

National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials

Washington, DC 20594



RRD23FR003

SIGNAL AND TRAIN CONTROL

Specialist's Factual Report

Monday, March 21, 2024

Table of Contents

A. ACCIDENT.....	3
B. SIGNAL AND TRAIN CONTROL GROUP.....	3
C. SUMMARY	3
D. DETAILS OF THE INVESTIGATION	3
1.0 DESCRIPTION OF THE RAILROAD SIGNAL SYSTEM	3
2.0 POST ACCIDENT SIGNAL DATA LOGS	4
3.0 POST ACCIDENT FIELD EXAMINATION AND SCENE MEASUREMENTS	5
4.0 DESCRIPTION OF TRACTION POWER SYSTEM.....	6
E. DAMAGES.....	6

A. ACCIDENT

TYPE: TRANSIT WORKER FATALITY (STRUCK BY TRAIN)
DATE AND TIME: NOVEMBER 29, 2023 00:13EST
LOCATION: TRACK B2 34TH STREET & 6TH AVENUE STATION
CARRIER: NEW YORK CITY TRANSIT
TRAIN #1: NORTHBOUND NO. 2317-D
FATALITIES: 1

B. SIGNAL AND TRAIN CONTROL GROUP

Group Chair	Brett Johnson National Transportation Safety Board Washington, DC
Group Member	Sandy Castillo New York City Transit / Department of Subways Brooklyn, New York
Group Member	Sherard John New York Department of Transportation Long Island City, New York

C. SUMMARY

For a summary of the accident, refer to the *Accident Summary* in the docket for this investigation, RRD24FR003.

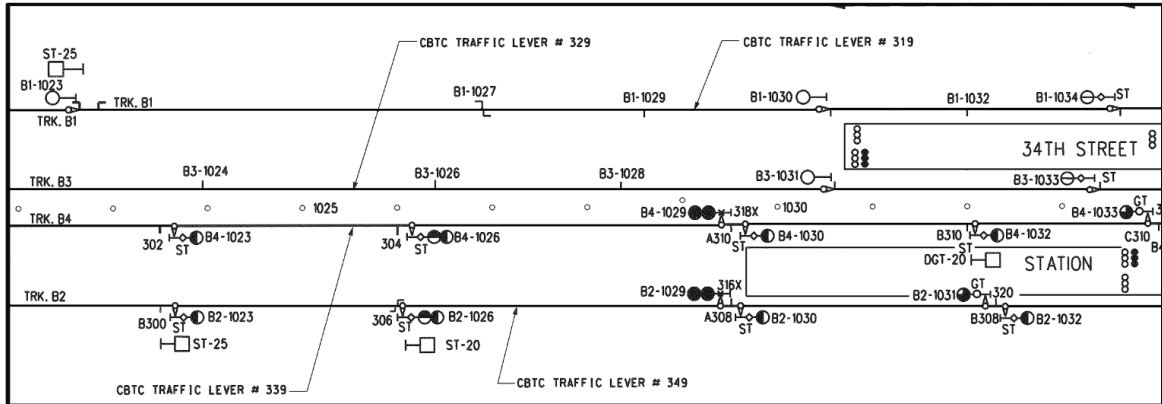
D. DETAILS OF THE INVESTIGATION

1.0 Description of the Railroad Signal System

The 6th Avenue IND (Independent) Line of the New York City Transit subway system is oriented in a north/south direction at the 34th Street & 6th Avenue station platform. It consists of 4 tracks with the 2 eastern most tracks being primarily used for northbound traffic and the 2 westernmost tracks primarily used for southbound traffic. Train movements are governed by signal indications and operating rules. Train control is achieved using two different modes of signaling: Automatic Signals in a single direction of traffic, and Interlocking Signals capable of traffic in both directions and are controlled by control towers. The train movements involved in this

case were within the limits of the 34th Street & 6th Avenue Interlocking controlled signal system.

Picture 1: Line drawing of track layout as approaching 34th street station (from MW7B-1022-SL 055.pdf)



2.0 Post Accident Signal Data Logs

On November 30, 2023, the investigative group conducted a review of the signal and train control download from the 34th Street & 6th Ave Interlocking Tower.

