DEPARTMENT OF TRANSPORT

RAILWAY ACCIDENT

Report on the Collision that occurred on 9th July 1980 at Holborn Station

ON THE
CENTRAL LINE
OF LONDON TRANSPORT RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

£2·90 net

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RAILWAY INSPECTORATE,
DEPARTMENT OF TRANSPORT,
2 MARSHAM STREET.
LONDON SW1P 3EB.
22nd October 1983.

SIR,

I have the honour to report for the information of the Secretary of State for Transport in accordance with the Direction dated 17th July 1980 the result of my Inquiry into a following collision at about 13.28 on 9th July 1980 between two westbound trains at Holborn Station on the Central Line of London Transport Railways.

The 13.17 train from Liverpool Street to White City (T10) was standing in the westbound platform at Holborn while the motorman and guard closed a set of faulty doors and returned to their positions. Just as they reached them, the 12.49 train from Hainault to Ealing Broadway (T66) which had passed two signals at Danger and had been tripped resulting in an emergency brake application, entered the station at about 12 mile/h and collided heavily with the rear of T10.

The emergency services were called at 13.32 and arrived at the scene of the accident between 13.39 and 13.48. The motorman of T66 and 20 passengers were evacuated to hospital with minor injuries although only the motorman and one passenger were detained for one night. The passengers on T66 were detrained by 14.30. Three trains were stranded by the discharge of traction current at 13.39; the 840 passengers were all detrained by 15.00. Central line services between Marble Arch and Liverpool Street were suspended until 09.00 on 10th July 1980.

The Site and Signalling

1. A diagram of the Central Line showing the track, gradients, sighting distances and signalling of the westbound line between Chancery Lane and Holborn is at the back of the report. At the time of the accident the signalling was operating automatically through the action of the continuous track circuiting although certain signals can be controlled when necessary from a signal cabin at Holborn. All signals are two aspect with two lamps per aspect and have an associated trainstop which is raised when the signal is at Danger and which will contact the tripcock of a passing train causing an emergency application of the brakes. The trainstop is lowered before the signal shows a proceed aspect.

2. With the platform at Holborn occupied by a train but with the intervening track circuit clear, the sequence of signals from Chancery Lane is as follows:

A446	Chancery Lane Starting Signal	Signal remains at Danger until the speed of an approaching train is proved to have been reduced to 15 mile/h by the occupation of track circuits when it will clear if track circuits up to and including 446B are clear.
	169 Metres to:—	
A444A	Holborn Outer Home Signal	With track circuit 444A occupied and track circuit 446B clear the signal remains at Danger until an approaching train is about 14 m from the signal and occupies rail circuit 444A which acts as an approach control and clears the signal.
	54 Metres to:—	
CCX444B	Holborn Intermediate Home Signal	Remains at Danger until track circuits 444A and 444B are cleared by a departing train.
	51 Metres to:—	
CC11	Holborn Inner Home Signal	At Danger until track circuit A is cleared by a departing train.
	3 Metres to:—	
	Holborn Station headwall.	

This arrangement provides that a signal will not exhibit a proceed aspect until the overlap track circuit of the next signal is clear. The overlap is calculated on gradient and speed as the distance required for a train, the tripcock of which has been operated at the maximum permitted speed, to stop. However to permit close headway working Signal A444A will clear when a train closely approaches it and a reduced overlap beyond Signal CCX444B is clear. This design is on the assumption that a train approaching Signal A444A at Danger is slowing to stop at it. It is provided to allow a train under control to approach an occupied platform more closely than would normally be permitted.

3. With Holborn platform unoccupied, track circuit A clear and no trains between Chancery Lane and Holborn, Signal A446 operates in the same way but the other 3 signals will display green aspects.

4. At Chancery Lane there is a headwall repeater for Signal A446. The total distance between the west headwall of Chancery Lane station and the east headwall at Holborn is about 292 m. The rear of T10 was probably about 1·5 m beyond the east headwall at Holborn before the accident. The signalling was designed in 1938/39 and commissioned in 1941. The new rolling stock introduced in 1962 has the same braking performance as the stock it replaced.

