National Transportation Safety Board

Railroad Accident Brief

Metropolitan Atlanta Rapid Transit Authority Train 401 Strikes On-Track Equipment

Sandy Springs, Georgia

June 3, 2018

The Accident

On June 3, 2018, about 8:46 p.m. eastern daylight time, Metropolitan Atlanta Rapid Transit Authority (MARTA) northbound train 401 struck on-track equipment (OTE) about 120 yards north of the Medical Center Station, near Sandy Springs, Georgia.[1] The train had departed the MARTA Medical Center Station just prior to the accident. The Cleveland Electric Company, a MARTA contractor, owned and operated the OTE. A contract employee, who was the operator of the OTE, died from injuries sustained during the collision. Neither the passengers nor the train operator reported any injuries. The train speed at the time of collision was 22 mph.

MARTA estimated the damages to the lead railcar at $16,814.26. The OTE was damaged beyond repair; its replacement cost $33,500. At the time of the accident, the temperature was 82°F, the sky was cloudless, and the visibility was 10 miles. Figure 1 shows the damaged railcar.

Figure 1. Postaccident photograph of front end of damaged MARTA railcar. (Photograph courtesy of MARTA.)

[1] (a) All times in this report are eastern daylight time (EDT) unless otherwise noted. (b) *On-track-equipment* is a maintenance vehicle using MARTA's rail system including but not limited to: tampers, ballast regulators, rail grinders, and hi-rail vehicles (including contractor vehicles). (c) The OTE was a 1998 GMC C6500 heavy-duty truck that was equipped with an apparatus to allow on-track movement.

MARTA was installing a high-speed cellular wireless network in the tunnels and stations throughout its system. MARTA had experienced delays to the project but hoped to have it installed before the Super Bowl game in February 2019. Generally, MARTA and its contractor worked on the project during nonrevenue hours and on weekends to limit the impact to customer service. At the time of this accident, the project work was in the tunnel south of the Medical Center Station. There were two main tracks at the accident site: one designated as northbound or the FR track, and the other designated as southbound or the FL track.

MARTA arranged a track restriction between the Medical Center and Northland Drive on the FR track for on-track protection for the employees working in the tunnel south of the Medical Center Station.[2] All trains were single-tracking on the FL track between the Medical Center and Northland Drive interlockings. The work group included MARTA flagpersons and contract employees.[3] One MARTA flagperson was designated as the primary flagperson and another MARTA flagperson was designated as the secondary flagperson.

The primary flagperson was in charge of the work group and responsible for the safe movement of the OTE. Although employees and contract employees normally worked two 12-hour shifts on the weekends; on the day of the accident, there was an insufficient number of employees available to work a second shift. The Rail Services Control Center (RSCC) instructed the primary flagperson to remove the OTE from the tracks because no relief flagpersons were available. At 8:01 p.m., after the OTE had been moved from the tunnel to the Medical Center Station, the primary flagperson telephoned the RSCC and stated that he would need an absolute block in about 30 minutes to remove the OTE from the tracks by moving it to the hi-rail access that was north of the Medical Center Station.[4]

The OTE was moved to the north end of the track restriction, which was at the Medical Center interlocking that was north of the Medical Center Station. About 8:30 p.m., the primary flagperson made the formal request over the radio to the RSCC for the absolute block to remove the OTE at the Medical Center hi-rail access.[5] This was in addition to the informal request made over the telephone 30 minutes earlier. The RSCC instructed the primary flagperson to, "stand by." However, at 8:38:11 p.m., the primary flagperson removed the portable trip stop and flags at the northern end of the restriction prior to receiving the absolute block and flagged the operator to move the OTE forward.[6] At 8:38:33 p.m., the operator moved the OTE outside of the restriction limits to the hi-rail access. The primary flagperson did not engage the hi-rail shunt box, in

[2] A *track restriction* is a condition which limits the normal operation of trains through a defined section of trackway. Each restriction defines the specific trackway limits.

[3] A *flagperson* is an individual trained and certified to control the movement of trains by the display of hand signals, flags, or lights. A flagperson is responsible for the safety of the work crew to which he or she is assigned.

[4] (a) Times in this section were provided by MARTA as derived from the railcar video. (b) An *absolute block* is a block in which no train is permitted to enter while occupied by OTE or another train. MARTA's process for establishing an absolute block are covered in Section 2.5.32 in its *Wayside Access Procedure*.

[5] This time is from the primary flagperson's written statement following the accident.

