MINISTRY OF TRANSPORT

RAILWAY ACCIDENTS

REPORT ON THE DERAILMENT which occurred on 17th July 1948 near NEW SOUTHGATE in the EASTERN REGION of the BRITISH RAILWAYS

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BRITISH RAILWAYS

MINISTRY OF TRANSPORT,
Berkeley Square House,
London, W.1.

23rd October, 1948.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order dated 19th July 1948, the result of my Inquiry into the derailment which occurred at about 6.0 a.m. on 17th July 1948, near New Southgate station, about 7½ miles north of King's Cross on the four-track main line of the Eastern Region.

The 7.50 p.m. Express Passenger train from Edinburgh, comprising 11 bogie coaches hauled by a Pacific type engine, was travelling at about 70 m.p.h. through a short tunnel on the straight Up Fast line when the trailing bogie wheels of the engine became derailed. Derailment of the leading bogie wheels followed at the V crossing of a facing connection 689 yards ahead, outside the tunnel, after which the whole train became derailed as the track was destroyed by the engine bogie.

The engine broke away from the train when the tender screw coupling parted, overturned to the right, and slid on its side for about 100 yards through an overbridge, coming to rest 1145 yards from the initial point of derailment. I regret to state that the fireman, A. E. Young, was killed, but there were no serious casualties in the crowded train, though the leading vehicle, a corridor brake third, was also overturned and considerably damaged ; all the Buckeye couplings between the coaches held fast and the remaining ten came to rest upright and in line with very little damage except to bogies and undergear. One passenger was detained in hospital for two days and nine others sustained minor injuries or shock ; the driver, W. Hoole, was also slightly injured.

The derailment was seen by the signalman in the adjacent Cemetery signal box, and he sent the Obstruction Danger signal at once on all four lines. He then telephoned to the Control and, in response to emergency calls, ambulances from local hospitals, Police and Fire Services began to arrive within 10 minutes. The night staff of the Standard Telephone & Cable Co. Ltd., whose works are opposite to the site, were also prompt in forming a first-aid party, and some of the injured passengers were treated in their surgery. All four passenger lines were blocked, also the Up Goods loop, but traffic was allowed to pass on the Down Slow at 8.5 a.m. and the Up Reception line on the outside of the formation was made available for through running at 9.30 a.m. Main line traffic was also diverted via Hertford.

Breakdown cranes arrived from King's Cross, Hornsey and Peterborough at 8.35 a.m., 9.9 a.m. and 10.26 a.m. respectively, and the derailed engine and coaches were cleared by 8.0 p.m. The Down Fast line, which was not very seriously damaged, was reopened to traffic 20 minutes later, but the Up Fast was destroyed for more than 200 yards and many chairs were broken from the initial point of derailment onwards : it was not possible to complete its repair until 6.0 p.m. on the following day, 18th July. Normal working was then resumed, though Up trains were hand signalled pending the renewal of the Cemetery box Up starting signal gantry which had been destroyed by the overturned engine.

The weather was fine and clear.

SITE AND TRACK

1. As will be seen from Fig. 1 of the attached plan, the initial derailment was in the middle of the three parallel Barnet tunnels ; it accommodates the Up and Down Fast lines, with the Slow lines in single line tunnels on either side. The tunnels are straight, 605 yards long, and are 5 miles south of the summit at Potters Bar (12½ miles from King's Cross), whence the Up line descends continuously at 1 in 200 for 8½ miles with easy curvature. Before the war speeds up to 90 m.p.h. were attained on this long falling gradient, but there is now a general limit of 60 m.p.h. on all lines south of Hatfield (17½ miles from King's Cross) pending restoration of the track to its pre-war standard. Occupation of the Up Fast line is considerable, with a summer weekday average of 100 movements, including 39 express passenger trains, during the 24 hours.

2. South of the tunnels, the Fast lines are straight for some distance in cutting past Cemetery signal box on the Up side where there is a facing crossover Up Fast to Up Slow, and where the Up Loop and Up Reception lines diverge from the Up Slow. The brick overbridge No. 37 spans all six lines, with a double line opening for the Up and Down Fast, through which the overturned engine slid on its side.

3. The length of Up Fast line in the tunnel was laid new in 1936 with 100 lbs. B.S. rails and it was re-railed with 95 lbs. R.B.S. rails in 1944 in accordance with the usual life of 7 or 8 years for rails in this tunnel ; their average weight at the time of the derailment was approximately 83 lbs. per yard, and complete renewal of the track is proposed for 1949. Each 60 ft. rail length is supported by 24 sleepers, at standard spacing for the short two-bolt fishplates ; those on either side of the joints are 8 ft. 6 ins. by 12 ins. by 6 ins. and the remainder 8 ft. 6 ins. by 10 ins. by 5 ins. All the sleepers had been chaired at the depot with three coachscrews per chair.

