

INTERSTATE COMMERCE COMMISSION:
WASHINGTON

INVESTIGATION NO. 3034
FLORIDA EAST COAST RAILWAY COMPANY
REPORT IN RE ACCIDENT
AT BOWDEN, FLA., ON
NOVEMBER 5, 1946

SUMMARY

Railroad: Florida East Coast
Date: November 5, 1946
Location: Bowden, Fla.
Kind of accident: Side collision
Equipment involved: Engine with cars : Passenger train
Train number: : 73
Engine numbers: 275 : Diesel-electric
units 1002-1054-
1007
Consists: 68 cars : 19 cars
Estimated speeds: 8 m. p. h. : 45 m. p. h.
Operation: Timetable, train orders and automatic
block-signal system; yard limits
Tracks: Double; tangent; 0.07 percent
ascending grade northward
Weather: Dense fog
Time: 6:43 a. m.
Casualties: 35 injured
Cause: Failure to provide adequate
protection for crossover movement

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3034

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

FLORIDA EAST COAST RAILWAY COMPANY

December 11, 1946.

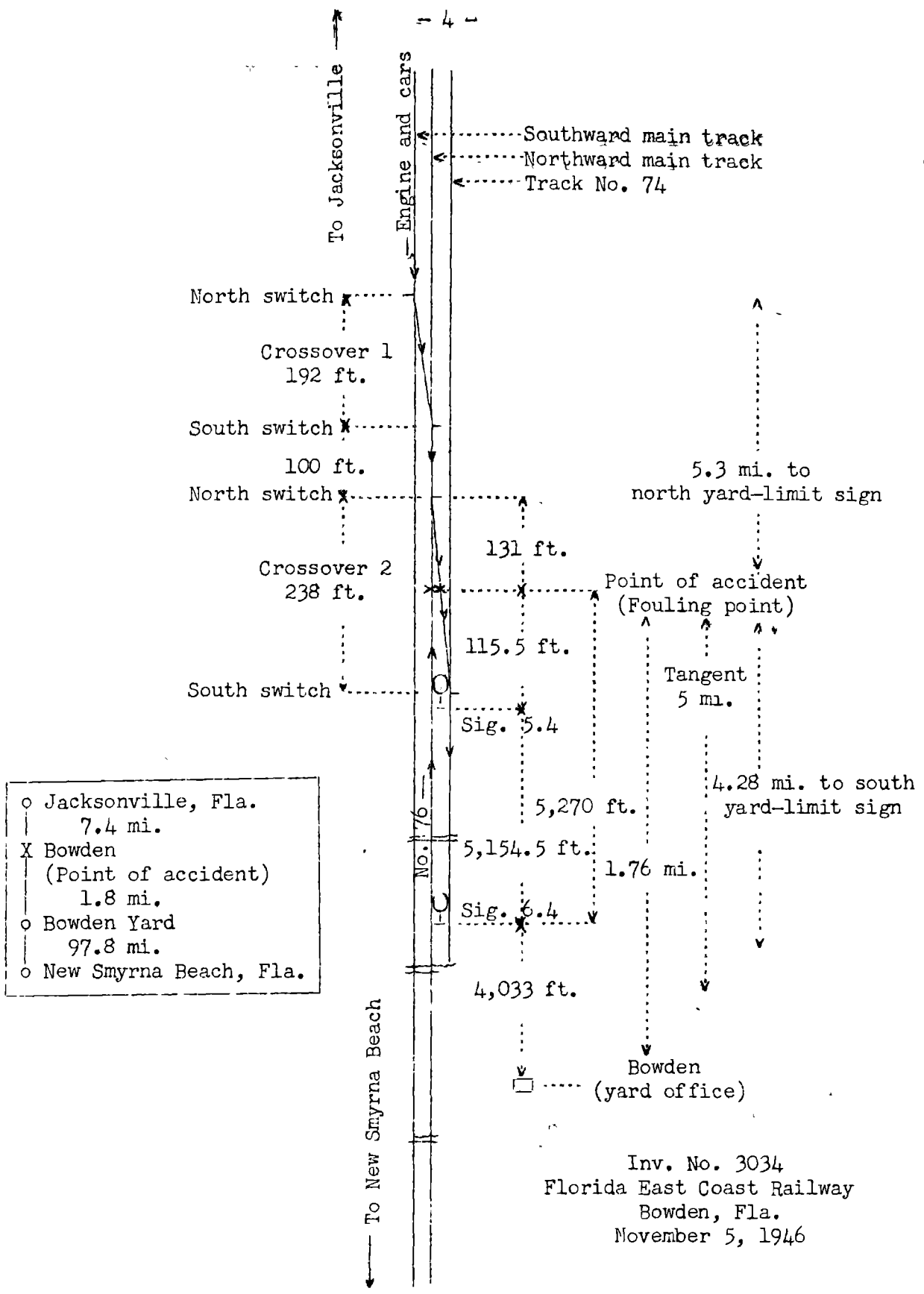
Accident at Bowden, Fla., on November 5, 1946, caused by
failure to provide adequate protection for a cross-
over movement.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On November 5, 1946, there was a side collision
between a passenger train and an engine with cars on the
Florida East Coast Railway at Bowden, Fla., which resulted
in the injury of 32 passengers, 1 person carried under con-
tract, 1 train-service employee on duty and 1 train-service
employee off duty.

