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WMSC Commissioner Brief: W-0292 Improper Roadway Worker Protection at Medical Center Station – July 27, 2023

Prepared for Washington Metrorail Safety Commission meeting on May 14, 2024

Safety event summary:

Roadway workers became disoriented and walked opposite of their intended direction on the Red Line between Medical Center and Bethesda stations, leaving them on the roadway without the designed protection and with trains approaching at full speed. A Train Operator encountered the track inspectors and reported that the inspectors were on the roadway without an Advanced Mobile Flagger. The Rail Traffic Controller instructed a following train to look for and subsequently pick up the work crew.

The track inspectors had initially walked from Bethesda Station to Medical Center Station on Track 1 with an Advanced Mobile Flagger properly placed at Medical Center Station to inform inbound trains of the work crew on the roadway. The inspectors reached Medical Center Station at 9:17 a.m.

Due to a train malfunction that led to heavy radio traffic and required the Rail Traffic Controllers to prioritize other responsibilities, the track inspectors remained at the Medical Center Station platform for approximately 25 minutes. Toward the end of this time, the inspectors sat on a bench facing Track 2.

The inspector acting as the Roadway Worker In Charge, who had just qualified at that Roadway Worker Protection qualification level (Level 4) a few weeks earlier, then requested and received permission from the Rail Traffic Controller to continue the inspection toward Grosvenor-Strathmore Station, where the Advanced Mobile Flagger was now positioned.

However, rather than continuing to walk against the flow of traffic on Track 1 toward Grosvenor-Strathmore Station, the inspectors walked against the flow of traffic on Track 2, back toward Bethesda Station.

The Train Operator of Train 104 encountered the work crew and reported this improper roadway worker protection, but continued past the personnel. Based on track circuit data, Train 104 approached the work crew at approximately 29 mph, stopped for approximately one minute, then continued on. According to investigative interviews, the Train Operator spoke with the inspectors to tell them there was no Advance Mobile Flagger. The Rail Traffic Controller contacted another work crew that had previously been in the area who reported their location at Chain Marker A2 349+00 (between Bethesda and Friendship Heights stations). The Rail Traffic Controller then directed the Train Operator of Train 105 to search the roadway for track walkers between Bethesda and Medical Center stations. That Train Operator found the inspectors at approximately Chain Marker A2 410+00 and picked up the personnel from the roadway.

The inspectors acknowledged the mistake of entering the roadway in the wrong direction on the wrong track. In investigative interviews, each inspector stated that they had intended to sit on a bench facing the track they would be walking on, but sat facing the other way due to a rider using the bench. The inspector acting as the Roadway Worker In Charge stated they had not walked this segment of track before. Track numbers are posted on the wall at the end of each station, are posted on each chain maker and can be identified by the normal direction of train travel. The Roadway

Worker In Charge had previously worked primarily as an Advance Mobile Flagger on the east side of the Red Line (B Line).

Probable Cause:

The probable cause of this event was a lack of physical characteristics and territory familiarization training and qualification, and inattention to safety requirements and orientation.

Corrective Actions:

Metrorail provided training on orientation to the track inspectors.

Metrorail addressed the urgency of reporting safety events with the operator of Train 104.

Metrorail's Roadway Worker Protection Program is designed to protect employees, contractors and, in emergencies, first responders and customers while they are on and around the tracks.

In 2023, Metrorail reported 51 improper roadway worker protection (RWP) safety events to the WMSC. These events included personnel entering the roadway without permission and without the proper protection, and improper use of watchmen/lookouts. The investigation reports attached are five final reports related to some of the events that occurred in March 2023, each of which are now ready for consideration by the Commissioners.

The WMSC is finalizing the draft report of our audit on Metrorail's Roadway Worker Protection Program that began in 2023 and continued into early 2024.

Metrorail currently has related open CAP C-0181 addressing the finding that elements of Metrorail have a culture that accepts noncompliance with written operational rules, instructions, and manuals. (Expected completion date October 2024) Metrorail has revised its Safety Management System related to Rail Operations. This has included implementing new methods of hazard and risk reporting, training of personnel on reporting and implementation of a new data collection system for those issues so they can be properly evaluated and addressed. The WMSC is currently reviewing this CAP to ensure the deliverables and intended outcomes of this CAP have been met.

Washington Metropolitan Area Transit Authority
Department of Safety (SAFE)
Office of Safety Investigations (OSI)

FINAL REPORT OF INVESTIGATION A&I E23521

Date of Event:	July 27, 2023
Type of Event:	Improper Roadway Worker Protection (RWP)
Incident Time:	09:58 hours
Location:	Medical Center Station, Track 2 Chain Marker (CM) A2 407+00
Time and How received by SAFE:	11:10 hours/MAC Notification
WMSC Notification Time:	11:10 hours
Responding Safety Officers:	The Office of Safety Oversight (OSO)
Rail Vehicle:	Train ID 104 (L7204/05X7583/82X7168/69X7651/50T) Train ID 105 (L7086/87X7023/22X7312/13X7097/96T)
Injuries:	None
Damage:	None
Emergency Responders:	None
SMS I/A Number	20230809#110529

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Abbreviations and Acronyms

AIMS	Advanced Information Management System
AMF	Advanced Mobile Flagger
AOM	Assistant Operations Manager
CAPD	Office of Capital Delivery
CCTV	Closed-Circuit Television
CM	Chain Marker
MSRPH	Metrorail Safety Rules and Procedures Handbook
MTPD	Metro Transit Police Department
NOAA	National Oceanic and Atmospheric Administration
OEP	Office of Emergency Preparedness
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
ROCC	Rail Operations Control Center
RWIC	Roadway Worker In-Charge
SAFE	Department of Safety
SDOC	Safety Director On-Call
SMS	Safety Measurement System
TRST	Office of Track and Structures
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

**Note that all times listed are approximate and may contain minor variations due to differences between systems of record. **

On Thursday, July 27, 2023, at 09:58 hours, the Train Operator of Train ID 104, located between Bethesda Station and Medical Center Station on track 2 in the outbound direction, reported to the Rail Operations Control Center (ROCC) that they observed personnel walking on the roadway, and they were not briefed by an Advanced Mobile Flagger (AMF) at Bethesda Station.

Prior to the event, the Office of Track and Structures (TRST) Roadway Worker In-Charge (RWIC) requested permission from the Radio Rail Traffic Controller (RTC) to conduct a walking track inspection between Bethesda and North Bethesda Stations by way of track 1 under AMF protection. At 08:49 hours, the Radio RTC granted permission to conduct the track inspection, and the Mobile Work Crew began the walk between Bethesda Station and Medical Center Station on track 1 with the AMF located at Medical Center Station.

The Mobile Work Crew arrived at Medical Center Station at 09:17 hours and were instructed by the Radio RTC to stand by before continuing their inspection. At 09:41 hours, the TRST RWIC requested permission to continue the track inspection between Medical Center Station and Grosvenor Station on track 1. The RWIC confirmed that the AMF was located at Grosvenor Station, and the Radio RTC granted permission for the Mobile Work Crew to continue the track inspection.

The Mobile Work Crew commenced moving back toward Bethesda Station by way of track 2, incorrectly assuming they were continuing their inspection toward Grosvenor Station.

At 09:58 hours, the Train Operator of Train ID 104 reported observing the Mobile Work Crew between Medical Center Station and Bethesda Station on track 2 to ROCC. Train ID 104 continued to Medical Center Station. Train ID 105 was then instructed to retrieve the Mobile Work Crew from the roadway on track 2.

At 10:05 hours, Train ID 105 reported that personnel were observed and stopped the train at Chain Marker (CM) A2 407+00 to allow the Mobile Work Crew to board.

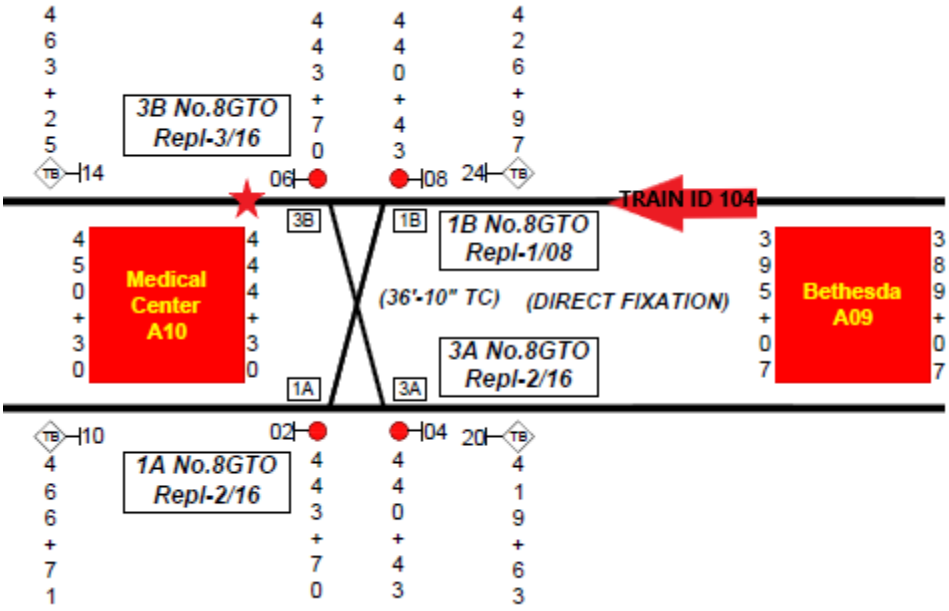
TRST removed the TRST RWIC from service for post-incident testing. There were no injuries or damage resulting from this event. The RWIC has over three years of experience as a Track Inspector, but only certified as a RWIC two weeks prior to this event.

The probable cause of the Improper RWP event on July 27, 2023, between Bethesda Station and Medical Center Station on track 2 was the RWIC's inattention to their location and orientation and inexperience in their role as a RWIC.

