Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2017-1179

Long Island Rail Road (LI)
Brooklyn, NY
January 4, 2017

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.

SYNOPSIS

On January 4, 2017, at 8:18 a.m., EST, westbound Long Island Rail Road (LI) Train 2817, consisting of 6 electric multiple unit, Bombardier M7 cars, with approximately 430 passengers onboard, failed to stop, and impacted the end-of-track bumping post structure on Atlantic Terminal Track No. 6, at Atlantic Terminal, Brooklyn, New York. The incident occurred during morning rush hour.

Train 2817 was traveling at a recorded speed of 12 miles per hour (mph) when it struck the end-of-track bumping post.

The train consist was approximately 510 feet in length, and included (from west to east): leading Control Car LI 7553, which was passenger occupied, followed by five additional passenger coaches numbered: 7554; 7067; 7068; 7073; 7074. The impact caused the lead car (7553), second car (7554), and fourth car (7068) to derail.

Of the estimated 430 passengers onboard, 108 passengers, and 2 crew members were transported to 6 area hospitals.

The leading car of the consist, (7553) impacted the end-of-track structures. The “F”-end truck impacted the concrete platform wall, causing detachment of the plow, dislodging the truck from the center pin, and derailing the No. 4-wheel set. As the bumping post collapsed, a section of stock rail bolted to the bumping post, penetrated the underside of the lead car and entered the electrical cabinet of the lead car behind the engineer’s cab. The intrusion through the floor of the lead car was approximately 14 inches. The impact and sudden deceleration caused the trailing cars to push into the leading cars, causing damage to buffer plates between cars. The couplers pushed in and off-center, and caused the No. 3-wheel set on the second car (7554) and No. 4-wheel set on the fourth car (7068) to derail. The impact also caused the third car (7067) to strike the platform and the fourth and fifth cars (7068 and 7073) to strike the wall on the left side of the track but did not result in any substantial damage. Interior inspection also revealed broken seat backs in the first and second cars.

Total estimated damages for equipment is $4,902,864 and track and structure damage is estimated to be $446,000.

The weather at the time of the accident was clear and 44 °F.

The Federal Railroad Administration’s investigation concluded that the probable primary cause for this accident was human factor code H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.

A contributing cause was determined to be H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2017-1179

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Long Island Rail Road	LI	EQ20170103

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Long Island Rail Road	LI	EQ20170103

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	1/4/2017	8:18 AM

5. Type of Accident/Incident
Obstruction

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
0	0	0	0	System

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Brooklyn	0	NY	KINGS

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
44 ˚F	Day	Clear	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Atlantic Terminal 6	Freight Trains-10, Passenger Trains-15		West

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2017-1179

OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
EMU	Yes	2817

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross excluding power units)	6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter	Code
12.0 MPH	R			0

6. Type of Territory

Signalization: Signaled

Method of Operation/Authority for Movement: Direct Train Control

Supplemental/Adjunct Codes: A, Q

7. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box	Alcohol	Drugs
(1) First Involved *(derailed, struck, etc.)*	LI 7553	1	yes		0	0
(2) Causing *(if mechanical, cause reported)*	0	0	no	9. Was this consist transporting passengers?		Yes

10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	0	0	0	0	0	(1) Total in Equipment Consist	0	6	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	3	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
4902864	446000

14. Primary Cause Code

H222 - Automatic block or interlocking signal displaying other than a stop indication - failure to comply.*

15. Contributing Cause Code

H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.