[6] A portable *trip stop* is a mechanical device installed by a flagperson which initiates an application of the emergency brake system when a train moves over it.

accordance with MARTA requirements.[7] Once at the hi-rail access, the OTE operator and the apprentice electrician began preparing the OTE for highway use by disengaging its track wheels.

The apprentice electrician completed his work on the rear of the OTE and moved clear of the tracks. The primary flagperson was also clear of the tracks. The OTE operator was still working in front of the OTE and fouling the track.

During a postaccident interview, the primary flagperson said that he was still waiting for an absolute block from the RSCC and that he did not have authority to move the OTE outside of the restriction onto the hi-rail access at the time of the accident. RSCC controllers confirmed this in their interviews.

At the time of the collision, the OTE operator was standing between the gage of the rail in front of the OTE (north end). The striking train struck the rear of the OTE, which struck the OTE operator. The OTE was shoved about 108 feet in the collision. Figure 2 is a diagram of the accident scene.

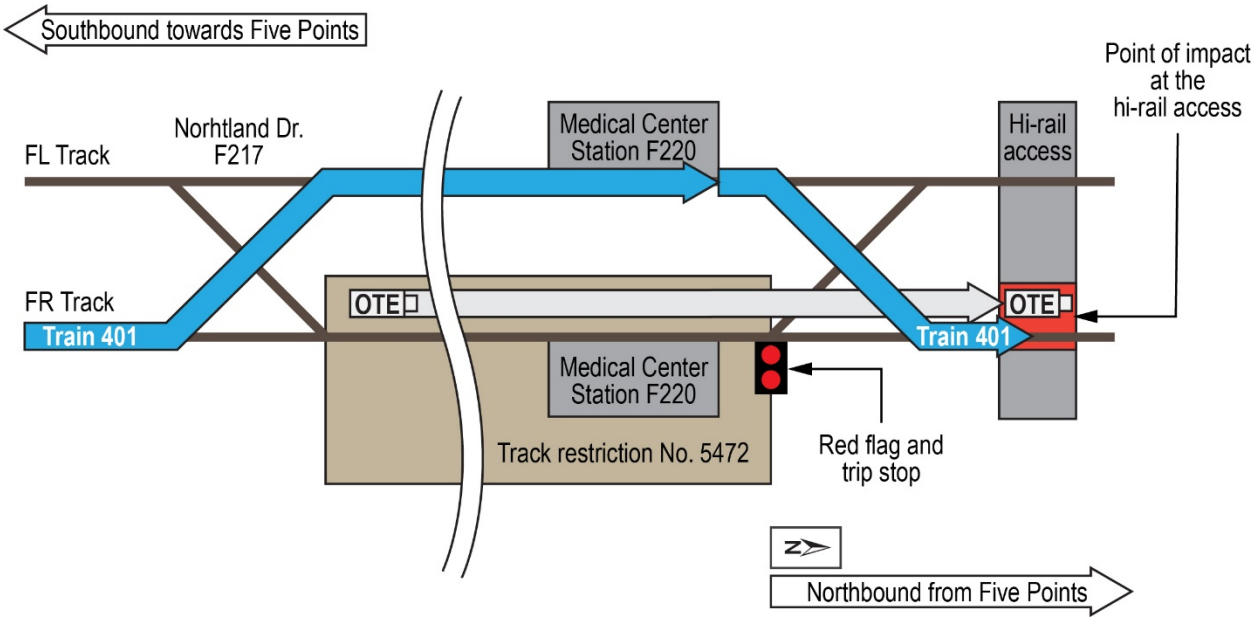

Figure 2. Accident site.

[7] (a) A signal *shunt box* is a fixed safety device located at hi-rail accesses designed to show track occupancy by redirecting the current in the signal system. (b) MARTA rules require workers to apply shunting devices at each end of a track restriction as a redundant means of on-track protection.

Investigative Factors

Method of Operation

The train operations on MARTA were governed by automatic train control (ATC) that automatically controls train movement, enforces train safety, and directs train operations. The ATC includes subsystems for automatic train operation, train protection, and line supervision. A third rail supplies 750 volts of direct current for propulsion. A collector shoe transfers the electrical power from the third rail to the railcar. These trains can operate at speeds up to 70 mph.

Fixed signals and signs conveying block and route information from the RSCC were on the wayside, usually on the right-hand side of the governed track. MARTA rules prohibit any OTE from passing a red signal without direct, specific authorization from the primary flagperson and any flagperson must have permission from the RSCC.