Incident Site

Medical Center Station, Track 2
CM A2 407+00

Field Sketch/Schematics



Approximate incident site and location of the incident marked with a "red star." The above depiction is 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

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). SAFE interviewed the following individuals:
  - The TRST Track Inspector
  - The TRST RWIC
- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information. Written statements were reviewed from personnel present during the event.
- Documentation Review – Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
  - Metrorail Safety Rules and Procedures Handbook (MSRPH)
  - National Oceanic and Atmospheric Administration (NOAA)

- TRST Inspector Training Records
- TRST Inspector Certifications
- TRST Inspector 30-Day work history review
- TRST RWIC Training Records
- TRST RWIC Certifications
- TRST RWIC 30-Day work history review

- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:
  - Audio Recording System (ARS) Playback
  - Closed-Circuit Television (CCTV)
  - Advanced Information Management System (AIMS) Playback

Investigation

On Thursday, July 27, 2023, at 08:49 hours, the Audio Recording System (ARS) determined that the TRST RWIC requested, via radio transmission to ROCC's Radio RTC, authorization to conduct a walking track inspection between Bethesda and North Bethesda Stations, on track 1 under AMF protection. The TRST RWIC confirmed with the AMF via radio transmission that the AMF was stationed at the eight-car marker on track 1 at the Medical Center Station. The AIMS confirmed that a blue block and human forms were set up for the area of inspection on track 1. Following procedure, the Radio RTC then granted permission, allowing the track inspection to proceed.

Figure 1 - AIMS depicting a blue block established for the area of inspection on track 1.

During the track inspection between Bethesda Station and Medical Center Station, a separate event occurred, which involved a train malfunction leading to the use of the "Proceed" methodology, causing heavy radio traffic at 09:00 hours. This made it difficult for the TRST RWIC to report that the track inspection was completed between Bethesda and Medical Center Stations, track 1 at 09:17 hours.

The Radio RTC was responding to other radio transmissions and did not acknowledge the TRST RWIC's report that they were clear of the roadway. The Radio RTC requested a temporary suspension of radio communications from all TRST units. The heavy radio traffic lasted for approximately 15 minutes, with the TRST RWIC attempting to contact the Radio RTC a second time at 09:25 hours.

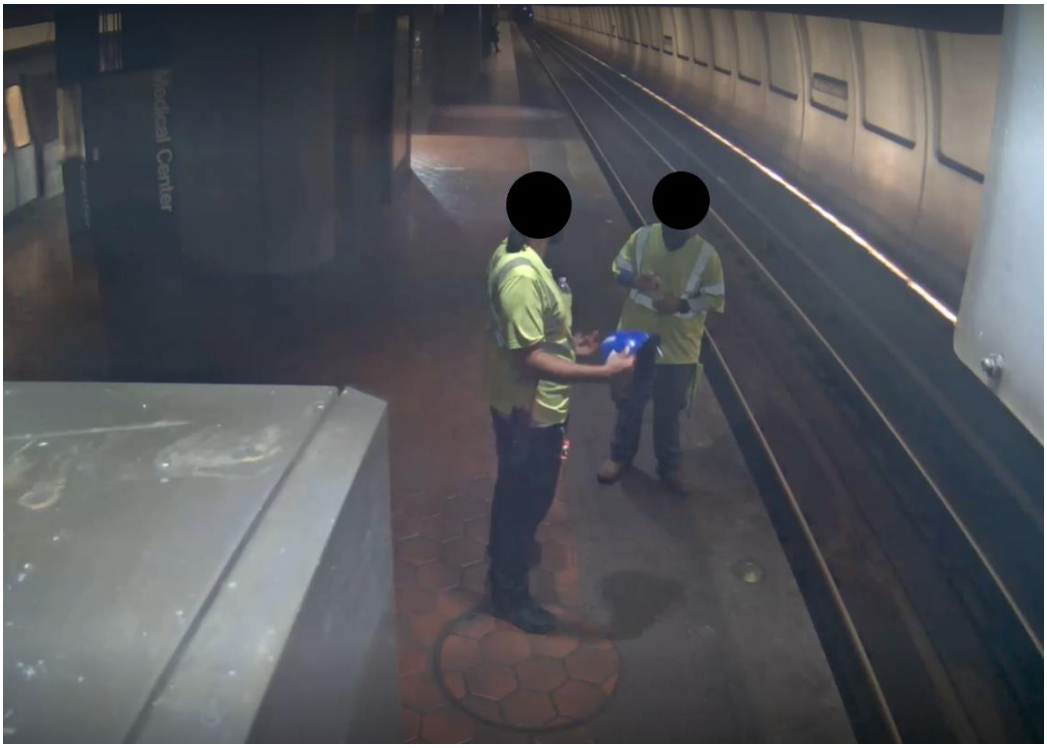


Image 1 – The TRST RWIC and TRST Track Inspector are observed at Medical Center Station on the track 1 side, waiting to continue their track inspection at 09:30 hours.

Image 2 – The TRST RWIC and TRST Track Inspector are observed at Medical Center Station seated, orientated towards track 2 at 09:34 hours.

At 09:41 hours, the TRST RWIC was able to advise the Radio RTC that they were safely on the platform at Medical Center Station and requested permission to continue their track inspection from Medical Center Station to Grosvenor-Strathmore Station by way of track 1 under AMF protection. The TRST RWIC confirmed with the AMF via radio transmission that the AMF was

stationed at the eight-car marker on track 1 at the Grosvenor-Strathmore Station. The Radio RTC granted the TRST RWIC permission to enter the roadway on track 1 at Medical Center Station.

Image 3 – The TRST RWIC and TRST Track Inspector are observed at Medical Center Station after having received permission to enter the roadway at 09:42 hours.

Image 4 – The TRST RWIC and TRST Track Inspector are observed at Medical Center Station eight car marker entering the roadway towards Bethesda Station, track 2 at 09:43 hours.

A review of Closed-Circuit Television (CCTV) verified that both the TRST RWIC and the Track Inspector initiated their movement on track 2, proceeding back toward Bethesda Station.

A consequential event transpired at 09:58 hours, when the operator of Train ID 104 reported encountering the TRST personnel on track 2 between Bethesda Station and Medical Center Station to the Radio RTC. The Train Operator noted the absence of the expected AMF presence at Bethesda Station, track 2. Train ID 104 continued to Medical Center Station. A speed analysis of Train ID 104 was conducted and revealed that the train did not violate speed restrictions within the vicinity of the work crew.

CCTV, ARS, and AIMS playback confirmed that Train ID 104 did not retrieve the TRST RWIC and TRST Track Inspector from the roadway and did not seek instruction from ROCC prior to passing the personnel.

At 09:59 hours, the Radio RTC contacted a separate Mobile Work Crew located at Bethesda Station. The outcome revealed that the crew was en route to Friendship Heights Station via track 2, prompting the Radio RTC to direct the Operator of Train ID 105 to perform an inspection on track 2 between Bethesda and Medical Center Stations.

At 10:02 hours, Train ID 105 reported the presence of the TRST RWIC and Track Inspector at Chain Marker (CM) A2 407+00.

By 10:05 hours, the Radio RTC instructed Train ID 105 to retrieve the personnel from the roadway.

At 10:08 hours, the Train Operator confirmed the personnel were clear from the roadway onboard Train ID 105. The TRST RWIC revealed their confusion regarding track identification to the Buttons RTC via landline communication at 10:09 hours.

At 10:10 hours, the Buttons RTC advised the Assistant Operations Manager (AOM) of the event.

The TRST RWIC was removed from service by their supervisor at Medical Center Station and sent for post-incident testing.

Chronological Event Timeline

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

Time	Description
08:49:57 hours	TRST RWIC: Requested permission from the Radio RTC to conduct a walking track inspection between Bethesda and North Bethesda Stations by way of track 1 under AMF protection, AMF positioned initially at Medical Center Station, track 1 eight car marker. PPE applied and safety briefing conducted. Radio RTC: Acknowledged, repeated back and advised RWIC to go direct with their AMF TRST RWIC: Acknowledged and confirmed that AMF was in position at Medical Center Station, track 1. TRST AMF: Acknowledged and repeated back. Radio RTC: Acknowledged and announced to all personnel on OPS 1 that personnel were conducting a track inspection between Medical Center and Bethesda Stations via track 1. Radio RTC: Gave permission for the RWIC to enter the roadway at Bethesda Station, track 1 and to remain vigilant. TRST RWIC: Acknowledged and repeated back. [Radio, OPS 1]
09:17:32 hours	TRST RWIC: Attempted to contact the Radio RTC. Radio RTC: Advised all track units to standby while they assign multiple rail movements as a result of heavy radio traffic. [Radio, OPS 1]
09:25:28 hours	TRST RWIC: Attempted to contact the Radio RTC a second time however, did not get a response back. [Radio, OPS 1]
09:32:00 hours	*Radio traffic begins to lessen.*
09:41:20 hours	TRST RWIC: Advised the Radio RTC that they were safely on the platform at Medical Center Station and requested permission to continue their track inspection from Medical Center Station to Grosvenor Station by way of Track 1 under AMF protection. Radio RTC: Acknowledged, repeated back, and advised they had permission once the train was properly berthed at Grosvenor Station and advised RWIC to go direct with their AMF. TRST RWIC: Acknowledged and confirmed that AMF was in position at Grosvenor Station, track 1. TRST AMF: Acknowledged and repeated back. [Radio, OPS 1]
09:58:32 hours	Train Operator of Train ID 104: Requested the Radio RTC make an announcement to all personnel on OPS 1 that track walkers were coming from Medical Center Station to Bethesda Station, track 2 in the roadway, and no AMF was present at Bethesda Station, track 2. Radio RTC: Acknowledged, clarified, and repeated back. Train Operator of Train ID 104: Further stated that an AMF was present at Friendship Heights but no AMF at Bethesda Station. [Radio, OPS 1]