¹ Under authority of section 17 (2) of the Interstate Com-
merce Act the above-entitled proceeding was referred by the
Commission to Commissioner Patterson for consideration and
disposition.



- o Jacksonville, Fla.
7.4 mi.
- X Bowden
(Point of accident)
1.8 mi.
- o Bowden Yard
97.8 mi.
- o New Smyrna Beach, Fla.

Inv. No. 3034
 Florida East Coast Railway
 Bowden, Fla.
 November 5, 1946

Location of Accident and Method of Operation

This accident occurred on that part of the railroad extending between New Smyrna Beach and Jacksonville, Fla., 105.2 miles, a double-track line. In the vicinity of the point of accident trains moving with the current of traffic are operated by timetable, train orders and an automatic block-signal system. Within yard limits in the vicinity of Bowden, 7.4 miles south of Jacksonville, an auxiliary track, about 5 miles long and designated as track No. 74, parallels the main tracks on the east. A facing-point crossover 192 feet in length, designated as crossover 1, connects the northward and the southward main tracks, and a trailing-point crossover 238 feet in length, designated as crossover 2, connects the northward main track and track No. 74. The north switch of crossover 1 is 1.84 miles north of the yard office at Bowden, and the north switch of crossover 2 is 100 feet south of the south switch of crossover 1. A freight classification yard is located to the east of track No. 74. The accident occurred 5.3 miles south of the north yard-limit sign, 1.76 miles north of the yard office, 4.23 miles north of the south yard-limit sign, and at the fouling point of the northward main track and crossover 2. The main tracks are tangent throughout a distance of about 5 miles immediately south of the point of accident and about 3 miles northward. At the point of accident the grade is 0.07 percent ascending northward.

The switches of crossovers 1 and 2 are hand-operated. The switchstands are of the low-stand type, and each switchstand is provided with an oil-burning lamp. The switchstand of the south switch of crossover 2 is immediately east of track No. 74, and the switchstand of the north switch is between the northward main track and track No. 74.

Automatic signals 6.4 and 5.4, governing north-bound movements on the northward main track, are, respectively, 5,270 and 115.5 feet south of the point of accident. These signals are of the three-indication color-light type, and are continuously lighted. The involved aspects and corresponding indications and names of these signals are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
6.4	Yellow	Approach Next Signal Prepared to Stop. A Train Exceeding One-Half Its Maximum Authorized Speed at Point Involved Must at Once Reduce to Not Exceeding That Speed.	Approach Signal.
5.4	Red	Stop; Then Proceed.	Stop and Proceed Signal.

The controlling circuits are so arranged that, when the switches of crossovers 1 and 2 are lined for movement through the crossovers, signal 6.4 will display approach-next-signal-prepared-to-stop, and signal 5.4 will display stop-then-proceed-at-restricted speed.

Operating rules read in part as follows;

Restricted Speed.--Proceed prepared to stop short of train, obstruction, or anything that may require the speed of the train to be reduced.

5. * * *

The time applies * * *; where there is no siding, it applies at the station.

D-11. A train finding a fusee burning red on or near ITS track, must stop and extinguish same and then proceed with caution prepared to stop short of train or other obstruction.

