platform, seeing what was going to happen caused the driver of the passenger train to get his train into motion, whereby the shock of the collision was reduced.

Although I consider that signalman Moore acted wrongly in using the signals in a manner for which they were not intended, and thereby to a certain extent misled driver Stewart, it is evident that a very poor look-out was being kept on the engine. For this reason the responsibility for the collision chiefly rests on driver John Stewart and to a lesser degree on fireman George Meyer, neither of whom can have been sufficiently on the alert, as they failed not only to see the starting signal put to danger, and the train in front of them, but also to hear the shouts of the signalman and of the platform staff, until it was too late. If these men had performed their duty in a satisfactory manner it can hardly be doubted that they would have become aware in sufficient time of the state of affairs.

Signalman Moore had been on duty 3 hours 45 minutes, and driver Stewart and fireman Meyer, each 5 hours 45 minutes.

The system of signalling to which reference has been made is one, which in spite of certain advantages, is liable to be improperly used, as in the present case, and in my opinion it would be preferable if the home signal at the Lesmahagow Junction signal-box were not released by the starting signal ahead of it. Each signal should be independent of the other, and it should be left to the signalman’s discretion to stop a train either at the home signal or starting signal according to circumstances. The risk of misleading a driver by lowering a signal for a moment and then replacing it at danger, would thus be avoided.

The insufficiency of the brake power on the engine of the ballast train calls for remark. There was no brake whatever on the engine wheels, and only a hand brake on the tender, and to work trains on a main line by means of an engine with such a small amount of brake power involves unnecessary risk both to the servants of the Company and to the travelling public. Had the engine in this case been fitted with a power brake capable of instantaneous application, the severity of the collision would probably have been reduced. The time has surely now arrived for the withdrawal of all engines of this obsolete description.

I have, &c.,
H. A. YORKE,
Lieut.-Colonel, R.E.

APPENDIX.

DAMAGE TO PLANT.

Caledonian Railway, Fish Van No. 202.—Two door standards, two end standards, end and side rail, end panelling, four axle boxes, buffer, vacuum and Westinghouse pipes broken.

Caledonian Railway, Brake third No. 457.—Two headstocks, three buffer spindles, four standards, one end rail, two end windows, one side light and bogie frame broken.

Caledonian Railway, First Class No. 270.—One buffer spindle broken and end panelling damaged.

Engine, No. 31.—Two intermediate buffer shells broken.

Printed copies of the above Report were sent to the Company on the 5th July.

DUBLIN, WICKLOW AND WEXFORD RAILWAY.

Railway Department, Board of Trade,
8, Richmond Terrace, Whitehall, London, S.W.,
2nd April, 1900.

Sir,

I have the honour to report, for the information of the Board of Trade, in compliance with the instructions contained in the Order of the 19th February, 1900, the result of my inquiry into the circumstances under which a collision occurred at about
49

1.35 p.m. on the 14th February, between a cattle train and the buffer-stops at Harcourt Street Station, Dublin, on the Dublin, Wicklow and Wexford Railway.

In this case, as a cattle train, consisting of an engine, twenty-nine trucks and a van, was entering Harcourt Street Terminal Station, the driver was unable to stop it at the platform, and it ran into the buffer-stops at the end of the line. The buffer-stops and the concrete block in which they were fixed gave way, and were carried forward with the engine through the terminal wall at the end of the station. The buffer-stops and concrete block fell forward into the street below, and the engine, which was fortunately travelling at a low rate of speed, came to rest on them, its front portion overhanging the street and its rear portion having dropped into the space from which the concrete block had been driven. The tender behind the engine came to rest standing nearly upright on its leading end, which also had dropped into the space vacated by the concrete block. The trailing end of the tender was up in the air, and had carried up with it the leading end of the first wagon, this vehicle being found standing nearly upright on its rear end. Neither the engine nor the tender nor the leading wagon was much damaged, and the remainder of the train was absolutely uninjured in any way.