09:59:52 hours	Radio RTC: Requested if an unaffiliated RWIC had commenced their track inspection from Bethesda to Friendship Heights Station. Unaffiliated RWIC: Acknowledged, affirmative. Radio RTC: Acknowledged and requested that Train ID 105 search the roadway for track walkers after servicing Bethesda Station and advise on the location of track walkers observed. Train Operator of Train ID 105: Acknowledged and repeated back. [Radio, OPS 1]
10:00:52 hours	Radio RTC: Clarified with Train ID 104 that they observed track walkers after leaving Bethesda Station, track 2. Train Operator of Train ID 104: Confirmed they observed the track walkers and advised they would write an incident report about the event as no AMF was observed at Bethesda Station. [Radio, OPS 1]
10:01:16 hours	Train Operator of Train ID 105: Advised the Radio RTC that they observed no AMF at Bethesda Station, track 2. Radio RTC: Acknowledged, repeated back. [Radio, OPS 1]
10:01:57 hours	Radio RTC: Requested the location of the unaffiliated RWIC. Unaffiliated RWIC: CM A2 349+00 Radio RTC: Acknowledged and repeated back. [Radio, OPS 1]
10:02:29 hours	Train Operator of Train ID 105: Advised the Radio RTC that they observed the TRST RWIC and Track Inspector ahead of them. Radio RTC: Acknowledged, repeated back, and requested a chain marker. Train Operator of Train ID 105: Advised the RTC that the chain marker was unreadable due to dust being present, obscuring the information. Radio RTC: Acknowledged and instructed the Train Operator to key down and retrieve the personnel from the roadway. Train Operator of Train ID 105: Acknowledged and repeated back. [Radio, OPS 1]
10:05:58 hours	Train Operator of Train ID 105: Advised the Radio RTC that both the RWIC and Track Inspector were approximately 300 ft away from them and that the train was located at CM A2 407+00 Radio RTC: Acknowledged, repeated back, and requested to advise when the crew were aboard. Train Operator of Train ID 105: Acknowledged. [Radio, OPS 1]
10:08:01 hours	Train Operator of Train ID 105: Advised the Radio RTC that all personnel are clear of the roadway and aboard their train. Radio RTC: Acknowledged, repeated back, and requested the RWIC landline the ROCC. Train Operator of Train ID 105: Acknowledged. [Radio, OPS 1]
10:09:34 hours	TRST RWIC: Advised the Buttons RTC that they thought that they were on track 1 advancing towards Grosvenor Station from Medical Center Station; however, they got confused and were instead on track 2 advancing towards Bethesda Station. Buttons RTC: Acknowledged and advised the RWIC that they would be removed from service and to standby. [Phone, OPS 1]

10:10:58 hours	Buttons RTC: Advised the AOM of the incident. AOM: Acknowledged. [Phone, OPS 1]

Note: Times above may vary from other systems' timelines based on clock settings.

Advanced Information Management System (AIMS)

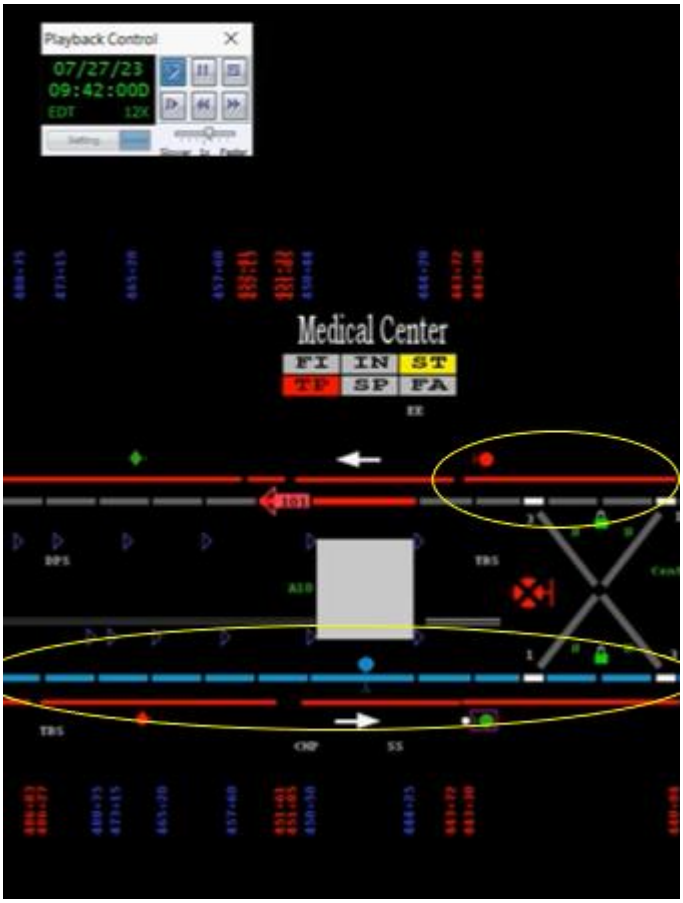


Figure 1 – AIMS depicting a blue block established for track 1, between Medical Center and Grosvenor-Strathmore Stations. Note the absence of the blue block between Medical Center and Bethesda Stations, track 2.

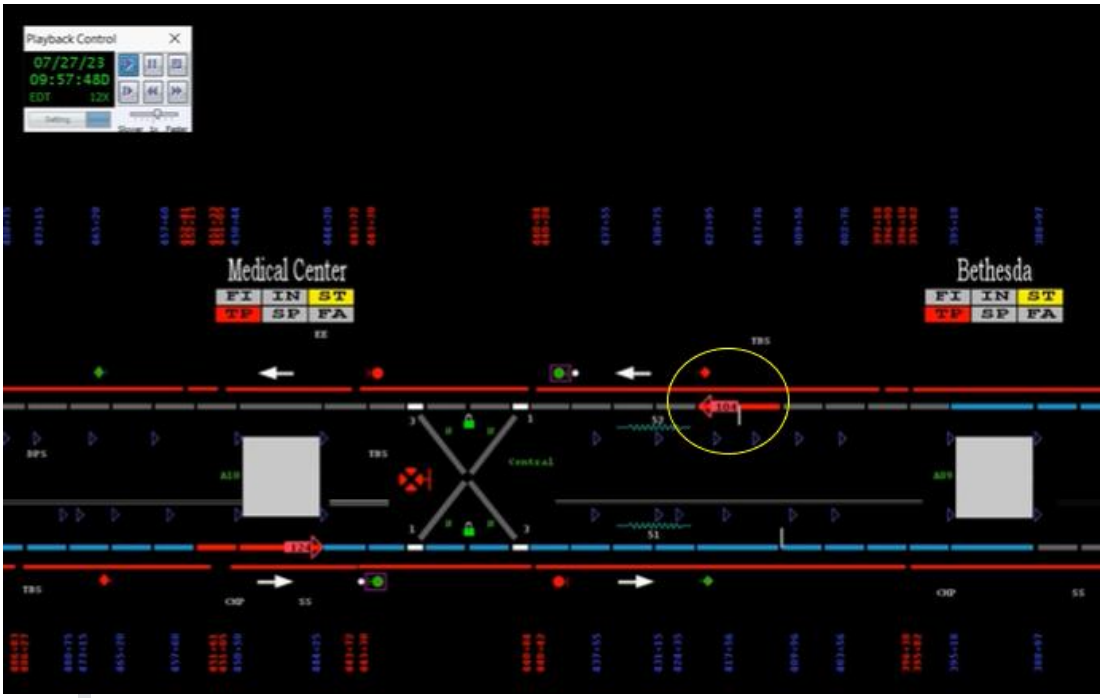


Figure 2 – AIMS depicting Train ID 104 stopped and addressed the RWIC and Track Inspector at approximately 09:57 hours.

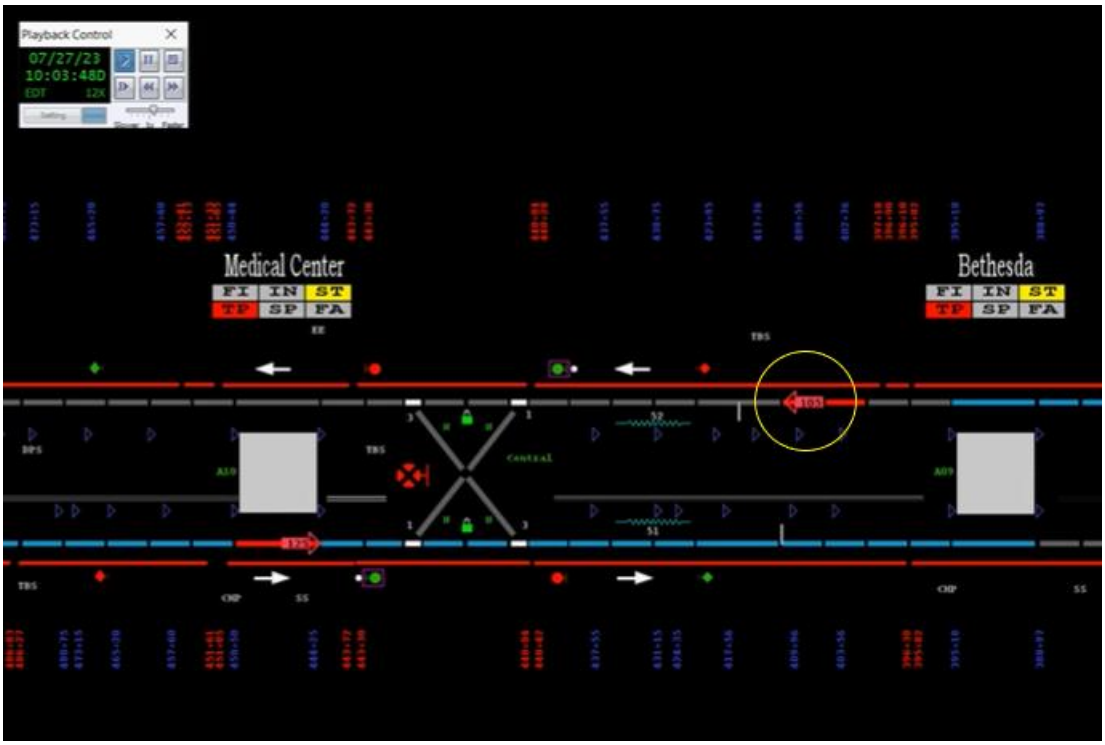


Figure 3 – AIMS depicting Train ID 105 stopped retrieved the RWIC and Track Inspector at approximately 10:03 hours.

