

WMSC Commissioner Brief: W-0185 - Improper Roadway Worker Protection - King Street Station - June 24, 2022

Prepared for Washington Metrorail Safety Commission meeting on November 15, 2022

Safety event summary:

A Yellow Line train departed King Street Station after receiving conflicting instructions from the Advance Mobile Flagger (AMF) on the platform and from the Rail Operations Control Center (ROCC) Rail Traffic Controller while a work crew under Foul Time Protection was on the roadway.

The crew obtained permission from the ROCC to conduct a track inspection between Van Dorn Street and King Street stations on track 2 under AMF protection. An AMF was positioned on the platform at King Street Station, track 2, to warn trains of the work crew ahead. When in place, the Roadway Worker In Charge (RWIC) requested Foul Time protection and instructed the AMF to hold all trains. Foul time protection ensures that there is no train movement in the specific location it is granted.

King Street Station is a location where trains diverge going outbound, with Blue Line trains heading toward Franconia-Springfield Station and Yellow Line Trains heading to Huntington Station. This investigation identified that, in some cases, contrary to Metrorail's written Roadway Worker Protection (RWP) procedures, trains that are taking the route that the work crew is not on are being allowed by the ROCC to proceed during Foul Time. Personnel stated that they do this because they do not expect the train to travel past the work crew's location. In this instance, Train 302 was traveling toward Huntington Station on the Yellow Line, while the crew was on the Blue Line heading from Van Dorn Street Station to King Street Station.

The AMF instructed the Train Operator to stay at the platform due to the work crew having Foul Time, which is in accordance with Metrorail procedures. Then, a ROCC Controller contacted Train 302 as it held on the platform at King Street, track 2, and confirmed the train's destination was Huntington Station. The ROCC Controller informed the Train Operator that speed commands and a lunar (proceed) signal would be set. This direction from the ROCC Controller, which the Train Operator interpreted as direction to proceed, conflicted with Foul Time procedures and the direction to hold by the AMF. The Train Operator understood the directions from the ROCC Controller to mean the train could proceed at normal speeds. When Train 302 departed the platform, the AMF reported an emergency over the radio and informed the ROCC Controller and work crew.

The Train Operator acknowledged they had not been briefed by the AMF on the platform before departing the station. The Train Operator was removed from service at Huntington Station for post-event toxicology testing, which found that the operator was not in violation of WMATA's Drug and Alcohol Program.

Probable Cause:

The probable cause of this event was Metrorail's practical drift away from written roadway worker protection (RWP) safety procedures.

Corrective Actions:





Office: 202-384-1520 · Website: www.wmsc.gov

A rule modification request was submitted for Section 5 – Roadway Worker Protection 5.13.6 Advanced Mobile Flagging (AMF) – Mobile Work Crew, Advanced Mobile Flagging Procedures, to replace the word "the" with "all" so that the rule requires the AMF to hold ALL Rail Vehicles until Foul Time is relinquished and the AMF procedures can resume.

The Office of Track and Structures (TRST) and the ROCC conducted safety briefings to discuss the importance of having no vehicle movement permitted while work crews are under Foul Time protection.

WMATA distributed an RWP Safety Bulletin to all personnel with an emphasis on AMF Procedures and will issue a staff notice emphasizing that RWICs should not instruct any train movement.

Metrorail will conduct safety briefings to discuss the importance of no rail vehicle movement while work crews are under foul time protection, in accordance with MSRPH Section 5 – RWP, 5.13.6 AMF – Mobile Work Crew and Rail Vehicle Operator Procedures.

WMATA contractors conducted a review of proper RWP AMF Flagging procedures with personnel.

WMSC staff observations:

WMSC's June 2020 audit of WMATA's roadway worker protection and training found that WMATA Roadway Worker Protection rules and processes were not being regularly followed and required WMATA to take corrective action to minimize practical drift from official written procedures. This event demonstrates that WMATA still has room for improvement to ensure policy adherence. Metrorail is currently making adjustments to its RWP program. The WMSC's next audit of WMATA's RWP program is scheduled for Fall 2023.



Washington Metropolitan Area Transit Authority Department of Safety (SAFE) Office of Safety Investigations FINAL REPORT OF INVESTIGATION A&I E22392

Date of Event:	June 24, 2022
Type of Event:	Improper RWP
Incident Time:	10:08 Hours
Location:	King Street Station, track 2
Time and How received by SAFE:	10:08 Hours – SAFE/MAC
WMSC Notification Time:	11:00 Hours
Responding Safety Officers:	WMATA: N/A
	WMSC: N/A
	Other: N/A
Rail Vehicle:	L3260/61x3254/55x3245/44T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20220625#101192

Incident Date: 06/24/2022 Time: 10:08 hours

Final Report – Improper RWP

E22392

King Street Station - Improper RWP

June 24, 2022

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Abbreviations and Acronyms

AMF Advanced Mobile Flagger

ARS Audio Recording System

ATO Automatic Train Operation

CAP Corrective Action Plan

CCTV Closed-Circuit Television

CMOR Office of Chief Mechanical Officer

COMR Office of Radio Communications

FT Foul Time

MSRPH Metrorail Safety Rules and Procedures Handbook

NOAA National Oceanic and Atmospheric Administration

OPMS Operations Management Services

RTC Rail Traffic Controller

RTRA Office of Rail Transportation

ROCC Rail Operations Control Center

RWIC Roadway Worker In Charge

SAFE Department of Safety

SMS Safety Measurement System

TRST Office of Track and Structures

WMATA Washington Metropolitan Area Transit Authority

WMSC Washington Metrorail Safety Commission

Incident Date: 06/24/2022 Time: 10:08 hours

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E22392

Drafted By: SAFE 707 - 08/31/2022 Reviewed By: SAFE 71 – 09/01/2022

Washington Metropolitan Area Transit Authority Department of Safety – Office of Safety Investigations

Executive Summary

On Friday, June 24, 2022, at approximately 10:08 hours, the Advanced Mobile Flagger (AMF) located at King Street Station, track 2 reported to the Rail Operations Control Center (ROCC) Rail Traffic Controller (RTC) that Train ID 302 (L3260/61x3254/55x3245/44T) departed King Street Station without receiving a briefing while a Mobile Work Crew was performing a track inspection.