4. The double line tunnel, which passes through London clay and is brick lined, is of pear-shaped section, and the upper surface of the invert is 6 ft. 3 ins. below rail level in the centre. The drain in the centre of the invert is surrounded by sand and shingle filling on which the stone ballast is laid, its upper layer consisting largely of limestone chippings, which are used for the shovel packing of sleepers in the tunnel in the course of maintenance. The tunnel is dry except for two or three isolated places, where water constantly drips from the roof ; as might be expected from the character of the foundation, ballast drainage is good though, as is usual in tunnels, there was a considerable amount of dirt on the surface.

5. I examined the track in the tunnel within a few hours of the derailment and again five days later with the aid of special lighting. The first sign of derailment was 218 yards from the tunnel entrance. It consisted of a single light flange mark, with no perceptible indentation, crossing the surface of the six-foot rail in a length of 15 ft. 10 ins. The mark was preceded by light scoring of the running edge of the rail, and its commencement was 5 ft. 4 ins. ahead of a badly "humped" rail joint, close to which there were continual drips of water from the roof into the six-foot way.

This sharply elevated joint was very noticeable to the eye and the longitudinal levels in its immediate neighbourhood are shown by Fig. 3, which was prepared from a careful survey before any further traffic had passed over the Up Fast line. In effect, the six-foot rail showed a "run up" of ¾ inch to the joint in a distance of 8 ft. 3 ins., representing a gradient of 1 in 132, and there was a corresponding "run down" of 13/16 in. in a distance of 5 ft. 5 ins., or 1 in 80 ; the end of the "run down" thus practically coincided with the commencement of the flange mark. It will be seen that the cess rail levels were about the same, so that there was no material variation of the cross level over the distance concerned ; at the joint it was correct (zero cant).

The joint had been lifted and packed on Sunday 11th July, six days before the derailment, in the course of routine track repairs, and I refer to this later. String measurement at my inspection five days after the derailment showed that the "hump" had become slightly more pronounced under the traffic which had been passing with a 15 m.p.h. speed restriction, presumably because the two joint sleepers had been more firmly packed than those on either side. One or two joints in rear also appeared to be over-packed but not nearly to the same extent.

6. Although the cross level in the immediate neighbourhood of the joint was nearly correct, its regularity over the preceding 200 yards in the tunnel was far from satisfactory—see Fig. 2, which was prepared from a survey with a level to confirm the readings of the ordinary cant gauge, and shows the differences in height between the cess and six-foot rails at joints and middles from the tunnel entrance to the flange mark on the six-foot rail. It is significant that the greatest variation was in the two rail lengths preceding the derailment, where there was a rise in the cess rail of ⅞ in. in 30 ft. (1 in 411), followed by a drop of ¾ in., also in a length of 30 ft. (1 in 480). Voidmeter readings taken after the accident showed no undue depression of the sleepers under load.

7. The sleepers and fastenings appeared to be in sound condition throughout. The gauge through the tunnel in rear of the joint was practically constant at ⅛ in. tight ; at the joint itself, however, it was ¼ in. tight, widening again to ⅛ in. slack in a length of 13 ft., which included the point of initial derailment. This local variation was probably due to some inaccuracy in the chairing of the sleepers at the depot or in the chair castings ; there was no sign of movement of the chairs on the sleepers.

Engine and Train

8. The engine was No. 60508, "Duke of Rothesay", of the A2/1 Class (see Fig. 4), stabled at King's Cross shed. This is a powerful three-cylinder mixed traffic type with 4-6-2 wheel arrangement ; the tractive force at 85% of the boiler pressure is 36,387 lbs. The total weight in working order with tender is 150 tons 0 cwts., with 22 tons on each of the coupled axles and 17½ tons on the bogie. The four engines in the A2/1 Class were built in 1944-45, and there are 35 others of similar characteristic type which were built by the former London and North Eastern Railway from 1943 onwards under the general A2 classification. With large boilers, 6 ft. 2 ins. coupled wheels, and modern front end design, they are all suitable for main line express duties and are so employed. At the time of the derailment engine No. 60508 had run approximately 36,500 miles since the last general repair in July 1947.

