

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2583
THE MISSOURI-KANSAS-TEXAS RAILROAD COMPANY
REPORT IN RE ACCIDENT
NEAR FLORA, OKLA., ON
APRIL 24, 1942

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SUMMARY

Railroad: Missouri-Kansas-Texas
Date: April 24, 1942
Location: Flora, Okla.
Kind of accident: Derailment
Train involved: Freight
Train number: 75
Engine number: 839
Consist: 61 cars, caboose
Estimated speed: 20-30 m. p. h.
Operation: Timetable, train orders and
automatic block-signal system
Track: Single; tangent; level
Weather: Raining
Time: 7:45 p. m.
Casualties: 5 killed; 1 injured
Cause: Accident caused by collapse of
a bridge which had been weakened
by flood water

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2583

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

THE MISSOURI-KANSAS-TEXAS RAILROAD COMPANY

June 16, 1942.

Accident near Flora, Okla., on April 24, 1942, caused by
collapse of a bridge which had been weakened by flood
water.

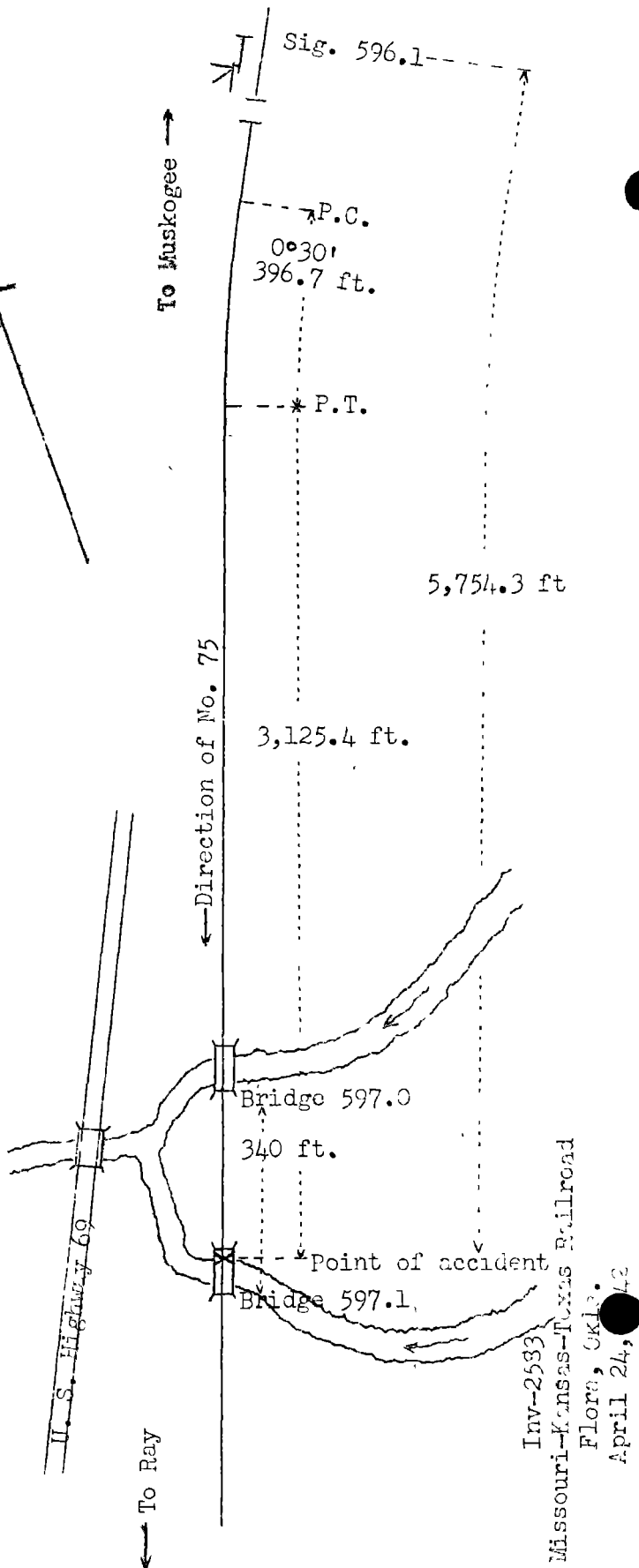
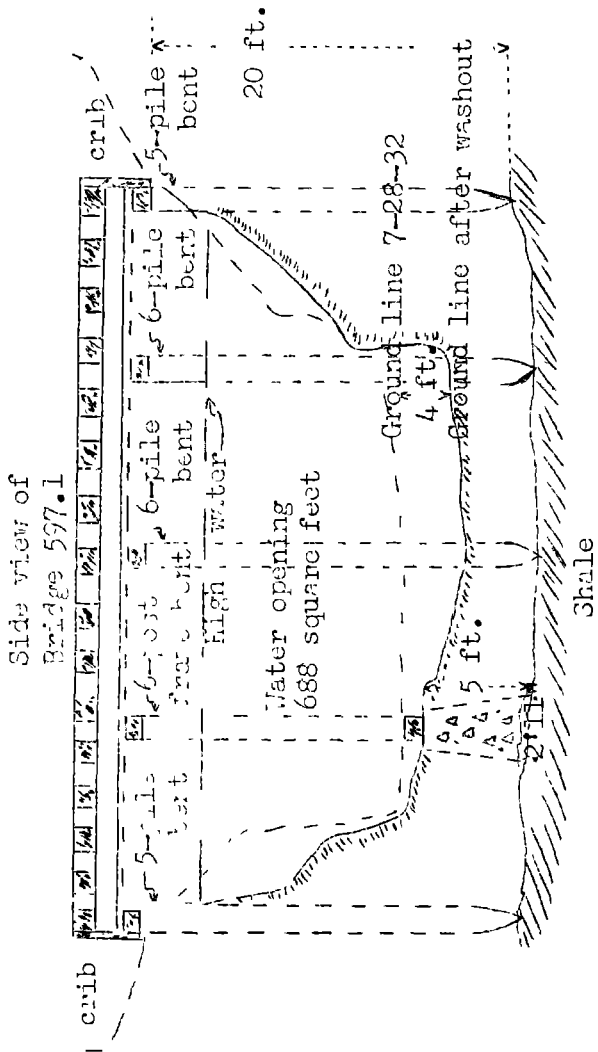
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On April 24, 1942, there was a derailment of a freight train on the Missouri-Kansas-Texas Railroad near Flora, Okla., which resulted in the death of three trespassers and two employees and the injury of one employee.