The Trains

5. Both trains were composed of two 4-car units with a driving cab at each end forming standard Central Line 8-car trains of 1962 stock. The driving cabs are fitted with speedometers. The trains are equipped with a single brake valve which, when turned, operates first the electropneumatic (EP) brake, then enters a lap position which retains any brake application made and then when turned further makes progressively greater service airbrake applications finishing with an emergency brake application position which opens the train pipe to atmosphere and also makes the contacts for a full EP brake application. Below each driving cab is a tripcock which will engage with a trainstop in the raised position. There are two tail lamps separately fused but on the same circuit and symmetrically placed about the centre of the cab.

The Course of the Accident and Damage Caused

6. After station duties had been completed normally at Holborn Station the guard of westbound train T10 found that one pair of doors could not be closed. He and his motorman went along the platform and closed the faulty doors. They had just returned to their positions when the following train, T66, which had passed Signals CCX444B and CC11 at Danger, collided at about 12 mile/h with the rear of the standing train. The speed of T66 had been reduced by an emergency brake application initiated when the tripcock was operated by the train stop of CCX444B. T10, which had the brakes fully applied while the crew attended to the faulty doors, was pushed forward about 1·2 m in the collision.

7. The leading cab of T66 was badly damaged. The front panel was forced back to within about 225 mm of the rear bulkhead, the master controller casting was cracked, the switches in the panel at the leading end were jammed or broken, all the windows were broken, the doors were jammed, and the external cocks and coupler were broken. The damage to the trailing cab of T10 was similar. In the passenger compartments next to the driving cabs the floors were raised, some side lights were broken, and some seats were torn and displaced. The tripcock of T66 had been operated. The leading bogie of T66 was forced backwards towards the centre of the car and the trailing pair of wheels derailed.

Evidence

As to the Running of the Trains

8. *Motorman M. J. Farrell,* who had been a motorman on the Central Line for about two years, drove a train from Leytonstone to West Ruislip shortly before the accident. His train was delayed entering Liverpool Street Station and he knew that he was closely following another train because of the signal aspects he saw. After departing from Chancery Lane he said that on taking the slight bend he saw Signals A444A, CCX444B, and CC11 at Danger and could see the tail lights of the preceding train standing in Holborn platform. He stopped too far away from Signal A444A for the approach control rail circuit to operate and saw that signal and the others change to green as he watched the preceding train departing from Holborn Station. He found no difficulty in seeing the signals and the rear of the train in front. Nor did he find anything abnormal about the handling of his train.

9. The driver of T10, *Motorman A. F. Casling,* had been a motorman on the Central Line for 20 years. He confirmed that there was no difficulty in seeing the signals between Chancery Lane and Holborn which were displaying green aspects as his train approached. His train was delayed about three minutes at Holborn while he secured it with the Westinghouse brake and went back and closed a pair of faulty doors after the guard had been unable to do so from his position. He had just returned to his driving position when, without warning, his train was moved forward and there was the sound of a collision from the rear and a cloud of dust or smoke. He confirmed that when he reversed his train at Liverpool Street he switched on the tail lights and turned off the headlights.

10. *Guard B. J. Bradshaw* had served on the Central Line for three months and was the guard of T10. His guard's position was at the leading end of the rear car of the train. He had checked that the

tail lights were on before the train left Liverpool Street by looking at the buttons. The journey to Holborn was normal and he thought the train would have stopped with its rear about 2 m from the headwall. Holborn was the only station with a platform to the left and he found that after pressing the 'door close' button, one pair of doors remained open. He and Motorman Casling attended to them and he was just about to enter his guard's position when, with a roar, a train came from behind and collided with T10. For a split second he saw the front of the train and thought the motorman was standing up.