9. The total wheelbase of the engine is 36 ft. 8 ins. with a rigid coupled wheelbase of 13 ft. 0 ins. The bogie wheelbase is 6 ft. 3 ins. with the long space of 8 ft. 2 ins. (reduced in later engines of the A.2 class) between its trailing axle and leading coupled axle. The bogie is of the side bearing type with lubricated bronze slides, and no weight is taken at the central pivot. Side control is by coil springs, initially at 4 tons and rising to 7 tons at maximum side displacement ; the control springs are so disposed that lateral wear is automatically taken up, and no uncontrolled side play can develop apart from that due to wear of axlebox surfaces and wheel bosses. The rear carrying axle is of radial type with lubricated bronze Cartazzi slides inclined at 1 in 10.66.

10. The coupled wheels have underhung, and the rear carrying wheels overhung, laminated springs. Each of the bogie wheels has a separate overhung laminated spring, 2 ft. 6 ins. long between the pin centres, composed of 7 plates each 4½ ins. wide and ½ in. thick. The designed weight distribution is shown by Fig. 4, but it would have been useless to weigh the engine after the derailment owing to the fracture of the right hand spring hanger of the rear carrying axle and damage to the Cartazzi assembly. The engine, however, had been in Darlington works for intermediate repairs only five weeks before the derailment, when the bogie was examined and weights adjusted to standard.

11. I inspected the engine at King's Cross shed four days after the accident, and the bogie was run out and its frame lifted from the wheels while I was there. The bogie was undamaged structurally except that its right hand frame plate was very slightly bent. A spring hanger was bent and the cast iron axlebox keeps were broken or lost. I refer in para. 15 below to the bruises and other markings on the tyres, and damage to the engine as a whole is briefly described in para. 18. Tyres and flanges of the bogie and coupled wheels showed no appreciable wear from their standard profile and the bronze surfaces of the bogie bearing slides were in good condition and well lubricated.

12. Subsequent detailed examination after the engine had been stripped in Doncaster works confirmed the satisfactory condition of the tyres and flanges, and all the wheels were found to be true on their axles; nor was there any undue side play of any of the axles in relation to the frames. The laminated springs of the coupled axles were in good condition, and tests showed no material variation from the standard deflection rate of .27 ins. per ton.

13. Three of the bogie springs approximated to their standard deflection of .17 ins. per ton, though several of their plates had old fractures or cracks at the cotter hole inside the buckle. In the left leading spring, however, six of the seven plates were broken in the buckle and it was weaker than standard with a deflection rate of .24 ins. per ton. I understand that such fractures are not uncommon in this type of laminated bogie spring; the A.2 engines were designed and built at a time when there was a general shortage of coil springs, which are preferred, and are used on all bogies of Pacific type engines of earlier and later London and North Eastern design.

14. As has been mentioned, the 11 bogie coaches, which included a composite sleeping car, were all Buckeye coupled, and the tender was screw coupled to the leading vehicle. All had steel underframes with bodies of hard wood or steel panelled on hard wood framing. Their weight was 362 tons and the combined brake power of the engine and train (steam on the coupled and tender wheels and vacuum on all wheels of the coaches) was 78% of the total weight of 512 tons. The total length of the train was 255 yards.

Course of Derailment and Damage

15. The initial stage of the derailment was witnessed by the driver of a parcels train on the Down Slow who saw the 7.50 p.m. Express emerge from the South end of Barnet tunnel with sparks coming from the engine bogie. His engine was struck by small pieces of metal, probably from the many broken chairs which were found in the 689 yards from the flange mark in the tunnel to the V crossing of the facing connection to the Up Slow.

In this distance, the chairs and coach screws were also marked continuously on the right hand side of both rails and there were corresponding heavy bruises, also marks from the galvanising of the coach screws, on the trailing bogie wheels of the engine. No other engine wheels bore any marks which suggested violent contact with chairs and fastenings in this way, and it is therefore reasonable to assume that the trailing axle of the bogie became derailed to the right in the tunnel.

The facing point lock bar on the inside of the left hand rail was smashed, and at the V crossing there was a flange mark which showed that the left hand derailed wheel had ridden up over the knuckle of the wing rail and had dropped to the four-foot side of it. This action evidently turned the bogie askew to the left and the derailed right hand trailing wheel tore away the outside edge of the right hand rail opposite to the check; there was corresponding heavy scoring at the back of its flange. A few feet further on there was a flange mark where it appeared that the left leading bogie wheel had been forced over the cess rail.

16. After that, marks on the chairs and sleepers indicated that the bogie had been running askew with the leading wheels derailed about 10 inches to the left and the trailing wheels derailed to the right close to the track alignment. This condition continued for a further 80 yards until a joint in the six-foot rail was broken, probably by shearing of the fishbolts. Thereafter derailment became complete as the Up Fast track was destroyed for a length of 200 yards.