Table 1: 34th Street and 6th Avenue Interlocking Tower Signal Data Log Summary (from data log file 34th6ave_112823_evr1.pdf, which is included in the docket)

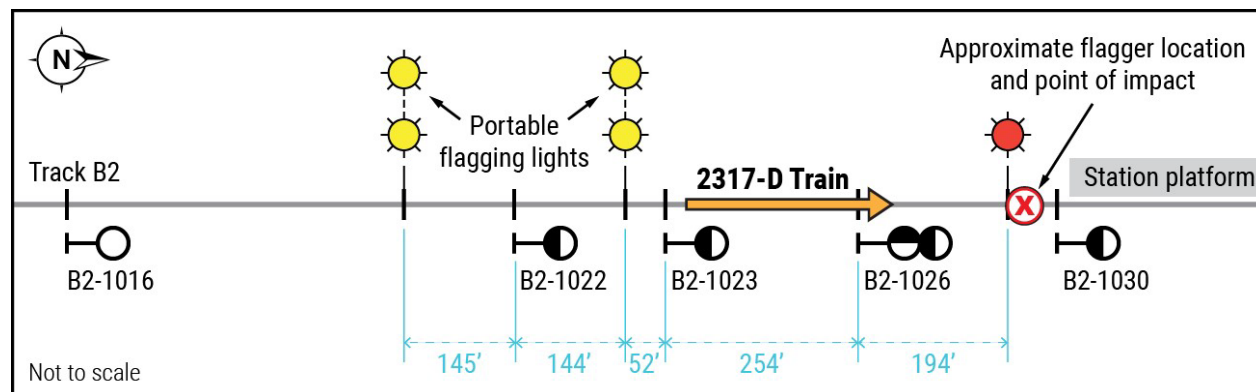
Time	Date	Ckt/Signal Nomenclature	State
23:53:12.33	11/28/2023	A308 H	OFF
23:53:19.61	11/28/2023	B2-1023 TP	ON
23:53:35.26	11/28/2023	B2-1026 TP	ON
23:54:38.23	11/28/2023	B2-1030 TP	ON
23:54:38.72	11/28/2023	A300 H	ON
23:54:38.73	11/28/2023	B300 H	ON
23:56:04.00	11/28/2023	306 H	ON
23:56:15.97	11/28/2023	A308 H	ON
0:11:37.58	11/29/2023	B2-1016 TP	OFF
0:12:07.77	11/29/2023	B2-1022 TP	OFF
0:12:08.09	11/29/2023	A300 H	OFF
0:12:25.44	11/29/2023	B2-1023 TP	OFF
0:12:25.85	11/29/2023	B300 H	OFF
0:12:42.68	11/29/2023	B2-1026 TP	OFF
0:12:43.19	11/29/2023	306 H	OFF
0:12:52.15	11/29/2023	B2-1016 TP	ON
0:13:10.62	11/29/2023	B2-1022 TP	ON
0:13:11.73	11/29/2023	B2-1030 TP	OFF
0:13:12.09	11/29/2023	A308 H	OFF

3.0 Post Accident Field Examination and Scene Measurements

At the direction of the NTSB, all working group's post-accident field examination were performed on December 1st, 2023, with the coordination and aid of NYCT personnel.

The primary focus for the Signal group was to determine the relationship between the placement of the portable flagger light placements and the track circuit defining insulated joints. This was measured by NYCT due to the third rail having to remain energized during the temporary track outage. This was also performed in conjunction with the ongoing re-enactment with the track and operations working group, staging the lights as they were found on the night of the incident, as the flagger light locations were marked in spray paint on the tunnel wall. (See Illustration 1)

Illustration 1: Measurements noted as per field visit and measured by NYCT staff in support of investigation.



NYCT signal maintenance staff briefed both NTSB and NYDOT on the signal system that governs train movements and the electro-mechanical trip/stop machines installed at train signal locations. The trip/stop mechanism is a track mounted device capable of activating a Brakes-In-Emergency (BIE) application on trains.

In the case of the signal system, motorized trip/stops are controlled by signal system logic to prevent collisions. This is achieved by arming and disarming (raising to the activated position or lowering to the de-activated position) in conjunction with track circuit occupancy signal logic. If the track section or circuit ahead of a train is occupied, by a train or a piece of equipment, making it not safe to enter, the signal governing movement for that train will convey that information to the operator. In conjunction stop signal indication being displayed, the trip stop will be in the appropriate position to enforce a BIE application if an operator fails to adhere to the signal indication.

In the case of flagger protection, the same trip/stop method can be used to protect roadway workers, but instead of the use of the motorized trip/stop mechanism controlled by the signal system, a flagger can deploy his/her own base of the rail

clamped trip stop, wherever necessary. This too, will cause a BIE application if a train fails to observe the protective flagging limits in place to protect roadway workers.

Picture 2: In-track automatic trip/stop system tied into the signal system.



4.0 Description of Traction Power System

Train propulsion power is supplied from an electrified contact rail with nominal 600 volts dc. The third rail was located parallel to the running rails and is typically shielded or covered but allowed for the contact rail shoes affixed to the rail cars to contact the top of the third rail as it moves along the track.

E. Damages

The railroad signal system was not damaged because of the accident.

Submitted by:

Brett Johnson
NTSB Signal and Train Control Group Chair