



National Transportation Safety Board

Railroad Accident Brief

New York City Transit Train Strikes Two Flagmen

Brooklyn, New York

November 3, 2016

The Accident

On November 3, 2016, at 12:05 a.m. eastern daylight time, New York City Transit (NYCT) subway train 2328G, operating underground in a tunnel between the Fort Hamilton Parkway and Church Avenue stations, struck two NYCT employees on the F Line in Brooklyn, New York.¹ The employees were setting up flagging protection for a contractor who needed to cross the track to access an instrument control room in the tunnel. One employee was killed, and one was seriously injured. After the accident, 23 passengers were evacuated while the crew remained with the train. The transit equipment and the track structure did not sustain any damage.

Background

A contractor supporting a communications-based train control (CBTC) project needed access to an instrument control room between the Fort Hamilton Parkway and the Church Avenue stations where the F Line and the G Line trains operate.² In this section of the tunnel, NYCT has two main tracks: track B1 southbound and track B2 northbound. Train movements are directed through line dispatch offices and operations are governed by signal indications from an automatic train control system. The contractor planned to enter the tunnel by emergency exit 336 and to cross over track B1 to access the instrument control room. (See figure 1.) Four NYCT employees were assigned as flaggers to establish full flagging protection on track B1 for the contractor. Two flaggers were responsible for placing a double set of two yellow lights; two flaggers were responsible for placing the red light, green light, and the portable stop.

¹ The New York City Transit is a subsidiary of Metropolitan Transportation Authority.

² *Communications-based train control* (CBTC) is a railway signaling system that makes use of the telecommunications between the train and track equipment for the traffic management and infrastructure control. By means of the CBTC systems, the exact position of a train is known more accurately than with the traditional signaling systems.

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Division IND
Line 6AV
Track B1
Location 571+39
Date 11/05/2016
File 7345
Time 17:09:34
Speed 14.9 mph
DataBreak 1476



Figure 1. View of the instrument control room, bench wall and emergency exit on track B1 northbound at Church Avenue.

The four flaggers entered the track at Church Avenue Station. Two of the four flaggers carried yellow flagging lights; they departed the station first and walked toward Fort Hamilton Parkway Station (FHPS) on track B1 (facing oncoming trains) as NYCT's Flagging Rules require.³ The lead flagger and his partner carried the red light, green light and portable stop. They arrived at survey marker 573 (the planned flagging position), and they stayed in the clear.

The two yellow placement flaggers walked further toward FHPS to place the two sets of lights. One of the two yellow placement flaggers was assigned to watch for and warn of approaching trains while the other placed the lights. One set of lights was placed at survey marker 578. In accordance with NYCT Flagging Rule 3.80(a), the flagger would have placed an additional two lights at survey marker 581. Figure 2 shows the planned placements of flagging protection and the location of the struck employees at the time of the accident. (See figure 2.) Prior to placing the additional lights, the flaggers were struck and pinned between G Line train car 5184 and the bench wall. The maximum authorized train speed at this location was 35 mph.

³ (a) The Metropolitan Transit Authority oversees Capital Program Management (CPM). CPM manages the contractors; (b) The NYCT Flagging Rules is a 32-page document that was revised September 16, 2015. The document appears in docket DCA17FR001.