11. Travelling seated with friends in the leading car of T66 was a retired London Transport employee *Mr. F. W. Gosden* who had once been a Central Line motorman and was an Area Manager on the Central Line from 1965 until retirement in 1978. He commented that the journey from Hainault to Liverpool Street was normal but that after being held there for about a minute he thought the train was then driven 5–8 mile/h above the speed limit, it was what he termed a 'rough ride'. As the train approached Holborn there was what he considered was an emergency brake application. Moments later he heard what he thought was a tripcock operation, although it had no effect on the deceleration, and the collision occurred seconds later when he thought the train was just about to stop. He thought that the second application would have been near the B signal. (CCX444B).

12. *Mr. D. I. Thompson*, an instructor at the White City Railway Training Centre, explained that before attending a motorman's course a trainee would have had experience driving a train as a guard/emergency motorman. The motorman's course at the training centre dealt mainly with Rules, instructions and train equipment. Two days during the course were spent driving under the control of a motorman instructor and a further two days with a Trainman's Inspector or at a rolling stock depot on the handling of failures. If they passed the course, potential motormen would go to a division for a further spell of practical instruction on the line rolling stock before learning the road under the control of a motorman. Trainees would eventually be accepted as motormen when they considered themselves ready and were passed out by an Area Manager who is required to sign the certificate of competence. He confirmed that Motorman Theobald, the driver of T66 had satisfactorily completed the training.

13. The guard of train T66 was *Guard M. M. Rana*. His guard's position was at the leading end of the rear car. He had acted as guard to Motorman Theobald for the whole of his duty on 9th July and there had been nothing unusual about any of the journeys. He recalled that the train was held at Liverpool Street for about 1½ minutes. Approaching Holborn he was preparing to go to the door controls as the train slowed down and then he realised that there had been a heavy brake application. As he attempted to use the telephone to the driver the collision occurred and he was struck and injured on his head. After that he had assisted the passengers.

14. Train T66 was being driven by *Motorman C. Theobald*, who had been a motorman on the Central Line for about 18 months. He told me that he had no domestic worries, was not receiving medical attention, and had not drunk anything other than coffee or tea on 9th July. He described the training and testing which led to him qualifying as a motorman. At the end he signed a form agreeing that he knew the route and signalling. He confirmed that in his training he was taught to have the train under sufficient control to stop short of signals displaying a red aspect.

15. The week commencing 22nd June he worked a week of nights finishing early on Sunday morning. The week commencing 29th June he was night spare at White City, did virtually no driving at all, about five hours, and again finished early on the Sunday morning. On Monday 7th July he was away sick and on the Tuesday he was on an early turn starting at 05.58. On Wednesday 9th July he commenced duty at 06.04 and drove an eastbound train and then westbound to West Ruislip before returning to White City for his break. Nothing out of the ordinary occurred and he could recall nothing special about the westbound trip in the course of which he passed through Holborn.

16. After the break he took over T66 at 11.11 and drove to Ealing Broadway the train handling satisfactorily. There he went to the lavatory and bought some mints and a copy of Punch magazine. He then drove the train to Hainault where he had 5–10 minutes to change ends. On leaving Hainault westbound he was sure that the lights, destination blind, and controls were all in order. His anorak was on a hook behind the door and he thought his telephone handset was in the cab. Although he couldn't remember whether the heater was on or off both windows would have been closed. The copy of Punch and a paper were in one pocket of his jacket and a book in another. He remembered his train satisfactorily passing westbound over a tripcock tester at Newbury Park.

17. He described the line, speed restrictions, and the signalling reasonably accurately from Leytonstone through to Chancery Lane confirming that his train was held for about 1½ minutes at Liverpool Street where he turned the cab light on, took his cigarettes and lighter from his anorak, and lit a cigarette. He was sitting and was not wearing a cap or glasses.

