC Asked T/O #2 "what happened?" Response. I made contact with the train.
- Could not perform ground walk around but was able to apply hand brake. Requested a Rail Supervisor
- It didn't take long for a Rail Supervisor to arrive

Rail Traffic Controller (RTC) #1 (Radio Controller)

RTC #1 Background Info

Reporting Location: CTF

Assigned Days Off: Monday/Tuesday

Assignment: 21:30 (Sun 10/6/2019) - 05:30 (Mon 10/7/2019) – Work additional 1:30 due to post-incident activities

Assignment During Accident Event: Radio Controller

RWP: Level 2

Fatigue: No concerns reported from RTC #1

Post-incident Testing: No

Former Titles: N/A – RTC Initial position into Metro

Last Certification: July 2018

RTC #1 Interview

On October 6, 2019, RTC #1's reporting and work location was the Carmen Turner Facility (CTF). RTC #1 was assigned to the OPS #2 Blue/Orange/Silver Line desk. They were hired as an external hire into the position of Rail Traffic Controller October 2016. Worked no overtime the previous two (2) weeks prior to accident event. Additionally, reported not having any difficulties sleeping, was well rested before arriving for work the evening of the accident event and alert prior and during event.

Prior to accident event, RTC #1 stated that due to post baseball event operation, they were coordinating the placement of Train Operators in the direction of their home divisions by switching them (change off) from trains operating in the opposite direction of their home divisions/terminals. This was performed at different stations supported by center platforms for efficient transfer of Train Operators at strategic points on the line.

Below is a summary of statements made by RTC #1 during interview:

- No distractions at time of accident event
- No reported radio issues on OPS 2
- T/O #1 from Train ID 755 reported over the radio that someone hit the back of their train
- Requested Train ID 755 confirm train was struck from behind and instructed Train ID 700 to secure train and perform a ground walk around inspection
- T/O #1 and T/O #2 both claimed injury and were unable to perform ground walk around procedure
- Dispatched two (2) Rail Supervisors to location
- RTC #2 (Buttons Controller) initiated removing 3rd rail power
- Arriving Rail Supervisors reported both Train Operators on ground of respective lead cars. Both Rail Supervisors remained with personnel until DC Medics arrived.
- Train ID 755 was just off of the platform (on approach to Farragut West, Track 1) when struck
- T/O #2 did not report losing speed commands leaving Foggy Bottom Station, Track 1
- Train ID 700 nor Train ID 755 were moved under any absolute/permissive block instructions from ROCC leaving Foggy Bottom Station, Track 1
- Due to post baseball game operation, Train ID 700, Train ID 755 and Train ID 792 were being used as gap trains. Trains were being transported without customers
- Could not see actual spacing of trains via the AIMS system (determining proximity of trains from one block to another)

Rail Traffic Controller (RTC) #2 (Buttons Controller)

RTC #2 Background Info

Date: 10/7/2019 Time: 00:48 hrs.
Final Report Collision C03 Rev.12
E19539

Drafted By: SAFE 70 – 10/10/2019
Reviewed By: SAFE 701 – 10/10/2019
Approved By: SAFE 70 – 10/10/2019

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Reporting Location: CTF
Seniority in title – 2007
Seniority in title – 2015
Assigned Days Off: Saturday/Sunday
Assignment: 21:30 (Sun 10/6/2019) - 05:30 (Mon 10/7/2019) – Work addition :30 for post-incident activities
Assignment During Accident Event: Buttons Controller
RWP: Level 2
Fatigue: No concerns reported from RTC
Post-incident Testing: N/A
Former Titles: – Bus Operator, Rail Supervisor
Last Certification: July 2018

RTC #2 Interview

On October 6, 2019, RTC #2's reporting and work location is the Carmen Turner Facility (CTF). RTC #2 was assigned to the OPS #2 Blue/Orange/Silver Line desk as the Buttons Controller. They were hired as an internal hire into the position of Rail Traffic Controller October 2015. Worked 8 hours overtime the previous two (2) weeks prior to accident event. Additionally, reported not having any difficulties sleeping, was well rested before arriving for work the evening of the accident event and alert prior and during event.

Prior to accident event, RTC #2 stated that just prior to the incident, they were monitoring railroad.

Below is a summary of additional statements made by RTC #2 during interview:

- No distractions at time of accident event
- No reported radio issues on OPS 2
- Overheard RTC #1 discussing with train in the front (Train ID 755) that reported "did something run into the back of my train" at Farragut West, Track 1.
- Informed RTC #1 to speak with train positioned behind Train ID 755 (Train ID 700) and ask if they contacted train in front of theirs and the T/O #2 responded "yes".
- RTC #1 requested a ground walk around performed by T/O #1 who stated they were unable to perform task due to neck and back injury
- RTC #1 also requested a ground walk around performed by Train ID 700 Operator who stated they were unable to perform task due to neck and back injury
- RTC #1 dispatched Rail Supervisor
- When Rail Supervisor arrived, they reported a collision event occurred and T/O #1 was laying on the floor

- Train ID 755 was not berthed on the platform at Farragut West because Train ID 792 was positioned stationary in front of their train (just outside of Farragut West Station platform toward McPherson Square)
- Train ID 700 did not report anything to ROCC prior to the incident such as losing speed commands or train in front striking their train
- The time of the collision was the first communication between ROCC and Train ID 700
- At no time did ROCC give Train ID 700 a permissive or absolute block to move train on approach to Train ID 755 leaving Foggy Bottom Station, Track 1
- The only train that made initial communication with ROCC was Train ID 755. Train ID 700 only responded to ROCC after asked if they made contact with Train ID 755
- When Train ID 755 reported being struck by something, it did appear that trains were close to each other via AIMS system

Rail Supervisor (R/S)

R/S Background Info

Reporting Location: West Falls

Seniority in Company – 2001

Seniority in title – 2019

Assigned Days Off: Thursday/Friday

Assignment: 16:00 (Sun 10/6/2019) – 01:00 (Mon 10/7/2019) – Worked addition 10 hrs. overtime in past 2 weeks

Assignment During Accident Event: Rail Supervisor

RWP: Level 2

Fatigue: No concerns reported from R/S

Post-incident Testing: N/A

Former Titles: – Bus Operator, Train Operator, Station Manager, Rail Traffic Controller, ROCC Assistant Superintendent, Superintendent

On October 6, 2019, R/S reporting location was West Fall Church Yard and they were assigned to support the Special Event Operation. They were hired as an internal hire into the position of Rail Supervisor in 2019. Worked 10 hours overtime the previous two (2) weeks prior to accident event. Additionally, reported not having any difficulties sleeping, was well rested before arriving for work the evening of the accident event and alert prior and during event.