At approximately 09:39 hours the Track and Structures (TRST) Roadway Worker in Charge (RWIC) requested and received permission to conduct a track inspection between Van Dorn Street and King Street stations. The RTC and RWIC performed all applicable procedures for establishing AMF Protection. At approximately 09:42 hours, the TRST RWIC was given permission to access the roadway.

At approximately 09:54 hours, the TRST RWIC requested Foul Time (FT) between J2 675+00 to 645+00. The TRST RWIC advised the AMF that the Mobile Work Crew was under FT and to hold all trains and the AMF acknowledged and responded that they would hold all trains.

At approximately 10:08 hours, Train ID 302 arrived at King Street Station, track 2. approximately 10:10 hours, the ROCC RTC inquired if the train located at King Street Station, track 2 had a destination of Huntington Station. The Train Operator of Train ID 302 confirmed that the train was destined for Huntington Station. The ROCC RTC replied that a lunar signal aspect would be set at King Street Station, no other instructions were given.

At approximately 10:11 hours, the AMF contacted ROCC, declaring an emergency. They reported that the train located at King Street Station, track 2 departed the platform without being briefed. The ROCC RTC contacted the Train Operator and inquired if they had been briefed by the AMF. The Train Operator responded that the AMF was present at King Street Station standing with the train, holding the train according to the AMF procedures; they were waiting for FT to clear; and were not briefed. The Train Operator was instructed to continue to Huntington Station.

At approximately 10:12 hours, the ROCC RTC inquired if the TRST RWIC was relinquishing their FT. The TRST RWIC confirmed that they were attempting to relinquish FT. At approximately 10:13 hours, FT was relinquished. At approximately 10:55 hours, the Mobile Work Crew was retrieved from the roadway.

The Office of Rail Transportation (RTRA) removed the Train Operator from service for postincident toxicology testing.

The probable cause of the Improper RWP event on June 24, 2022 was a conflicting instruction that resulted in confusion by the Train Operator when they were given a lunar signal and speed commands by the ROCC RTC after being held on the platform by the AMF due to a Mobile Work Crew under FT protection. A contributing factor to the event was practical drift from the procedure to hold all trains while a Mobile Work Crew is under FT and allowing the RWIC to authorize movement on adjacent lines. Additional contributing factors are a significant amount of radio traffic during the time of the event and numerous parties contacting ROCC.

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Incident Site

King Street Station, track 2

Field Sketch/Schematics



^{*}Locations are approximate. Not to scale.

Purpose and Scope

The purpose of this accident investigation and candid self-evaluation is to collect and analyze available facts, determine the probable cause(s) of the incident, identify contributing factors, and make recommendations to prevent a recurrence.

Investigative Methods

Upon receiving notification of the Improper RWP event at King Street Station, track 2, on June 24, 2022, SAFE dispatched a cross-functional team to assess the scene and conduct a subsequent investigation. SAFE team members worked with relevant WMATA subject matter experts to review the incident's facts and data.

The investigative methodologies included the following:

- Site Assessment through video and document review
- Formal Interviews SAFE interviewed two individuals as part of this investigation. Interviews included persons present at, during, and after the incident, those directly involved in the response process, and representatives from the Washington Metrorail Safety Commission (WMSC). The following personnel were interviewed:
 - Train Operator
 - AMF
- Informal Interviews Collected through conversations with individuals during the investigation to provide background and supporting information. Note: Written statements were reviewed from personnel present during the event.

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- Documentation Review Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
 - Train Operator 30-Day work history review
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
 - ROCC Roadway Access Log
 - Maximo
- System Data Recording Review A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Landline Communications]
 - Advanced Information Management System (AIMS)
 - Closed-Circuit Television (CCTV)

Investigation

On Friday, June 24, 2022, at approximately 10:08 hours, the AMF located at King Street Station, track 2 reported to the ROCC RTC that Train ID 302 departed King Street Station without receiving a briefing while a Mobile Work Crew was performing a track inspection under foul time protection.

The Audio Recording System (ARS) playback indicated that at approximately 09:39 hours, the TRST RWIC requested permission to conduct a track inspection between Van Dorn Street and King Street Stations. The ROCC RTC acknowledged the request and that the AMF was standing in place at King Street station, track 2 at the 8-car marker ready to perform AMF duties. At approximately 09:41 hours the ROCC RTC made an announcement, advising that the Mobile Work Crew would be walking from Van Dorn Street to King Street Station, track 2. At approximately 09:42 hours, the TRST RWIC was given permission to access the roadway.

At approximately 09:54 hours, the TRST RWIC requested FT between J2 675+00 to 645+00.