Office of Systems Maintenance, Office of Radio Communications (COMR)

No system-related communications issues were identified or reported during the investigation about this event.

Office of the Chief Mechanical Officer, Incident Investigation Team (IIT)

Adopted from CMOR IIT report with minor formatting and grammatical edits:

"IIT has completed the required download and analysis of this incident. Train ID 105 departed from Friendship Heights (A08) and activated the road horn multiple times during departure. Train ID 105 lost speed commands between Friendship Heights and Bethesda and regained speed commands. Train ID stopped for Roadway workers 1,129 Feet beyond the Bethesda Station Platform.

There was no fault in the logs that would have contributed to this incident."

Lead Car 7086 ER analysis Table-1

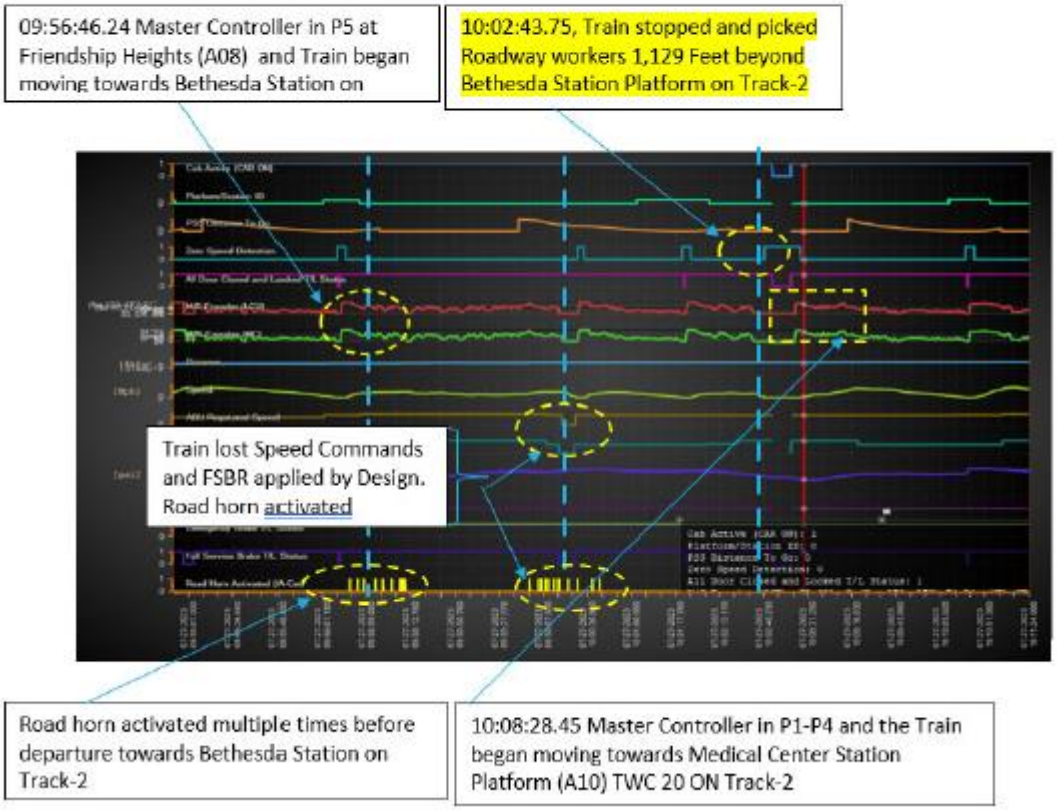
Time	Description of Events	Master Controller Position	Train Speed	Regulated Speed	Distance beyond Friendship Heights (A08) Track-2 (TWC16)
09:56:46.24	Master Controller in P5 at Friendship Heights (A08) TWC(16) ON Track-2, Speed 0.404MPH.Regulated Speed 50MPH, Distance 00 Feet at 8 Car Marker, Road horn activated multiple times. The Train began to move towards Bethesda Station (A09) TWC(18)	P5	0.404MPH	50MPH	00 Feet
09:56:46.24 09:59:15.24	Master Controller cycled through P1-P4, Coast, B1-B3, Speed up to 20MPH, Regulated Speed 54MPH , Distance 5,737 Feet beyond the Friendship Heights 8 Car Station Marker	P1-P4 Coast B1-B3	Up to 19MPH	54MPH	5,737 Feet
09:59:15,24 09:59:47.83	Road horn activated multiple times, Master Controller cycled through P1-P4, Coast, B1-B3, Speed up to 22MPH, Regulated Speed 54MPH, Distance beyond the 8 Car Marker 6,592 Feet	P1-P4 Coast B1-B3	Up to 22MPH	54MPH	6,592 Feet
10:00:15.67	Train ID 105, lead Car 7086 lost speed commands, FSBR applied by design, Master Controller in B4, Speed 31MPH, Regulated Speed 00MPH, Distance from 8 Car Marker 7,840 Feet	B4	31MPH	00MPH	7,840 Feet

Drafted By: SAFE 705 – 09/19/2023
Reviewed By: SAFE 707 – 09/25/2023
Approved By: SAFE 71 – 09/25/2023

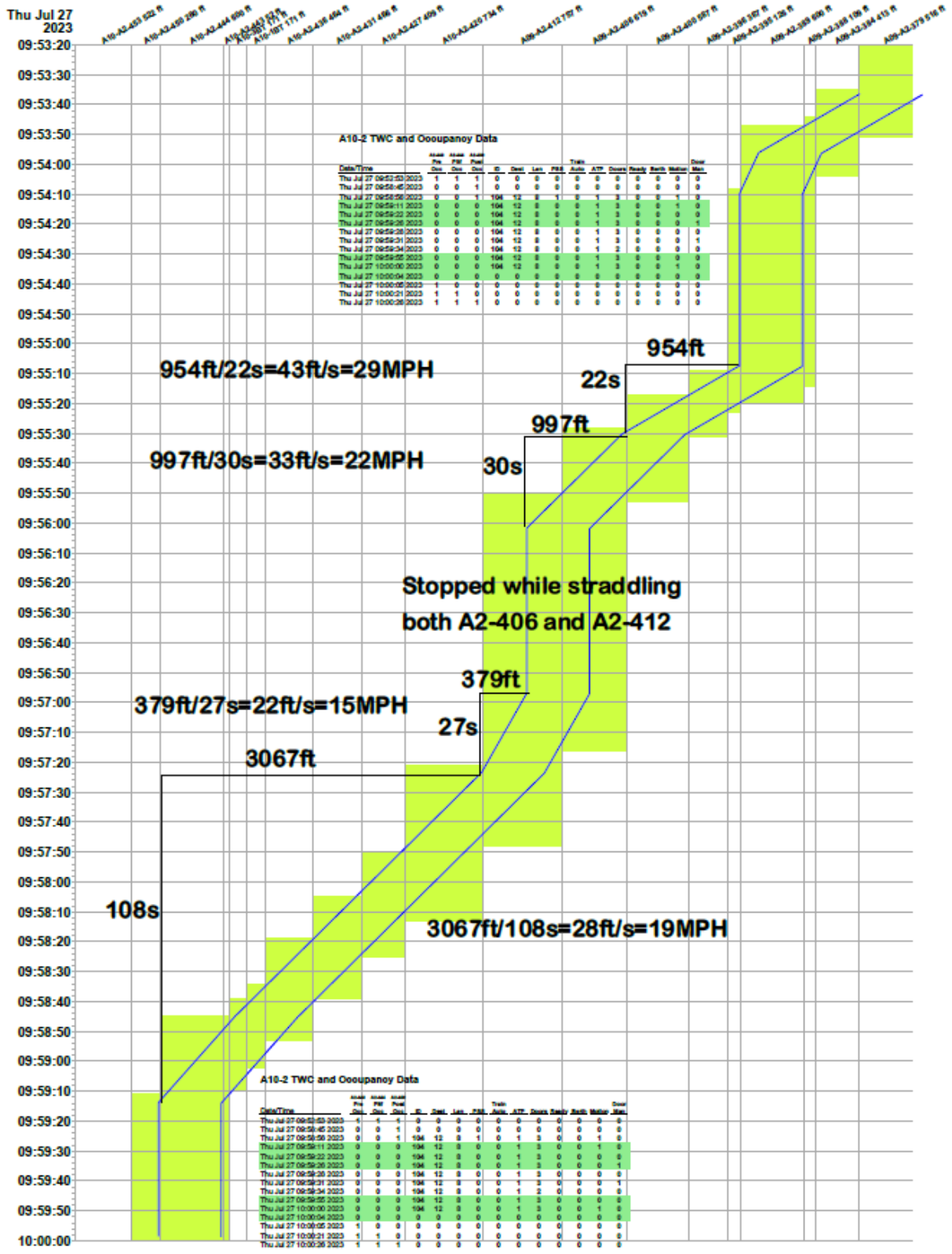
10:00:30.48	Train ID 105, lead Car 7086 came to a complete stop. Speed commands returned while stopped. Speed 00MPH, Regulated Speed 50MPH, Master Controller in B4	B4	00MPH	50MPH	7,840 Feet
10:00:34.43	Master Controller in P5, Regulated speed 50MPH, Speed 2MPH, Distance 8,141 Feet	P5	2MPH	50MPH	8,141 Feet
10:00:55.21	Train ID 105, lead Car 7086 entered Bethesda Station Platform(A09) TWC(18) on Track-2 with Master Controller in Coast , Speed 29MPH, Regulated Speed 50MPH, Distance to Bethesda Station Platform 600 Feet	Coast	29MPH	50MPH	Distance to Bethesda 8 Car Marker 600 Feet
10:01:03	Train ID 105, lead Car 7086 is at the Center of Bethesda Station Platform, Master Controller in B1-B3, Speed 22MPH, Regulated Speed 50MPH, Distance to 8 Car Marker 300 Feet	B1-B3	22MPH	50MPH	Distance to 8 Car Marker 300 Feet
10:01:26.60	Train ID 105, lead Car 7086 came to a complete stop at the 8 Car Marker of Bethesda Station on Track-2, Regulated Speed 49MPH, Speed 00MPH, Master Controller in B4, Distance 00 Feet at 8 Car Marker	B4	00MPH	49MPH	00 Feet Train at 8 Car Marker (A09), Bethesda Station Platform
10:01:33.29	All door closed and locked signal goes low indicating door opened	B4	00MPH	49MPH	00 Feet
10:01:57.26	Master Controller in P5, Speed 0.74MPH, Regulated Speed 49MPH and the Train began moving towards the next Station, Medical Center (A10) TWC(20) on Track-2	P5	0.74MPH	49MPH	2 Feet Beyond Bethesda
10:02:00.77	Master Controller in P1-P4, Speed 11MPH, Regulated Speed 49MPH, Distance beyond Bethesda 8 Car marker 34 Feet	P1-P4	11MPH	49MPH	34 Feet Beyond Bethesda 8 Car Marker
10:02:07.22	Master Controller in Coast, Speed 22MPH, Regulated Speed 49MPH, Distance from Bethesda 8 Car Marker 148 Feet	Coast	22MPH	49MPH	148 Feet Beyond Bethesda Station
10:02:09.12 10:02:28.92	Master Controller cycled through Coast, B1-B3, P1-P4, Speed 21MPH, Regulated 49MPH, Distance beyond 8 Car Marker 881 Feet	Coast B1-B3 P1-P4	21MPH	49MPH	881 Feet Beyond Bethesda Station Platform