Number of Crew Members

16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen
1	0	1	1

Length of Time on Duty

20. Engineer/Operator	21. Conductor
Hrs: 8 Mins: 2	Hrs: 8 Mins: 2

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	2	108	0

25. EOT Device?	26. Was EOT Device Properly Armed?
N/A	N/A

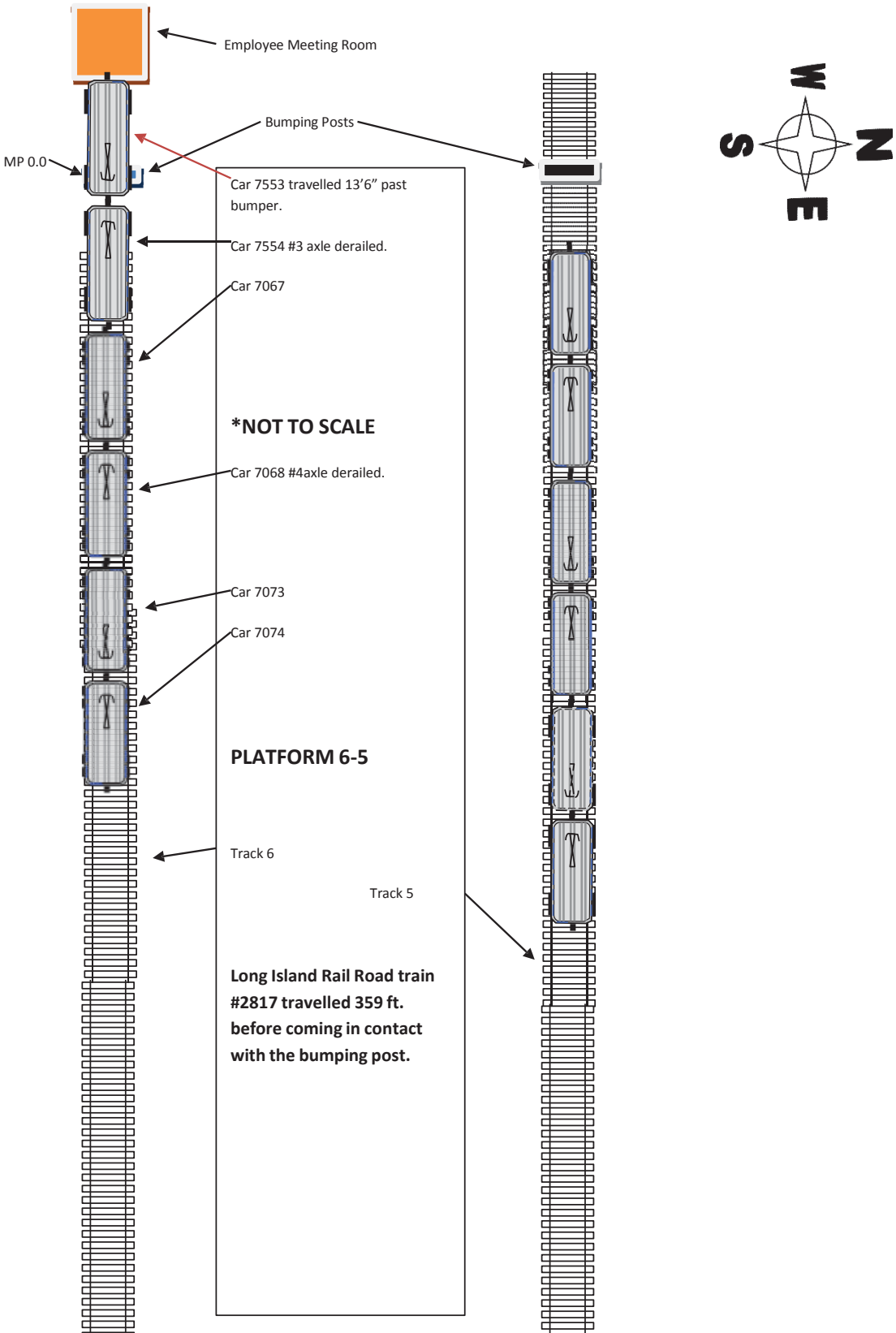
27. Caboose Occupied by Crew? N/A

28. Latitude	29. Longitude
40.684593000	-73.977523000

SKETCHES

Accident sketch

HQ-2017-1179



NARRATIVE

Circumstances Prior To Incident

The crew of Long Island Rail Road (LI) Train 2817 consisted of the regular engineer for Job 85, an extra board conductor, and an extra board assistant conductor/brakeman. All crew members went on duty at 12:16 a.m., EST, and were fully rested according to the records provided by LI. The Engineer was returning from a 2-day rest period. The Conductor received 14 hours and 18 minutes of rest between assignments, and the Assistant Conductor/Brakeman received 13 hours and 55 minutes of rest between assignments.

The Engineer was positioned in the operating cab of Cab Car 7553. The Conductor was stationed in the second car in the consist (7554), and the Assistant Conductor/Brakeman was in the rear car (7074).

Train 2817 was a passenger train originating on the Far Rockaway Branch at the Far Rockaway Passenger Station (Milepost 5.0) at 7:18 a.m. The total distance to be traveled to Atlantic Terminal was 20.8 miles.