Below is a summary of additional statements made by R/S during interview:

- R/S stated that the Post Baseball Operation (special event) was finishing at the time of the accident event
- Located at Metro Center when event occurred
- Found out about incident via radio while awaiting a change-off
- Heard T/O #1 over the radio report something running into the back of their train, Train ID 755
- ROCC requested if T/O (train ID 755) needed medical attention and T/O responded "yes"
- ROCC then spoke to train (Train ID 700) positioned behind Train ID 755 and questioned if they ran into back of train and T/O responded "yes"
- This all took place on OPS 2
- Responded approximately 10 minutes aboard outbound train to Farragut West Station platform after hearing initial report of collision event over the radio
- Received foul time from ROCC to walk to incident trains via Track 1 from Farragut West Platform, Track 1
- Hotsticked and confirmed 3rd rail power de-energized.
- R/S was first on scene along with Student R/S and noted the following:
 - No other personnel on the track upon arrival
 - Boarded Train ID 755 and observed T/O #1 on floor in lead car 3141 by cab area
 - Proceeded to secure train with hand brakes
 - While attempting to walk to next car, 3140, they could get through due to doors being jammed
 - Informed ROCC of current condition of train and utilized safety walk to get to T/O #2 (Train ID 700)
 - Instructed Student R/S to stay with T/O #1
 - After passing second car (3140) could see inter-car barriers stretched between cars 3140 and 3121. The train was observed uncoupled at this point
 - Observed expansion bars hanging down in an unidentified car in route to T/O #2
- Once arriving to Lead car (3008) of Train ID 700, R/S noted the following:
 - T/O # 2 was sitting in the lead car cab seat
 - The couplers of lead car did not appear damaged
 - The Lead car 3008 was separated approximately 6 to 7 feet from trailing car of Train ID 755 (3207)
 - All of the married pair's threshold plates were mashed into each other except in between cars 3140 and 3121 which were separated
 - There was no attempt to move the trains at all by responding R/S
 - No internal inspection to check for ATP being cut out was performed
 - Based on interview with T/O #2, they stated:

- They did not see any taillights or marker lights illuminated on Train 755
 - Did not lose speed-read outs
 - Did not receive overspeed alarm
 - Did not indicate what speed readouts were
 - Did not state if he applied emergency brakes or not in order to bring train to a stop.
- Accident Fatigue Risk Analysis Study

On October 9, 2019, the Fatigue Risk Management System (FRMS) Manager interviewed T/O #2 and prepared the following analysis based on:

On alertness and fatigue behaviors

Operator reports:

- no symptoms of fatigue (e.g. yawning, struggling to stay awake, heavy eyelids, etc.) in the work period leading up to the incident.
- feeling alert at the time of the incident; no loss of situational awareness.
- that he "did not see the train" in front due to conditions (placement on curve, dim lighting in tunnel) not from lapse in attention

On the risk of fatigue related to the work schedule

Aspects of the work schedule contribute to an elevated risk of impairment:

- Night work. T/O #2 started on nights (usually 00:00 hrs. to 08:00 hrs.) with the September work assignment (around 9/6/19). Incident time of day (00:54 hrs.) would be affected by circadian decrease in alertness
- Schedule unpredictability/extra assignments: During the day before the incident shift, T/O #2 was called at 12:00 hrs. (noon) to report at 17:00 hrs. rather than 00:00 hrs. (i.e. ~7 hours earlier than planned). The change in work schedule had an impact on the opportunity for sleep.

On the risk of fatigue related to sleep and personal factors

Sleep and personal factors contribute to an elevated risk of impairment:

- Short sleep duration. T/O #2 reported a total of 5.75 hours of sleep in the day before the event. Sleep was interrupted by a call from work and split into two periods. Sleep durations less than 6 hours are associated with an increased risk of impairment. The sleep opportunity was shortened by the work schedule: T/O #2 reports that he usually gets supplemental evening sleep from 17:00 hrs. – 21:00 hrs. before reporting for work.
- Sleep debt: T/O #2-night work (daytime sleep) schedule would contribute to chronic sleep loss and increase the risk of impairment.

During the interview, T/O #2 reported no sleep disorders and generally restful sleep. The daily off-duty opportunity for rest typically lasted about 16 hours. T/O#2 reported a very short commute (of about 10 minutes) and no commitments that would otherwise cut into opportunities for sleep. Night shifts (since starting new pick) were not excessively long; about 8 hours in duration. Incident shift was the 4th consecutive night of work.

The rest opportunity preceding the incident was exceptional: The T/O was offered and accepted an extra assignment with an earlier report time. This unexpected change in the work schedule truncated the off-duty period to 9 consecutive hours.

Factors including a short (<6 hours) sleep duration in the period leading up to the accident contributed to an elevated risk of fatigue-related impairment at the time of the accident. While the risk was present, no clear fatigue behaviors or symptoms were detected, and the operator indicated no lapse in alertness in the time leading up to accident.

T/O #2 Disciplinary History

- In 2006 Disqualified as a Train Operator for several major safety related incidents that included:
 - Collision
 - Red Signal Overrun
 - Two (2) Station Overruns
- **Note:** A stipulation was documented in T/O #2 demotion paperwork to Bus Operator signed by Red Line Division management that revealed T/O #2 was eligible for return back to Train Operator position no earlier than an 18 month period.
- Re-Instated to Train Operator 2010
- In 2011 T/O #2 was suspended twelve (12) days for Passing a Red Signal without permission
- In 2015 T/O #2 was suspended three (3) days for failure to report a station over-run
- In 2015 T/O #2 was suspended three (3) days for operating a train with the cab door open while talking to a customer

RTRA Management Report:

On Monday, October 7, 2019 at approximately 00:51 hrs. ROCC received notification of a collision between two non-revenue trains outside Farragut West, Track #1. Following confirmation, the operators of both consists requested medical assistance for non-life-threatening injuries and were transported to an area hospital.

Train ID 700, which was a 6-car 3k series consist, made contact with Train ID 755 which was also a 6-car 3k series consist. Both trains served as gap trains to support crowds returning from a Nationals baseball game.

Data obtained showed that Train ID 700 made contact with Train ID 755 while traveling approximately 11 mph at 00:48 hrs. with the master controller engaged in a P4 power mode. The impact subsequently resulted in the undesired uncoupling of Train 755's lead pair.

The incident was reported to the Rail Operations Control Center approximately three (3) minutes later at 00:51 hrs. by T/O #1 onboard Train ID 755. And upon contacting the operator onboard Train ID 700, the collision was confirmed.

All appropriate notifications were made and support personnel, to include paramedics, were dispatched to the incident location. The collision caused substantial damage to both consists and major service disruptions to the Orange/Blue/Silver Line as trains single tracked around the incident.

T/O #2 was in violation of the following Cardinal Rules and MSRPH Rules related to (1) Safety Stops, (2) Proper control of train to prevent collision events, (3) Train Movement under ROCC direction when losing speed commands, (4) Writing false statements, (5) and (6) Reporting Incidents):

- Cardinal Rule 1.38
- Cardinal Rule 3.89
- Cardinal Rule 3.91
- Cardinal Rule 3.97
- MSRPH Operating Rule 1.32
- MSRPH Operating Rule 3.18

ATCE Data Summary:

On 10/7/2019 at approximately 00:48 hrs. Train ID 700 collided with Train ID 755. The following analysis was performed to ensure the integrity of the ATC System during the time of the accident:

00:39:25 – The Train ID 755 Entered the Foggy Bottom station, Track 1 Platform. The Track Circuit occupancy shows Train ID 755 continued inbound until it occupied track circuits C1-47, C1-49, and C1-52. These three track circuits remain occupied, indicating

Train ID 755 had come to a stop. **Note:** See Attachments 2 through 5 for Track Circuit positions.