	J Line Tr	ack 2			
J Line Track 2	Station	Station	Chain Marker	Chain Marker	Notes
Franconia-Springfield Station	3-03	1-03	881+00	875+00	
Clear View: Interlocking	J-03	J-02	875+00	870+00	
Clear View: Curve	J-03	J-02	870+00	825+00	
Clear View	J-03	J-02	825+00	780+00	
Clear View: Curve	J-03	J-02	780+00	745+00	
Clear View	J-03	J-02	745+00	694+00	
Van Dorn Street Station	3-02	1-02	694+00	688+00	
Clear View: Interlocking	J-02	J-01	688+00	684+00	
Clear Many	1-02	1-01	694+00	675+00	
Restricted View: Curve/Aerial	3-02	J-01	675+00	660+00	
Restricted View: Curve	3-02	1-01	660+00	645+00	
Clear view	7-02	701	043*00	030*00	
Clear View: Curve	J-02	J-01	630+00	612+00	
Clear View	J-02	J-01	612+00	568+00	
Clear View: J-01 Turnout Switch #3	J-02	J-01	568+00	566+00	
Clear View	J-01	C-13	566+00	539+00	
Clear View: C98 Turnout Switch #38	J-01	C-13	539+00	536+00	
Clear View	J-01	C-13	536+00	520+00	
Portal	3-01	C-13	520+00	516+00	
Restricted View: Curve	J-01	C-13	516+00	508+00	
Portal	1-01	C-13	508+00	508+00	
Portal Turnout Switch #3	3-01	C-13	J-508+00	C-564+00	

Table 1 - RWP Track Access Guide

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C Line Track 2

C-14 623+00

C-14 C-13 590+00 582+00

C-13 C12 558+00 529+00

618+00

618+00

C-15

C Line Track 2

Clear View: Interlocking

Restricted View: Curve/Hill

Clear View

Reviewed By: SAFE 71 – 09/01/2022 Approved By: SAFE 71 – 10/14/2022 At approximately 09:58 hours, the ROCC RTC advised the TRST RWIC that Prohibited Exits were in place and FT was granted. The TRST RWIC advised the AMF that the Mobile Work Crew was under FT and to hold all trains, the AMF acknowledged and responded that they would hold all trains. The hot spot area is approximately 3,000 feet in length. The end of the hot spot area, at CM J2 645+00 is over two and a half miles from the C97 Junction.

At approximately 10:08 hours, Train ID 302 arrived at King Street Station, track 2. According to the AMF statement, "They flagged the next train to stop; they did not read the script because the crew was under FT. The AMF stated that they told the Train Operator that the Mobile Work Crew was under FT." Train ID 302 stood by at King Street Station for approximately two minutes. At approximately 10:10 hours, the ROCC RTC inquired if the train located at King Street Station, track 2 had a destination of Huntington Station. The Train Operator of Train ID 302 confirmed that the train was destined for Huntington Station. The ROCC RTC replied that a lunar signal aspect would be set at King Street Station, with speed commands. According to the Train Operator's statement, "they did not have speed commands upon arrival at the eight-car marker at King Street Station. ROCC asked that they verify their destination was Huntington Station, they confirmed that their train was heading to Huntington Station. The ROCC RTC informed them that a lunar aspect with speed commands were coming." The Train Operator assumed that the last transmission from the ROCC RTC implied permission to continue to Huntington Station. Foul time was not relinquished at this point. Based on CMOR IIT analysis of the downloaded VMS and ER, the Train Operator closed the train doors before receiving speed commands, then departed King Street Station. This action is not in accordance with MSRPH Section 3, Operating Rules 3.79.1, Upon losing speed commands on the platform, the operator may NOT adjust the train in the same direction of traffic to service the station without contacting ROCC or terminal supervisor for permission. After servicing the station, the operator must keep their train doors open, until such time when the operator has received speed commands, a proper signal aspect (Lunar or Flashing) along with contacting the ROCC or terminal supervisor for permission to leave and an absolute block for the move if speed commands do not return. Additionally, the CMOR IIT analysis of the downloaded VMS and ER revealed that the Master Controller was placed in a P5 mode upon departure at King Street Station, this action could impact the mechanical wear of the Master Controller leading to ride comfort issues.

At approximately 10:11 hours, the AMF contacted ROCC, declaring an emergency. They reported that the train located at King Street Station, track 2 departed the platform without being briefed. The ROCC RTC contacted the Train Operator and inquired if they had been briefed by the AMF. The Train Operator responded that the AMF was present at King Street Station; they were waiting for FT to clear; and was not briefed. The admission from the Train Operator acknowledging that they, "were waiting for foul time to clear and was not briefed" before departing King Street Station displays that they were not compliant and understood that their train was being held due to FT Their actions was not in accordance with MSRPH Section 5 – RWP, 5.13.6 AMF – Mobile Work Crew and Rail Vehicle Operator Procedures. The Train Operator was instructed to continue to Huntington Station.

At approximately 10:12 hours, the ROCC RTC inquired if the TRST RWIC was relinquishing their FT. The TRST RWIC confirmed that they were attempting to relinquish FT. At approximately 10:13 hours, FT was relinquished. At approximately 10:38 hours, Train ID 403 was instructed to pick up the Mobile Work Crew from the roadway. The Train Operator of Train ID 403 reported to ROCC that they attempted to pick up the Mobile Work Crew and experienced a stuck Automatic

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Train Operation (ATO) Pushbutton on rail car 6093¹. Train ID 403 was instructed to continue to Franconia-Springfield Station. At approximately 10:50 hours, Train ID 404 was instructed to pick up the Mobile Work Crew from the roadway; at approximately 10:55 hours, the Mobile Work Crew was picked up from the roadway.

The CCTV confirmed that Train ID 302 entered the platform at King Street Station, track 2. The Train Operator looked out of the cab window and opened the doors on the platform side, words were exchanged with the AMF. A short time later the Train Operator looked out the cab window and closed the doors. As the train proceeds to depart the station the AMF waves their hand at the train, then speaks into the handheld radio. The train stops briefly, then continues toward Eisenhower Avenue Station.

RTRA removed the Train Operator from service for post-incident toxicology testing.

Further investigation into this incident revealed that personnel have displayed confusion at stations that service multiple train lines with turnouts, where the line changes after departure and a Mobile Work Crew is under foul time protection. As in this case at King Street Station, the yellow line train was continuing towards Huntington Station, not continuing in the direction of the Mobile Work Crew (near Van Dorn Street Station on the blue line) as shown in the figure.