The driver of the train, who pluckily stuck to his engine even when he saw that the collision was imminent, was caught between the engine and tender; his right arm was cut off and one of his feet was badly injured; he was in hospital at the time of the inquiry, but gave his evidence very clearly. The fireman jumped off the train just before the collision occurred, and neither he nor the guard nor any of the cattle suffered any injuries at all.

The engine was a six-wheels coupled tender engine, fitted with a vacuum automatic brake, working blocks on the six coupled wheels and on the six wheels of the tender. The brake is reported by the driver to have been in first-class working order.

The train consisted of twenty-nine wagons and a van; the former were fitted with the usual wagon-brake and the latter with a hand-brake, which the guard reports to have been in good order.

The damage to rolling stock was but slight, and that to permanent way consisted of the destruction of the buffer-stops.

Description.

Harcourt Street Station, where this collision occurred, is the Dublin terminus of the Dublin, Wicklow and Wexford Railway.

The line is a double one up to the entrance to the station, which it approaches in a northerly direction, the up line on which the cattle train was travelling being on the western side.

There is, however, only one passenger platform at the station; it is 200 yards in length and is situated on the west side of the main line. Just outside the entrance to the station is a junction between the up and down lines. The platform line terminates in a turntable, and immediately beyond the turntable are the buffer-stops, which are fixed against a 3-foot thick wall, forming the terminal wall of the station. This wall abuts on a public road, which, however, is at a level of 24 feet below that of the line.

The following distances from the buffer-stops are noted:

<table>
<thead>
<tr>
<th>Buffer-stops to</th>
<th>Yds</th>
</tr>
</thead>
<tbody>
<tr>
<td>east end of platform</td>
<td>20</td>
</tr>
<tr>
<td>station master's office</td>
<td>75</td>
</tr>
<tr>
<td>lamp room</td>
<td>140</td>
</tr>
<tr>
<td>west end of platform</td>
<td>220</td>
</tr>
<tr>
<td>engine shed</td>
<td>350</td>
</tr>
<tr>
<td>up home signal</td>
<td>680</td>
</tr>
</tbody>
</table>

Owing to the fact of the buffer-stops being close to the terminal wall of the station, and of the ground behind the wall being at a much lower level than the line, these buffer-stops have no back struts to support them. In lieu of struts, however, there are in front of the stops stays, which are carried down through the concrete block, on which the buffer-stops stand, into the masonry below it.

Opposite the station, to the east of the main line, is the goods yard, which was the destination of the cattle train to which this accident occurred. There is no direct access to this goods yard from the up line, the only approach to it being by means of a trailing connection on the down line about 200 yards outside the station. A train for the goods yard arriving on the up line has therefore to be brought into the station and then backed
out on to the down line before it can enter the goods yard. It was with this object that the cattle train to which this accident occurred was being brought into the station.

For trains approaching Dublin on the up line there is a steep falling gradient, which commences at a point about 4 1/2 miles outside Dublin, and continues to about 3/4 mile from Harcourt Street Station. For the first 2 1/2 miles this gradient varies from 1 in 60 to 1 in 100, and for the next 1 1/4 miles it is a continuous one of 1 in 169. From this point, i.e., 1/4 mile from the station, the fall for a little over 3/4 mile is only 1 in 3,054, and finally there is a rising gradient of 1 in 1,000 for the last 166 yds. up to the station.

The up home signal is at a point 460 yds. from the outer end of the platform. From this signal a driver does not get a good view of the approach to the station, but just after passing it the line curves to the left, and he then obtains a clear view.

Rule 355 of the Company's rules contains the following instructions as regards entering terminal stations:

"Trains approaching Terminal Stations or Stations having a dead-end Bay must be controlled by Hand Brakes only."

Evidence.