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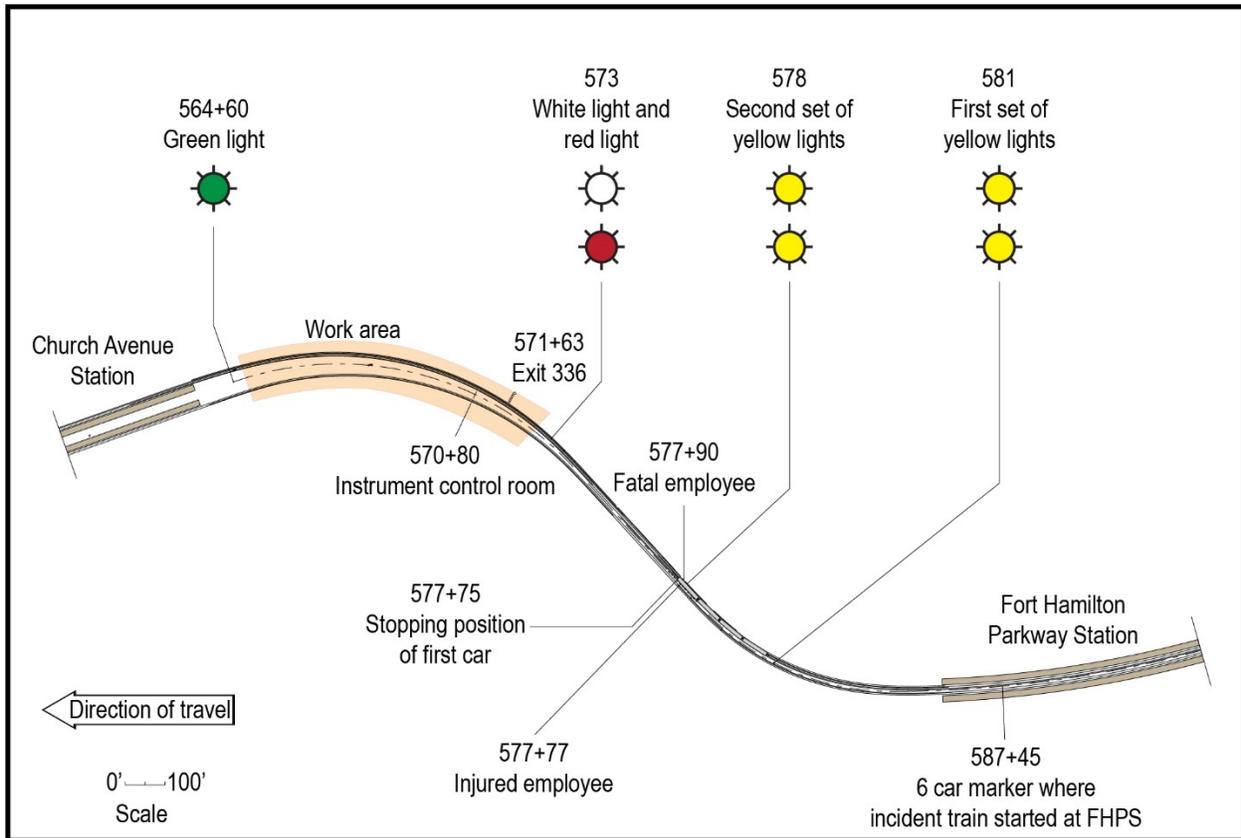


Figure 2. Planned flagging protection and the location of the struck employees.

The Investigation

The train operator, the Church Avenue dispatcher, and the Church Avenue tower operator could not recall having conversations about the flaggers on the evening of the accident. The lead flagger reported to work at 9:30 p.m. at Chamber Street Station. He called the Rail Control Center (RCC) and provided the track number and general order number to obtain permission to enter the roadway. The RCC gave him a reference number and permission to enter the roadway.

NYCT Flagging Rule 3.72(b) states:

before employees go to work under flagging or General Order protection at a given location, authorization must be obtained from the Rail Control Center before entering the work location. Between 2200 hours and 0500 hours Monday through Friday, and all weekend between 2200 hours Friday and 0500 hours Monday, the Rail Control Center will make periodic announcements (every 30 minutes) to inform all trains in the affected area of the presence of employees on the right of way and reminding Train Operators to operate with **RESTRICTED SPEED AND EXTREME CAUTION** and sound the horn if caution lights or employees are observed.

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The Church Avenue tower operator reported for work at 5:00 p.m. The tower operator who was going off duty briefed the on-coming tower operator about what was occurring in the tower and the interlocking; and if there were any late trains.⁴ The tower operator is responsible for the switches and signals within the interlocking under their control. The train dispatcher and the assistant train dispatcher instruct the tower operator to re-route trains when the need arises.