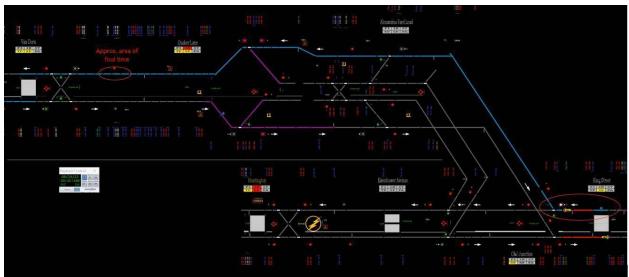


Figure 1 - AIMS display of FT protection in place at 10:12 hours as Train ID 302 departs King Street Station, track 2.

ARS playback confirmed that RWICs are instructing AMFs to release a particular train line while they are under FT protection, this action has contributed to the confusion. Radio communication observation revealed that RWICs intermittently instruct AMFs to allow one train line to continue and another train line to hold while the Mobile Work Crew is under FT protection. This action leads to confusion on the part of the Train Operator when they encounter AMFs that have been instructed to hold all train movement during FT. According to the MSRPH Section 5 – RWP, 5.13.6

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¹ According to Maximo, rail car 6093 received a Daily Safety Test (DST) on June 24, 2022. Signs of a stuck ATO Pushbutton was not noted.

AMF – Mobile Work Crew, 9.e. When FT procedures are in effect, the RWIC shall inform the AMF to hold the Rail Vehicle until FT is relinquished and the AMF procedures can resume.

Chronological Event Timeline

A review of ARS playback, i.e., phone and radio communications, revealed the following timeline:

Time**	Description
09:39:40 hours	TRST RWIC: Requested permission to conduct a track inspection from Van Dorn to King Street, then from Huntington to King Street, track 2. I have an AMF standing by at King Street, AMF standing by at Eisenhower; safety briefing conducted, hot spots identified. ROCC RTC: Acknowledged. I copied your AMF at King Street; I didn't copy your AMF at Eisenhower. You have permission to go direct with your AMF at King Street. Let me know who's the second AMF. TRST RWIC: I have an AMF at Van Dorn, track 1 and at Eisenhower, track 2. AMF at King Street, how do you copy? [Radio]
09:40:43 hours	AMF #1: I'm in place, King Street 8-car marker. Ready to flag. TRST RWIC: ROCC, do you copy? ROCC RTC: Acknowledged. [Radio]
09:41:32 hours	ROCC RTC: Track Walkers present between Van Dorn to Franconia, track 1 and Van Dorn to King Street, track 2. [Radio]
09:42:11 hours	ROCC RTC: RWIC you have permission to start your track inspection Van Dorn to King Street, track 2. Notify when you need Foul Time. TRST RWIC: Acknowledged and repeated. [Radio]
09:54:04 hours	TRST RWIC: Requesting Foul Time J2 675+00 to 645+00. ROCC RTC: Acknowledged and repeated. Did that train pass your location? Standby and clear. TRST RWIC: No train passed, standing by and clear. ROCC RTC: Advise when train passes your location. TRST RWIC: Acknowledged and repeated. [Radio]
09:56:20 hours	TRST RWIC: Central, train has passed my location. [Radio]
09:58:12 hours	ROCC RTC: I copy the train has passed your location. J01-08 Red, prohibited exit, blue block and human form set up for Foul Time, track 2. Advise Central when relinquishing. TRST RWIC: Acknowledged and repeated. AMF at King Street we're under Foul Time. AMF #1: I understand we're under Foul Time, holding all trains at my location. [Radio]
10:02:45 hours	Train ID 302: Permissive block to Braddock Road. ROCC RTC: You have a permissive block to Braddock Road, track 2 with speed commands continue. [Radio]
10:07:31 hours	TRST RWIC: Contacts ROCC to relinquish foul time, radio communication distorted. ROCC RTC: No response. [Radio]

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Time**	Description
10:08:16 hours	ROCC RTC: Requested all Track Walkers and ATC personnel to standby and clear. Requested a Rail Supervisor to relieve a train at Gallery Place Station, and a Rail Supervisor to standby at Pentagon City for an emergency relief from Ops 2. [Radio]
10:10:30 hours	ROCC RTC: Train, track 2 King Street confirm you're going to Huntington. Train ID 302: 302, destination Huntington. ROCC RTC: Lunar and speed commands coming to you. [Radio]
10:11:30 hours	AMF #1: Emergency, emergency! The train that left King Street left without being briefed! ROCC RTC: Okay, that's a yellow line going straight. Train ID 302: Go for 302. ROCC RTC: Was there an AMF on the platform at King Street? Did you get briefed? Train ID 302: There was an AMF. ROCC RTC: Did you speak to the AMF? Train ID 302: The AMF was standing on the platform. I was waiting for Foul Time; she didn't brief me. You gave me speed readouts, I continued on. ROCC RTC: Did you speak to the AMF? Train ID 302: I'm looking out for personnel. ROCC RTC: 302, continue on. [Radio]
10:12:56 hours	ROCC RTC: RWIC, are you relinquishing your Foul Time? TRST RWIC: I'm trying to, you said for everyone to standby. I want to relinquish and make another request. ROCC RTC: Your relinquish time is 10:13 hours, standby. TRST RWIC: Relinquish time 10:13 hours, standby. AMF at King Street back under AMF for the moment. AMF #1: Relinquishing Foul Time, back under AMF. [Radio]
10:29:47 hours	ROCC RTC: RWIC, What's your chain marker? TRST RWIC: 624+00 ROCC RTC: Give Central a landline. [Radio]
10:31:13 hours	ROCC RTC advised the RWIC to standby for a train pick up from the roadway. [Phone]
10:38:02 hours	ROCC RTC: Train ID 403, pick up personnel at J2 624+00. Train ID 403: Pick up personnel at J2 624+00, key-down. [Radio]
10:47:22 hours	TRST RWIC: Train has keyed down permission to board. ROCC RTC: You have permission, advise when you're aboard. [Radio]
10:48:40 hours	Train ID 403: I put the train in auto-store for personnel to board and the train moved in ATO. I didn't advise the personnel to board. ROCC RTC: RWIC, are you in a place of safety? TRST RWIC: Affirmative, I'm on the catwalk. ROCC RTC: The next train will pick you up. Train ID 403 continue on. Train ID 403: The auto-store button is pressed in. ROCC RTC: Train ID 404, pick up personnel at J2 624+00. [Radio]