Peter Farrell states: I am assistant stationmaster at Harcourt Street Terminus, and was on duty at the station on the afternoon of the 14th February. It was a clear afternoon. I saw the cattle special enter the station about 4.37 p.m. I was close to the turntable at the end of the station and saw the engine just abreast of the commencement of the platform. I saw that the train was entering the station unusually quick, and I did not think that it would be able to stop before reaching the buffer-stops. I watched the train advancing for an instant, and then, seeing that in my opinion the engine was certain to run into the buffer-stops, I ran down to see that there were no people in the street behind the buffer-stops. The assistant inspector, Mr. Delaney, was standing near the turntable with me, and he ran up the platform to meet the train. When I first saw the engine I could not see whether it had its brakes on. After the accident occurred I set to work to get the station clear to resume traffic, and reported the occurrence and sent for doctors. I did not receive any explanation of the accident. The engine carried away the buffer-stops right through the end wall of the station, but came to a stand before falling into the street; the tender was close behind the engine, but standing upwards on its leading end; the next van—an open one containing timber—was standing upwards on its rear end. The coupling between the engine and tender was broken, but not between the tender and timber truck. The remainder of the train was not injured at all, and none of the cattle were injured. I found the driver pinned between the engine and the tender, and he was not extricated till about 20 or 25 minutes. He was then taken to hospital. No one else was hurt. I have been assistant stationmaster at Harcourt Street for a year and a half. I am acquainted with the Company's rule that trains approaching terminal stations, of which Harcourt Street is one, should be controlled by hand brakes only. I have, however, frequently seen trains enter the station making use of their vacuum brake; in fact, they usually do so. I have not, however, ever drawn anyone's attention to the fact that drivers are in the habit of disregarding this rule. I have, however, sometimes seen the hand brake made use of, but only in addition to the vacuum brake.

William Hyland, driver, states: I was driver of the cattle train which arrived at Harcourt Street Station about 4.35 p.m. on the 14th February, 1900. My engine was a six-wheeled coupled tender engine, fitted with vacuum automatic brake, working blocks on the six coupled wheels and on the six wheels of the tender. This brake was in first-class working order. We stopped at Farnrock Station and detached one wagon, and then proceeded to Harcourt Street Station with 29 wagons and a van. On approaching Harcourt Street Station all signals were clear for us. I shut off steam at the top of Dundrum incline and applied the hand brake on the six coupled wheels of the engine as usual. I applied the automatic brake two or three times for a short time before reaching Dundrum station, so as to keep my train under control. After passing Dundrum Station I applied the hand brake a bit tighter. On reaching Milltown—a mile and a half from Harcourt Station—I applied the automatic brake three or four times between that point and the home signal at Harcourt Street. At this point—the home signal—I was going at from five to six miles an hour. After leaving Ranelagh—one mile from Harcourt Street Station—I applied the automatic brake three or four times between that point and the home signal at Harcourt Street. At this point—the home signal—I was going at five to six miles an hour: I then again tightened up the hand brake on the tender. On approaching the lamp room I was going at about three miles an hour, and I then applied the vacuum brake. The whole of the engine shuddered, I released the brake and put it on again, but the wheels still shuddered. On reaching the stationmaster's office I saw that the train was not going to stop in time, so I reversed the engine and turned on the steam. I tried to get another turn out of the hand brake, but having struck the buffer-stops. The stops gave way and the engine fell forward. I made no attempt to jump on the engine, as I made sure that the buffers would stop us. I was pinned between the engine and the tender, and was taken off to hospital. I know the Company's rule about controlling the train by the hand brake alone when entering Harcourt Street Station, and I generally adhere to this rule.
I am in the habit of frequently entering Harcourt Street Station. On this occasion I put the vacuum brake on when passing the lamp room, as I thought that the train was going too fast, but I had intended to stop the train entirely by the hand brake. I have been in the Company's service for eight years, during seven of which I was foreman, and I had been driving for nine months. I came on duty at 5 a.m. on the 14th, and should have come off duty about 5.30 p.m. I had an hour's interval at Gorey, where I had my breakfast, but I had no interval for dinner. On the 13th I had worked from 2 p.m. to 8.30 p.m. My impression is that the rails were very greasy and my train was a very heavy one. I have every reason to believe that my guard had his brake on. At the lamp room my train was only travelling at the usual speed for entering the station. I have often entered the station with a heavy train as the case in question. I am familiar with the notice which has been posted in the running sheds calling drivers' attention to the necessity for complying with the rule to control their engines with the hand brake only when entering terminal stations.