17. The final position of the derailed coaches is shown by Fig. 1. The leading coach, was overturned on its right hand side diagonally across the Up and Down Fast and Up Slow lines, 1,046 yards ahead of the initial mark. As has been mentioned, this was the only vehicle which received serious damage; both the bogies were detached, the underframe was bent, and the right hand (corridor) side of the body was partly torn away. The underframe of the second coach also was bent, but its body and those of the remaining nine received no structural damage; a few window lights were broken.

18. The engine came to rest 1,145 yards ahead of the initial mark in the tunnel, but it was not possible to determine exactly the point at which it broke away from the train when the tender coupling shackle was torn open, nor where it finally turned over. It was clear, however, from the absence of damage to the sleepers, chairs, and fastenings of the Up Fast line beyond the overturned coach that the engine and tender had been sliding on their right hand sides on the rails for at least 100 yards; in this length there was some track distortion and heavy scores at intervals on the rail surface, and corresponding grooves were cut in the right hand outside cylinder casting and in the steel motion bracket, probably by the six-foot rail of the Up Fast.

There was severe damage to the cab sheeting and other platework on the right hand (fireman's) side, and a displaced rail penetrated the tender tank; the return crank and the expansion link of the *right* hand set of Walschaert's valve gear were broken off and the connecting link, which remained in place between them, was bent double and twisted. These parts, also a right hand cylinder cock, were probably torn off by a displaced rail soon after the engine became completely derailed and were flung in some way to the *left* hand side of the track; they were found in the position shown in Fig. 1.

The trailing wheels of the tender, as it slid on its side, swept away the main lattice post of a signal gantry and immediately after that struck and severely damaged the brick pier of overbridge No. 37. All except one of the tender springs became detached and all its axleboxes were broken.

19. The following is a summary of relevant distances with reference to the commencement of the flange mark on the six-foot rail in the tunnel :

Potters Bar summit	5 miles	North.
North end of Barnet tunnel	218 yards	,,
Marked irregularity of cross level	42-12 yards	,,
"Humped" rail joint	5 ft. 4 ins.	,,
Commencement of flange mark on six-foot rail (trailing wheels of engine bogie derailed to *right*)	—	
South end of Barnet tunnel	387 yards	South.
Cemetery Signal Box	615 yards	,,
V crossing of facing connection to Up Slow	689 yards	,,
Flange mark on cess rail (leading bogie wheels derailed to *left*) ..	697 yards	,,
Commencement of destruction of Up Fast track	781 yards	,,
End of destruction of Up Fast track	982 yards	,,
Front of overturned leading coach	1,046 yards	,,
Overbridge No. 37	1,088 yards	,,
Front of overturned engine	1,145 yards	,,

Evidence Regarding Speed

20. The driver of the train concerned was W. Hoole of King's Cross Shed, who is thoroughly experienced in working express trains over this route ; he had driven the same train on the previous day, but no high speed had been attained South of Potters Bar owing to signal checks. He stated that on the morning of the accident he was coasting downhill through Barnet tunnel at about 60 m.p.h. He felt no unusual movement in the tunnel apart from some degree of roughness of running which was always present there and which he could not define more precisely ; nor was anything out of the ordinary noticed by the driver of the preceding express train at a similar speed, and there was no record that any complaints of bad riding in the tunnel had been received from drivers that week or previously.

Just as the engine emerged from the tunnel, Driver Hoole and Fireman Young heard a rattling noise, apparently from the front on the right hand side ; he realised at once that something was seriously wrong and applied the brake fully. The noise increased but, in Hoole's own words "the debris did not really begin to fly until we got through the points," after which the engine heeled over gradually to the right until it was on its side about 20 yards before reaching overbridge No. 37. According to Hoole, the sliding motion was quite smooth as the engine passed through the bridge and gradually came to rest. He got off without difficulty and concerned himself with the protection of the Down lines.

21. Hoole stated that he had shut off steam at Hadley Wood, about 3 miles in rear, having attained about 60 m.p.h. there after passing the Potters Bar summit at a somewhat lower speed. He did not think that with a mixed traffic engine of this type speed would increase without steam on the 1 in 200 gradient ; moreover, apart from the general 60 m.p.h. limit, of which he was well aware, he was anxious not to let the speed rise too high on account of patches of mist, but he had not used the brake until the final emergency application at the South end of Barnet tunnel. Hoole's statement that he shut off steam at Hadley Wood was not supported by Signalman G. A. J. Salmons at New Barnet North box (¾ mile further on) who said that the engine was steaming as the train passed, but Salmons did not think that it was going much faster than the usual 60-65 m.p.h.