Train 2817 was scheduled to arrive at Atlantic Terminal at 8:11 a.m. The train consisted of six electric multiple unit cars, numbered: Lead Car 7553; 7554; 7067; 7068; 7073; and 7074. The train weighed about 760,800 pounds and was an estimated 510 feet long.

The topography of the movement westward into Atlantic Terminal Track No. 6 from the interlocking in advance of the station is a combination of ascending and descending grades of 1 percent, traversing a triple compound curve (maximum curvature 14 degrees).

The Accident

Train 2817 approached Brook interlocking on Track No. 1, crossed over to Track No. 2, then Atlantic Terminal 6. The maximum authorized speed through Brook interlocking is 5 mph. Upon entering Terminal 6 and operating on a “Restricting Signal,” the train was to stop short of the bumping block to discharge the passengers. Instead, the train impacted the bumping block at a recorded speed of 12 mph. As the bumping post collapsed, a section of stock rail attached to the bumping post penetrated the underside of the lead car, into the electrical cabinet behind the engineer’s cab. With the damaged bumping post acting as a ramp, the train’s momentum carried it 13 feet and 6 inches beyond the bumping block, impacting the concrete wall behind it, striking an office located at the end-of-track and coming to a stop after striking two roof support columns.

LI’s Terminal Manager arrived on-scene and immediately requested third rail power to be removed from Terminal 6. Power was removed by LI’s Electric Traction Foreman.

The incident was responded to by the City of New York Police Department, New York City Fire Department (FDNY), New York City Emergency Management, emergency medical services (EMS), LI Fire Marshals, and a private ambulance company. The Metropolitan Transportation Authority Police Department had terminal jurisdiction and formed a unified command with fire and EMS. The evacuation of the train did not require specialized equipment, extrication, or ladders. Local hospitals were notified of a surge of emergency patients. However, there were no life-threatening injuries or issues with coordination.

Upon arrival by first responders, they encountered multiple injured people who had self-evacuated the

train onto the platform. The station platform was then controlled and a triage area was established across the street from the station on Flatbush Avenue. Each of the injured was marked with FDNY triage tags. The triage categories were as follows:

- Red-Immediate
- Orange-Urgent
- Yellow-Delayed
- Green-Minor
- Black-Deceased

One injury was deemed "orange," 13 were "yellow," and 94 were "green." The injured were transported to 6 area hospitals.

The total passenger count onboard Train 2817 was approximately 430 people.

The lead car of the consist (7553) impacted the end-of-track structures. The "F"-end truck impacted the concrete platform wall, causing detachment of the plow, dislodging the truck from the center pin, and derailing the No. 4-wheel set. A section of stock rail bolted to the bumping post penetrated the underside of the lead car, into the electrical cabinet of the lead car behind the engineer's cab. The impact and sudden deceleration caused the trailing cars to push into the leading cars, causing damage to buffer plates between cars, couplers pushed in and off-center, and caused the number 3 axles on the second car (7554) and number 4 axle on the fourth car (7068) to derail. The impact also caused the third car (7067) to strike the platform and the fourth and fifth cars (7068 and 7073) to strike the wall on the left side of the track, but did not result in substantial damage. An inspection of the interior also revealed broken seat backs in the first and second cars.

Exterior side doors would not open electrically on the entire train from either the inside or outside due to accident damage causing circuit breakers to trip. However, manual door releases allowed emergency egress and access. Emergency lighting worked as intended.

The event recorder data revealed that the train was traveling at 12 miles per hour (mph) in the minimum power setting as it struck the bumping post and the end of the platform. The maximum authorized speed for this train in Atlantic Terminal tracks was 5 mph as designated in the current LI Special Instructions.

Damage estimates totaled $446,000 to the infrastructure and $4,902,864 to equipment.

Analysis and Conclusions

Analysis - Toxicological Testing: The three-person crew was tested under the Federal Railroad Administration post-accident policy. All three crew members tested negative for drugs and alcohol.

Conclusion: Drug and alcohol use was not a factor in the accident.

Analysis - Engineer Performance: The Engineer of Train 2817 was hired April 26, 1999, as an engineer trainee and promoted to engineer in 2000. His last certification date was December 9, 2016, which was to expire on November 17, 2019. He was coming off his 2 rest days and fully rested for his job assignment beginning at 12:16 a.m., on January 4, 2017, the day of the accident. He had worked nights/early morning assignments for at least 10 years. He had been on his current assignment (Job 85), for about a year. Job 85 worked Tuesday–Saturday, with Sunday and Monday as rest days. The on-duty times were Tuesday–Friday, 12:16 a.m. to 10:15 a.m., and Saturday, 12:36 a.m. to 8:34 a.m., on duty at West Side Yard. The weekday schedule consisted of five trains—a roundtrip from Brooklyn to Long Beach, a roundtrip from Brooklyn to Far Rockaway, and a trip from Brooklyn to Jamaica.