18. Departing from Chancery Lane Mr. Theobald said that the light was still on in the cab but that he was not smoking or reading. After that he said repeatedly that he had a complete blank and could

remember nothing until his cab was about level with signal CCX444B when, travelling at about 30 mile/h he saw the red aspect of Signal CC11 and the tail lights of a train standing in Holborn Station. He agreed that this was not a normal situation but that he then reacted to stop short of the standing train. He made a full EP application but within about two seconds he realised that T66 would not stop short of T10. He released the driver's safety device (DSD), made an emergency brake application, and jumped out of his seat but recovered consciousness trapped in the wreckage.

19. He claimed repeatedly that he had made a full EP application at about the time when his cab was at CCX444B and that he was tripped at CC11 at about the same time as he released the DSD and made an emergency brake application. He could think of nothing that could have distracted him and agreed that from the evidence of preceding drivers and the signal engineers he was satisfied, as far as he could be, that the signalling was in order.

20. He claimed that if the signals had been at red when he approached them he would instinctively have braked as he did on the test carried out some days later when he had recovered, but that at the time of the accident he could not recall anything after departing from Chancery Lane until seeing Signal CC11 at red and the tail lights of the train in the station. He had tried in the test to simulate a normal day's driving and not to concentrate specially. On the test he was under the impression that he approached CCX444B at about 20 mile/h but on the day of the accident he must have been travelling at about 30 mile/h. He told me that he had tried to think which of all the possible reasons was the cause of his failure to react to the red signals and tail lights until he was at CCX444B but that he could not come to a conclusion. He was not reading, he was not asleep, and he was not distracted.

21. *Mr. M. Heaton* the *Deputy Chief Signal Engineer* described the signalling and confirmed that the two minor alterations in the area and the maintenance over the past 20 years had been carried out in accordance with the London Transport regulations and that he had the certificates for the trainstop checks which had been carried out in June 1980. At the time of the accident no technicians were working in the area. He described the thorough testing of the signalling that had taken place after the accident and said that no defects had been found and that the signalling equipment was to specification. Over the last five years he had found records of one fault in the area, in May 1978, when a loose connection on a track circuit caused signals to remain at Danger.

22. Mr. Heaton confirmed that after the accident the rail circuit on the approach to Signal A444A that permitted an approach to CCX444B with a reduced overlap had been taken out of use together with similar controls at four other locations. At another five locations a delay feature had been introduced so that the signal did not clear, and the train stop lower, until some seconds after the train had been detected approaching the signal. Thus, if a driver does not reduce the speed of his train approaching these signals, the train stop will not have lowered and the signal cleared by the time the train reaches it and the tripcock will be operated.

23. The rail circuit feature, which was installed with the original signalling installation, was intended to permit the clearing of Signal A444A, when a train, which would be stopping at the signal, had closely approached that signal. The release feature was provided to permit the headways required at the time of the signalling installation to be met. However, as trials have shown, if a train was driven at full speed towards the signal at Danger, the train was detected in sufficient time for the signal to clear and the trainstop to lower thus not enforcing a reduction in speed. The release feature has been taken out of use at the locations where an increase in headways can be accepted and the delay feature introduced at locations where the original headways must be retained.

24. *Mr. L. Lawrence* the *Chief Signal Engineer* said that he was satisfied that the signal was operating in the designed manner at the time of the accident.

25. *Mr. G. Hafter* the *Rolling Stock Engineer (Railways)* confirmed that the train involved in the accident had been maintained and examined in accordance with London Transport requirements. He said that, so far as the damage would allow, tests showed that the braking system of the train was in order at the time of the accident with the DSD and the tripcock operating properly. He described the damage and the position of the trains and said that it was consistent with a collision at 10–15 mile/h. The tripcock valve of T66 was locked open.