22. All signals had been clear for the train from Peterborough onwards. According to the signal box timings and the guard's journal, it was running 10 minutes late when it passed Hatfield at 5.50 a.m., having regained 10 minutes on the booked time in running the 58½ miles from Peterborough. The actual average speed over this distance was 55.7 m.p.h., generally against the gradient ; this average was, however, within that permitted by the standard section timings to which trains may run when necessary to regain time.

The passing time recorded at Potters Bar was 5.55 a.m., and at Cemetery box the signalman noted the time as 5.59 a.m., as the train passed just before it became completely derailed. These timings represent an average speed of 67.3 m.p.h. for the 10.1 miles from Hatfield to Cemetery, or 56.4 m.p.h. for the 4.7 miles of rising gradient from Hatfield to Potters Bar and 81 m.p.h. for the 5.4 miles of 1 in 200 falling gradient thence to Cemetery.

23. Signal box timings are not an accurate measure of speed over short distances, and the recorded interval of 4 minutes for the 5.4 miles from Potters Bar to Cemetery is no proof that the average speed of the train over this distance was as high as 81 m.p.h. The engine, however, appears to have been gaining time steadily with the comparatively light load, and in comparison, records showed that for 20 similarly timed express trains during the previous 6 days the average interval from Potters Bar to Cemetery was 6 minutes (minimum 5 minutes, maximum 8 minutes) or 54 m.p.h. It should also be noted that the leading coach and the engine came to rest 659 yards and 758 yards respectively from the South end of the tunnel where the brake was applied fully, or 265 yards and 364 yards from the point where complete derailment began. In all these circumstances, it seems likely that speed on the long falling gradient may have risen higher than Driver Hoole had estimated, perhaps to 70 m.p.h.

24. The guard, G. S. Olney, and the assistant guard, W. J. Pelling, were travelling in the rear van. They were not good witnesses and their evidence as to the indications of the vacuum gauge in the tunnel was conflicting. Both, however, felt violent snatching of a type which was consistent with an emergency brake application at speed.

Evidence Regarding Track

25. The Engineering staff directly concerned were the Chief Permanent Way Inspector of the King's Cross District, Mr. A. J. Mowl, Permanent Way Inspector G. R. B. Compton, and the length ganger, W. Flitney. The District Engineer had retired two months before; his successor had been appointed but had not yet arrived, and in the meantime the Assistant District Engineer, Mr. J. L. Adamson, was temporarily in charge.

26. Ganger Flitney is nearly 65 years of age with 44 years of railway service. He had been in charge for five years of the length gang whose authorised strength is five men, including the sub-ganger and himself; during the week before the derailment (10th—17th July) one man had been away sick, and the gang had also been one man under strength from February to May. Flitney was responsible for the maintenance of one mile of quadruple track, including the three parallel Barnet tunnels. Apart from a wet patch just north of the tunnel on the Up Fast line he did not consider that the length was at all difficult to maintain; the foundation in the tunnel was good although the joints required packing from time to time in the ordinary way.

He had undertaken the routine quarterly examination and repair of the Barnet tunnel lines on Sunday, 11th July, 6 days before the accident; the work had been done under traffic, and he had been lent two additional men for the day. He had required to lift and pack several joints on the Up and Down Fast lines which he had found "a shade down"; he had done the work himself, with assistance, and had used a shovel to pack limestone chippings under the joint sleepers. The joint immediately preceding the derailment was included but Flitney said that, although the ballast under the "running on" sleeper was wet from the drips from the roof, this joint was not particularly troublesome, and he could not recollect that it had required attention for some months. On the other hand, Acting Sub-ganger Stevens, who had helped him to open out the joint on the 11th July, thought that it had required lifting fairly often, and mentioned that the ballast under the joint sleepers on that day had not been as wet as usual.

Flitney explained that he confined the packing to the two joint sleepers whose centres, with the short two-hole fishplates, were only 17½ ins. apart. He stated that he finally left the joint about ½ in. high so that it should settle down to a level surface as the packing was consolidated by the first few trains. This was his usual practice in repairing wet joints in the tunnel, and he had always found that they had become level, or nearly so, at his examination of the track on a Monday morning after Sunday repair work. He had not, however, looked specially at the joint in question after packing it on 11th July as he was entirely confident from his experience that it would have settled down properly under traffic. He appeared to be genuinely surprised that the joint was found to be as much as ¾ in.—13/16 in. high after the derailment, and could not suggest why it had not gone down as usual; in the light of events he was very regretful that he had not looked at it again, in which case he would have taken steps to lower it. He would not, however, have thought that its condition was unsafe for any speed which might be attained by Up trains.