14. ENGINE AND MOTOR CAR WHISTLE SIGNALS.

Note.--The signals prescribed are illustrated by "o" for snort sounds; "—" for longer sounds. * * *

Sound.	Indication.
* * *	
(d) --- --- --- ---	Flagman may return from south, as prescribed by Rule 99.
* * *	

15. The explosion of two torpedoes is a signal to reduce speed and lookout for a train ahead or obstruction. * * *

* * *

34. All members of train and engine crews must, when practicable, communicate to each other by its name the indication of all signals affecting the movement of their train.

D-93. Within yard limits the main track may be used, protecting against first-class trains.

* * *

99. When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes, and when necessary, in addition, displaying lighted fuses.

When signal 14 (d) * * * has been given to the flagman and safety to the train will permit, he may return, leaving two torpedoes; and when conditions require, he will leave a lighted fusee.

The front of the train must be protected in the same way, * * *

* * *

Flagman's signals:

* * *

Light signals--A red light,
A white light,
Torpedoes and
Fusees.

D-152. When a train crosses over to, or obstructs the other track, unless otherwise provided it must first be protected as prescribed by Rule 90 in both directions on that track.

809. When a train is stopped by a Stop and Proceed-Signal it may proceed:

* * *

(B) On Two or more tracks, at restricted speed expecting to find train in block, broken rail, switch improperly set, or other obstruction.

913. Before entering the main track in automatic block signal limits a train must in addition to other precautions wait two minutes after opening the switches before proceeding.

FORMS OF TRAIN ORDERS.

D-E

Time Orders.

(1.) No One 1 Eng.....run Fifty 50 mins late A to G.

This makes the schedule time of the train named, between the stations mentioned, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time, as before required to run with respect to the regular schedule time. * * *

* * *

The maximum authorized speed for the passenger train involved was 85 miles per hour.

Description of Accident

Train order No. 4, addressed to No. 76 at New Smyrna Beach and to Yard at Bowden, read as follows:

NO. SEVENTY SIX 76 ENG. 1002 RUN TWENTY 20 MINUTES LATE NEW SMYRNA BEACH TO JACKSONVILLE.

Yard engine 275, headed north and pulling 68 loaded freight cars en route southward from Jacksonville to Bowden, stopped about 6:36 a. m. on the southward main track and immediately north of the north switch of crossover 1. About 7 minutes later, while this movement was proceeding southward through crossovers 1 and 2 en route to track No. 74 at an estimated speed of 8 miles per hour, the twenty-sixth car was struck by No. 76 at the fouling point of the northward main track and crossover 2.

No. 76, a north-bound first-class passenger train, consisted of Diesel-electric units 1002, 1054 and 1007, coupled in multiple-unit control, six express cars, three mail cars, one baggage car, five coaches and four Pullman sleeping cars, in the order named. All cars were of steel construction. At New Smyrna Beach, the last open office, the crew of No. 76 received copies of train order No. 4, and this train departed at 4:58 a. m., 46 minutes late, passed the yard office at Bowden about 6:41 a. m., 25 minutes late, passed signal 5.4, which displayed approach-next-signal-prepared-to-stop, passed signal 5.4, which displayed stop-then-proceed-at-restricted-speed, and while moving at a speed of 45 miles per hour it collided with the twenty-sixth car of the cut of cars being pulled by engine 275.

The twenty-sixth to thirty-fifth cars, inclusive, of the cut of cars being pulled by engine 275 were derailed and seven of these cars were demolished. The Diesel-electric units and the first five cars of No. 76 were derailed. The first unit stopped on its left side immediately west of the southward main track and at right angles to it and 285 feet north of the point of accident. The second unit stopped practically upright and at an angle of 45 degrees to the tracks, with the front end 10 feet south of the first unit and 45 feet west of the southward main track. The third unit stopped upright on the roadbed and in line with it and immediately south of the second unit. The first two units were badly damaged, and the third unit was considerably damaged. The first two cars stopped practically upright, across the tracks and at right angles to them and at the rear of the third Diesel-electric unit. The third car stopped upright, opposite the first two cars, west of the tracks and at an angle of 45 degrees to them. The fourth car stopped upright at the rear of the third car, with the rear end on the northward main track and at an angle of 15 degrees to it. The fifth car stopped upright, at the rear of the fourth car and in line with the northward main track. The first two cars were demolished, the third and fourth cars were badly damaged, the fifth, the eleventh to fifteenth, inclusive, and the nineteenth cars were more or less damaged.