Track Restriction 5472

MARTA track restriction 5472 (restriction), effective between 10:30 p.m., on June 2, 2018, and 9:30 p.m., on June 3, 2018, encompassed the FR track between the interlockings at Northland Drive F217 and Medical Center F225.[8] During the restriction, all trains ran on the southbound track between these two points, with northbound trains running in the reverse direction.[9] The restriction provided on-track protection for the flagpersons, the contract OTE operator, and the contractor employees installing the Wi-Fi components in the tunnel between Northland Drive and the Medical Center interlockings. The restriction did not include the hi-rail access located north of the Medical Center Station or the interlockings at Northland Drive and Medical Center.

MARTA Train 401

MARTA Train 401, which consisted of six railcar vehicles configured in three married pairs, entered the Medical Center Station at 8:44:06 p.m. and stopped at 8:44:28 p.m. The rail operator (train operator), who was the only crewmember, was positioned on the left side of the cab; he opened a window and watched the passengers board and deboard the train. Once all passengers were clear, he closed the doors and moved the train northward out of the station at 8:44:47 p.m. while he was still facing the platform (backward) and was on the left-hand side of the cab. As the train began moving through the Medical Center interlocking, the train operator moved back to the right side of the cab, took his seat, and looked through the windshield. He told investigators during an interview that he saw the OTE but there was not enough time to stop the train. He said that he put the master controller selector switch in stop and applied the emergency

[8] (a) Track Restriction 5472 was "track out of service restriction," as outlined in the MARTA *Wayside Access Procedure*, Section 2.5.1, meaning that the restriction required de-energizing the contact [third] rail; (b) MARTA track designations show the route segment and the direction of traffic from the hub at Five Points. For example, F indicates the Highway 400 segment (or north segment) and R means the right track when facing away from Five Points. FL indicates the left track when facing away from Five Points on the Highway 400 segment; (c) Signs noting the track chart designation of stations and interlockings are along the wayside. For example, the Medical Center Station platform is at F220 and the interlocking north of the Medical Center Station is at F225.

[9] *Reverse running* is movement in the opposite direction of normal train traffic.

brakes, but the train could not stop before hitting the OTE.[10] About 8:45:00 p.m., the train, which was traveling about 22 mph, struck the rear of the OTE. At 8:45:07 p.m., the train stopped.

Flagpersons

Four MARTA flagpersons provided flagging protection and piloting to the contractor employees while wayside. One flagperson served as the primary flagperson and the liaison between the RSCC and the contractor employees, directing the movement of the OTE. At the time of the accident, two flagpersons were on each end of the restriction. MARTA procedures required that the RSCC establish an absolute block at Medical Center and Dunwoody and grant permission for movement through the Medical Center interlocking before moving the OTE outside of the restriction. The primary flagperson removed the flags, trip stops, and other safety devices from the north end of the restriction and had the contract OTE operator move the OTE outside of the restriction, through the Medical Center interlocking, to the hi-rail access without the absolute block or authority to pass the red signal and move through the interlocking.

OTE Operator

The contract OTE operator had completed the required MARTA training and held a current level 1 certification to operate the OTE on the tracks, which allowed him access to the wayside under the direction of a flagperson. The OTE operator was always subject to the primary flagperson's instruction.

MARTA Rules and Procedures

MARTA had multiple rules and procedures that dealt with the on-track protection of its employees and contractors.[11] In the events leading up to this accident, the MARTA primary flagperson violated several of these rules.

The action of the MARTA primary flagperson violated three separate rules in the MARTA *Wayside Access Procedure*.[12] These rules say that flagpersons should remain alert for trains while personnel are on the wayside and notify the RSCC any time the team is entering or exiting the wayside, that all OTE movements under a work restriction should be subject to absolute blocking, and that absolute blocking should be used for removing and clearing OTE.

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[10] The *master controller switch selector* is a device on the operator's console in a controlling cab used to select a train's operating status.