The Church Avenue dispatcher reported for work at the Church Avenue tower at 11:01 p.m. The Church Avenue dispatcher who was going off duty informed the on-coming dispatcher about conditions of service: what train crews may be doing, which trains were late, which trains were to become lay-up trains, and which were staged for future service.⁵ However, the dispatcher did not discuss the flagging operations on track B1. According to the lead flagger, the flagging crew received permission to be on the roadway from the previous dispatcher.

The train operator of the striking train called the Church Avenue tower and informed them that the train arrived at FHPS and the last stop would be Church Avenue Station. At the last stop, the train would become a lay-up train. The Church Avenue tower acknowledged the communication, and the train operator left the station. As the train proceeded out of the station into a right-hand curve, the train operator estimated a forward sight distance of about 65 to 75 feet. The train operator saw the two flaggers on the roadway. The train operator placed the train into emergency braking and sounded the horn. The train operator was unable to stop the train before striking the two flaggers.⁶ After the train struck the two flaggers, the train operator called the RCC to report the incident.

Safety Issues

Flagging Operations

The flag protection was to ensure the safe crossing of a contractor to work on an on-going CBTC project. Where the accident occurred, the approaching train came around a curve, thus reducing the reaction time for the flagger to recognize its presence and to warn the other flagger. The flaggers did not inform the tower operator that they would be on the track. Although NYCT Flagging Rule 3.72(b) requires flaggers to contact the RCC, this rule does not require them to contact the tower operator because the RCC should do so.

The RCC did not make periodic announcements every 30 minutes to inform trains in the affected area of the presence of flaggers on the tracks, as required by NYCT Flagging Rule 3.72(b). The RCC also did not instruct train operators to use restricted speed and extreme caution in the area where the flaggers were on the tracks, as required. The importance of RCC communicating with the tower operator and dispatcher is so that either one can make periodic announcements to the trains about the presence of employees on the track. It is critical to on-track safety that train

⁴An *interlocking* refers to signal appliances that are interconnected so that each of their movements follows the other in a proper sequence. Interlockings may be operated manually or automatically.

⁵ A “*lay-up train*” is a train being removed from customer service and returned to a storage facility, either due to a reduction in service or a defect on the train.

⁶ The exact speed of the train is unknown. Due to the proximity of stations on the majority of the system, the typical running speed would have been about 30 miles per hour. During sight distance observations, NTSB investigators were unable to achieve more than 30 mph at the accident location.

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operators are informed of the presence of employees on or about the track. Then train operators know to be on the lookout for employees and to reduce train speed in the appropriate locations.

If the RCC or flaggers for contractors do not inform the tower operator where they intend to work, those provisions of the flagging rule are not engaged. The NTSB believes that in this accident, the striking train was moving at maximum authorized speed because the train operator was not aware of the flaggers. The NTSB recommends that the NYCT revise its flagging rules to prohibit the movement of trains at greater than restricted speed while flagging protection is being established and require the RCC to communicate a flagger's location to train dispatchers, tower operators, and train operators.

Risk Assessment

A comprehensive risk assessment should be the first step when planning for safety. The NYCT's Flagging Rules include a broad spectrum of activities to address the many variations and different track configurations within the NYCT system. The NYCT Flagging Rule, 3.72 (i) allows employees to cross a track after a train passes their location because the programmed headway between train operations indicates that there will be a period of safety, as detailed based on the day of the week and time of day. This may have been a safer alternative approach to the flagging protection.