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Time**	Description
10:50:30 hours	ROCC RTC: Train ID 404, pick up personnel at J2 624+00. Train ID 404: Acknowledged and repeated. Key-down at J2 624+00. [Radio]
10:55:34 hours	TRST RWIC: Permission to board the train. ROCC RTC: You have permission to board. Train ID 404: 404 is keyed-down. ROCC RTC: Notify when personnel are aboard. [Radio]
10:56:45 hours	Train ID 404: Personnel are aboard the train. Permission to continue. TRST RWIC: Personnel are clear of the roadway. ROCC RTC: Train ID 404, continue on. [Radio]

^{**}Note: Times above may vary from other system's timelines based on clock settings.

Office of Radio Communications (COMR)

The Office of Radio Communications conducted comprehensive handheld radio checks (Transmit/Receive) between King Street Station and Van Dorn Street Station on tracks one and two, no trouble was found. The radio tests were loud and clear.

The Office of Chief Mechanical Officer (CMOR) / Vehicle Monitoring and Diagnostic System (VMDS) Timeline

Event Recorder (ER) Data Graph/Sequence of Events

Based on IIT CMOR analysis of the downloaded VMS and ER, details from the data analysis are as follows:

Adopted from CMOR IIT Report:

IIT has completed analysis of the data retrieved from the consist (L3260/61X3244/45X3254/55). Based on the VMS data, the lead car 3260 entered King Street Station traveling at a speed of 34 MPH, the train came to a complete stop 5 feet before reaching the eight-car marker, speed limits changed from 40 mph to 0 mph.

At 10:07:27 the left side doors were opened to service the station. After closing the doors, the train received a speed limit of 55 mph, the master controller was placed in P5 power mode, and the train moved 577 feet then came to a complete stop with 55 mph speed limits. The train began to move and stopped again after traveling 63 feet. The train remained in a stop position for 26.6 seconds then proceeded towards Eisenhower Avenue Station with multiple road horn activations. Based on the available data, there was no failures of the train that may have contributed to this incident.

TIME**	SEQUENCE OF EVENTS	SPEED LIMITS
10:06:56.5	Train ID 302 entered King Street Station platform at a speed of 34 MPH, the Master Controller placed in coast.	40 mph

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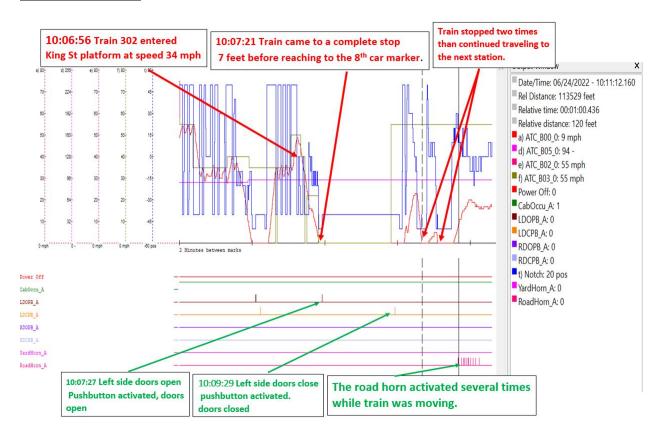
TIME**	SEQUENCE OF EVENTS	SPEED LIMITS
10:07:21	Train ID 302 came to a complete stop approximately 5 feet before the eight-car marker.	0 mph
10:07.27	The Left side doors opened; station serviced.	0 mph
10:09:29	The Left side doors closed.	55 mph
10:09:42	The Master Controller was placed in power mode and the train proceeded.	55 mph
10:10:11	Train ID 302 stopped after traveling approximately 577 feet.	55 mph
10:10:21	Train ID 302 began to move, the Master Controller placed in P4 power mode.	55 mph
10:10:37	Train ID 302 stopped again after traveling approximately 63 feet.	55 mph
10:11:08	Train ID 302 began to move, the Master Controller placed in P3 power mode.	55 mph
10:11:12	The road horn activated several times while train was moving towards Eisenhower Avenue Station.	55 mph

^{**}Note: Times above may vary from other system's timelines based on clock settings.

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3260 VMS Graph:



Closed-Circuit Television (CCTV)



Image 1 – AMF positioned at the 8-car marker as Train ID 302 arrives at King Street, track 2.

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Image 2 – AMF & Train Operator acknowledgement and AMF attempting to stop Train ID 302 from departing King Street Station.

Interview Findings

As part of the investigation launched into the King Street Station Improper RWP event, SAFE conducted two interviews via Microsoft Teams, including the Investigations Team and the WMSC. The interview was conducted 11 days after the event and identified the following key findings associated with this event. Findings detailed below include reported information from interviews and may conflict with other data sources contained in the report.

Train Operator

The Train Operator stated that once they arrived at King Street, they serviced the station and the AMF said FT. They didn't have any speed commands. The Train Operator stated that ROCC asked that they verify their destination was Huntington, they confirmed with ROCC that their train was heading to Huntington Station. ROCC informed them that a lunar aspect with speed commands were coming, they repeated the transmission.

The Train Operator stated that they received speed commands, then went to the window, made an announcement, then closed the doors. The Train Operator stated that the AMF did not say anything. The Train Operator stated that the departed the station and suddenly heard the AMF on the radio saying that they train left without being briefed.