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

- o Muskogee, Okla. 62.4 mi.
- o McAlester 28.0 mi.
- o Chockie 3.23 mi.
- X Point of accident 1.17 mi.
- o Flora, Okla. 62.5 mi.
- o Denison, Texas 1.0 mi.
- o Ray, Texas



Inv-2533
 Missouri-Kansas-Texas Railroad
 Flora, Okla.
 April 24, 1942

Location of Accident and Method of Operation

This accident occurred on that part of the Southern District designated as the Choctaw Division, which extends between Muskogee, Okla., and Ray, Tex., a distance of 158.3 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and an automatic block-signal system. The accident occurred at Bridge 597.1, which spans a dry ravine at a point 1.17 miles north of the station at Flora, Okla. At this bridge water flows from east to west. As the point of accident is approached from the north there are, in succession, a tangent 4,779.7 feet in length, a 0°30' curve to the left 396.7 feet in length, and a tangent 3,125.4 feet to the point of accident and 469.7 feet beyond. The grade for south-bound trains is 0.771 percent descending throughout a distance of 4,800 feet and then is level 520 feet to the point of accident.

Immediately north of Bridge 597.1 the track structure consists of 90-pound A.R.A. rail, 39 feet in length, laid in 1952 on 24 treated ties to the rail length; it is single-spiked, fully tieplated, laid on 12 inches of rock ballast, and is well maintained.

Bridge 597.1, an open-deck 5-bent pile-and-timber trestle, constructed in 1919 to replace a similar bridge, was a four-panel structure, 55 feet in length. The bents were numbered consecutively from north to south. Bents Nos. 1 and 5 consisted of 5 piles each, 20 feet in length, driven to a depth of almost 20 feet. Bent No. 2 consisted of 6 piles, 22 feet in length, driven to a depth of 6 feet. Bent No. 3 consisted of 6 piles, 22 feet in length, driven to a depth of 5 feet. Bent No. 4 was of post-frame design, and consisted of 6 posts, 12 inches square and 15-1/2 feet in length. This bent rested on a sill 12 inches square, which in turn rested on a concrete pedestal. The pedestal was 23 feet 9 inches long, 5 feet high, 20 inches wide at the top and 2 feet 11 inches wide at the base, and rested on shale. All piles were driven to shale. The outer piles of the bents were placed in a batter of 2 inches to 1 foot. Sway braces of timbers measuring 4 inches by 8 inches were provided on bents Nos. 2, 3 and 4. The caps were 14 inches square by 14 feet in length. Two 4-ply chords of 8-inch by 16-inch stringers were provided. Longitudinal braces were 6 inches by 8 inches, and were dapped 3 inches at the caps of the bents.