In this accident, NYCT employees established flagging protection to protect the contractor from a train strike while crossing the track to enter and exit the instrument control room. As an alternative approach with less risk, NYCT employees could have used the programmed headway between trains to escort the contractor onto the property via the exit nearest the control room without having to establish flagging protection. NYCT employees and the contractor could have walked on the bench wall out of harm's way, waited on the passage of a train, descended safely to the track, and crossed the track. The egress could have been accomplished safely in reverse manner. This would have reduced the time employees were on the track to seconds versus minutes and limited the number of employees required to accomplish the task. The risk to employees using this method of access to the control room would have been significantly reduced compared to setting flags in compliance with NYCT's existing rules and procedures.

Postaccident Actions

The NYCT has had an active Track Safety Task Force (TSTF) on its property for decades. This task force reviews accidents and employee fatalities, and it provides recommendations. The NYCT notified the NTSB that it had implemented a pilot project to find a better method of providing flag protection. According to the NYCT, the TSTF was tasked to identify and implement protection for flaggers when they are setting up or removing the first caution lights that train operators encounter in a flagging sequence.

The TSTF developed several alternative protective measures that could be implemented by flaggers when setting up or removing the caution lights. A pilot project was initiated on June 8, 2017, on the 4th Avenue Line between 95th Street Station and the Atlantic Avenue Station. The pilot project instructed employees who would perform flagging duties to select from the following three options for their on-track protection from trains:

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1. employees could opt to withhold train movements where flagging would be set up (hold-back service)
2. opt to place an employee at the nearest station platform in the direction of travel to warn the train operators of the presence of workers ahead (place an additional flagger at the preceding station platform)
3. “taxi” (flaggers riding a train into the work locations) the flaggers into the first yellow-light location and to the green- and red-light locations before setting the remaining lights in accordance with the flagging rules.

The NYCT modified the flagging rules in place at the time of the accident because of the pilot project input; however, these flagging rules have not been applied systemwide. The NTSB believes these pilot project flagging rules may reduce the risk of operations if applied throughout NYCT. The NTSB recommends the NYCT conduct a comprehensive risk assessment of its current flagging rules, and the alternatives found in the pilot flagging program, to identify and implement systemwide revisions to the flagging rule that will reduce risks. In addition to this pilot project, the NYCT issued several safety bulletins pertaining to the flagging and the procedures for establishing protection on or about the track. NYCT’s summary of those actions can be found in the docket.⁷

Additionally, on the NYCT, close calls are reported to the RCC. Currently, no system is in place for confidential reporting. The NYCT Office of System Safety investigates reported incidents that are critical to roadway worker protection, such as improper flagging; trains not operating properly through a work area, either at excessive speed or not blowing their horn; and portable trip stop overruns. The NYCT Office of System Safety provides a quarterly trend analysis report for the president of NYCT. The NTSB believes a confidential reporting system is vital for the accurate reporting of hazards and near misses. The NTSB recommends the NYCT modify the current close call reporting system to include the anonymous and confidential reporting of hazards and near misses.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Rail Control Center to communicate to the train dispatcher and tower operator that flaggers were on the track. Also contributing to the accident is New York City Transit’s absence of a risk assessment when planning its flagging operations and permitting train movements into unprotected work zones.

⁷ The information is in docket DCA17FR001.

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Recommendations

As a result of the investigation, the National Transportation Safety Board makes the following safety recommendations:

To the Metropolitan Transportation Authority for New York City Transit:

1. Revise your flagging procedures to prohibit the movement of trains at greater than restricted speed while flagging protection is being established and require the Rail Control Center to communicate a flagger's location to train dispatchers, tower operators, and train operators. (R-19-033)
2. Conduct a comprehensive risk assessment of its current flagging rules, and the alternatives found in the pilot flagging program, to identify and implement systemwide revisions to the flagging rule that will reduce risks. (R-19-034)
3. Modify your current close call reporting system to include the anonymous and confidential reporting of hazards and near misses. (R-19-035)

For more details about this accident, visit www.nts.gov/investigations/dms.html and search for NTSB accident ID DCA17FR001.

Adopted: June 24, 2019

The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train. (49 U.S. Code § 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." 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 *United States Code*, Section 1154(b).