AMF

The AMF stated that they arrived at King Street Station at 9:30am and verified they were in the correct location. The AMF stated that ROCC gave the crew permission to begin the walk and they made sure that they were in place. The AMF stated that sometimes the RWIC instructed them to hold all trains or only certain lines. The RWIC would specifically state that when the they're under FT the trains on a different line can continue.

The RWIC called for their first FT and it was approved by ROCC. The AMF stated that the RWIC told them they were under FT and to hold all trains. The AMF stated that they flagged the next train to stop; they did not read the script because the crew was under FT. The AMF stated that

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the Train Operator closed the window and sat down for 3-4 minutes, then they came to the window, looked down the platform and closed the doors.

The AMF stated that they noticed the train beginning to move, they motioned for the Train Operator to stop because they hadn't read the script and FT was not relinquished. The AMF stated that they went over the radio and said "emergency" three times and sounded the air horn three times and reported to ROCC that the train moved, and the crew was still under FT. Foul time was relinquished, and they continued flagging. The AMF stated that ROCC canceled the walk and told the RWIC a train would pick them up.

Weather

On June 24, 2022, at the time of the incident, NOAA recorded the temperature as 75° F, and partly sunny. Weather was not a contributing factor in this incident.

(Weather source: NOAA – Location: Alexandria, VA)

Human Factors

Fatigue

Signs and Symptoms of Fatigue

Train Operator

We evaluated conditions at the time of the incident to distinguish whether evidence of fatigue was present. Video of the incident was reviewed for behaviors suggesting fatigue. No indications of fatigue were evident from the video. The Train Operator reported feeling fully alert at the time of the incident. The Train Operator reported experiencing no symptoms of fatigue in the time leading up to the incident.

AMF

We evaluated conditions at the time of the incident to distinguish whether evidence of fatigue was present. Video of the incident was reviewed for behaviors suggesting fatigue. No indications of fatigue were evident from the video. The AMF reported feeling fully alert at the time of the incident. The AMF reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

The incident data was evaluated for fatigue risk factors. Risk factors for fatigue were not present for the Train Operator and AMF. Since fatigue evidence and risk factors were not present, the biomathematical fatigue modeling application (SAFTE-FAST Web SFC) was not applied.

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Train Operator that was tested in relation to this event was not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/6.

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Findings

- The Mobile Work Crew acted in accordance with Roadway Worker Protection procedures for AMF protection.
- The AMF advised the Train Operator that the crew was inspecting under FT.
- ROCC advised the Train Operator that they would receive a lunar signal and speed commands prior to the Mobile Work Crew relinquishing FT. Upon receiving the lunar signal, the Train Operator interpreted that as permission to depart the station.
- The Train Operator departed the platform without receiving a briefing from the AMF.
- The Mobile Work Crew relinquished FT shortly after Train ID 302 departed King Street Station.
- Metrorail personnel are not following the procedure to hold trains while a Mobile Work Crew is under FT when the train is located at a station that service multiple train lines at turnouts.
- The MSRPH does not contain language governing movement of trains on adjacent lines while FT protection is in place.
- As a general practice at stations where trains service multiple lines, ROCC RTCs request that RWICs permit train movement on adjacent lines after verifying prohibits are in place for FT protection.

Immediate Mitigation to Prevent Recurrence

- ROCC instructed a train to retrieve the TRST Mobile Work Crew from the roadway.
- RTRA removed the Train Operator from service for post-incident toxicology testing.

Probable Cause Statement

The probable cause of the Improper RWP event on June 24, 2022 was a conflicting instruction that resulted in confusion by the Train Operator when they were given a lunar signal and speed commands by the ROCC RTC after being held on the platform by the AMF due to a Mobile Work Crew under FT protection. A contributing factor to the event was practical drift from the procedure to hold all trains while a Mobile Work Crew is under FT and allowing the RWIC to authorize movement on adjacent lines. Additional contributing factors are a significant amount of radio traffic during the time of the event and numerous parties contacting ROCC.

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SAFE Recommendations/Corrective Actions

Corrective Action Code	Description	Responsible Party	Due Date
101192_SAFE CAPS_OPMS _001	Train Operator to attend refresher training with an emphasis on MSRPH Section 5 – RWP, 5.13.6 AMF – Mobile Work Crew and Rail Vehicle Operator Procedures.	RTRA/ROQT	Completed
101192_SAFE CAPS_RTRA_ 001	Distribution of RWP Safety Bulletin to all personnel with an emphasis on AMF Procedures.	RTRA	Completed
101192_SAFE CAPS_QAQC _001	Continuation of Red Signal Aspect/Zero Speed Commands audits of Train Operators to evaluate the adherence of OR's 3.69, 3.79, 3.79.1-3 and PO T-20-28	RTRA QA/QC	Ongoing
101192_SAFE CAPS_TRST_ 001	Conduct safety briefings to discuss the importance of no rail vehicle movement while work crews are under foul time protection, in accordance with MSRPH Section 5 – RWP, 5.13.6 AMF – Mobile Work Crew and Rail Vehicle Operator Procedures.	TRST	11/30/2022
101192_SAFE CAPS_TRST_ 002	Distribute a Staff Notice emphasizing that RWIC's should not instruct any train movement.	TRST	11/30/2022
101192_SAFE CAPS_ROCC _001	Conduct safety briefings to discuss the importance of no rail vehicle movement while work crews are under foul time protection, in accordance with MSRPH Section 5 – RWP, 5.13.6 AMF – Mobile Work Crew and Rail Vehicle Operator Procedures.	ROCC	11/30/2022
101192_SAFE CAPS_SAFE_ 001	AMF to review and receive reinstruction on the proper RWP - AMF Flagging procedures.	RailPros	Completed
101192_SAFE CAPS_SAFE_ 002	Submitted a request for rule change: Section 5 –Roadway Worker Protection 5.13.6 Advanced Mobile Flagging (AMF) – Mobile Work Crew, Advanced Mobile Flagging Procedures: #18. When FT procedures are in effect, the RWIC shall inform the AMF to hold ALL Rail Vehicles until FT is relinquished and the AMF procedures can resume.	SAFE/OSI SAFE/OOP	Rule Change and updates to AMF Protection are in progress with the Rail Safety Standards Committee

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Appendices

Appendix A – Interview Summary

The narrative below summarizes the interview with SAFE and represents the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record.