The Engineer stated to the National Transportation Safety Board and the Federal Railroad Administration (FRA), that his day usually started by dead heading on the 11:14 a.m. train out of Hicksville, to West Side Yard for duty. However, due to a grade crossing accident on the main line, third rail power was shut off for over 2 hours, resulting in no train movements. The New York Stationmaster instructed the Engineer to report to Jamaica at 4:28 a.m. to pick up his job and relieve the yard Engineer who had filled in for him. After reporting and relieving the replacement Engineer and holding a job briefing with the crew, which were extra board personnel, they ended the run at Atlantic Terminal. The Engineer stated that the delay made the day seem longer and prevented him from taking his normal nap during his morning break. The Engineer stated he was not stressed about it, and stated that he has no medical problems and has not been diagnosed with sleep apnea.

After arriving at 6:09 a.m., at Far Rockaway on Train 2806, and turning on Train 2817 to arrive at Atlantic Terminal at 8:11 a.m., there were no issues reported. Approaching Atlantic Terminal on Atlantic Main Track 1, the train was lined for Atlantic Main Track 2 in Brook interlocking, then traversed three turnouts lining the train to track Atlantic Terminal 6. The Engineer was operating on "Restricting" signals with a terminal maximum authorized speed of 5 mph. He stated that it is necessary to alternate the throttle/brake handle from power to braking due to a combination of ascending and descending grades of 1 percent. The Engineer said he did not remember his speed, but assumed that he was going between 4 and 6 mph. However, the event recorder download indicates that the train impacted the bumping post at the end-of-track at a recorded speed of 12 mph. There was no indication of a brake application on the event recorder.

Conclusion: The performance of the Engineer of Train 2817 was determined to be the primary cause of the accident.

Analysis - Conductor Performance: The Conductor of Train 2817 was hired by LI on August 22, 1998, as an assistant conductor. She was promoted to conductor in 2001. The Conductor's last certification date was September 16, 2016, and the certification expires September 16, 2018. The Conductor worked the extra board and had 14 hours and 18 minutes of off-time before reporting for her assignment of Job 85 at 12:16 a.m., on January 4, 2017. She was also delayed that night by the grade crossing accident and began her shift at Penn Station instead of West Side Yard. She reported no other significant issues during the runs prior to Train 2817. The Conductor reported that a proper job briefings occurred, and no issues upon arrival at Atlantic terminal. She was stationed in the second car preparing to make announcements and open the doors when the accident occurred. In post-accident interviews, witnesses stated that the regularly-assigned Conductor would station himself in the head-end with the Engineer upon the approach to the end-of-track. General Notice No. 2-52 with LI Rule 1033, requiring that conductors station themselves on the head-end on the approach to end-of-track locations was to go in effect at 5:01 p.m., on January 4. 2017 and was not yet required at the time of the accident.

Conclusion: The job performance of the Conductor of Train 2817 did not cause or contribute to the severity of the accident.

Analysis - Assistant Conductor Performance: The Assistant Conductor of Train 2817 was hired on April 21, 2007, and was promoted in approximately 2010, with a certification date of April 30, 2015, which expires April 30, 2017. The Assistant Conductor worked the extra board and had 13 hours and 55 minutes off duty prior to reporting for his assignment of Job 85 at 12:16 a.m., on January 4, 2017. The

Assistant Conductor was also delayed by the same grade crossing accident and reported to Penn Station to meet up with the equipment. There were no reports of unusual occurrences on Train 2817. The Assistant Conductor was stationed in the rear car of the consist and prepared to apply the hand brake upon arrival.

Conclusion: The job performance of the Assistant Conductor did not cause or contribute to the severity of the accident.

Analysis - Mechanical Equipment/ Safety Devices: Train 2817 consisted of six Bombardier M7 self-propelled (EMU) cars powered by a 750-volt (direct current) third rail. Each car is equipped with friction and electric brakes and electric couplers. Each car weighs between 125,300 and 128,300 pounds and are 85 feet in length. The operating cab was equipped with an automatic speed control system (cab signals), an alerter, and an audible warning device. Propulsion and braking was controlled by a single "master control lever" from which the Engineer controls speed and braking by moving the controller forward (propulsion) and backwards (braking).