Peter Jackson, fireman, states: I have been three years in the service of the Company, during two of which I have been fireman. I came on duty at 4 a.m. on the 14th February, and should have come off duty at 5.30 p.m. I had no regular interval during the day for meals. I was fireman on Driver Hyland's train. I remember leaving Foxrock Station. Steam was shut off at the top of the Dundrum incline, and at the same time the hand brake was applied by the driver to the tender. It was tightened at Milltown and Ranelagh, and remained on till the accident occurred. The automatic brake was put on temporarily several times after leaving Dundrum, and was put on permanently at the engine shed just past the home signal for Harcourt Street, and was kept on till the accident occurred. I am sure that the automatic brake was on from the time we passed the engine shed till the accident occurred. At the time at which the collision occurred we were going very slowly, but I cannot estimate the speed. When passing the lamp room I thought that we were going too fast, and we were going at that time faster than we usually are at that point. I helped the driver to tighten the hand brake. When I saw that the collision was imminent I jumped off and was uninjured. I frequently ran into Harcourt Street Station on trains. I have not often travelled on passenger trains, but when I have the drivers usually use the vacuum brake for stopping the trains when entering Harcourt Street Station. On goods trains the drivers usually use both the automatic brake and the hand brake. I came off duty at 5.30 p.m. on the 13th. The brakes of the engine were in good working order.

Robert Dovan, guard, states: I have been 19 years in the service of the Company, during 10 of which I have been guard. I came on duty on the 14th at 5 a.m. to work till 5.30 p.m. I had no intervals for meals. I had come off duty at 5.30 p.m. on the 12th. I was guard on the cattle train to which the accident occurred. I remember leaving Foxrock Station. The train consisted of 25 wagons and a van. The wagons were all fitted with the ordinary wagon brake, and the van with a hand brake, which was in good working order. At the top of Dundrum bank I put on my hand brake. We ran rather faster than usual down the bank, but from Milltown to Harcourt Street the speed gradually slackened. On reaching the Harcourt Street home signal I estimate the speed at 6 miles an hour. Twice before reaching this point I had slackened my brake and put it on again because my wheels were skidding and I thought that the train was going too fast. It was half way down the incline, before reaching Dundrum, that I thought we were going too fast, but not until I passed Ranelagh Station. When my van passed the canal bridge it occurred to me that we were going too fast; I think that we were then going at 5 miles an hour; my brake was then full on. I felt a very slight shock from the collision. My wheels were skidding when passing the canal bridge. Till that point I did not think that we were going too fast. The train slackened speed from that point, but up to that point I had not noticed the engine brake being put on. I estimate that we were going at 3 miles an hour when the collision occurred. None of the cattle were damaged. The rails were very greasy.

Matthew Delany, states: I am outdoor assistant manager and was on the platform at Harcourt Street Station when the accident occurred. I was close to the turntable when I first saw the train; the engine was then about 50 yards away from me, and I think that it was then running at about 4 miles an hour. I knew that the train could not stop before striking the buffer, so I went forward to meet it and turned and ran with it, telling the driver to do all he could to stop it. I had not to run fast and did not go faster than a man could walk, so I estimate the speed at 4 miles an hour. This was at a point 12 yards from the turntable, i.e., about 30 yards from the buffer-stops. The train was distinctly slowing, and I think, have stopped in 30 yards more. I quite thought that the buffer-stops would stop the train, but they scarcely checked it and gave way before it. I had been on the engine of this train several times during the day and the brake had acted excellently. I know Driver Hyland well and consider him a good and careful driver. After the accident the couplings between the wagons were all as tight as possible, showing that the brake at the end of train was doing its work.