With regard to the cross-level, Flitney had not noticed the marked irregularity (see Fig. 2) about two rail lengths in rear of the initial derailment. He had made some tests with the superelevation gauge on 11th July, which did not suggest that the Up Fast line was noticeably out of level, but he added that he had had no time to make a thorough check.

27. Permanent Way Inspector Compton had been promoted 13 months before to the charge of this permanent way district, which includes 13¼ miles of the main line, between the 4¾ and 18 mile posts. He and his predecessor, Permanent Way Inspector R. A. Adams, spoke well of Ganger Flitney's work, and this was confirmed by 22 track inspection reports for the last 5 years which were made under the Region's marking system by the Assistant District Engineers and Mr. Mowl, and by other Permanent Way Inspectors as well as Mr. Compton and Mr. Adams. From these reports the average total marking of Flitney's length under the various heads, top, line, level, etc., was 882 out of 1,000 (maximum 930 and minimum 857), and comment was generally favourable.

Mr. Adams had known the length for many years and said that a few of the joints in the tunnel required regular but not excessive attention in the winter when they were wet. He could not recollect that Flitney was in the habit of packing joints too high; he considered that it would be the right practice to leave a joint ½ in. high at a soft place, but not where the foundation was solid.

Mr. Compton said that it was his routine practice to inspect the Up and Down Fast lines on foot once a week, and on 17th June, a month before the accident, he had travelled over them on the footplate. As a result of this test he had been satisfied with the Up Fast line in the tunnel, but he considered that some realignment of the Down line was required and he instructed Flitney accordingly. He was not present during the repair work on 11th July, but at his inspection on 14th July he examined the Down line and found that slight further re-alignment was required. He did not pay special attention to the Up Fast line, as he had been satisfied with the running on 17th June and had received no complaints since, though he gave it a cursory inspection.

He could not explain the derailment, as he did not consider that the high joint, as it was found, was unsafe for a speed of 60 m.p.h., though the condition was undesirable in a fast running line, and he emphasised that no complaints of bad riding in the tunnel had been received since it had been lifted on 11th July. He thought that Flitney had acted correctly in leaving the joint standing high at a wet place in the track. Otherwise it would have gone down in a few hours, and the work would have had to be done again.

28. Chief Permanent Way Inspector Mowl examined the Up Fast line in the tunnel about two hours after the accident, and was present at my subsequent inspection. He expressed the opinion that although the joint was a "trifle stiff," he did not think that it would be dangerous at a speed of 60 m.p.h. He reiterated this opinion, which he thought was justified by the fact that many fast trains had passed over this joint during the week. Later in his evidence, however, he went so far as to say its condition was very undesirable and should have been corrected without delay.

Mr. Mowl was not satisfied with the cross level. Though he did not think that the irregularity which was present would have had a serious disturbing effect at 60 m.p.h., he said that its correction would be essential for materially higher speeds. He did not however wish to suggest that the 60 m.p.h. restriction should justify any relaxation in maintenance.

CONCLUSION

29. I have no doubt that local track defects close in rear of the initial derailment, were the primary cause, and speed in excess of the authorised limit appears to have contributed. Apart from the weak left leading bogie spring, mentioned later, Engine No. 60508 was in normal condition, having regard to the mileage run since the last general repair.

It was inevitable that the irregularity of cross level should set up some degree of rolling, and this no doubt accentuated the slight alternations of flange pressure at the bogie wheels, such as occur in the ordinary course with an engine running at speed on the straight. The weight on the bogie would naturally be increased as it rose to negotiate the high joint a few yards ahead ; at the same time the main frame would be lifted and the subsequent rapid fall in the level of both rails would result in corresponding relief of weight from the bogie, as the leading coupled wheels rose in their turn.

The character of the flange mark, which was only 5 ft. 4 ins. beyond the joint, suggested that the right trailing bogie wheel was very lightly loaded at the critical moment, and evidently the weight on it was insufficient to prevent climbing under side thrust which had been accentuated by the preceding irregularity of cross level. Although the joint had been standing high for the previous six days, and many fast trains had negotiated it during that time, including 33 hauled by A.2 Class engines, it is probable that the particular and momentary combination of flange thrust and relief of weight which were necessary to cause derailment did not occur until the passage of the train concerned, which was running faster than usual.