LI mechanical maintenance personnel provided inspection records for the consist. The calendar-day inspections for both the exterior and interior, along with the Class I brake test were completed on January 4, 2017, at 12:01 a.m., at the Jamaica facility. The cab signal system was also tested prior to departing the initial terminal. No exceptions were noted.

Post-accident testing of the train's first two cars proved to be difficult due to the level of damage and difficulty of removing them from the crash scene. However, the remaining 4 cars received a Class 1 brake test, and the public-address system and emergency lighting system was tested. No exceptions were noted.

The equipment was properly inspected and maintained, and all inspection records were up to date. All safety devices operated as designed. The initial impact at the end-of-track caused the electrical circuits that controlled the doors to trip, only allowing the doors to be opened using manual emergency exit and access handles. The manual emergency access and exit controls worked as intended.

Conclusion: Mechanical equipment and safety devices did not cause or contribute to the severity of this accident.

Analysis - Track Conditions: The Atlantic Terminal consists of six tracks. Each track ends with a bumping post. The accident track, Atlantic Terminal 6, is 438 feet long and consists of 100-pound, Pennsylvania Standard jointed rail in 39-foot segments. Ties were 8 feet, 6 inches in length (except for every fifth tie, which is 9 feet, 6 inches to support the third rail), 9 inches wide by 7 inches tall, and spaced 21 inches on-center. Track fasteners were a combination of Pandrol e-clips and conventional double shoulder plates with cut spikes, hair pin fasteners, and lag screws. The track is fully ballasted with granite stone, seated on a concrete slab. The bumping post was a Western Cullen Hays, Inc., model WDC. The bumping post was bolted to two sections of stock rail, that was attached to the running rail by bolted rail joints. Calculations provided by the manufacturer show that the bumping post had a maximum impact capacity of 415,000 pounds. This force is equal to six partially loaded M7 cars moving at 1 mph. The distance from the bumping post-face to the Atlantic Terminal wall/floor structure was 5 feet. Track 6 was inspected visually on a weekly basis, with the last inspection performed on January 3, 2017, with no exceptions noted. The last internal defects inspection was performed on August 19, 2016, with no defects detected.

Post-accident inspection of the track began at the crossover switch from Atlantic Main Track 1 to Main Track 2 at the east-end of Brook 1 interlocking. There were no exceptions taken.

After the removal of the rear four cars of the train, it was noted that the track was misaligned, consistent with train-induced forces resulting from sudden impact with the end-of-track structures.

An examination of track inspection records, from June 28, 2016, to January 3, 2017, revealed that the inspection records were complete and no problematic conditions were reported for Atlantic Terminal 6.

Conclusion: Track conditions did not cause or contribute to the severity of this accident.

Analysis - Signal and Train Control: Train movements into the Atlantic Terminal are coordinated by the Brook 1 Tower Operator located at the Atlantic Terminal Train Station. No exceptions were found with the physical operation of Brook interlocking or the signal system. Cab signal codes are not transmitted west of the 1W and 2W signals coming off the main tracks to the terminal. The Automatic Cab System enforces a maximum speed of 15 mph into the terminal tracks. LI established a maximum 5 mph in the interlocking and terminal tracks.

Post-accident signal system examination of the signal equipment and appurtenances at Atlantic Terminal were found to be locked and secured with no signs of tampering. The pneumatic switch machines involved in the route for Train 2817 were tested with no exceptions.

Maintenance, inspection and test records of the signal system were examined and no exceptions were taken.

Conclusion: The signal and train control systems did not cause or contribute to the severity of this accident.

Overall Conclusion

The equipment, track, and signals were all compliant with railroad standards and Federal regulations. Based on the extensive analysis performed, including inspections, testing of equipment, and investigations conducted, FRA's investigation concluded that the cause of the accident was human factor.

Probable Cause and Contributing Factors

The primary probable cause for this accident is H222, Automatic block of interlocking signal displaying other than a stop signal - failure to comply.

A contributing cause is H605, which is failure to comply with restricted speed, or its equivalent, not in connection with a block or interlocking signal.

Examination of event recorder downloads, along with physical evidence also indicate a loss of situational awareness on the part of the Engineer during the approach to the bumping block resulting in excessive speed and a lack of braking before impact.