RAILROAD ACCIDENT INVESTIGATION

Report No 4020

BOSTON AND MAINE RAILROAD

WINCHESTER, MASS

AUGUST 16, 1964

INTERSTATE COMMERCE COMMISSION

Washington

SUMMARY

DATE	August 16, 1964	
RAILROAD	Boston and Maine	
LOCATION	Winchester, Mass	
KIND OF ACCIDENT	Head-end collision	
TRAINS INVOLVED	Passenger	Passenger
TRAIN NUMBERS	918	123
CONSISTS	Diesel-powered passenger unit 6130	Diesel-powered passenger unit 6140
ESTIMATED SPEEDS	2 m p h	10-15 m p h
OPERATION	Timetable, train orders, automatic block-signal system	
TRACKS	Double, 2°15' curve, level	
WEATHER	Clear	
TIME	2 41 p m	
CASUALTIES	29 injured	
CAUSE	Failure to deliver a train order to the northbound train and failure of the crew of that train to comply with a Stop signal indication	
RECOMMENDATION	It is recommended that the Boston and Maine Railroad take immediate action to enforce compliance with its operating rules	

INTERSTATE COMMERCE COMMISSION

SAFETY AND SERVICE BOARD NO 1

RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4020

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SYNOPSIS

At 2 41 p m , August 16, 1964, a head-end collision occurred between two passenger trains on the Boston and Maine Railroad at Winchester, Mass Twenty-three passengers and six train-service employees were injured

The accident was caused by failure to deliver a train order to the northbound train and failure of the crew of that train to comply with a Stop signal indication

LOCATION AND METHOD OF OPERATION

The accident occurred on that part of the Boston Division between Boston and Haverhill, Mass , 33 3 miles In the accident area this is a double-track line over which trains moving with the current of traffic operate by time-table, train orders and an automatic block-signal system Trains moving against the current of traffic operate by train orders An interlocking is at Winchester, 7 8 miles north of Boston The interlocking tower is 78 feet south of the station Wedgemere, another station at Winchester, is 2,307 feet farther southward

The collision occurred on the northward main track 7 miles north of Boston, and 2,012 feet south of Wedgemere and 4,397 feet south of the Winchester station

Within the interlocking at Winchester, a crossover connects the main tracks a short distance north of the interlocking station A few feet farther northward, a single-track line known as the

Woburn Loop diverges northwestward from the southward main track The Woburn Loop extends 2 1 miles to Woburn, Mass , and beyond

A hump yard is at Mystic Junction, 1 9 miles north of Boston Movements in the hump yard are controlled from a tower on the west side of the main tracks This tower is a train order station but no fixed train order signal is provided Instead, timetable special instructions require a double staff red flag by day or a red light by night to be displayed between the rails of the track involved when there are train orders to be delivered

Winter Hill, an interlocking, is 0 6 miles north of Mystic Junction and is remotely controlled by the Mystic Junction tower operator Crossover No 1 connects the main tracks within the Winter Hill interlocking

Semi-automatic signal L2, governing northbound movements on the northward main track through the Winter Hill interlocking, is 2,783 feet north of the Mystic Junction tower

Automatic signals 5 7, 6 5, and 7 3, governing northbound movements on the northward main track, are 1 4 miles south, 2,930 feet south, and 1,564 feet north of the collision point, respectively

Semi-automatic signal RD38, governing southbound movements from the Woburn Loop to the double-track line at Winchester, is 1,334 feet north of the Winchester station

Details concerning the tracks, operating rules, timetable special instructions, signals, trains, damages, and other factors involved in the accident are provided in the appendix

DESCRIPTION AND DISCUSSION

Bulletin Order No 123, issued August 13, 1964, read in part as follows

Effective at 11 00 P M Saturday, August 15, 1964 and continuing until 7 00 P M Sunday August 16, 1964 the * * * southward main track will be out of service between Somerville Jct and interlocking at Winter Hill

During this period all southward train and engine movements will be made over the northward main track on train orders from Winchester to Winter Hill

* * *

(Note - Somerville Jct is 0 4 miles north of Winter Hill)

On August 16, a work equipment train and maintenance-of-way on-track equipment occupied the southward main track between Winter Hill and Somerville Jct , and southbound trains operated over the northward main track in this area as prescribed by Bulletin Order No 123 A crew member of the work equipment train stationed himself at Signal L2 and performed flagman's duties He stopped all trains approaching on the northward main track and instructed the enginemen to pass the equip-

ment on the southward main track with care

About 2 05 p m , the train dispatcher transmitted train order No 123 to the operators at Winchester interlocking station and Mystic Junction tower The order was addressed to No 918 at Winchester, and to the Mystic Junction tower operator and all northbound trains at Mystic Junction It was made complete at 2 11 p m , and read in part as follows