10:02:43.75	Train ID 105, lead Car 7086 came to a complete stop 1,129 Feet beyond the Bethesda 8 Car Marker where the Roadway workers were picked up by Train ID 105	B4	00MPH	49MPH	1,129 Feet Beyond Bethesda 8 Car Marker where Roadway workers were picked up by Train ID 105
10:03:41.31	Lead Car 7086 is keyed down				
10:08:17.79	Lead Car 7086 is keyed up	B4	00MPH	49MPH	1,129 Feet beyond 8 Car Marker
10:08:28.45	Master Controller in P1-P4 and the Train began moving to the next Station Medical Center (A10) TWC(20)	P1-P4	0.247MPH	49MPH	1,130 Feet beyond the Bethesda 8 Car Marker

Lead Car 7086 ER Analysis Graph #1



Graph 1 - VMS Data readout for Train ID 105 for the incident.



Graph 2 - Average speed calculations for Train ID 104 for the incident.

Interview Findings

As part of the investigation launched into the event, SAFE interviewed two (2) people. The interviews identified the following key findings associated with this event. Findings detailed below include reported information from involved personnel and may conflict with other data sources contained in the report.

TRST Track Inspector

- The Track Inspector stated they had just concluded an inspection between Bethesda Station, track 1, and Medical Center, track 1, and intended to continue their inspection towards Grosvenor-Strathmore Station, track 1.
- The Track Inspector stated that the RWIC had advised them that a delay had occurred, and the ROCC had advised they standby and stand clear until the delay was rectified. The Track Inspector stated they then sat down approximately mid-way along the platform at Medical Center Station, on the center seating, facing towards track 2.
- The Track Inspector stated the intent was to sit facing the track 1 side; however, a customer was seated that way, and both the Track Inspector and RWIC, due to being "covered in dust and grime," decided to sit facing away from their planned orientation.
- The Track Inspector stated they then proceeded along the track 2 side of the Medical Center platform back towards Bethesda Station instead of their intended destination of Grosvenor-Strathmore Station.
- The Track Inspector stated they were inspecting for track faults along track 2 for approximately six minutes when they were contacted by Train ID 104 from ahead of them, who advised them that the AMF was not set up at Bethesda Station. The Track Inspector stated the RWIC talked with the Train Operator about the issue.
- The Track Inspector stated the RWIC had both of them remain in location and await retrieval by the next train, Train ID 105.
- The Track Inspector stated they were then retrieved by Train ID 105 and dropped off at Medical Center Station where a supervisor retrieved them.
- The Track Inspector stated that orientation and navigation are the responsibility of the RWIC and that formalized training in maintaining orientation was typically down to "common sense."

TRST RWIC

- The RWIC stated they had completed training and qualified as an RWIC two weeks before the incident.
- The RWIC also stated they had not walked the specific segment of track prior to the incident.
- The RWIC stated that they had just concluded an inspection between Bethesda Station, track 1 and Medical Center, track 1, and intended to continue their inspection towards Grosvenor-Strathmore Station, track 1. The RWIC stated they had just requested permission to access to continue towards Grosvenor-Strathmore Station, track 1, when they were advised of an emergency and told by the Radio RTC to stand by and clear until it was resolved.
- The RWIC stated they sat down approximately mid-way along the platform at Medical Center Station, on the central seating, facing towards track 2.
- The RWIC stated the intent was to sit facing the track 1 side; however, a customer was seated that way, and both the Track Inspector and RWIC opted to sit facing towards the track 2 side, down the bench from the customer, as not to interrupt them with "loud radios, or dirt and sweat."
- The RWIC stated they proceeded along the track 2 side of the Medical Center platform back towards Bethesda Station instead of their destination of Grosvenor-Strathmore Station. The RWIC stated this was due to still thinking they were oriented toward track 1.

Drafted By: SAFE 705 – 09/19/2023
Reviewed By: SAFE 707 – 09/25/2023
Approved By: SAFE 71 – 09/25/2023

- The RWIC stated they requested to continue their track walk toward Grosvenor-Strathmore Station. Once they were permitted to enter the roadway, the RWIC said they proceeded past the end gate without confirming the track number and assuming they were in the appropriate area.
- The RWIC stated that they initially encountered Train ID 104 in the roadway, who contacted them and advised that their "AMF was not in position." The RWIC stated they then waved the train past and contacted their AMF, who advised that they were in position at Grosvenor-Strathmore Station.
- The RWIC stated they then heard Train ID 104 tell the Radio RTC that no AMF was present at Bethesda Station and that the Radio RTC was contacting other RWICs to determine the locations of each work crew. At this point, the RWIC stated they stopped their progress and consulted their track access guide as they believed an issue had arisen.
- The RWIC stated they did not hear their callsign being called over the radio.
- The RWIC stated that they observed Train ID 105 while they observed signage advising that Bethesda Station was approximately 1500 feet in the direction they were traveling.

Weather

On July 27, 2023, at the time of the incident, NOAA recorded the average temperature as 80°F, with minor cloud cover, winds averaging 7.5 mph, and 73% humidity. This event occurred within a tunneled section of the rail system. The weather was not a contributing factor in this incident (Weather source: NOAA) – Location: Bethesda, MD.

Related Rules and Procedures

MSRPH 5.13.6 Advanced Mobile Flagging – Mobile Work Crew

Human Factors

Fatigue

Signs and Symptoms of Fatigue

Conditions at the time of the incident were evaluated to distinguish whether evidence of fatigue was present. No video was available in order to observe fatigue factors. The TRST RWIC reported feeling fully alert at the time of the incident and reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

The TRST RWIC worked day shifts (07:00 – 15:00 hours) in the days leading up to the incident. The TRST RWIC reported 7 hours of sleep in the last sleep period preceding the incident and was awake for 4.51 hours at the time of the incident. The TRST RWIC was off duty for a calculated total of 10.91 hours, which provided the opportunity for 7-9 hours of sleep. The employee reported usual workday sleep durations of 7 hours and no issues with sleep.

Incident data was evaluated for fatigue risk factors. There were no major risk factors for fatigue identified.

Incident data was evaluated for fatigue risk factors. There were no major risk factors for fatigue identified, however the incident time of day (03:10 hours) may suggest an increased risk of fatigue-related impairment.

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Track Inspector and TRST RWIC complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Training and Work History

The TRST RWIC was hired on January 6, 2020, and spent most of their career as an AMF on the B-Line. The TRST RWIC was trained and qualified as a RWIC approximately two weeks prior to the incident. The TRST RWIC began working on the A-Line at Bethesda Station the day of the incident. The TRST RWIC has no previous safety violations.

Findings

- The TRST RWIC set up AMF protection between Bethesda and North Bethesda Stations to conduct a track inspection by way of track 1.
- The TRST RWIC completed their inspection between Bethesda and Medical Center Stations, track 1, and remained there for approximately 25 minutes, awaiting permission to continue their inspection while the ROCC dealt with an unrelated incident.
- The TRST RWIC reported that they were confused with orientation during the paused inspection to continue the track inspection and did not observe the signage on track 2 when utilizing the end gate at CM A2 443+70.
- Train ID 104 initially stopped and spoke with the TRST RWIC and advised them that their AMF was not positioned at Bethesda Station and aired the information to the ROCC after they had left the RWIC to remain in the roadway.
- The TRST RWIC was retrieved by Train ID 105 from the roadway at CM A2 407+00.
- The TRST RWIC held their position for approximately 2 weeks prior to the incident and reported they had not walked the specific area prior to the incident.

Immediate Mitigation to Prevent Recurrence

- The TRST RWIC and Track Inspector were removed from the roadway.

Probable Cause Statement

The probable cause of the Improper RWP event on July 27, 2023, between Bethesda Station and Medical Center Station on track 2 was the RWIC's inattention to their location and orientation and inexperience in their role as a RWIC.

Recommended Corrective Actions

Corrective Action Code	Description	Responsible Party	Estimated Completion Date
110529 _SAFECAPS_TRST_001	Retraining on orientation for the TRST Track Inspector and TRST RWIC.	TRST SRC	Completed
110529 _SAFECAPS_RTRA_001	Address incident reporting urgency with the Train Operator of Train ID 104.	RTRA SRC	Completed

Appendices

Appendix A – Interview Summaries

The below narratives summarize the incident and represent the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record.

TRST Track Inspector

The Track Inspector has been with WMATA for approximately 3.5 years, all as a Track Inspector. The Track Inspector is currently qualified as an RWP Level 2 which expires on 08/31/2023.

The Track Inspector stated they were assigned to observe and report on track faults and issues affiliated with the Medical Center Tunnel that stretches between Grosvenor-Strathmore, Medical Center, and Bethesda Stations at the time of the incident.