There was dense fog at the time of the accident, which occurred about 6:43 a. m.

The fireman of No. 76 was injured.

Diesel-electric engine 1002 is provided with D-22-L brake equipment and an MS-40 automatic brake valve. A safety-control feature is so arranged that when there is no pressure exerted on either the foot pedal or the automatic brake-valve handle, the train brakes will be applied in continuous service application, unless a brake application of at least 25 pounds brake-cylinder pressure has been made. The feed valve was adjusted to supply brake-pipe pressure of 110 pounds. Of the cars of No. 76, eighteen were equipped with UC-12-5 control valves, which are arranged to produce emergency action of the brakes after the brake-pipe pressure is reduced below 35 pounds.

Discussion

The rules governing operation on this line provide that within yard limits the main track may be used, but protection against first-class trains must be furnished. Before a train may enter a main track in automatic block-signal territory, it must remain clear of the main track for two minutes after the switches are lined for the movement. An approach signal-indication requires the speed of a train to be so controlled

that it can be stopped short of the next signal. A stop-then-proceed signal-indication requires a train to stop short of the signal and then it may proceed prepared to stop short of a train or an obstruction.

No. 76, a north-bound first-class train, was due to leave Bowden Yard, the last station where time is shown, 1.8 miles south of the point of accident, at 6:16 a. m. There is no siding or fixed signal at Bowden Yard, and, under the rules, the time of No. 76 at Bowden Yard applied at the yard office, where traffic is received and discharged. Train order No. 4 required No. 76 to run 20 minutes late from New Smyrna Beach to Jacksonville, and, under the provisions of this train order, No. 76 was due to leave Bowden Yard at 6:36 a. m. The crew of No. 76 and the yardmaster at Bowden held copies of train order No. 4.

The investigation disclosed that about 5:52 a. m. the yardmaster at Bowden communicated by telephone with the foreman of yard engine 275 at Jacksonville and informed him of the provisions of train order No. 4. Engine 275 had assembled 68 freight cars, which were to be moved by engine 275 on the southward main track from Jacksonville to crossover 1 at Bowden, thence through crossovers 1 and 2 to track No. 74. The yardmaster informed the foreman of engine 275 arrangements had been made that when this movement arrived at crossover 1, the members of the crew of another yard engine would line the route for the intended movement of engine 275, and that the yardmaster would provide flag protection, if necessary, against No. 76. About 6:37 a. m. the crossover switches were lined for engine 275 to move from the southward main track across the northward main track and thence to track No. 74, and this engine started the crossover movement about 6:39 a. m. There was no signal provided at any of these crossover switches to indicate the approach of a train on either main track. No. 76 passed the yard office at Bowden about 6:41 a. m., and passed signal 6.4 about 5 minutes after the switches had been lined for the crossover movement of yard engine 275. Engine 275 was moving southward in backward motion and pulling 68 cars through the crossovers when the twenty-sixth car was struck about 6:43 a. m. by No. 76 at the fouling point of the northward main track and crossover 2.

As No. 76 was approaching Bowden the speed was 85 miles per hour, as indicated by the tape of the speed recorder of the first Diesel-electric unit. The brakes of this train had been tested and had functioned properly en route. The conventional headlight and an oscillating headlight of the first unit were lighted brightly. The enginemen were maintaining a lookout ahead from the control compartment of the first unit. Because of dense fog, the view had by the enginemen of the track ahead was materially restricted. When the engine was about 4,000 feet south of signal 6.4, located 5,154.5 feet south of signal 5.4 and 5,270 feet south of the point where the accident occurred,

two torpedoes were exploded and the engineer moved the controlling lever toward closed position and made a 3-pound brake-pipe reduction, which was not released. When the engine was in the immediate vicinity of signal 5.4 the enginemen observed that this signal was displaying approach-next-signal-prepared-to-stop, and the engineer immediately made a 15-pound brake-pipe reduction. Before the brake-pipe exhaust had ceased, he moved the brake valve to full service position. The engineer thought that the action taken would be sufficient to stop the train short of signal 5.4. However, the speed of the train was 52 miles per hour when the engine passed signal 5.4, which displayed stop-then-proceed-at-restricted-speed, and 45 miles per hour when the collision occurred at a point 115.5 feet north of the signal. The engineer said that when the engine was a short distance south of signal 5.4 he saw the indication displayed by the signal and stop signals being given with a lighted red fusee in the vicinity of signal 5.4. Then he released pressure on the brake-valve handle and the foot pedal but, because of the continuous service brake-pipe reduction which had previously been made, action by the safety-control feature was forestalled.