Conclusion.

This accident appears to have been immediately due to the fact of driver Hyland, who was in charge of the cattle train engine, having miscalculated the speed at which he was entering Harcourt Street Station.

According to the evidence, the driver shut off steam at the top of the Dundrum incline, and at this point the hand brakes were applied on the wheels of both the tender and the guard's brake. The guard states that before reaching Dundrum he thought that the train was going too fast, and the driver admits that he had to put on his automatic brake two or three times in order to keep his train under control, though both state that the
speed was moderate when passing Ranelagh Station, distant one and three-quarter miles from Harcourt Street. It appears, therefore, from their own evidence, that it is highly probable that the train was allowed to descend the Dundrum incline at a rather high rate of speed.

On reaching the 'home signal, distant 680 yards from the buffer-stops, the driver states that the speed of the train was between five and six miles an hour, and that at that time the hand brakes were still applied to both the tender and guard's van. At the lamp room—distant 140 yards from the buffer-stops—he estimates the speed at three miles an hour, whilst from this point the vacuum brake was fully on, and from the station-master's office—distant 75 yards from the stops—the engine was reversed and steam applied.

Had the rates of speed at these points been as stated, there could have been no difficulty in stopping the train in good time; but it is quite certain from the evidence of Mr. Delaney, who was "trotting" alongside the engine at the time, that at a distance of about 30 yards from the stops the speed of the train was at least four miles an hour.

It is therefore clear that the speeds given by Hyland are not correct, and that he must have entirely miscalculated the speed at which he was entering the station. The Company's rule on the subject of the use of brakes when entering a terminal station is very clear, viz., that trains entering such stations should be controlled by the hand brakes alone. The evidence as to whether this rule was strictly adhered to on this occasion is contradictory. Driver Hyland asserts that he did adhere to it, that he was controlling his train entirely by the hand brake, and that it was not until he was abreast the lamp room—140 yards from the buffer-stops—that he realised that his train was running too fast, and that then for the first time he applied his vacuum brake. The fireman, on the other hand, states that the vacuum brake was applied abreast the engine shed—350 yards from the buffer-stops—but this witness gave his evidence in such an unsatisfactory manner that I do not consider much reliance can be placed on it. I am not therefore prepared to say that on this occasion, though the train was undoubtedly travelling too fast, the rule was not literally adhered to, but Mr. McDonald, the station-master at Harcourt Street Station, stated in his evidence that it was habitually disregarded by drivers when entering this station. At a terminal station like Harcourt Street a strict adherence to this rule is essential, and steps should certainly be taken forthwith by the Company to ensure that it is invariably complied with.

It is clear from the evidence that the speed of the train at the time of its collision with the buffer-stops could not have been more than about three miles an hour. Both the driver and Mr. Delaney, the assistant manager of the line, who was alongside the engine at the time, were of opinion that the buffer-stops would stop the train; but it appears that they at once gave way in front of it, and hardly checked its speed at all. This is by itself sufficient proof that the buffer-stops were wanting in strength. An inspection of them showed that while the actual stops were securely fixed in a concrete block, there was little to hold this block in its place beyond the staves, which, however, were not well placed for taking the strain; also, the proximity of the turntable, and the consequent break which occurred in the rails at this point, prevented the weight of the engine being utilised in holding the stops in position as is usually the case. Under these circumstances it is not surprising that the staves broke and the whole concrete block was carried bodily away in front of the engine. Considering that these buffer-stops abut on a public road, and that the line is at a considerably higher level than the road, the position is certainly one in which very strong stops should be provided, and the Company should take early steps to make these as effective as possible. It is doubtless the proximity of the turntable to the buffer-stops which has made this a matter of some difficulty, but if some means could be found whereby this turntable could be dispensed with, it would then be possible for the stops to be brought forward into a position where it could easily be done.