The Track Inspector stated they had just concluded an inspection between Bethesda Station, track 1, and Medical Center, track 2, and had intended to continue their inspection towards Grosvenor-Strathmore Station, track 2. (This would later be understood to be track 1).

The Track Inspector stated that the RWIC had advised them that a delay had occurred, and the ROCC had advised they standby and stand clear until the delay was rectified. The Track Inspector stated they then sat approximately mid-way along the platform at Medical Center Station, on the center seating, facing towards track 2.

The Track Inspector stated the intent was to sit facing the track 1 side; however, a customer was seated that way and both the Track Inspector and RWIC, due to being "covered in dust and grime," decided to sit facing away from their planned orientation.

The Track Inspector stated they proceeded along the track 2 side of the Medical Center platform back towards Bethesda Station instead of their destination of Grosvenor-Strathmore Station.

The Track Inspector stated they were inspecting for track faults along track 2 for approximately 6 mins when they were contacted by Train ID 104 from ahead of them, who advised them that the AMF was not set up at Bethesda Station. The Track Inspector stated the RWIC talked with the Train Operator about the issue.

The Track Inspector stated the RWIC had both of them remain in location and await retrieval by the next train, Train ID 105.

The Track Inspector stated they were retrieved by Train ID 105 and dropped off at Medical Center Station, where a supervisor recovered them. The Track Inspector said the RWIC and themselves were submitted for post-incident testing.

The Track Inspector stated that orientation and navigation are the responsibility of the RWIC and that formalized training in maintaining orientation was typically down to "common sense."

TRST RWIC

The RWIC has been with WMATA for approximately 3.5 years and has been a Track Inspector that entire time. The RWIC recently qualified as an RWP Level 4 (two weeks before the incident), which expires on 06/30/2024.

The RWIC stated that they were assigned to be the RWIC for a track inspection of the Medical Center Tunnel that stretches between North Bethesda, Grosvenor-Strathmore, Medical Center, and Bethesda Stations at the time of the incident. The RWIC stated they had not walked that section of track prior to the incident.

The RWIC stated that they had just concluded an inspection between Bethesda Station, track 1, and Medical Center, track 1, and intended to continue their inspection towards Grosvenor-Strathmore Station, track 1. The RWIC stated they had just requested foul time to continue towards Grosvenor-Strathmore Station, track 1, when they were advised of an emergency and told by the Radio RTC to stand by and clear until it was resolved.

The RWIC stated they then sat approximately mid-way along the platform at Medical Center Station, on the central seating, facing towards track 2.

The RWIC stated the intent was to sit facing the track 1 side; however, a customer was seated that way, and both the Track Inspector and RWIC opted to sit facing towards the track 2 side, down the bench from the customer as not to interrupt them with "loud radios, or dirt and sweat."

The RWIC stated they then proceeded along the track 2 side of the Medical Center platform back towards Bethesda Station instead of their destination of Grosvenor-Strathmore Station. The RWIC stated this was due to still thinking they were oriented toward track 1.

The RWIC stated they requested to continue their track walk toward Grosvenor-Strathmore Station. Once they were permitted to enter the roadway, the RWIC stated that they proceeded past the end gate without confirming the track number and assuming they were in the appropriate area.

The RWIC stated that they initially encountered Train ID 104 in the roadway, who contacted them and advised that their "AMF was not in position." The RWIC said they then waved the train past and contacted their AMF who advised that they were in position at Grosvenor-Strathmore Station.

The RWIC stated they then heard Train ID 104 tell the Radio RTC that no AMF was present at Bethesda Station and that the Radio RTC was contacting other RWICs to determine the locations of each work crew. At this point, the RWIC stated they stopped their progress and consulted their track access guide as they believed an issue had arisen. The RWIC said they did not hear their call-sign being called over the radio.

The RWIC stated that they observed Train ID 105 while they observed signage advising that Bethesda Station was approximately 1500 feet in the direction they were traveling.

The RWIC stated that Train ID 105 retrieved them and the Track Inspector and took them back to Medical Center Station via track 2 where a supervisor removed both they and the TRST Track Inspector from service. The RWIC said both they and the Track Inspector were submitted for post-incident testing.

Drafted By: SAFE 705 – 09/19/2023
Reviewed By: SAFE 707 – 09/25/2023
Approved By: SAFE 71 – 09/25/2023

AMF/LSC Roadway Access

Rail Operations Control

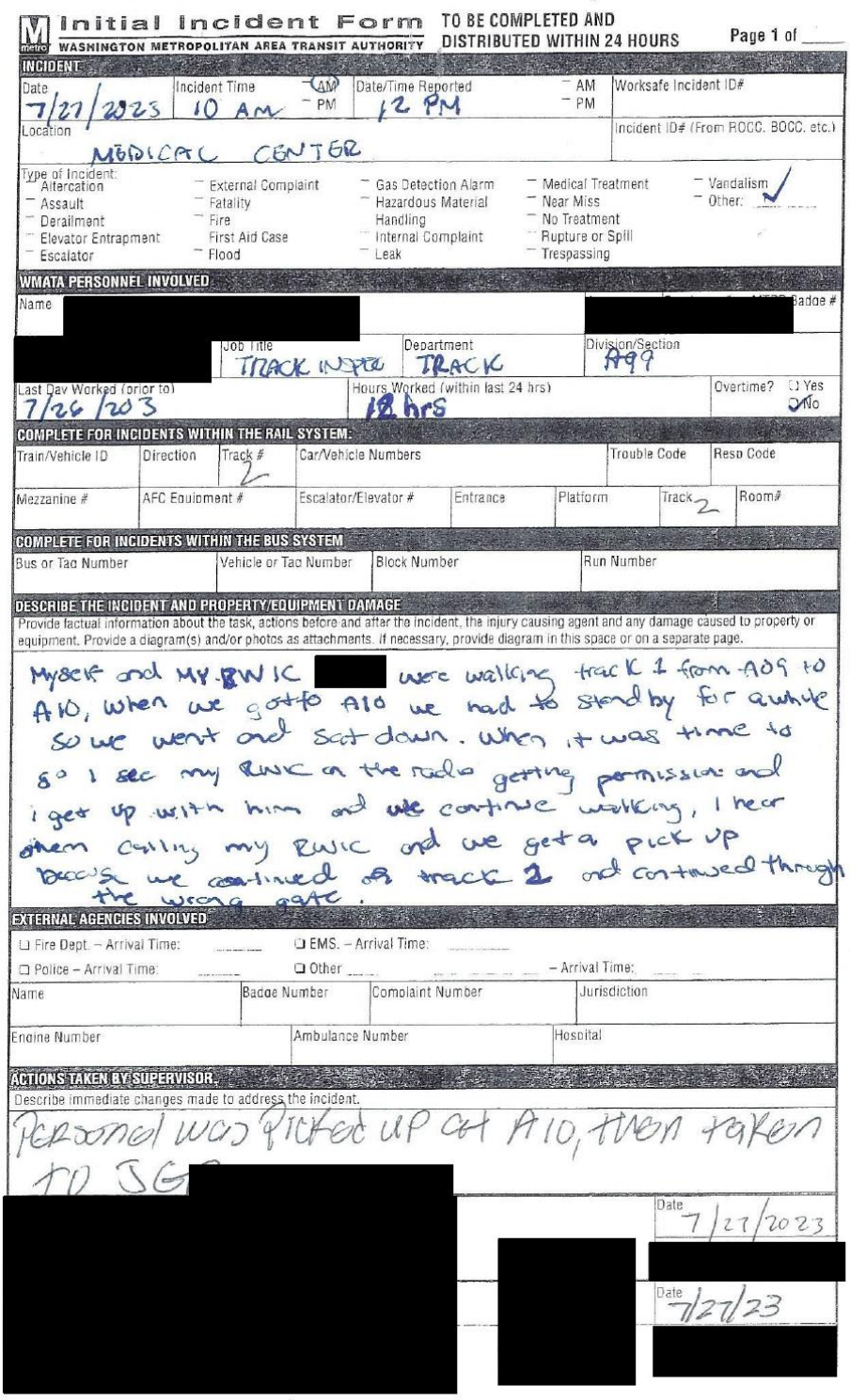
Page 1 of 2

Day Thursday Date 7.27.23

Radio Call #	Location (track, chain markers)	Type of work / Support Restrictions	Type of Protection (AMF, LSC)	Pwr Out (Y/N)	Start time	End time
6215 6052	A13 - A12	TRK	MURPHY AMF	N	0837	1206
6055 6216	B05 - B04	TRK	MOORE AMF	N	0844	1224
6188 6379	A09 - A12	TRK	Collins AMF	N	0854	
6272 6212 6297	A09 - A04	TRK	Conway AMF	N	0946	1156
285 2209 2265	B10 B1 684 601	Marker Coil Loop	2431	N	1112	1246
2436 2102 2386	A11	Interlocking Loop	2409	N	1115	1157
2533 2439 2509 2524 2285	A05 A2781 135	Shunt van	2453	N	1128	1248
2225 2445 2288 2485	B11	Interlocking Loop	2280	N	1130	1234
6404 6321	A04 - B03	TRK	JONES AMF	N	1032	1240
ERT 658	A2 56+00 A1 56+00 A11	Remove bolt from ground area	6243 AMF	Y	1522	1652
+4 2432	504+00 506+00 A2 419+00	TCV	2416 AMF	N	1925	2157

410-ROCC-ROC-05-01 Approved: 11/16/2022

Document 1 – AMF/LSC Roadway Access Form Excerpt Page 1 of 1.



Initial Incident Form
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
TO BE COMPLETED AND DISTRIBUTED WITHIN 24 HOURS
Page 1 of ____

INCIDENT

Date	Incident Time	Date/Time Reported	Worksafe Incident ID#
7/27/2023	10 AM (AM) PM	12 PM AM PM	

Location: MEDICAL CENTER
Incident ID# (From ROCC, BOCC, etc.)