The yardmaster at Bowden said that after he had communicated with the foreman of engine 275 he instructed the foreman of engine 277 to proceed to crossover 1 and to line the route for engine 275. About 6:30 a. m., the foreman of engine 277 informed the yardmaster by telephone that engine 275 was approaching crossover 1, and the yardmaster placed two torpedoes and a lighted 10-minute fusee on the northward main track at a point about 4,000 feet south of signal 6.4. Then the yardmaster returned to the yard office and informed the foreman of engine 277 that flag protection had been provided at that point and instructed the foreman to provide additional flag protection in the vicinity of crossover 2. The foreman of engine 277 said that he proceeded southward, and was displaying a lighted red fusee from a point about 1,000 feet south of crossover 2 when No. 76 passed him. The enginemen of No. 76 said that no lighted fusee was seen where the torpedoes were exploded and that the fusee displayed in the vicinity of the crossover was a considerable distance north of the point which the foreman of engine 277 said he had reached. Since an interval of at least 11 minutes had elapsed from the time the yardmaster placed the lighted fusee until No. 76 passed the location of the fusee, it is evident that it had been consumed at the time No. 76 was approaching that point.

After the accident tests of the air-brake equipment of 16 undamaged cars of the train of No. 76 disclosed that the control valves of these cars functioned properly. The brake-cylinder piston travel of 15 cars varied between 3-1/3 inches and 3-1/2 inches, and the piston travel of one car was 3-1/2 inches. The superintendent of air brakes said that, in his opinion, from a

speed of 85 miles per hour, a distance of not less than 5,000 feet is required to stop a train consisting of equipment similar to that of No. 76 on the day of the accident. Several days after the accident occurred a series of braking tests was made in this territory with trains comparable in weight, braking ratios and consists to that of No. 76 on the day of the accident. During one test a speed of 85 miles per hour was attained and when the engine reached signal 6.4 the controlling lever was notched in from position 8 to idling position. The movement of the lever was made during an interval of 9 seconds, which is in accordance with the carrier's instructions for the operation of Diesel-electric engines. At a point 1,137 feet north of signal 6.4, a full-service brake-pipe reduction was initiated; and the brakes became fully applied one second before the train reached signal 5.4. The train passed signal 5.4 at a speed of 50 miles per hour and stopped at a point 1,345 feet northward, 6,999 feet north of signal 6.4 and 5,362 feet north of the point where the brake application was initiated. During another test a speed of 95 miles per hour was attained at a point 1,000 feet south of signal 6.4, where torpedoes were exploded by No. 76 on the day of the accident. At this point the controlling lever was notched in from position 8 to position 3, in accordance with the carrier's instructions for unexpected stops, and an 8-pound brake-pipe reduction was initiated simultaneously with the reduced controller action. The train passed signal 6.4 at a speed of 80 miles per hour, where a further brake-pipe reduction of 20 pounds was made and the controlling lever was moved to idling position, and the train stopped at a point 53 feet south of signal 5.4. The distance the train traversed following the initial brake-pipe reduction was 2,515 feet, or 3,330 feet greater than the distance between signals 6.4 and 5.4.

Section 204 of the Commission's order of April 13, 1939, prescribing rules, standards, and instructions for the installation, inspection, maintenance and repair of automatic block signal systems, requires that signals shall be spaced at least stopping distance apart or, where not so spaced, an equivalent stopping distance shall be provided by two or more signals arranged to display restrictive indications for trains approaching signals where such indications are required. The circumstances in this case forcibly direct attention to the necessity for this requirement. A passenger train was being operated at or near maximum authorized speed in a dense fog which greatly reduced the sighting distance of signals, in territory where, as disclosed by subsequent braking tests, the signals were not spaced far enough apart to provide adequate stopping distances. To correct this condition the carrier will be expected at once to properly respace its signals or to reduce the maximum authorized speed of its trains to rates which will enable them to be stopped in conformity with the restrictive indications of the signal system as it now exists.

Cause

It is found that this accident was caused by failure to provide adequate protection for a crossover movement.

Dated at Washington, D. C. this eleventh day of December, 1946.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.