[11] For more information on these MARTA rules and procedures, please see the following documents in NTSB Docket RRD18LR008: MARTA *Rail Transportation Operating Rules*, effective December 21, 2008; MARTA *Wayside Access Procedure*, Standard Operating Procedure SOP 10.3.51, effective February 20, 2013; *Temporary Change to SIMPLE CLEARANCE Wayside Access*, Notice N14-01, effective January 2, 2014; MARTA *Basic – On Track Equipment Operations Contractors Edition*, effective January 2014; MARTA *Wayside Safety – Single Tracking During Construction Activities*, General Order #01-13, effective May 22, 2013; MARTA *On-Track Equipment Operating Rules and Procedures*, SOP OP.4.3.04, effective December 10, 2013; MARTA Department of Rail Operations General Order 16-03, MARTA *Location Verification Procedure for OTE Placement*, General Order No. 16.03, July 14, 2016; and the MARTA *Distraction Avoidance Policy*, Policy 10.1.69, effective December 29, 2016.

[12] MARTA *Wayside Access Procedure*, Standard Operating Procedure SOP 10.3.51, effective February 20, 2013, Rules 2.1.5, 2.5.32.1, and 2.5.40.

The primary flagperson also violated MARTA *On-Track Equipment Operating Rules and Procedures* when he did not obtain proper authorization from the RSCC before directing the OTE operator to move outside of the established track restriction; failed to secure authority before fouling track outside of the track restriction; and directed movement of the OTE past the red signal at the north end of the track restriction.[13] In addition, by not engaging the hi-rail access shunt box at the hi-rail access at the Medical Center Station, the primary flagperson violated the MARTA *Location Verification Procedure for OTE Placement*.[14]

Furthermore, the rail operator violated MARTA rules by not making a visual check of the immediate track area before commencing movement and not maintaining a constant visual check of trackway conditions.[15]

Toxicology

The rail operator and flagpersons tested negative for alcohol and other drugs. The Fulton County Medical Examiner found no evidence of alcohol or other drugs in the remains of the OTE operator.

MARTA Postaccident Actions

Following the accident, MARTA suspended all wayside work that required having tracks out of service, including single track operations, taking tracks out of service, or using OTEs. Within a week of the accident, MARTA began conducting a series of mandatory wayside-related safety briefings and holding system-wide mandatory refresher sessions on standard operating procedures (SOP) for all personnel—employees and contractors—that might require access to the wayside. MARTA did not resume performing maintenance work that required having tracks out of service until the applicable personnel completed the refresher training on SOPs and participated in the mandatory wayside-related safety briefings.[16] Within 2 months of the accident, MARTA issued a general order to reduce unnecessary operating risks by preventing unauthorized OTE movements onto or from mainline revenue tracks at high rail access points during absolute block requests.[17]

[13] MARTA *On-Track Equipment Operating Rules and Procedures,* SOP OP.4.3.04, effective December 10, 2013, Section I. C., "Responsibilities," Item B; Section II. A., "Requirements for On-track Equipment Operation," Item 6; Section II. H., "Fixed Signals and Signs Requirements," Item 6; and Section II. K., "Non-MARTA On-track Equipment Guidelines," Items 2 and 4.

[14] MARTA *Location Verification Procedure for OTE Placement,* General Order 16.03, July 14, 2016.

[15] MARTA *Rail Transportation Operating Rules*, effective December 21, 2008, rules 3.1.5 and 3.7.4.

[16] MARTA put provisions into place which allowed personnel who had not completed the mandatory training and briefing to request a track out-of-service restriction under extreme emergency circumstances such as a broken rail. However, that required receiving joint concurrence from the RSCC, the assistant general manager of safety and quality assurance, and the assistant general manager of rail operations.

[17] MARTA Department of Rail Operations, the Department of Safety and Quality Assurance, Office of Rail Transportation, Office of Maintenance of Way, Office of the Integrated Operations Center, and the Office of System Safety, *High Rail Access Shunt Boxes*, General Order 18-04, July 31, 2018.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this collision was the primary flagperson moving the on-track equipment outside of the restriction area without authority and on-track protection. Contributing to the accident was the rail operator's failure to make a visual check of the immediate track area ahead of the train before commencing movement from the Medical Center Station and a failure to maintain a constant visual check of track conditions as far ahead as possible.

For more details about this accident, visit https://www.ntsb.gov/investigations/SitePages/dms.aspx and search for NTSB accident identification number RRD18LR008.

Report Date: August 6, 2019

The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a pipeline accident in which there is a fatality or substantial property damage, or significant injury to the environment. (49 U.S. Code, Section 1131 - *General authority*)

The NTSB does not assign fault or blame for an accident or incident: rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties…and are not conducted for the purpose of determining the rights or liabilities of any person." Title 49 *Code of Federal Regulations*, Section 831.4. Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 U.S. Code, Section 1154(b).