Type of Incident:
- Altercation
- Assault
- Derailment
- Elevator Entrapment
- Escalator
- External Complaint
- Fatality
- Fire
- First Aid Case
- Flood
- Gas Detection Alarm
- Hazardous Material Handling
- Internal Complaint
- Leak
- Medical Treatment
- Near Miss
- No Treatment
- Rupture or Spill
- Trespassing
- Vandalism
- Other: ✓

WMATA PERSONNEL INVOLVED

Name	Badge #	Job Title	Department	Division/Section
[redacted]	[redacted]	TRACK INSPR	TRACK	A99

Last Day Worked (prior to)	Hours Worked (within last 24 hrs)	Overtime?
7/26/23	12 hrs	( ) Yes (✓) No

COMPLETE FOR INCIDENTS WITHIN THE RAIL SYSTEM:

Train/Vehicle ID	Direction	Track #	Car/Vehicle Numbers	Trouble Code	Reso Code
		2			

Mezzanine #	AFC Equipment #	Escalator/Elevator #	Entrance	Platform	Track	Room#
					2	

COMPLETE FOR INCIDENTS WITHIN THE BUS SYSTEM

Bus or Tac Number	Vehicle or Tac Number	Block Number	Run Number

DESCRIBE THE INCIDENT AND PROPERTY/EQUIPMENT DAMAGE

Provide factual information about the task, actions before and after the incident, the injury causing agent and any damage caused to property or equipment. Provide a diagram(s) and/or photos as attachments. If necessary, provide diagram in this space or on a separate page.

Myself and MY RWIC [redacted] were walking track 1 from A09 to A10, when we got to A10 we had to stand by for awhile so we went and sat down. When it was time to go I see my RWIC on the radio getting permission and I get up with him and we continue walking, I hear them calling my RWIC and we get a pick up because we continued on track 2 and continued through the wrong gate.

EXTERNAL AGENCIES INVOLVED

- ☐ Fire Dept. – Arrival Time: ____
- ☐ EMS. – Arrival Time: ____
- ☐ Police – Arrival Time: ____
- ☐ Other ____ – Arrival Time: ____

Name	Badge Number	Complaint Number	Jurisdiction

Engine Number	Ambulance Number	Hospital

ACTIONS TAKEN BY SUPERVISOR

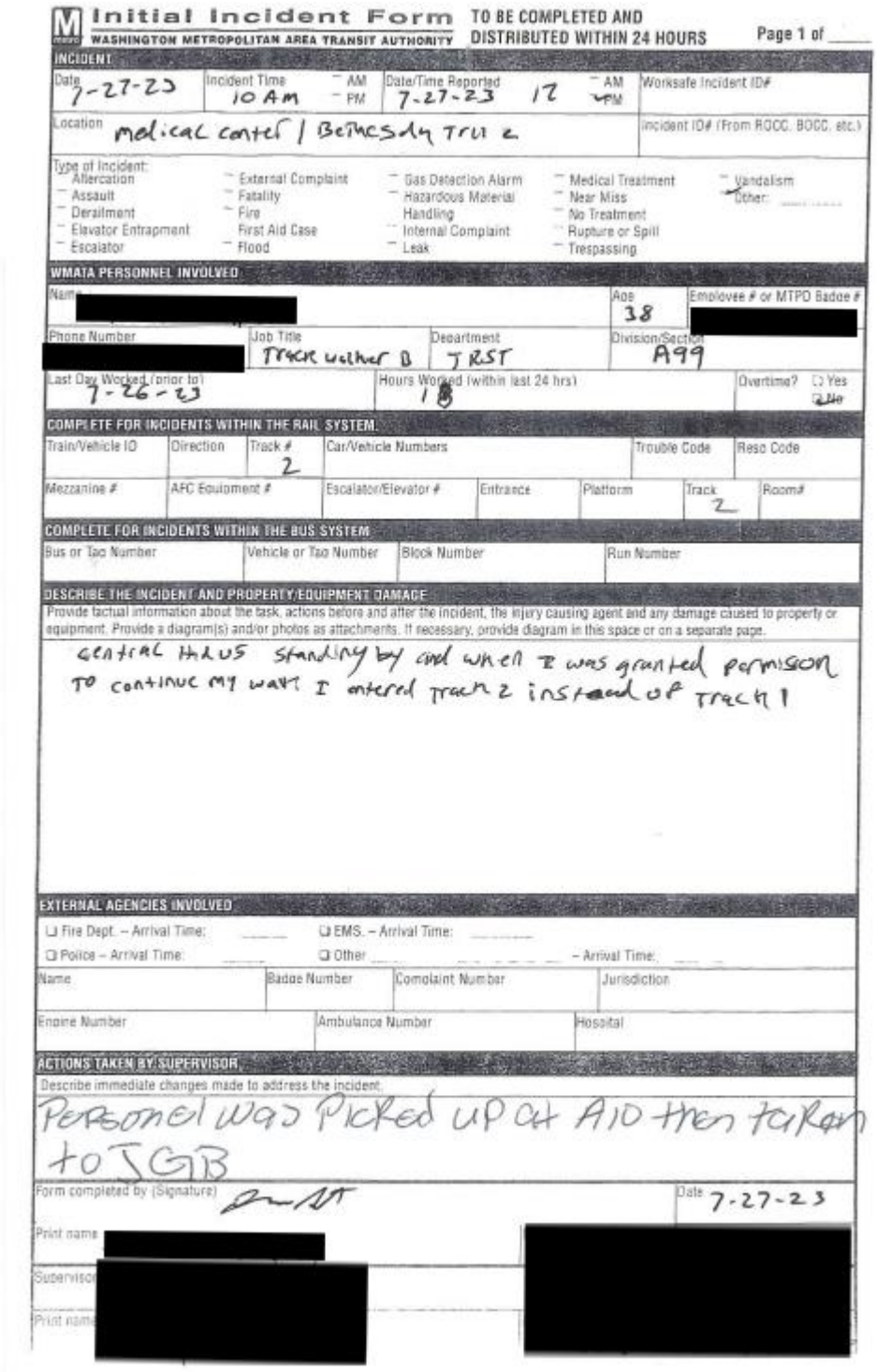
Describe immediate changes made to address the incident.

Personnel was picked up at A10, then taken to SG[redacted]

[redacted] Date 7/27/2023 [redacted]

Date 7/27/23 [redacted]

Document 2 – TRST Track Inspector's Statement Page 1 of 1.



Initial Incident Form — WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY — TO BE COMPLETED AND DISTRIBUTED WITHIN 24 HOURS — Page 1 of ____

INCIDENT

Date	Incident Time	Date/Time Reported	Worksafe Incident ID#
7-27-23	10 AM ☐ AM ☐ PM	7-27-23 12 ☐ AM ☑ PM	

Location: medical center / Bethesda Trlr 2 — Incident ID# (From ROCC, BOCC, etc.):

Type of Incident: ☐ Altercation ☐ Assault ☐ Derailment ☐ Elevator Entrapment ☐ Escalator ☐ External Complaint ☐ Fatality ☐ Fire ☐ First Aid Case ☐ Flood ☐ Gas Detection Alarm ☐ Hazardous Material Handling ☐ Internal Complaint ☐ Leak ☐ Medical Treatment ☐ Near Miss ☐ No Treatment ☐ Rupture or Spill ☐ Trespassing ☑ Vandalism Other: ____

WMATA PERSONNEL INVOLVED

Name	Age	Employee # or MTPD Badge #
[redacted]	38	[redacted]

Phone Number	Job Title	Department	Division/Section
[redacted]	Track Worker B	TRST	A99

Last Day Worked (prior to)	Hours Worked (within last 24 hrs)	Overtime?
7-26-23	18	☐ Yes ☑ No

COMPLETE FOR INCIDENTS WITHIN THE RAIL SYSTEM:

Train/Vehicle ID	Direction	Track #	Car/Vehicle Numbers	Trouble Code	Resp Code
		2			

Mezzanine #	AFC Equipment #	Escalator/Elevator #	Entrance	Platform	Track	Room#
					2	

COMPLETE FOR INCIDENTS WITHIN THE BUS SYSTEM

Bus or Tac Number	Vehicle or Tac Number	Block Number	Run Number

DESCRIBE THE INCIDENT AND PROPERTY/EQUIPMENT DAMAGE

Provide factual information about the task, actions before and after the incident, the injury causing agent and any damage caused to property or equipment. Provide a diagram(s) and/or photos as attachments. If necessary, provide diagram in this space or on a separate page.

central HUB standing by and when I was granted permission to continue my walk I entered track 2 instead of track 1

EXTERNAL AGENCIES INVOLVED

☐ Fire Dept. – Arrival Time: ____ ☐ EMS. – Arrival Time: ____

☐ Police – Arrival Time: ____ ☐ Other ____ – Arrival Time: ____

Name	Badge Number	Complaint Number	Jurisdiction

Engine Number	Ambulance Number	Hospital

ACTIONS TAKEN BY SUPERVISOR

Describe immediate changes made to address the incident.