00:45:50 – The Train ID 700 entered Foggy Bottom station, Track 1 Platform. The Track Circuit occupancy shows Train ID 700 continuing inbound until it is occupying Track Circuits C1-59 and C1-55. The Track Circuit C1-52 was already occupied by Train ID 755. Because of this, Train 700's occupancy of C1-52 could not be detected by the ATC system.

The Advance Information Management System (AIMS) Data Summary:

The AIMS data was pulled for analysis from 2019 Oct 7 00:30:00 to 2019 Oct 7 01:00:00. The initial status of Power Transfer and Circuit Power are Normal. These indications do not change during the time of the incident. This indicates that C04 Train Control Room does not experience any abnormal power incidents during the time frame of the collision.

The traffic is correctly locked in the Normal direction due to occupancy between the C04 and C02 interlockings. There are no Temporary Speed Restrictions in effect at C03 or C04. The Occupancy and Train ID information listed on the AIMS event log show Train ID 755 traveling inbound on Track 1 until it stops while occupying Track Circuits C1-52, C1-49, and C1-47. Approximately six minutes after Train ID 755 passes through the C04 Track 1 Platform, the occupancy and train ID data show that Train ID 700 then passes through the C04 Track 1 Platform. The Train ID 700 continues traveling inbound until it occupies Track Circuits C1-59 and C1-55. Since Track Circuit C1-52 is already showing Occupancy due to the Train ID 755, the ATC system is unable to provide any indication of when the Train ID 700 enters C1-52.

The AIMS data also indicated that both Train ID 755 and 700 had ATP Enabled.

The AIMS occupancy data shows that there are no Loss of Shunt (LOS) or bobbing events in the area during the time of the incident.

CENV/CMNT Data Summary:

On October 7, 2019, Train ID 700, consisting of six (6) 3K cars (L3008-09x3010-11x3019-18T) collided with Train ID 755, also consisting of six (6) 3K cars (L3141-40x3121-20x3206-07T).

At approximately 00:48:11, Lead car 3008 (from Train 700), while traveling inbound on Track 1 on the Orange/Blue/Silver Line toward Farragut West, ran into trailing car 3207 (Train 755), which was stationary, at Chain Marker C1-52+30, within track circuit C04-C1-52. At the time of the collision, the master controller (of car 3008)

was in the P4 position, with the train traveling at a speed of 11mph. There is no evidence that the brakes of Train 700 were applied prior to the collision.

CENV's investigation team responded to the incident, inspected the cars and removed the Vehicle Monitoring system (VMS) units from each car, due to third rail power being removed from scene of the incident. The VMS units were transported to the Greenbelt yard, where the data was downloaded and analyzed.

CMNT response team dispatched from Brentwood Yard arrived on the scene. Personnel installed collector shoe paddles, cut off cover of car #3008. Also, removed QD, secured damaged raceway and wires.

- 1625 Chief Maintenance Officer clears everyone from the scene to platform
- 2100 RWIC provides safety briefing and CMNT walks scene to verify that trains are ready to be moved
- 2140 CMNT verified trains ready to be moved
- 2230 Third rail power up.

----Wednesday 10-9-2019----

- 0044 Train ID #755 roll tested to verify smooth rolling stock
- 0106 Car #3141 clears the platform and is on its way to the yard
- 0142 Train ID #755 arrives and Brentwood yard and is stored on the wash track
- 0212 PM #49 arrives to scene and couples to car #3008
- 0242 PM #42 Arrive to scene on side of car #3009
- 0325 Car 3137 of consist ID #810 couples to car 3018 of consist ID #700 in preparation for transport to Brentwood yard
- 0342 Car 3010 leaves platform and heads to the BW yard
- 0350 PM #49 with railcar #3008 leaves for the BW yard
- 0405 PM #49 Heads to the Brentwood yard with car #3008
- 0429 PM #49 with Railcar #3008 arrives at Brentwood yard
- 0459 Train #810 arrives at the Brentwood yard
- 0646 Good track inspection track one between Foggy Bottom McPherson square Normal service restored.

During the investigation, it was determined that due to the absence of speed command signals, lead car 3141 (of train 755) stopped at Chain Marker C1-47+80, at 00:40:16, while occupying track circuits C04-C1-52, C04-C1-49 and C03-C1-47 (see attached Track Occupancy Report).

At 00:45:55, Train 700 lost speed command signals. The train entered Stop and Proceed mode, without speed command signals. On three (3) separate instances, the speed (of Train 700) reached 15mph creating overspeed condition and application of Full Service Brake by ATC system. Train 700 was accelerating in P4 mode and collided with Train 755 at Chain Marker C1-52+30, at 00:48:11 while traveling at a speed of 11mph.

Based on the investigation, both Train 700 and Train 755 responded to wayside signals as designed. There is no evidence of vehicle malfunction.