> No 918 has right over opposing trains on the Northbound track Winchester to crossover at Winter Hill

Under this order, No 918, a southbound first-class passenger train was authorized to operate against the current of traffic on the northward main track between Winchester and the crossover at Winter Hill All northbound trains were restricted from proceeding on the northward main track beyond Winter Hill until No 918 entered this crossover and cleared the northward main track

No 123, consisting of diesel-powered passenger unit 6140, left Boston at 2 30 p m , on time Five minutes later, it passed Mystic Junction, where the crew members should have received copies of train order No 123 A red flag was not displayed to indicate there were train orders for northward trains at this point and the Mystic Junction tower operator failed to deliver copies of the train order involved After passing Mystic Junction, No 123 approached signal L2, which indicated Stop The conductor saw this signal indicated stop from his position in the passenger compartment and he proceeded to the front vestibule Soon afterward, the train stopped on the northward main track with the front end 75 to 125 feet south of signal L2 and near where the flagman of the work equipment train was standing The conductor started to alight from the front vestibule to ascertain from the operator why signal L2 indicated Stop About this time the flagman of the work equipment train was cautioning the engineer to exercise care when approaching the work equipment occupying the southward main track

The engineer acknowledged the flagman's instructions He then looked up at signal L2 and although it still indicated Stop he erroneously concluded that the aspect had changed and the signal indicated Proceed He immediately called a green aspect and the conductor who was about to alight from the train remained in the front vestibule The engineer then sounded two short blasts on the horn and prepared to pass signal L2 He said before proceeding he asked the flagman of the work equipment train if a green aspect was displayed by the top unit of the signal and the flagman replied in the affirmative The conductor who was then closing a side door in the front vestibule, overheard the engineer question the flagman about signal L2 but did not hear a reply He said that he did not see the signal after the engineer called the green aspect The flagman of No 123 saw signal L2 indicated Stop when he alighted from the rear vestibule to provide rear-end protection He said he did not look at the signal again before the train passed it According to statements of the flagman of the work equipment train, he did not call the signal aspect to the engineer of No 123 He stated that because of his close proximity to the signal while talking to the engineer, he was unable to distinguish the aspect displayed for No 123 About 2 37 p m , the train passed the signal which still indicated Stop

After it passed signal L2, No 123 trailed through the north switch of Crossover No 1, which was in reverse position, lined for a crossover movement None of the crew members had noticed the position of the switch and the train continued northward, passing several wayside signals displaying Clear aspects It then passed signal 5 7, which displayed an Approach-medium aspect and the engineer decreased the speed to about 30 miles per hour When the train passed signal 6 5, which displayed an Approach aspect, the engineer further decreased the speed and the train entered the curve north of the signal at about 20 miles per hour As it proceeded on the curve, the engineer suddenly saw No 918 approaching a short distance ahead He promptly applied the brakes in emergency and left the control compartment He said the collision occurred immediately afterward, when the speed of No 123 had been reduced to between 10 and 15 miles per hour

No 918, consisting of diesel-powered passenger unit 6130, left Woburn at 2 20 p m , on time, proceeded on the Woburn Loop to Winchester, and stopped short of signal RD38 about 2 26 p m Soon afterward, the Winchester interlocking operator delivered copies of Clearance Form A and train order No 123 to the crew No 918 then passed signal RD38, entered the southward main track of the double-track line involved, crossed over to the northward main track, and stopped at the Winchester station It left the station about 2 37 p m and proceeded southward against the current of traffic on the northward main track, as authorized by train order No 123 While approaching Wedgemere, the engineer reduced the speed to about 10 miles per hour When he saw there were no passengers waiting to board the train at this station, he increased the speed, and the train passed Wedgemere without stopping Shortly thereafter, while moving between 25 and 35 miles per hour, it entered the curve where the accident occurred As it proceeded southward on the curve, the engineer suddenly saw No 123, a northbound first-class passenger train, approaching on the curve a short distance ahead Moments later, upon realizing the approaching train was on the northward main track, he applied the brakes of No 918 in emergency and ran into the passenger compartment to the rear He estimated the speed of No 918 was reduced to about 2 miles per hour before the collision occurred The conductor and flagman, the other members of the crew, were in the passenger compartment as No 918 approached the accident point They were unaware of anything wrong before the brakes applied in emergency