The desirability of the provision of a direct entrance to the goods yard from the up main line is another point to which attention must be called. As previously stated, a goods train arriving on the up main line has to enter the passenger station and be backed out again on to the down main line before it can enter the goods yard.

This arrangement, which would be an unsuitable one anywhere, is especially so in the case of a terminal station, such as Harcourt Street, and the provision of a direct entrance from the up line to the goods yard is very desirable. Till this entrance is provided, it is recommended that, with the view of preventing goods trains from running into the station at too high a rate of speed, all such trains should be made to come to a stand at the home signal or at the previous station. This will ensure the drivers of goods
trains having their trains well under control after descending the Dundrum incline, and
before actually entering the station.

While, therefore, this collision was immediately due to the miscalculation of speed on
the part of the driver, the faulty arrangements of the station must also be clearly regarded
as having largely contributed to cause it.

It is therefore hoped that the Company will earnestly consider the advisability of
adopting the recommendations made above for improving them.

I am, &c.,

P. G. von Donop,
Lieut.-Col., R.E.

The Assistant Secretary,
Railway Department, Board of Trade.

Printed copies of the above Report were sent to the Company on the 19th April.

DUBLIN, WICKLOW AND WEXFORD RAILWAY.

Railway Department, Board of Trade,
8, Richmond Terrace, Whitehall, London, S.W.,
11th April, 1900.

Sir,

I have the honour to report for the information of the Board of Trade, in
compliance with the Order of the 22nd March, 1900, the result of my inquiry into the
circumstances under which a collision occurred about 7.37 p.m. on the 17th March at
Glenealy Station, on the Dublin, Wicklow and Wexford Railway.

In this case, as the 6.10 p.m. down passenger train from Dublin to Wexford, con-
sisting of an engine, tender, six carriages and a van, was leaving Glenealy Station, it ran
into the engine of an up special goods train which was standing on the line outside the
station.

Fortunately the passenger train was at the time proceeding at a low rate of speed
and consequently no serious damage was done to anyone, though two passengers com-
plained that they had been slightly hurt. The damage to rolling stock and permanent
way was also practically nil.

The passenger train consisted of an engine, tender, three 3rd’s, one 1st, two 2nd’s and
a van. The engine was a four-wheels-coupled bogie tender engine, fitted with the
automatic steam brake, working blocks on the four coupled wheels and on the wheels of
the tender. The train was fitted throughout with the automatic vacuum brake, and both
brakes are reported as having been in excellent order.

The goods train consisted of an engine, tender, 24 waggon’s, of which 21 were
empties, and a brake van. The engine was a four-wheels-coupled tender engine, fitted
with hand-brake working blocks on the tender wheels. The van also was fitted with a
hand-brake.

Description.

Glenealy Station, where the collision occurred, is a station on the Dublin, Wicklow
and Wexford main line, between Wicklow and Rathdrum.
The line is a single one, running through the station in a north-easterly direction,
and it is worked on the electric staff system.

Glenealy Station has only a single platform, which is on the west side of the line; the
station is consequently not used for the crossing of passenger trains, but, in order
that passenger trains and goods trains may be crossed at it, a loop is provided on the east
side of the line opposite to the station platform. This loop has catch points at each end
to protect the passenger line, and the space between these points available for a goods
train is 170 yards in length. There is also a siding to the south of the station, 244 yards
in length, running parallel to the main line and to the westward of it.

The signal box is at the north end of the station platform. Home signals for the
main line and for the loop are provided at each end of the station outside the junctions
between them.

The station is on the level, but just to the south of the station there commences a
falling gradient of 1 in 140 towards Rathdrum.