26. Mr. Hafter described the 2 sets of tests that had been carried out with a similar train. In the first group the train had been driven by an experienced motorman and in the second by Motorman Theobald. In tests 1 and 2 the train was driven in full parallel from Chancery Lane with the track circuits at Holborn shunted to represent a train standing at the platform. Approaching Signal A444A at Danger the speed was indicated as 31 mile/h. The train stop lowered just before the tripcock passed it with the signal changing to a green aspect. At this point power was cut off and the train coasted to Signal CCX444B at Danger at which signal it was tripped. The front of the train came to rest 8.36 m and 7.6

m respectively beyond the headwall at Holborn Station. The speed at the headwall was estimated as between 10–15 mile/h and calculated at 11–12 mile/h.

27. Other tests applied various combinations of power, the release of the DSD, and braking to represent possible ways in which the train might have been driven before the accident. The effect of maintaining power until it was cut off by the control governor when the brake pipe pressure fell to about 40 lb./sq. in after the train had been tripped at Signal CCX444B, instead of coasting as in test 1 and 2, was that the train stopped 15·3 m beyond the headwall at Holborn having passed it at 16 mile/h. This represented the effect of a driver completely ignoring all the signals.

28. Mr. Hafter had determined the position of the rear of the stationary train in the platform and estimated that in the collision it had been moved forward about 1·2 m. With the tripcock of T66 in contact with the trainstop of Signal CC11 the front of the cab of T66 would have been less than 0·5 m from the rear of T10. For a driver to stop his train at Signal A444A he would have to shut off power about 91 m after leaving Chancery Lane, about 23 m after the signal comes into view, and make a full brake application. He had calculated that after being tripped at Signal CCX444B, running as in tests 1 and 2, about 7½ seconds would have elapsed before the collision occurred.

29. Mr. Hafter described the tests when Motorman Theobald was driving. A dummy board representing the tail lights of a train standing at Holborn was positioned over the rails where the rear of T10 would have been located and the platform track circuits were shunted. Thus signals A444A, CCX444B and CC11 were at Danger. Motorman Theobald was then asked to drive the test train as he claimed to have driven T66 before the collision. He made a number of trips but in every case his actions brought the train to a stand well short of the platform headwall whether the dummy board carrying the tail lights was in position or not.

Discussion

30. Motorman Theobald either could not or would not explain to me what he had done after leaving Chancery Lane. I was unable to decide which was the case. It may be significant that he was visited in hospital within a few hours of the accident by several other drivers. His claim that he took action on being tripped at Signal CC11 is clearly incorrect, there would not have been time. The tests show that he probably did nothing, except to shut off power, between passing Signal A444A and being tripped at Signal CCX444B. When his train was tripped at Signal CCX444B, as it must have been, the collision was about seven seconds away. His description of an attempt to make a normal brake application followed by the release of the DSD and an attempt to leave the cab could have taken up the time and corresponds with Mr. Gosden's evidence of brake applications and Guard Bradshaw's comment that he thought the motorman of T66 was standing up an instant before the collision.

Conclusion

31. The collision was caused by the failure of Motorman Theobald to control his train in accordance with the aspects of Signals A444A and CCX444B. The collision that resulted was greatly reduced in severity by the trainstop and trip cock system.

Remarks

32. Where a signal can have both a full speed overlap and a reduced overlap due to site circumstances and only the reduced overlap is available, then before the preceding signal can clear it is current practice to include a speed check to prove that the speed of a train has been reduced to that for which the reduced overlap is adequate. If the speed of train is not reduced the train will be tripped.

33. Having noted the irresponsible behaviour of Motorman Theobald in allowing himself to be distracted so that he took no notice of the signals at Danger until it was too late, London Transport issued a circular to all drivers reminding them of their responsibility in respect of obeying signals. In addition

the action of altering the signalling to require the occupation of the rail circuit for a delay period enforces a reduction of speed. If a driver does not reduce speed approaching the signal preceding that with the reduced overlap then the train is tripped and brought safely to a stand. Accordingly I have no recommendations to make.