Train Operator

The Train Operator is a WMATA employee with 19 years of service and 14 years of experience as a Train Operator. The Train Operator is certified and completed the Computer Based Training for Train Operations Certification on June 7, 2022 and completed Train Operations Certification Practical on June 15, 2022. The Train Operator holds a Roadway Worker Protection (RWP) Level 2 certification that expires in June 2023.

The Train Operator stated that they were operating the train towards Huntington Station and would be on a break upon arrival. The Train Operator stated that once they arrived at King Street, they serviced the station and the AMF said FT. They didn't have any speed commands. The AMF was standing with their arms crossed and did not brief their train; they were waiting.

The Train Operator stated that ROCC asked that they verify their destination was Huntington; they confirmed with ROCC that the train was heading to Huntington Station. ROCC informed them that a lunar aspect with speed commands were coming; they repeated the transmission. The Train Operator stated that they received speed commands then went to the window, made an announcement, then closed the doors. The Train Operator stated that the AMF did not say anything.

The Train Operator stated that they departed the station and suddenly heard the AMF on the radio saying that they train left without being briefed. The Train Operator stated that the personnel were walking on the blue line, not the yellow line.

The Train Operator stated that they understand the procedure is not to move the train when you don't have speed commands. When you have speed commands, the RWIC says let the yellow line train go and that its governed by the AMF. The Train Operator stated that this AMF did nothing.

The Train Operator stated that they would like to see others held accountable for their actions, not always the train operators. The Train Operator stated that the AMF's need training, they're on their phones, sitting on the bench – not at the 8-car marker. The Train Operator stated that there's too much chatter on the radio, the RWIC's and AMF's are always chattering on the radio; they need their own radio ops. The Train Operator stated that the communication is confusing, ROCC says there "may" be multiple crews; either the crews are out there or they aren't, that's not safe. The Train Operator stated that the Train Operators are feeling like they're the bad guys.

<u>AMF</u>

The AMF is a WMATA contractor with 3 months of service and experience as an AMF. The AMF holds a Roadway Worker Protection (RWP) Level 2 certification that expires in March 2023.

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The AMF stated that they clocked in on duty at 7:00am, met with the Supervisor and received their assignment and locations. They received a safety briefing and were told that they would be the AMF at King Street, track 2. The AMF stated that they met with the RWIC and signed their Roadway Job Safety Briefing, and drove to Van Dorn Street Station to take the train to King Street Station.

The AMF stated that they arrived at King Street Station at 9:30am and verified they were in the correct location. The Mobile Work Crew called on duty and they were already standing by at King Street Station, track 2 with the proper PPE. The AMF stated that ROCC gave the crew permission to begin the walk and they made sure that they were in place. The AMF stated that they had conducted AMF duties at King Street, track 2 before and explained the duties when the crew is walking under FT. The AMF stated that sometimes the RWIC instructed them to hold all trains or only on certain lines. Sometimes the RWIC specifically stated that when they're under FT the trains on a different line can continue.

The AMF stated that during the incident, they were set up for flagging duties. One or two trains had already passed their location and they provided the script to the Train Operators. The RWIC called for their first FT and it was approved by ROCC. The AMF stated that the RWIC told them they were under FT and to hold all trains. The AMF stated that a lot of communication was going on when the train arrived on the platform, the RWIC attempted to relinquish FT and was told to standby. The AMF stated that they flagged the next train to stop; they did not read the script because the crew was under FT. The AMF stated that they told the Train Operator that the Mobile Work Crew was under FT. The Train Operator went to make announcements and asked them if the crew was under FT. The AMF stated that they replied to the Train Operator that the Mobile Work Crew was under FT and they were waiting for them to relinquish. The AMF stated that the Train Operator closed the window and sat down for 3-4 minutes, then they came to the window, looked down the platform and closed the doors.

The AMF stated that they noticed the train beginning to move, they motioned for the Train Operator to stop because they hadn't read the script and FT was not relinquished. The AMF stated that they went over the radio and said emergency three time and sounded the air horn three times and reported to ROCC that the train moved, and the crew was still under FT. The AMF stated that ROCC replied that its fine since it was a yellow line train. The AMF stated that ROCC contacted the RWIC to see when FT would be relinquished. Foul time was relinquished, and they continued flagging. The AMF stated that they heard ROCC ask the RWIC for a landline. ROCC canceled the walk and told the RWIC a train would pick them up.

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Appendix B - Train Operator Written Statement

Location Station TYPE OF INCIDENT Property Damage Customer injury Criminal Activity WEATHER Clear M Rain Clear M Rain Station Station Incidents: J	Mezzanine #	Track #/Destination	Reported by: Customer □ Employee □ ROCC □ Other □ Chain Marker/Signal Number
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□ Customer injury □ Criminal Activity WEATHER Clear ☑ Rain □ Snow □ Sleet/Ice □ STATION INCIDENTS: J			
□ Criminal Activity WEATHER Slear ☑ Rain □ Snow □ Sleet/Ice □ STATION INCIDENTS: J		□ Fire	□ Customer Complaint
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STATION INCIDENTS: J		usk 🗆 Daylight 🗹	Lights On □ Lights Off □
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lame of Responding Superv		Name/Department of PLNT/AFC	C or other WMATA responder
TRAIN INCIDENTS			
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302 lame of Responding Superv	tuntington	Name/Department of (CMNT/TRST or other WMATA responder
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Action taken/needed			4/25/22
MS Number:			