While it seems possible that a more flexibly sprung bogie might have passed over the high joint without derailment, it cannot be suggested that its design was a contributory cause with such track defects as existed. Nor was there any contribution from the weakness of the broken left leading bogie spring, as the leading axle remained on the rails for nearly 700 yards until it was forcibly derailed to the left at the V crossing. I understand, that locomotive spring fractures have become more common throughout the country in recent years, which may be a reflection of the general condition of the permanent way.

30. In this case the track material was sound and the formation in the tunnel was solid and well drained, but faulty adjustment had resulted in two serious defects in level. Inspection reports which were consistently favourable indicated that Ganger Flitney had maintained his length conscientiously for the last 5 years, but it was clear from his omission to make a careful test with the superelevation gauge on the previous Sunday that he had not attached sufficient importance, at any rate in recent months, to the maintenance of regular cross level on a fast running line.

A surprising error of judgment had also resulted in a sharply elevated joint which had not become level under traffic as he had expected ; he had evidently made an excessive allowance for the effect of water in a stable and permeable foundation, which had led him to pack the joint much too high. Flitney's evidence on these matters was entirely straightforward, and I particularly regret the circumstances in which he must accept responsibility for a serious derailment on the eve of his retirement.

31. I do not think that Permanent Way Inspector Compton can be criticised for concentrating his attention on the Down Fast line in the tunnel, at the expense of the Up Fast, at his inspection on 14th July, in view of his footplate test on 17th June, and in the absence of complaints from drivers ; also, from his own experience of Flitney and from earlier track inspection reports, he was entitled to expect better work. But Mr. Compton's evidence and that of Chief Permanent Way Inspector Mowl suggested that neither was disposed at first to take a sufficiently serious view of the defects which were found to exist in rear of the point of derailment, and both expressed the opinion that the high joint should not have been unsafe at the prevailing speeds. I am confident that such an impression no longer persists, and that they will direct their supervision to ensure an appropriate standard of care in maintenance on all lines in their charge.

REMARKS

32. The general war-time restriction of 60 m.p.h. on the East Coast main line was retained south of Hatfield although it was raised in 1945 to 70 m.p.h. elsewhere. The reasons for this decision were the accumulated arrears of track renewals and arrears of drainage work in the clay formation in the London area, and shortage of permanent way staff. Since that date approximately 35% of the mileage of the Fast lines south of Hatfield has been renewed, some of it with 110 lbs. flat bottomed rails ; a considerable sum has also been spent on drainage works, and much of the track material and foundation is back to its pre-war condition which then justified considerably higher speeds.

But before such speeds can be resumed, with great benefit to traffic, it will also be necessary to raise the standard of day to day maintenance. The length gangs in the London area of the King's Cross Engineering District are still nearly 10% below their normal total strength, and recruitment of suitable men to the permanent way grades is difficult for many reasons ; it is hoped, nevertheless, that the position will improve as time goes on, and that the material rehabilitation already accomplished will encourage a higher standard of work. A general limit of speed is a regrettable necessity in the meantime, but I feel that such restrictions, if long continued, may react undesirably on the staff and the impression may be formed that meticulous attention to line and level may not matter so much ; in this case there were defects on a good foundation which should not have existed in any main line and there was no margin of safety even at the moderately high speed of 70 m.p.h.

33. Driver Hoole was probably exceeding the authorised speed, but he was not assisted by an indicator on the footplate. Speed recorders which were removed during the war are being refitted to 4-6-2 type engines of the former London and North Eastern Railway, and future policy in this respect is under consideration by the Railway Executive.

I have the honour to be, Sir,

Your obedient Servant,

G. R. S. WILSON,

Lieut.-Colonel.

The Secretary,

Ministry of Transport.