The engineer, conductor and flagman of each train, and 23 passengers, were injured

The operator at Mystic Junction said that about 2 05 P M when the train dispatcher instructed him to copy a Form 19 train order for northward trains, he caused signal L2 to indicate Stop, but did not display a red flag, as required, to indicate that there were train orders for northward trains at this station He said the tower was not equipped with the prescribed double staff flag, of the type intended for display on the track After copying train order No 123, repeating it to the train dispatcher and receiving Complete in response, he lined the route through crossover No 1 at Winter Hill and actuated the signal governing the reverse or southward movement within the interlocking for No 918 to proceed from the northward main track to the southward main track No 123 passed the Mystic Junction tower on the northward main track without stopping about 2 35 P M The operator said he did not deliver copies of the train order involved to crew members of No 123 because he was descending the stairs in the tower for that purpose when the train passed He said he did not become concerned about the failure to deliver the train orders at that time because he expected No 123 would remain

at signal L2, which indicated Stop He then became engaged in other duties and did not observe the panel of the track indicator chart which shows track occupancy at Winter Hill interlocking Later, when he learned that No 123 had departed from Winter Hill he immediately reported it to the dispatcher However, the accident had occurred before this report was made

According to the dispatcher's train order book, the dispatcher gave signal "19" before he transmitted order No 123 to the Mystic Junction tower operator There was no record, however, to indicate the operator had replied "Stop displayed" before copying the order According to statements of the chief train dispatcher and the carrier's rules examiner, if the operator had replied "Stop displayed," this reply should have been recorded in the train order book Entries in the book indicate signal "19" is always recorded when given by the dispatcher, but the response "Stop displayed" is not recorded as required The chief train dispatcher stated that on the day of the accident it was expected No 918 would arrive at Winter Hill and cross over to the southward main track before No 123 arrived at Mystic Junction In this case, he said order No 123 would have been annulled before arrival of No 123 at Mystic Junction

In tests made after the accident signal L2 functioned properly Observations of this signal under conditions similar to those prevailing at the time of the accident revealed that because of the height of the three signal units above the rails, the aspect displayed by the top unit could not be distinguished from the engineer's station of an approaching northbound diesel-powered passenger unit after the front end of the unit was within 133 feet of the signal None of the aspects displayed by the signal units was visible from the engineer's station within 47 feet of the signal During these observations, it was noted the sun did not affect the visibility of the signal aspects displayed

FINDINGS

The investigation disclosed that the collision occurred at a point where No 918 was authorized by train order to proceed against the current of traffic with right over opposing trains on the northward main track between Winchester and the crossover at Winter Hill It also disclosed that crew members of No 123, an opposing train, had not received copies of the train order involved which restricted the authority of this train to depart from Winter Hill until No 918 had arrived and cleared the northward main track at that point Train order No 123 was issued simultaneously to the operators at Winchester interlocking and Mystic Junction tower The operator at Mystic Junction did not display a red flag as a stop-signal to indicate there were train orders for trains on the northward main track, as required, nor did he give the prescribed response to indicate that he had done so before he received the train order from the train dispatcher, who took no action to require the operator to comply with these provisions of the rules before issuing the order As a result of the absence of the prescribed signal to indicate there were train orders for northward trains, No 123 passed Mystic Junction without stopping and members of the crew did not receive copies of the train order which restricted authority of their train to proceed between points named in the order It is probable that if this train order had been delivered to members of the crew of No 123 this accident would have been avoided It is also evident that if No 123 had not passed signal L2 which indicated Stop, the accident would have been averted

CAUSE

This accident was caused by failure to deliver a train order to the northbound train and failure of the crew of that train to comply with a Stop signal indication

RECOMMENDATION

It is recommended that the Boston and Maine Railroad take immediate action to enforce compliance with its operating rules

Dated at Washington, D C , this thirty-first day of March, 1965

By the Commission, Safety and Service Board No 1

(SEAL)

BERTHA F ARMES,

Acting Secretary

APPENDIX

Tracks

From the south on the northward main track there are, in succession, a tangent 429 feet long, and a compound curve to the right, having a maximum curvature of 2°15', 1,796 feet to the collision point and 782 feet northward From the north there are, successively, a long tangent, a compound curve to the right, having a maximum curvature of 1°54', 1,489 feet, a tangent 148 feet, and the curve on which the collision occurred In this area, the grade is practically level

The north switch of the crossover connecting the main tracks at Winchester is 1,096 feet north of the Winchester station and is facing point for southbound movements on the southward main track The switch connecting the Woburn Loop to the double-track line is 13 feet farther northward