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Appendix C – AMF Written Statement

6/24/22 0930 AM KING ST-OLD TOWNE STATION	
Today at 0920 AM I arrived at king St-Old towne station at track 2 waiting for my EWIC for permission to start his walk. At 0926 AM, RAIC (Slled me on the radio to ensure that I was in place. shortly after I confirmed that I was in place at king at station, 8 car marker, track 2, and was ready to start flagging. At 0942 AM EOCC gave him permission to enter the roadway. Then I turned on my amber light, and made sure I had all my other required material out and on. I had my crange vest on, my orange flag out, my backge and stop sign on, and my airhorn out. I began flagging until 0950 AM when the 2000 granted RWIC his first foul time. RWIC called me on the radio stating he was under foul time and to hold all trains at the platform. I proceeded to that I understood he was currently under foul time and RWIC called into the ROCC to relinquish his foul time yellow train with a female operator heading to Eisenhauer the foul time. When she completely stopped on the king stunder foul time. When she completely stopped on the king stunder foul time. She proceeded to make an announcement on the train and then tuned back to me asking again if we are under foul time. I confirmed and cantinual to monitor my	

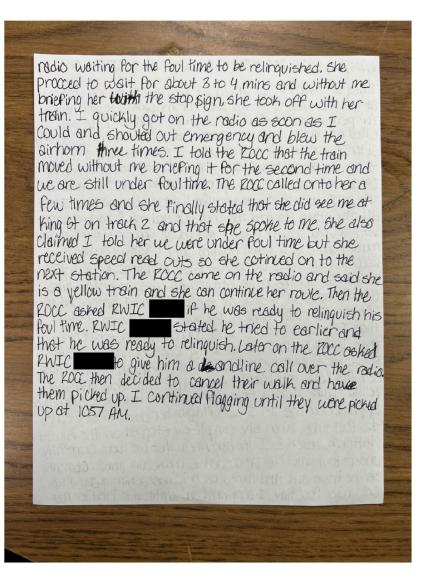
Project Manager RailPros Rail isn't part of our business, it IS our business.

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Rail Station & Train Operations

RWP SAFETY

RWP is a means of providing personnel with a uniform method of establishing On-Track protection, while minimizing dangers and hazards associated with working on the Roadway. Personnel are encouraged to raise and report safety concern(s) and Roadway specific issues.

RWP SAFETY

- As the Rail Vehicle Operator approaches an AMF, all Rail Vehicle Operators MUST come to a
 COMPLETE STOP at the end of the station platform (eight (8) car marker or end gate area).
 When departing from a terminal station Class 1 Rail Vehicle Operators are required to stop at
 the end of the platform to receive instructions from the AMF regardless of the number of cars in
 a consist.
- The Rail Vehicle Operator will be given face-to-face verbal instructions regarding working crews
 on the tracks. Important: It is the Rail Vehicle Operator's responsibility to ensure they receive all
 necessary instructions before proceeding.
- The Rail Vehicle Operator will depart the station at half the regulated speed until the operator reaches the next station, staying alert for multiple work crews. The Rail Vehicle Operator MUST REMAIN VIGILANT and on the lookout for all work crews. The Rail Vehicle Operator must blow the train hom continuously, in short blasts, until they encounter the mobile work crew. Upon observing a work crew, the Rail Vehicle Operator MUST reduce speed to 15 mph, change to low beam headlights, and be prepared to stop.
- As the Rail Vehicle Operator approaches the location of the Watchman/Lookout, and receives the
 approved Hand Signal to proceed, the Operator will sound the Mainline horn, using two (2) short
 blasts to acknowledge the Hand Signal being given by the Watchman/Lookout, then operate at
 a speed no greater than 15 mph past the entire work crew.
- If the Rail Vehicle Operator DOES NOT receive the proper approved Hand Signal to proceed from the Watchman/Lookout, the Rail Vehicle Operator MUST IMMEDIATELY STOP one car length away from the Watchman/Lookout and contact ROCC for further instructions.
- Once the rear of the Rail Vehicle has passed the entire work crew (count at least eight chain
 markers after passing the roadway workers), the Rail Vehicle Operator shall continue at half the
 regulated speed until they reach the next station.

SAFE Hotline • The Safety Hotline is used to report any safety concern(s). Individuals may choose to remain anonymous when reporting their concern(s). • Personnel can report a concern via the WMATA Intranet homepage or by calling the SAFE Hotline 202-249-7233. Close Call Reporting Close Call is a voluntary, confidential and non-punitive reporting system that encourages personnel to report close calls that WMATA would otherwise not know about. • Report a Close Call by calling the Bureau of Transportation Statistics (1-888-568-2377) or via the internet at www.closecall.bts.gov. • A Close Call report must be initiated within 16 hours of the close call event and completed within 24 hours.

January 2022

TIP #1

Ensure you understand the AMF instructions.



TIP#2

Travel at half the regulated speed, continously sounding your horn until you observe personnel on the roadway.



TIP#3

Upon observing personnel on the roadway and after receiving proper hand signal, 2 short horn blasts, and reduce speed to 15 mph until clear of personnel.



TIP #A

Once you are clear of personnel (count at least eight chain markers), travel at half the regulated speed until you reach the next station.



RTRA RWP Safety Bulletin, Page 1 of 1

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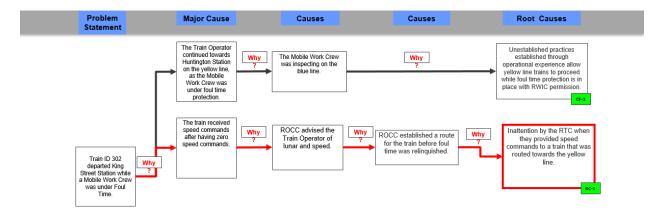
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Appendix E - Root Cause Analysis



Root Cause Analysis

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY



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