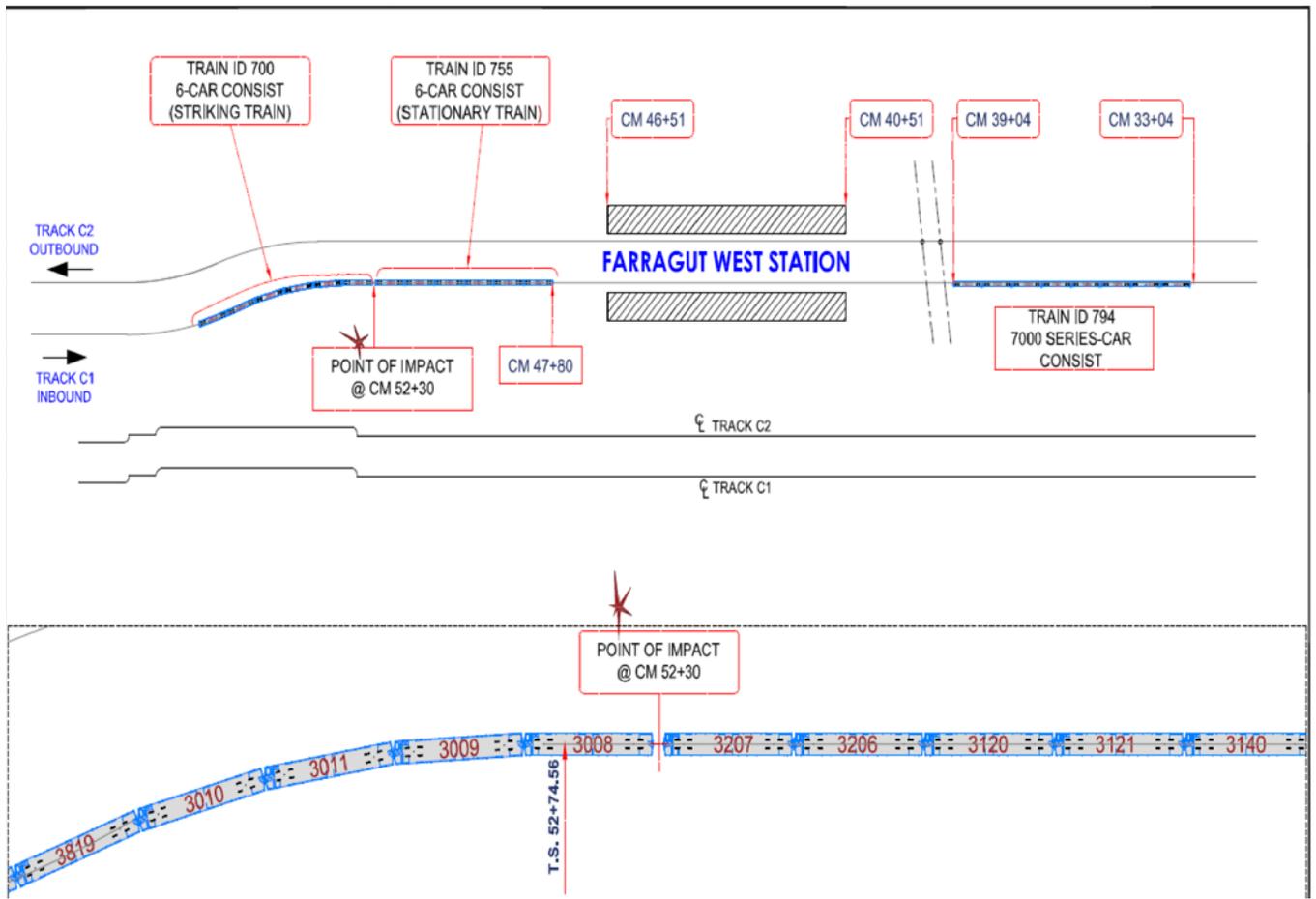


Figure 1 – Model of Incident Scene

Timeline of Events

00:36:06 **ID 794**, Clears Farragut West Station Platform

00:36:48 **ID 794**, Train stopped with leading car approximately at Chain Marker C1-33+04

Date: 10/7/2019 Time: 00:48 hrs.
Final Report Collision C03 Rev.12
E19539

Drafted By: SAFE 70 – 10/10/2019
Reviewed By: SAFE 701 – 10/10/2019
Approved By: SAFE 70 – 10/10/2019

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and trailing car at Chain Marker C1-39+04. Occupying Track Circuits C03-C1-36, C02-C1-33 and C02-C1-30

00:38:08 **ID 755**, Approaching Foggy Bottom station, 34 mph, Limiting Speed 65

00:38:42 **ID 755**, Speed Command signals drop to 50 entering Track Circuit C1-77. Actual speed is 33mph decelerating.

00:38:59 **ID 755**, Speed Command Signals drop to 40 entering Track Circuit C1-68 (C04-1 Foggy Bottom Platform). Actual speed is 26 mph decelerating.

00:40:01 **ID 755**, Speed Command Signals drop to 28 entering Track Circuit C1-55. Actual speed is 24mph decelerating.

00:40:12 **ID 755**, Speed Command signals drop to 0 entering Track Circuit C1-52. Actual speed is 14mph decelerating.

00:40:16 **ID 755**, Train stopped. Lead car at Chain Marker C1-47+80, Trailing car at Chain Marker C1-52+30, occupying Track Circuits C04-C1-52, C04-C1-49, and C03-C1-47.

00:43:52 **ID 700**, Approaching C04-1, at 18mph. Limiting Speed = 65 mph.

00:44:56 **ID 700**, Speed Command signals drop to 50 entering Track Circuit C1-77. Actual speed is 16mph

00:45:22 **ID 700**, Speed Command signals drop to 40 entering Track Circuit C1-68. Actual speed is 21mph.

00:45:46 **ID 700**, Speed Command signals drop to 28 entering Track Circuit C1-67. Actual speed is 26mph.

00:45:56 **ID 700**, Speed Command signals reduced to 0mph entering Track Circuit C1-62. speed is 27mph decelerating

00:46:06 **ID 700**, Train stopped. Lead car at Chain Marker C1-61+42, Track Circuit C1-59.

00:46:11 **ID 700**, Enters Stop & Proceed mode, without speed commands. Accelerates to 15 mph and is reduced to 0mph, when ATC applies Full Service Brake, on three (3) separate instances. Travels 574 ft within 49 seconds then moves again, this time reaching 4mph before coming to a stop. Travels a total of 589 feet.

00:47:28 **ID 794**, Train in motion, traveling at a speed of 3mph.

00:47:37 **ID 755**, Begins receiving speed readouts at a value of 28 mph

00:47:43 **ID 755**, Receives speed readouts at a value of 40 mph

00:47:45 **ID 700**, Lead car at Chain Marker C1-55+54, 320 feet between consists. NOTE: Track has 790 ft Radius curve (Restricted View) at this location. Master Controller moved to P3, then B2 and finally P4.

00:47:55 **ID 700**, Accelerated to 11 mph (249 ft from car 3207). Master controller moved to Coast.

00:48:05 **ID 700**, Master controller placed in P4. Train speed is 9mph (69 ft from car 3207).

00:48:11 **ID 700**, Master Controller in P4, speed is 11 mph, at Point of Impact.

CENV Findings

Although only 2 trains were involved in the collision, it was determined that a third train (Train ID 794), which was traveling ahead of Train ID 755, was indirectly involved. The narrative below describes the situation from the perspective of each train.

TRAIN ID 794 (L7102-03x7085-84x7092-93x7073-72T)

On October 7, 2019 at 00:33:05, Train ID 794 was traveling inbound (toward Farragut West) on Track 1 of the Orange/Blue/Silver line with Limiting & Regulated speeds of 40mph (actual train speed of 28mph). As the train approached Farragut West station at 00:35:48, the Limiting & Regulated speeds increased to 50mph, while actual train speed was reduced to 21mph. At 00:35:58, the train arrived at, but did not service, the Farragut West station. Train ID 794 cleared Farragut West station at 00:36:19. The Limiting & Regulated speeds were reduced to 30mph (with actual train speed of 20mph) at 00:36:21. Due to trains being held and subsequently dispatched out of Metro Center to support special event activity, Train 794 came to a standstill at 00:36:48 just outside of McPherson Square, with the leading car 7102 located approximately at Chain Marker C1-33+04. In summary, Train ID 794 occupied track circuits C03-C1-36, C02-C1-33 and C02-C1-30, for 11 minutes and 15 seconds. Speed command signals were never lost.

TRAIN ID 755 (L3141-40x3121-20x3206-07T)

On October 7, 2019, Train ID 755 was traveling inbound on the Orange/Blue/Silver line between Foggy Bottom and Farragut West stations. At 00:40:12 hrs. Train ID 755 entered Track Circuit C04-C1-52, shortly after the Speed Command signal (i.e. Limiting & Regulated Speeds) was reduced to 0mph. Train was traveling at a speed of 14mph and decelerating. Upon traveling 2037ft (from Foggy Bottom), Train ID 755 came to a complete stop at Chain Marker C1-47+80, at 00:40:16 hrs. and remained at this location for 7 minutes and 52 seconds. When Train ID 700 collided with Train ID 755, at 00:48:11 hrs., Train ID 755 was not in motion (0mph).