At a point approximately 40 feet north of the north end of the bridge the ground-line was approximately 1 foot above the top of the rail. Starting about 15 feet south of the north end of the bridge and extending southward a distance of 30 feet,

the ground-line was 20 feet below the top of the rail. At a point near the south end of Bridge 597.1, the ground-line was about 8 feet below the top of the rail.

Bridge 597.0, which is a 4-panel pile-bent trestle, is 340 feet north of Bridge 597.1 and spans a dry ravine. These two channels converge at a point about 100 feet west of the track, and form a single channel, which passes through highway culverts at a point 285 feet west of the railroad.

Operating rules read in part as follows:

407. All trains will run at restricted speed during and immediately after heavy storms, keeping a close lookout for all places that are likely to wash out or slide.

408. In cases of severe storms * * *. Conductors and enginemen will promptly report to the Superintendent or Trainmaster when they encounter storms or unusual foggy weather.

Rules and Instructions for the Maintenance of Way and Structures read in part as follows:

402. During heavy storms or floods, whether by day or night, whereby tracks or structures may be damaged, foremen and such of their forces as they deem necessary, must be on duty. At such times, they must go over their sections to make sure that the track is safe, taking stop signals with them. They must examine track, waterways, culverts, bridge substructures, etc., and if any damage is found make repairs, or protect by flags or lamps, and advise extent of same by telegraph to superintendent and roadmaster.

Automatic signal 596.1, which governs southward movements, is located 5,754.3 feet north of the point of accident.

In the vicinity of the point of accident the maximum authorized speed for freight trains is 45 miles per hour.

Description of Accident

No. 75, a south-bound third-class freight train, consisted at the time of the accident of engine 839, 1 auxiliary water car, 27 loaded and 33 empty cars and a caboose. After a terminal air-brake test was made this train departed from Muskogee, 94.8 miles north of Flora, at 3:59 p. m., according to the

dispatcher's record of movement of trains, 5 hours 59 minutes late, passed McAlester, 32.4 miles north of Flora and the last open office, at 6:20 p. m., 6 hours 15 minutes late, and while moving at an estimated speed of 20 to 30 miles per hour it was derailed at Bridge 597.1.

Engine 839 and its tender, remaining coupled, were derailed and stopped, badly damaged, on their right sides, parallel to the track and 37 feet west of it, with the front end of the engine 87 feet south of the south end of the bridge. The cab was badly damaged. The tender frame was broken and the rear of the tender was crushed inward. The first to tenth cars, inclusive, were derailed and stopped at various angles in the channel and across the track. The front truck of the eleventh car was derailed. The tenth car was loaded with matches, which became ignited, and the fire consumed four cars.

After the accident, some of the material of Bridge 597.1 was found under the wreckage in the channel, and some of the piles were lodged against a highway bridge, 285 feet west of the track. Between bents Nos. 2 and 3 of Bridge 597.1 the channel was scoured to a depth of approximately 4 feet.

It was daylight and rain was falling at the time of the accident, which occurred at 7:45 p. m.

The employees killed were the fireman and the front brakeman, and the employee injured was the engineer.

Data

The watershed drained by the channel under Bridge 597.1 contains approximately 970 acres. The terrain in the watershed consists of a steep, rocky, timbered slope. The channel is dry most of the time. Prior to the time of the accident, timber on about 12 acres of land immediately east of Bridge 597.1 had been cut and left on the ground.

The cross-sectional area of the space between bents Nos. 1 and 5 and below the stringers was 688 square feet. The cross-sectional area below the high-water mark made on the day of the accident was 495 square feet.

According to the U. S. weather records at Atoka, 11.2 miles south of Flora, between 1 p. m. and 7 p. m., April 24, there was 3.45 inches of rainfall, and between 7 p. m. and 11 p. m. there was 2.41 inches of rainfall.