The north switch of Crossover No 1 is trailing point for northbound movements on the northward main track and is 3,223 feet north of the Mystic Junction tower

Operating Rules

DEFINITIONS

FIXED SIGNAL - A signal of fixed location indicating a condition affecting the movement of a train or engine

NOTE - The definition of a "Fixed Signal" covers such signals as switch, train order, block, interlocking, * * * or other means for displaying indications that govern the movement of a train or engine

* * *

SPEEDS Medium - A speed not exceeding 30 miles per hour

* * *

Restricted - A speed that will permit stopping short of another train, * * * but not exceeding 15 miles per hour

* * *

SIGNALS AND THEIR USE

10 COLOR SIGNALS

	COLOR	INDICATION
(a)	Red	Stop

* * *

34 All members of the crew in cab of engine must, and other members of train crew, when practicable will, communicate to each other by its name the indication of each signal affecting the movement of their train or engine as soon as it becomes visible * * *

* * *

SUPERIORITY OF TRAINS

D-71 A train is superior to another train by right or class Right is conferred by train order class by timetable * * *

RULES FOR MOVEMENT BY TRAIN ORDERS

211 Clearance Form A must be filled out by the operator before clearing a train, showing thereon, * * * the total number of train orders and the number of each train order * * * addressed to a train He will then repeat from Clearance to the train dispatcher the information shown thereon * * *

* * *

Clearance must be delivered together with all train orders to each person addressed * * *

221 Unless otherwise provided a fixed signal must be used at each train order office, which shall indicate "stop" when there are train orders for any train in that direction * * *

When an operator receives the signal "19", followed by the direction, he must immediately display the "stop" signal for the direction indicated and then reply "Stop displayed," adding the direction, and until the orders have been delivered or annulled the signal must not be restored to "proceed "

While "stop" is indicated, a train must not leave * * * without Clearance Form A, or before examining train orders and/or Clearance Form A, * * *

22 (a) When a fixed signal is not in use at a train order office, a signal will be used which shall indicate "stop" when trains are to be stopped for train orders

* * *

ENGINE AND TRAIN CREWS

663 No train or engine shall pass an interlocking signal indicating "stop" without first securing authority from the operator * * *

OPERATORS

736 They must be conversant with the Rules for Movement by Train Orders, know that required signals are promptly displayed, and see that all orders received are properly delivered * * *

Carrier's Timetable Special Instructions

221a There is no train order signal at the following train order stations and a double staff red flag by day or a red light by night is used when there are train orders * * * Mystic Junction * * *

Signals

Semi-automatic signal L2 is a three-unit signal of the color-light type and is approach lighted It is mounted on a mast located 24 feet east of the northward main track and a few feet east of an

auxiliary track that parallels the northward main track on the east in this area The three signal units are fixed to a bracket and are about 21 feet east of the northward main track They are vertically spaced 4 feet 6 inches apart The top unit is 33 feet 10 inches above the rails

A wayside telephone is about 10 feet north of signal L2

Automatic signals 5 7, 6 5 and 7 3 are two-unit signals of the color-light type and are approach lighted

The signal aspects applicable to this investigation and the corresponding indications and names are as follows

Signal	*Aspect*	*Indication*	*Name*
L2	Red-over-red-over-red	Stop	Stop
	Green-over-red over-red	Proceed	Clear
5 7	Yellow over-green	Approach Next Signal at Medium Speed	Approach Medium
6 5	Yellow-over-red	Prepare to Stop at Next Signal Train Exceeding Medium Speed Must at Once Reduce to That Speed	Approach
7 3	Red-over-red	Stop Then Proceed * * *	Stop and Proceed

Signal L2 is remotely controlled by the Mystic Jct interlocking operator The controlling circuits of the automatic signals are so arranged that when the block of signal 7 3 is occupied and the blocks of signals 5 7 and 6 5 are unoccupied, signal 7 3 displays a Stop and Proceed aspect, and signals 6 5 and 5 7 display Approach and Approach Medium aspects, respectively

Train Equipment

Diesel-powered passenger units 6140 and 6130 are of all-steel construction Each is 85 feet long and is mounted on two 4-wheel trucks Power is supplied by two 275-horsepower diesel engines mounted under the floor An engineer's station is at the right side of the vestibule at each end of the unit and is provided with a safety control feature actuated by a pedal If downward pressure on the pedal is released, an emergency brake application occurs unless a service brake application of predetermined pressure has been made