Car 3141 (lead car – Train 755) only lost speed command signals when entering Track Circuit C04-C1-52. It must be noted that train separation is maintained by the transmitting of speed command signals. A train occupying a track circuit will receive a speed corresponding to the length of unoccupied track ahead of the train. It has been determined that the presence of Train 794 in Track Circuit C03-C1-36, caused Train 755 to lose its speed command signals upon entering Track Circuits C04-C1-52, C04-C1-49, and C03-C1-47.

TRAIN ID 700 (L3008-09x3010-11x3019-18T)

On the morning of October 7, 2019 (00:45:56), Train ID 700, lost speed command signals, while traveling inbound on the Orange/Blue/Silver line towards the Farragut West station. At 00:46:11, the train entered Stop and Proceed mode, without speed command signals. On three (3) separate instances, the train speed reached 15mph creating an overspeed condition and application of Full-Service Brake by the ATC system.

Then the train moved again, this time reaching 4mph before coming to a stop. While in stop & proceed mode, the consist traveled 589ft stopping at chain marker C1-55+54, approximately 320ft behind Train 755. At 00:47:55, Train 700 accelerated to 11mph, master controller was moved from P4, to Coast and back to P4 before colliding with Train 755 at 00:48:11.

Actions Taken/Recommendations

1. Performed VMS download and analysis for all cars in both consists of train 700 and train 755.
2. Performed Event Recorder (ER) download and analysis for lead car (7102) of train 794.
3. Performed video download for trailing car (7072) of train 794.
4. Performed Damage Inspection on both trains.
5. SAFE recommended the performance of functionality tests on 3207 taillights, 3008 headlights, 3008 Master Controller and Emergency Pushbutton from the cab of 3008.

Note: Functionality tests were successfully completed.

Damage Assessment

The Damage assessment is covered in Attachment #1.

The total cost to repair cars 3010, 3011, 3018, 3019, 3140 & 3141 is \$135,188.00
Three (3) married pairs (3008-3009, 3206-3207 and 3120-3121) have not been recommended for repair due to cost and age prohibitive. **See Attachment 1**

Stop and Proceed Mode

Stop and Proceed mode enables the Train Operator to take a point of power in the absence of speed commands, up to a maximum speed of 15 mph. In compliance with operating procedures Train Operators shall not move trains with zero speed commands except after notifying ROCC and upon proper authorization will be permitted to move with zero speed commands and either a permissive block for the move going with traffic or an absolute block for the move going against traffic.

In the past, Train Operators have overrun red signals after taking a point of power in Stop and Proceed mode. A recently revised procedure developed for the 7000 Series Rail Cars requires positive Operator action to initiate Stop and Proceed mode to reduce the risk of accidentally overrunning a red signal. CENV has committed to instituting the "Stop & Proceed" mode awareness software modification on the 2000, 3000 and 6000 series rail cars by the end of 2nd QTR of FY 2021 thereby making this mode awareness feature

operational across all series of cars in revenue operation at WMATA Metrorail by the end of Calendar Year 2020.

The Track and Structures (TRST) department:

Pre-Rail Car Removal Assessment

- The TRST department responded and provided the following assessment related to the collision area at Farragut West, Track 1:
- No visible damage to any track components or any further anomalies related to the track components were identified.

Post-Rail Car Removal Assessment

- Minor scrapes on the top of the running rail from the revenue train braking
- Fastener/Stud/Clip Summary
- Fasteners are in good condition, there is a mixture of F20 & SW31 fasteners within the area
- All clips are installed within the area on both rails
- No broken studs on the Left rail
- Broken & (4) loose studs on the Right rail

The Communications Department (COMM):

All the communication systems were operational and performing as designed during inspections, testing conducted on-scene and review of communication logs.

The Office of Plant Maintenance (PLNT):

No smoke conditions were reported requiring fan operation between Foggy Bottom and Farragut West Stations; however, post-incident inspection of the fan system was performed by PLNT personnel to verify the fan system associated with the affected stations were in good working order. A Fan Operational Test performed on October 9, 2019 between the Farragut West and Foggy Bottom stations verified the fans operated in exhaust and supply with no abnormal indications or alarms generated indicating any abnormalities, either at the fan control panel (field) or remotely at the ROCC. Additionally, verification was performed to ensure fans stopped when a request to shut off was executed.

MTPD:

On October 7, 2019 at approximately 0103 hours, Responding MTPD Officer (R/O) reported to the Farragut West Metro Station for a train collision. While on scene, R/O confirmed there were two non-revenue trains involved in an accident event on Track 1, in the portal just prior to reaching the Farragut West Station Platform. Train ID 700 struck Train ID 755 from the rear. DC Fire and Medics responded to the scene and evacuated both operators from the trains. Both operators were transported to George Washington Hospital for further evaluation. In addition to both trains sustained significant damage and were removed the following day. There was no reported damage to the tunnel or structures.

Note: In addition to DC Fire and Medics, the following WMATA personnel responded; MTPD, Track and Structure, ATC, Power, Safety, Rail Supervisions, Office of Emergency Management, and Car Maintenance.

Following SAFE's post-incident interview of T/O #2, MTPD re-engaged T/O #2 and attempted to gain possession of the cell phone they believed to belong to T/O #2. T/O #2 declined MTPD's request to turn over the cell phone. After a request from SAFE, The Office of Inspector General (OIG) opened an investigation to ascertain if T/O #2 was using the cell phone before or during the collision in violation of any criminal law. Although OIG's investigation confirmed that the cell phone believed to belong to T/O#2 was in use at and around the time of the collision, OIG could not conclusively establish that T/O #2 was in possession of that cell phone at or around the time of the collision.

Data Findings:

1. The AIMS data indicated that both Train ID 755 and 700 had ATP Enabled
2. CENV VMS Download data from Train ID 700 revealed the following information:
 - a. Train 700 lost speed command signals leaving Foggy Bottom Station
 - b. The train entered stop & proceed mode, without speed command signals.
 - c. On three (3) separate instances, the speed (of Train 700) reached 15mph creating overspeed condition and application of Full-Service Brake by ATC system.
3. Post-incident inspection and further system analysis revealed that the Automatic Train Control Signal system, Rail Car, Radio Communication, Track Component and Power distribution systems were working as designed during the accident event
4. T/O #2 failed to contact ROCC per operating procedures when speed commands were lost on approach to Farragut West Station
5. T/O #2 reported that they could hear Train ID 755 report Collision Accident; however, failed to report incident immediately

6. Stop and Proceed mode software is currently not installed in legacy fleet (2K,3K,6K cars)
7. OIG, through its investigation, were able to examine and analyze cell phone records. The examination of cell phone records led OIG to request additional cell phone records for other numbers associated with the subject's cell phone. A review of the additional cell phone records and interviews conducted by the OIG established that the cell phone believed to be T/O #2's was in use at and around the time of the collusion but did not conclusively establish that T/O #2 was in possession of this cell phone at or around the time of the collision.
8. Functionality tests were performed to assess the performance of Car 3207 taillights, Car 3008 headlights, Car 3008 Master Controller and Emergency Pushbutton from the cab of 3008. Note: All systems were operating as designed
9. The marker/tail lights on trailing car 3207 of Train ID 755 were illuminated when the train operated through the Foggy Bottom station based on Station video playback review.