I have the honour to be

Sir,

Your obedient Servant,

A. G. B. KING

Major

The Permanent Secretary
Department of Transport

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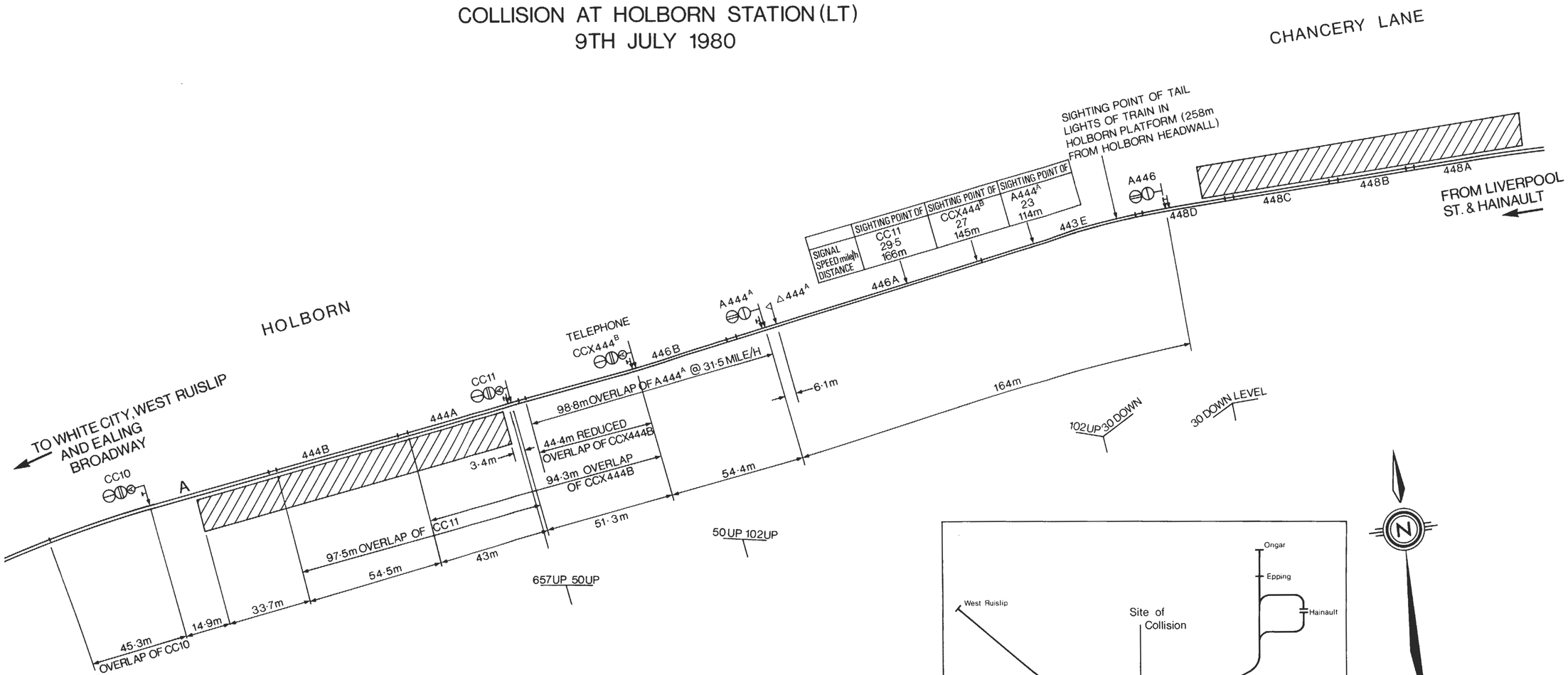
COLLISION AT HOLBORN STATION (LT)
9TH JULY 1980



STOPPING DISTANCES	FULL E.P. metres	EMERGENCY
10 M.P.H. TO REST	10·7 - 13·7	10·7 - 12·2
20 M.P.H. TO REST	41·1 - 44·2	36·6
25 M.P.H. TO REST	61 - 65·5	54·9
30 M.P.H. TO REST	91·5 - 96	76·2

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