Personnel was picked up at A10 then taken to JGB

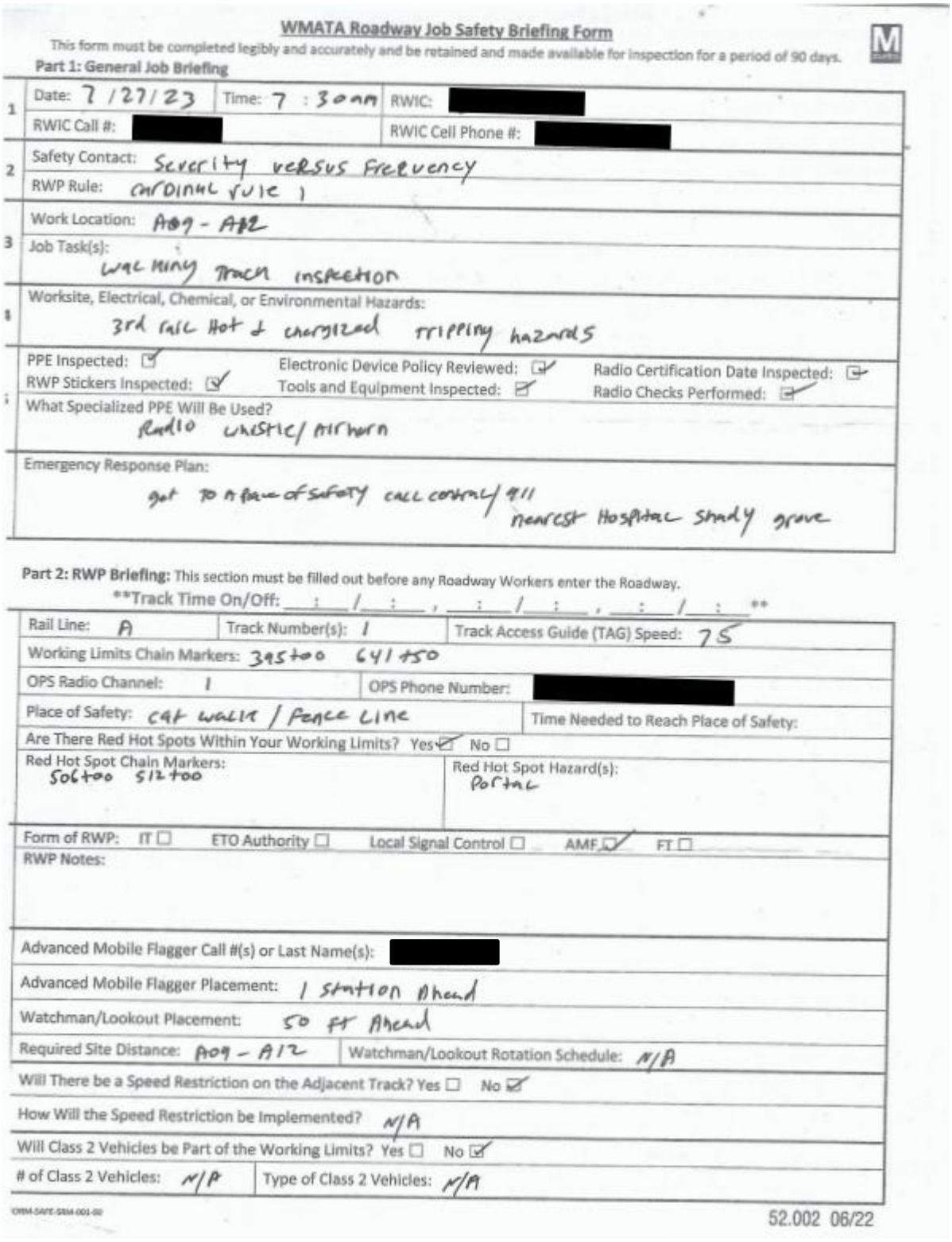
Form completed by (Signature): [redacted] Date: 7-27-23

Print name: [redacted]

Supervisor: [redacted]

Print name: [redacted]

Document 3 – TRST RWIC's Statement Page 1 of 1.



WMATA Roadway Job Safety Briefing Form

This form must be completed legibly and accurately and be retained and made available for inspection for a period of 90 days.

Part 1: General Job Briefing

1. Date: 7/27/23 Time: 7:30am RWIC: [redacted]
   RWIC Call #: [redacted] RWIC Cell Phone #: [redacted]
2. Safety Contact: Severity versus Frequency
   RWP Rule: Cardinal rule 1
3. Work Location: A09 - A12
   Job Task(s): walking track inspection
4. Worksite, Electrical, Chemical, or Environmental Hazards: 3rd rail Hot & charged tripping hazards
5. PPE Inspected: ☑ Electronic Device Policy Reviewed: ☑ Radio Certification Date Inspected: ☑
   RWP Stickers Inspected: ☑ Tools and Equipment Inspected: ☑ Radio Checks Performed: ☑
   What Specialized PPE Will Be Used? Radio whistle/ airhorn
   Emergency Response Plan: get to a place of safety call control/ 911 nearest Hospital Shady grove

Part 2: RWP Briefing: This section must be filled out before any Roadway Workers enter the Roadway.

**Track Time On/Off: __:__ /__:__ , __:__ /__:__ , __:__ /__:__ **

Rail Line: A | Track Number(s): 1 | Track Access Guide (TAG) Speed: 75

Working Limits Chain Markers: 395+00 641+50

OPS Radio Channel: 1 | OPS Phone Number: [redacted]

Place of Safety: CAT walk / Fence Line | Time Needed to Reach Place of Safety:

Are There Red Hot Spots Within Your Working Limits? Yes ☑ No ☐

Red Hot Spot Chain Markers: 506+00 512+00 | Red Hot Spot Hazard(s): Portal

Form of RWP: IT ☐ ETO Authority ☐ Local Signal Control ☐ AMF ☑ FT ☐

RWP Notes:

Advanced Mobile Flagger Call #(s) or Last Name(s): [redacted]

Advanced Mobile Flagger Placement: 1 station Ahead

Watchman/Lookout Placement: 50 ft Ahead

Required Site Distance: A09 - A12 | Watchman/Lookout Rotation Schedule: N/A

Will There be a Speed Restriction on the Adjacent Track? Yes ☐ No ☑

How Will the Speed Restriction be Implemented? N/A

Will Class 2 Vehicles be Part of the Working Limits? Yes ☐ No ☑

# of Class 2 Vehicles: N/A | Type of Class 2 Vehicles: N/A

OHM-SAFE-SRM-001-00 52.002 06/22

Document 4 – TRST Job Safety Briefing Page 1 of 2.

WMATA Roadway Job Safety Briefing Form

This form must be completed legibly and accurately and be retained and made available for inspection for a period of 90 days.

Part 2: RWP Briefing, continued:

12	Power Outage: Red Tag ☐ Supervisory ☐ N/A		Hot Sticking Chain Markers: N/A	
	Red/Supervisory Tag #: N/A			
	Red/Supervisory Tag Holder: N/A			
	Insulated Mat(s) Color Blue ☐ Red ☐ Green ☐ Orange ☐ Yellow ☐			
	WSAD Certification Due	WSAD Serial #/Asset ID	WSAD Certification Due	WSAD Serial #/Asset ID
	N/A / /	N/A	/ /	
	/ /		/ /	
13	Will a Piggyback Crew(s) be Working Within Your Working Limits? Yes ☐ No ☑			
	Crew Leader/EIC Call #(s): N/A		Piggyback Work Area Chain Markers: N/A	
	Piggyback Work Assignment(s): N/A			

Part 3: Good Faith Challenge: The following must be read aloud by the RWIC to the Roadway Workers.

"WMATA guarantees each Roadway Worker the right to challenge, in good faith, the effectiveness of the Roadway Worker Protection being provided. The Roadway Worker making the challenge, and those that are sympathetic to the challenge, shall remain clear of the roadway until the challenge has been resolved."

RWP Issues:	Worker Name(s):
NO ISSUES	N/A
	Was the GFC Issue Resolved? Yes ☐ No ☐

Part 4: Roadway Worker Acknowledgement

"I understand and agree with all aspects of the Roadway Job Safety Briefing I just received. I am adequately protected from any train movement or roadway hazards. I understand I have a responsibility to conduct myself in a safe manner at all times."

ROADWAY WORKERS HAVE THE RIGHT AND RESPONSIBILITY TO INITIATE A GOOD FAITH CHALLENGE WHEN NECESSARY

Roadway Worker Signature	Employee ID #	Roadway Worker Signature	Employee ID #	Crew Leader/EIC Signature	Crew Leader/EIC Employee ID #
[redacted]		[redacted]			

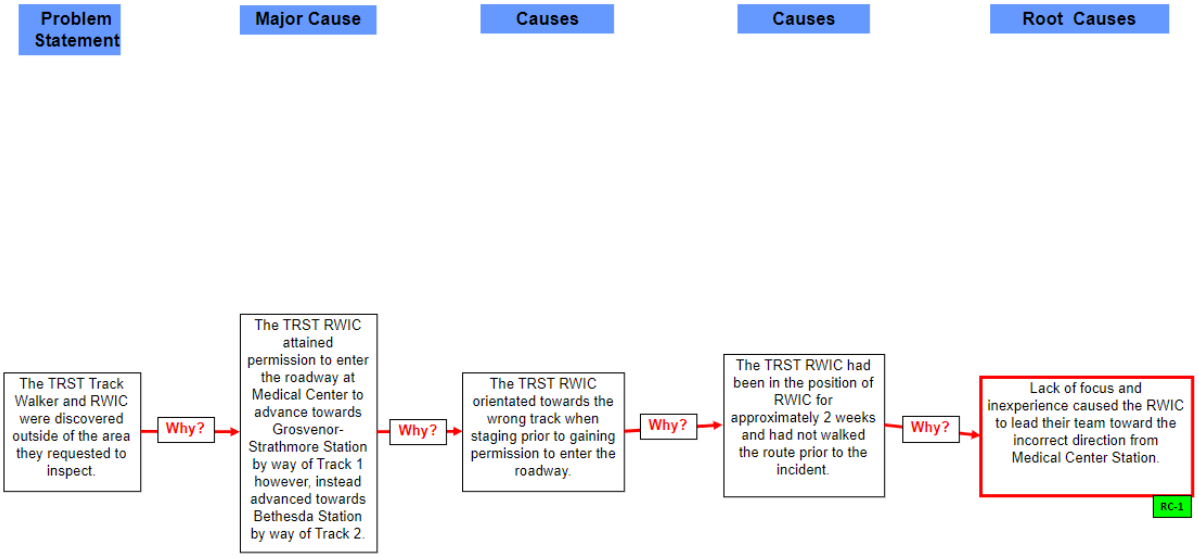
Part 5: RWIC Signature(s)

Additional RWIC Comments:		
RWIC Signature: [redacted]	RWIC Employee ID #: [redacted]	Date: 7/27/23
Relieving RWIC Name: N/A	Relieving RWIC Employee ID #: N/A	
Relieving RWIC Signature: N/A	Date/Time: N/A / / :	
Relieving RWIC Call #: N/A	Relieving RWIC Cell Phone #: N/A	

FORM-SAFE-SRM-001-00

Document 5 – TRST Job Safety Briefing Page 2 of 2.

Appendix D – Why-Tree Analysis



Root Cause Analysis