Analysis:

Post-incident inspection and further system analysis revealed that the Automatic Train Control Signal system, Rail Car, Radio Communication, Track Component and Power distribution systems were working as designed during the accident event. Each of these system components were ruled out as contributing factors in this collision event based on supporting data. In this event, Train ID 755 was positioned ahead of Train ID 700 and the signal system performed as designed based on supporting data by issuing zero (0) speed command to Train ID 700. Although there was no report of a smoke event related to the collision accident, the fan system was tested for functionality by Plant Department and result of such test were satisfactory. Functionality tests were performed to assess the performance of Car 3207 taillights, Car 3008 headlights, Car 3008 Master Controller and Emergency Pushbutton from the cab of 3008. All systems were operating as designed.

CENV Data revealed Train ID 700 lost speed command signals (zero (0) speed) leaving Foggy Bottom Station on approach to Farragut West Station, Track 1 on three (3) separate occasions. The train entered "Stop and Proceed" mode due to the loss of speed commands. During these occasions, Train ID 700's speed reached a max speed of 15mph which resulted in an overspeed condition. Data revealed that Train ID 700 experienced a full-service brake application each time the train reached 15 mph.

Additionally, data from CENV revealed that T/O #2 failed to place Train ID 700 into a braking mode through manipulation of the master controller or application of the emergency mushroom. The master controller was in a power mode (P4) at the time of the collision. This indicates that the master controller was in the next to highest mode

(P5) of traction motor power available to the train.

There is no evidence to support T/O #2 made any attempt to contact ROCC when losing speed commands as required by MSRPH Cardinal Rule 3.79 which states in part: *Train Operators shall not move trains with zero speed commands except after notifying ROCC and being given permission to move with zero speed commands and either a permissive block for the move going with traffic or an absolute block for the move going against traffic (see SOP 15).*

SAFE concludes that based on the facts derived during this accident investigation, Train ID #755 was sitting stationary with its lead car approximately 100 feet from the entrance to the Farragut West Station, Track 1 when Train ID # 700's lead car collided into the trailing car of Train ID #755. Data from the ATC system and Rail Car does not support T/O #2's account that their train had carborne cab signaling speeds of 25 mph at the time of impact. Additionally, Data provided by CENV from the Vehicle Monitoring System (VMS) from Train ID #700 revealed that Train ID 700 collided with Train ID 755 while traveling at a speed of 11mph and under a "stop and proceed" operation due to not having speed commands. This does not corroborate the account by T/O #2 who stated during interview that their train was traveling 25 mph at the time of the accident.

Based on a post-inspection of the radio system by the Communication Department, and testimony from both T/O #1 and T/O #2 who stated the radio system was working without any problems or concerns leading up to and during the accident event, SAFE concludes that T/O #2 failed to contact ROCC when losing speeds for permission to operate in "Stop and Proceed" mode and failed to contact ROCC immediate after the accident event. **Note:** T/O #2 completed the Stop and Proceed CBT on 7/25/2019. Based on findings mentioned in RTRA Management report, SAFE concurs with RTRA's identification of rule violations as described in their report.

SAFE concludes based on Foggy Bottom Station Video playback and the results from the functionality test on the taillights on Car 3207, the tail lights were illuminated at the time of the event and does not concur with T/O #2's account that the tail lights were not illuminated on trailing car 3207. **Note:** Functionality Test involved utilizing an external power source (12v) to determine taillights were operable.

As part of the investigation, SAFE was able ascertain through OIG review of T/O #2 cell phone records during the time of the collision event. Based on the information provided by OIG, SAFE concludes that a cell phone initially believed to belong to T/O #2 was in

use before and during the collision event, however, OIG could not conclusively determine that T/O #2 was in possession of the cell phone before or during the collision. It should be noted there were no reported discrepancies with Train ID 700 or Train ID 755 train that could have contributed to this accident.

It should be noted there were no reported discrepancies with Train ID 700 or Train ID 755 train that could have contributed to this accident.

In summary, in spite of T/O #2's account of the event, Train ID 700 received three (3) overspeed alarms indicating the train did not have speed commands prior to making contact with Train ID 755. The first loss of speed commands occurred at 00:45:55 which was a little over two (2) minutes before the collision occurred. T/O #2 of Train ID 700 failed to contact ROCC in all three (3) instances when the overspeed alarm was received and even failed to contact ROCC after the train made contact with Train ID 755. This was a preventable collision that could have resulted in a devastating outcome.

Corrective Action Plan

1. RTRA Management shall take the appropriate actions to include but not limited to retraining of T/O #2. **T/O #2 is no longer employed by WMATA and is not eligible for reinstatement in the future.**
2. RTRA Management will develop and distribute a lesson's learned document to Rail Operating Staff with an emphasis of proper operation when trains lose speed commands. **RTRA developed and distributed Lessons Learned document 2019-002 entitled "Collision Due to Carelessness and Bad Habits" and dated 11/5/2019**
1. WMATA shall pursue installation of "Stop and Proceed" for the legacy fleets in alignment with recently implemented stop and proceed technology used on the 7000 series rail car fleet. **CENV has committed to instituting the "Stop & Proceed" mode awareness software modification on the 2000, 3000 and 6000 series rail cars by the end of 2nd QTR of FY 2021 thereby making this mode awareness feature operational across all series of cars in revenue operation at WMATA Metrorail by the end of Calendar Year 2020.**
3. WMATA SAFE shall conduct an After-Action Review (AAR) debrief with WMATA Operations personal with a focus on the emergency response operation. **SAFE**

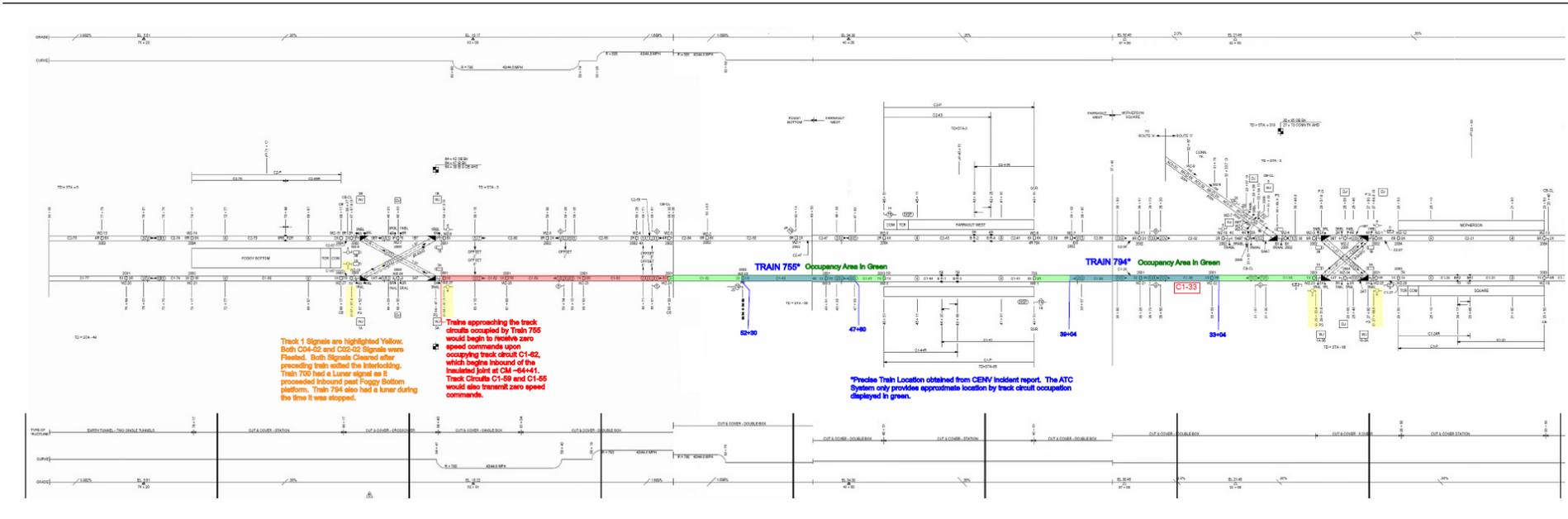
held debriefing the morning of the incident concerning incident response efforts with responding operations personnel. There were no injuries or damage to equipment as a result of the response efforts and responding personnel were in compliance with procedures related to Command, Control and Coordination of Emergencies on the Rail System as defined in SOP #1A and managing a mainline train collision in compliance with Train Collision - Mainline (SOP #11).