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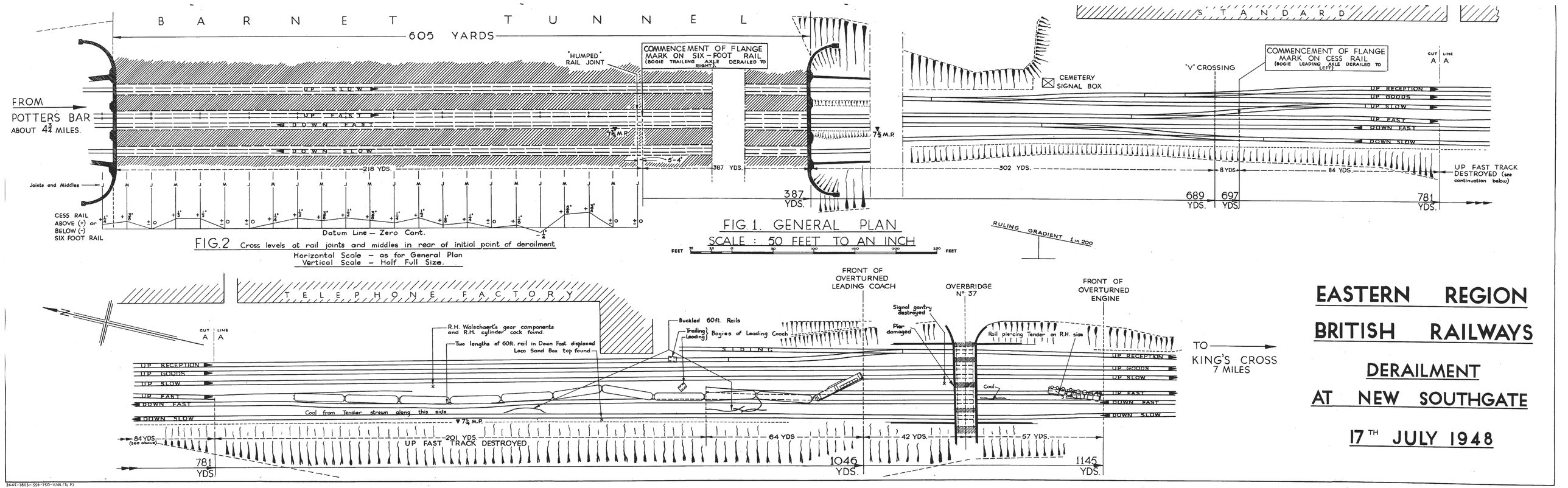

FIG. 2 Cross levels at rail joints and middles in rear of initial point of derailment
Horizontal Scale – as for General Plan
Vertical Scale – Half Full Size.

FIG. 1. GENERAL PLAN
SCALE : 50 FEET TO AN INCH

EASTERN REGION BRITISH RAILWAYS

DERAILMENT AT NEW SOUTHGATE

17TH JULY 1948

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EASTERN REGION — BRITISH RAILWAYS

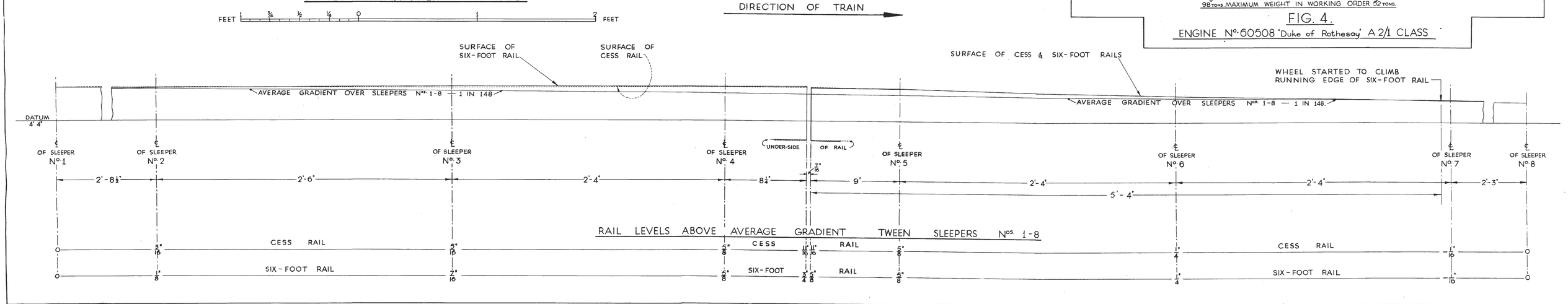
DERAILMENT AT NEW SOUTHGATE

17TH. JULY 1948

FIG. 3.

LONGITUDINAL RAIL LEVELS IMMEDIATELY BEFORE INITIAL DERAILMENT IN TUNNEL.

SCALE. ONE QUARTER FULL SIZE



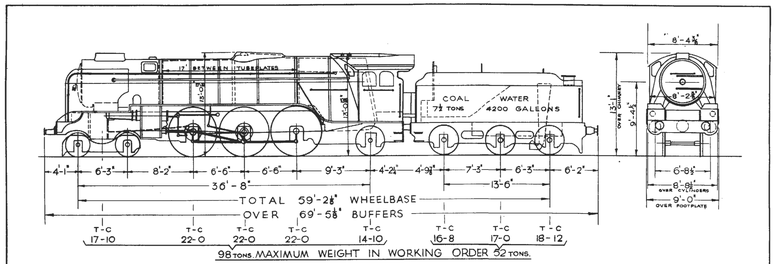


FIG. 4.

ENGINE No. 60508 "Duke of Rothesay" A 2/1 CLASS