The brakes of both trains were tested before the accident and they functioned properly when used en route

Damages

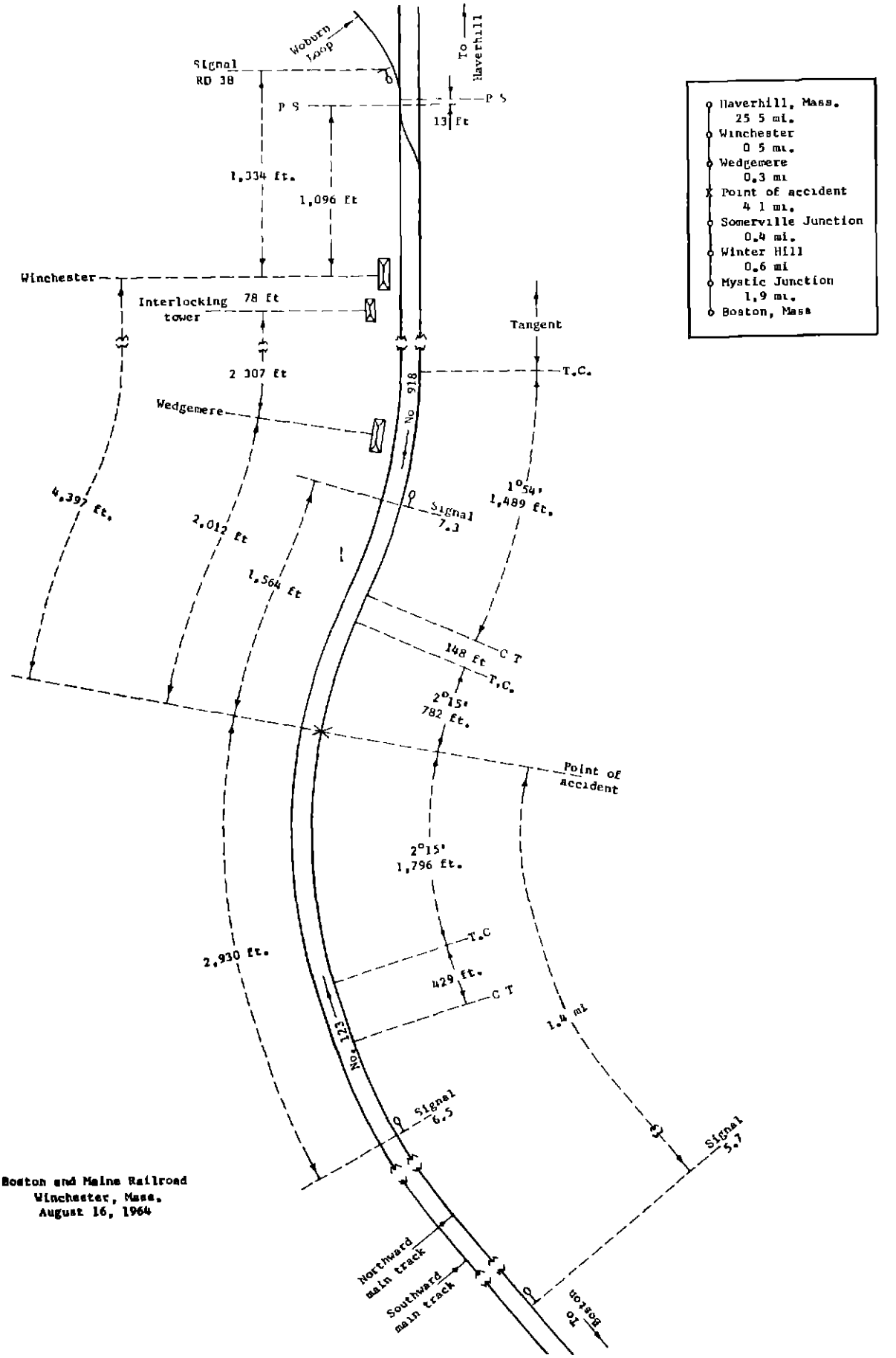
No 918 stopped with its front end against the front end of No 123 at the collision point Neither train derailed The control compartment at the front of each train was crushed and both trains were considerably damaged

Other Factors

The maximum authorized speed for passenger trains in the accident area is 70 miles per hour It is restricted, however, to 30 miles per hour for trains operating against the current of traffic

The accident occurred at 2 41 p m , in clear weather

Because of track curvature and trees on the east side of the track structure, the view ahead from a train approaching the accident point from either direction is materially restricted



Boston and Maine Railroad
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