Attachments

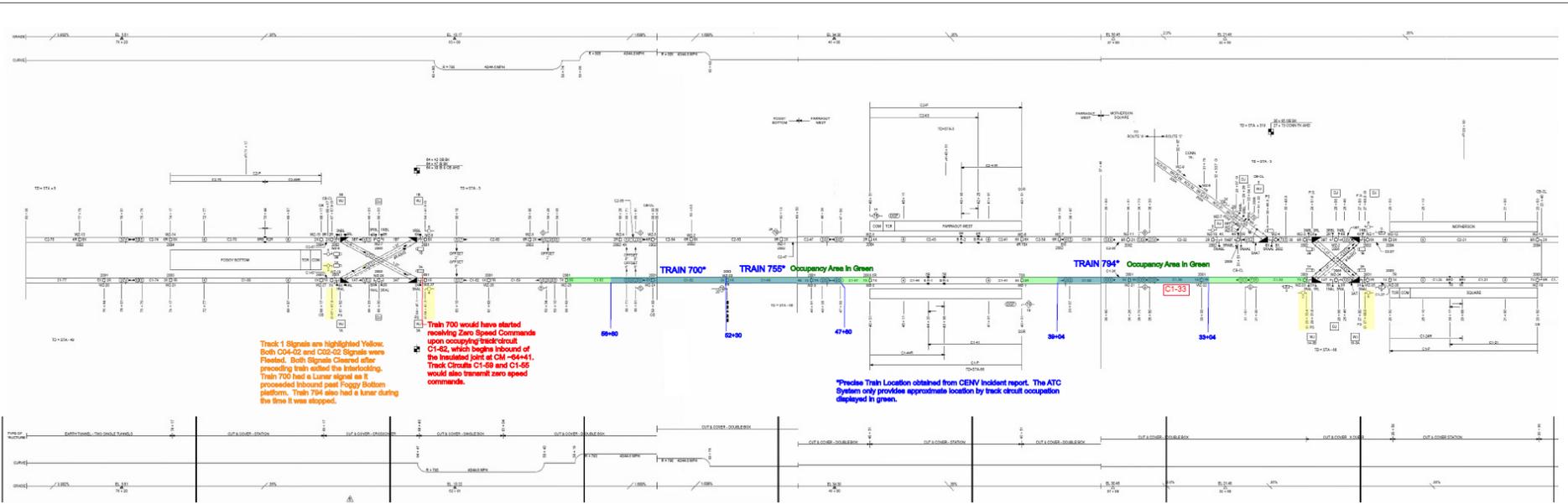
Rail Car	Damage
3140	Rear coupler shear bolts broken
3140 3121	Train uncoupled due to impact
3120 3121	Anti-climbers made contact
3121	Rear coupler shear bolts broken
3206 3120	Anti-climbers made contact
3206	Rear coupler shear bolts broken
3206	Exterior wall panel buckled behind door#2
3206 3207	Anti-climbers made contact
3207	Rear coupler shear bolts broken
3008 3207	Train uncoupled due to impact
3207	TWC Antenna broken
3008	Propulsion Reactor broken brackets
3008	Propulsion Common Case broken brackets
3008	Rear HVAC unit damaged and #3 traction motor Quick Disconnect disconnected from the car
3008	Truck frame and car body frame made contact with #5 wheel
3008 3009	Anti-climbers made contact
3008	Rear coupler shear bolts broken
3010	Front Coupler Shear bolts and TWC antenna broken
3009 3010	Anti-climbers made contact

3010	Anti-climbers made contact
3011	
3019	Anti-climbers made contact
3011	
3011	Rear coupler shear bolts broken
3019	Front Coupler Shear bolts and TWC antenna broken
3018	Anti-climbers made contact
3019	
3019	Rear coupler shear bolts broken
3009	Cab floor buckled
3009	Floor buckled
3008	Ceiling buckled
3008	Unable to open doors due to floor buckling between cars
3009	
3008	Indicator lights broken and signs of train contacting tunnel ceiling
3009	
3008	Ceiling buckled
3008	Passenger area floor buckled
3008	Cab floor buckled
3008	Indication of top of train making contact tunnel ceiling

Attachment 1 –Damage List



Attachment 2 – Track Circuits Between C04-C03 Page 1



Attachment 2 – Track Circuits Between C04-C03 Page 2

Photographs



Photo 1 – October 07, 2019, Car 3008 – Photo showing floor, stanchions and side décor panels buckled.