Discussion

No. 75 was moving on tangent track at a speed of 20 to 30 miles per hour in territory where the maximum authorized speed for freight trains was 45 miles per hour when the bridge involved collapsed under the engine. According to the statement of the engineer, as his train was approaching the point where the accident occurred the throttle was closed, the headlight was lighted and both the fireman and he were maintaining a lookout ahead. The engine was riding smoothly. Signal 596.1, the last signal passed, displayed proceed for his train. When the engine passed over Bridge 597.0, located about 340 feet north of Bridge 597.1, Bridge 597.0 appeared to tremble. Because of heavy rainfall, the view ahead was considerably restricted. When the engine was a short distance north of Bridge 597.1, the engineer observed that the bridge did not appear safe. He immediately moved the brake valve to emergency position, but the distance was not sufficient to stop short of the bridge. The bridge started to collapse when the engine-truck wheels entered upon it. When the tender entered upon the bridge the rear end of the engine dropped and the front end appeared to rise, and then the bridge collapsed completely. The engine stopped with the front end about 87 feet south of the south end of the bridge. Of the 11 cars derailed, 9 stopped in the channel.

The engineer said that No. 75 had encountered an ordinary amount of rain between Muskogee and Kiowa, 94.8 miles and 15.6 miles, respectively, north of Flora. At Kiowa extremely heavy rainfall was encountered. Between Kiowa and Flora, a considerable amount of rain fell. At Chockie, 4.4 miles north of Flora, water was high along the track but it did not appear to be dangerous. Since the fireman and the front brakeman were killed in the accident, it could not be determined if either observed any dangerous condition of Bridge 597.1 before the derailment occurred; however, since neither warned the engineer prior to the emergency application of the brakes, it is probable they did not see any defective condition of the bridge. Inspection of the engine disclosed that prior to the accident no condition existed that might have contributed to the cause of the derailment.

After the occurrence of the accident, it was found that considerable timber and driftwood had washed from the land drained by the channel spanned by Bridge 597.1. According to the statement of the assistant division engineer, the driftwood lodged against the bents and blocked the opening under the bridge. This condition caused the water on the upstream side of the bridge to rise to a higher level, and the velocity of the flood water was increased so that the channel was scoured

to a depth of 4 feet, almost to the lower ends of the piles of bents Nos. 2 and 3. Undoubtedly this scouring so weakened the footings of the bents that the bridge collapsed under the impact of the engine.

The investigation disclosed that rain had fallen during 6 days immediately preceding the time of the accident and that the ground was saturated. During 8 hours preceding the time of the accident, considerable rain had fallen in the vicinity of the point of accident. According to statements of residents near the area drained by the channel under Bridge 597.1, rain had fallen steadily between 12 noon and 6:30 p. m., and there was a downpour between 6:30 p. m. and 7 p. m. Between noon and the time of the accident 4 or 5 inches of rain fell. The level of a lake covering about 90 acres immediately south of the area in question rose about 2 feet in 1/2 hour. About 5:15 p. m. the section force assigned to the section involved passed over Bridge 597.1, and at that time there was about 2 feet of water in the channel, but there was no indication of drift against the bents. According to the statements of the crew of a north-bound freight train, they passed over the bridge about 6:30 p. m. At that time considerable water flowed under the bridge, but there was no indication of drift blocking the channel. About 7 p. m., the dispatcher received reports from McAlester, 32.4 miles north of Flora, and from Stringtown, 4.2 miles south of Flora, that excessive rain had fallen. He immediately issued a slow order to the station at Stringtown, and, at 7:50 p. m., issued a general slow order for the entire division.

The rules governing storm conditions on the line involved provide that trains will run at restricted speed during heavy storms and train-service employees shall report storm conditions promptly to designated officials. In addition, maintenance-of-way foremen are required to patrol their sections to ascertain if there is any damage by storm, provide necessary flag protection for weakened track structure and bridges, and then report such conditions promptly to the designated officials. In the case under investigation, the foreman in charge of the section involved inspected the track about 2 hours 30 minutes prior to the accident and was again patrolling the track when the accident occurred. The crew involved in the accident were not alarmed about flood conditions; however, at the time of the accident they were operating their train at one-half the maximum authorized speed.

The investigation disclosed that the piling and timbers were sound and the cross-sectional area for the passage of water

was greater than the drainage area had previously required. The high-water mark was about 2-1/2 feet below the stringers of the bridge. If the channel had not become blocked by timber and debris against the bents, it is probable that the water would not have scoured the channel sufficiently to cause the footings of the bents to be insecure.

Cause

It is found that this accident was caused by the collapse of a bridge which had been weakened by flood water.

Dated at Washington, D. C., this sixteenth day of June, 1942.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.