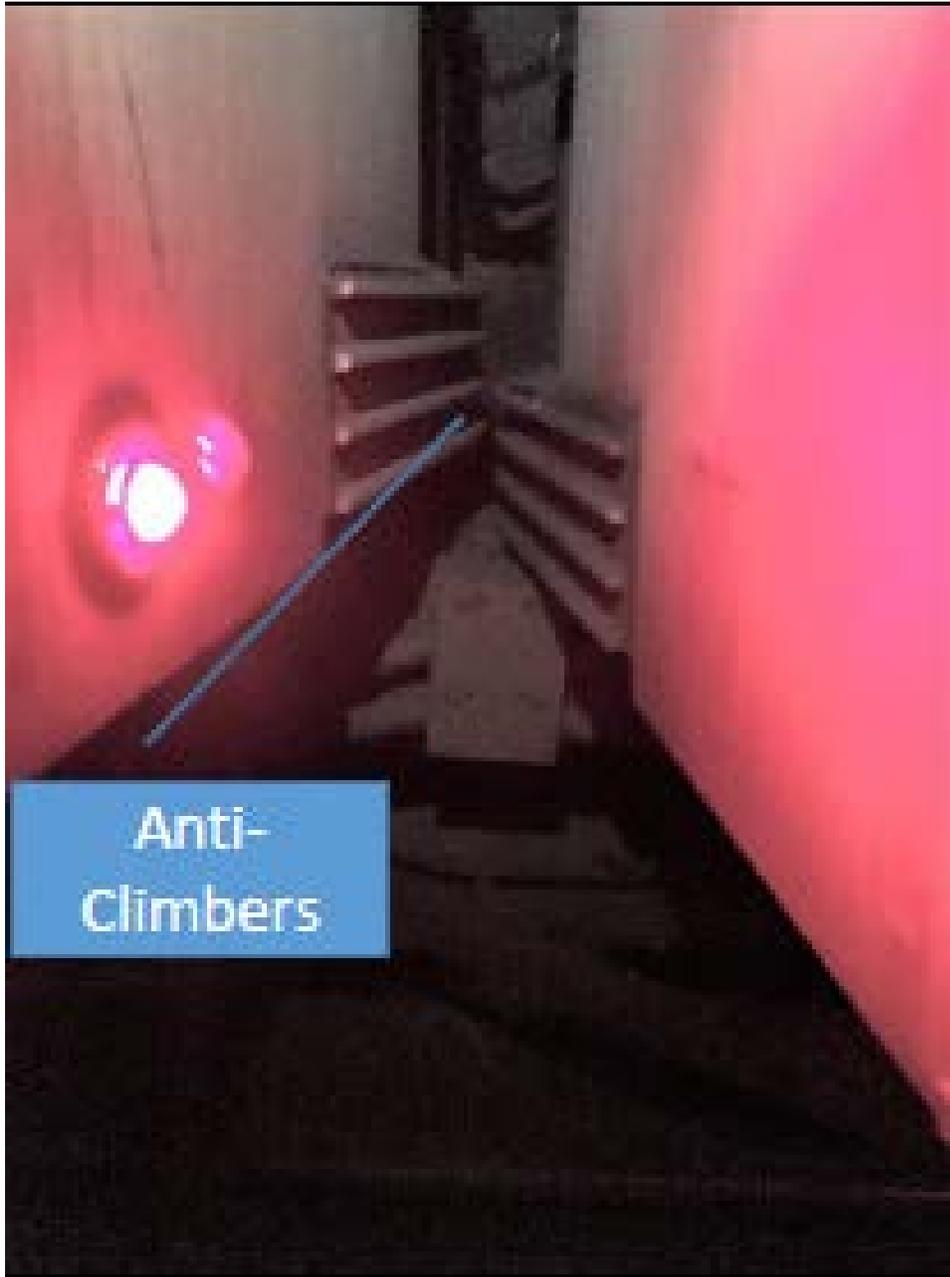


Photo 2 – October 07, 2019, Car 3008 – Photo showing Anti-Climbers made contact with each other.

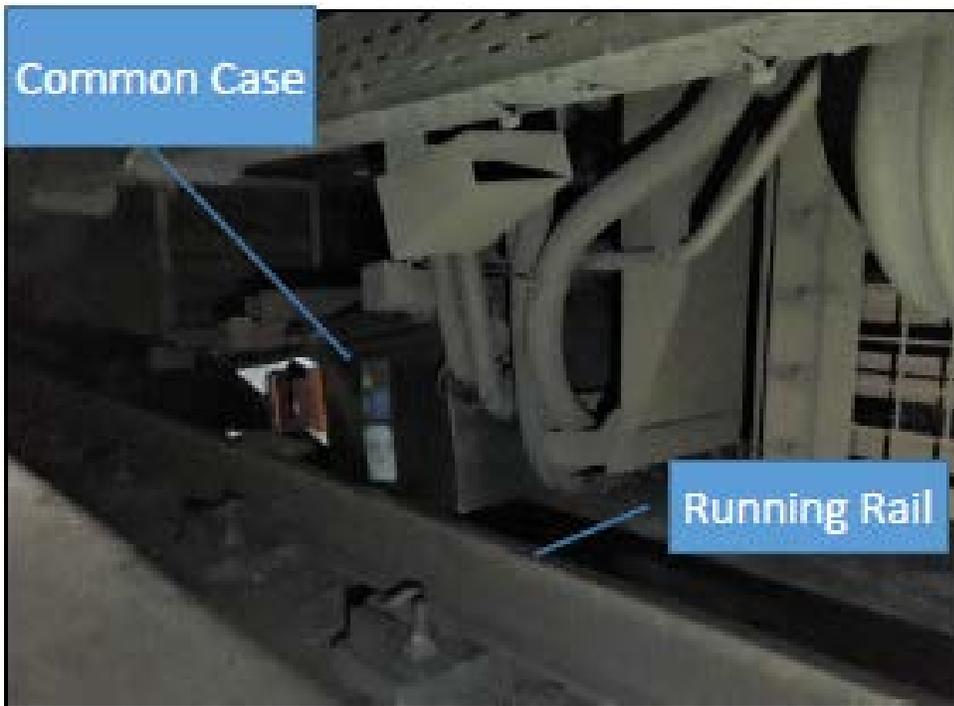


Photo 3 – October 07, 2019, Car 3008 – Photo showing Propulsion Common Case brackets broken and lying on top of the running rail.



Photo 4 – October 07, 2019, Car 3007 – Photo showing floor, stanchions and décor panels buckled.



Photo 5 and 6 – October 09, 2019, Car 3008 – Photo showing roof buckled and sings of roof making contact with tunnel ceiling.

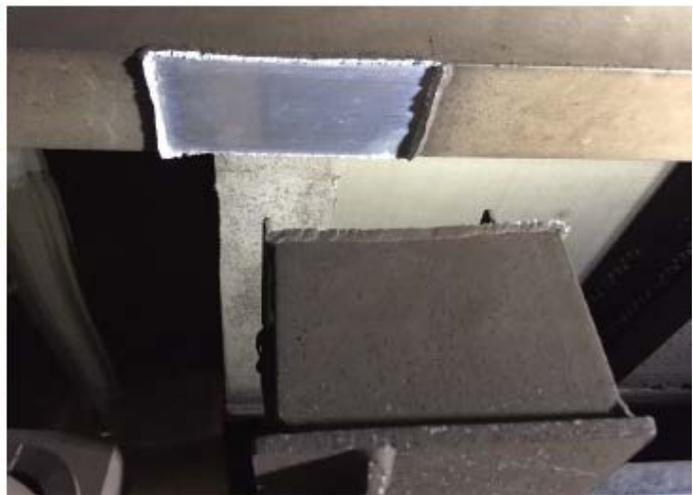


Photo 7 and 8 – October 09, 2019, Car 3008 – Photo showing broken Propulsion Common Case brackets.



Photo 9 and 10 – October 09, 2019, Car 3008 – Photos showing damaged door pocket and décor panels.



Photo 11 and 12 – October 09, 2019, Car 3008 – Damaged floor heat covers, stanchions, floor and décor panels.



Photo 13 – October 09, 2019, Car 3008 – Photo showing exterior body panels buckled.



Photo 14 and 15 – October 09, 2019, Car 3008 – Photo showing exterior body panels buckled.



Photo 16 – October 09, 2019, Car 3008 – Photo showing exterior body panels buckled.



Photo 17 and 18 – October 09, 2019, Car 3009 – Photo showing exterior body panels buckled.



Photo 19 and 20 – October 09, 2019, Car 3206 – Photo showing exterior body panels buckled.