

Dangerous occurrence at Broad Oak level crossing near Canterbury, Kent, 29 June 2017

1. Important safety messages

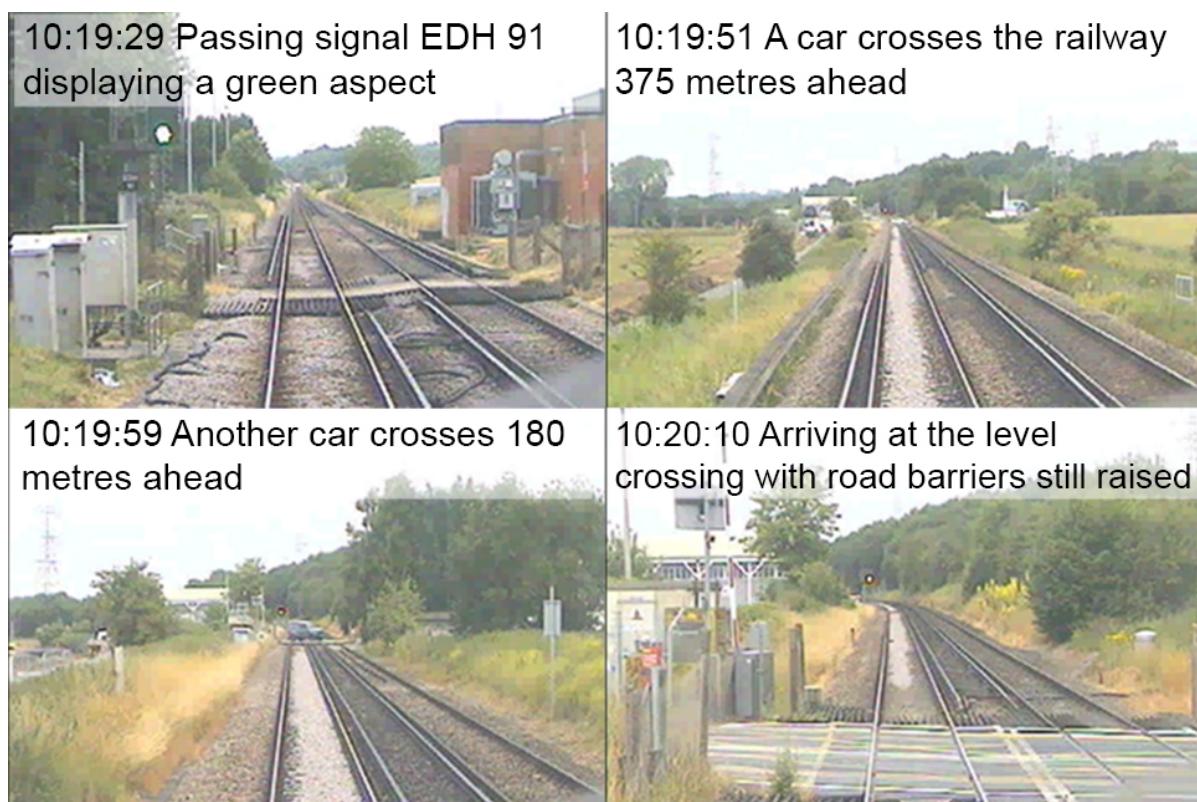
This incident demonstrates the importance of:

- Following the procedures defined in the Rule Book in full, when arranging to carry out work that will affect the normal operation of a level crossing. In particular:
 - signallers are reminded to replace the signals protecting a level crossing at danger before allowing a level crossing attendant to take local control of the crossing for whatever reason
 - signallers are also reminded that they should come to a clear understanding with maintainers who are about to start work on signalling equipment, about the work that needs to be done, how any equipment will be affected, how long the work will take, when the work can start and by when it must be completed
 - level crossing attendants are reminded that when the barriers are raised on a level crossing under local control, they should make sure a red flag, or red light during darkness or poor visibility, is displayed at each side of the level crossing so that it is clearly visible to the driver of any train that may approach
- It also illustrates the need for newly qualified signallers who have just completed their initial training, to be given sufficient time to understand the operation of a signal box, and gain as much experience of as many different operating circumstances as they can, while still under the mentorship of an experienced signaller

2. Summary of the incident

On 29 June 2017, at about 10:20 hrs, a passenger train was approaching Canterbury West station, in the up direction, after passing signal EDH 91 displaying a green (proceed) aspect. As it approached Broad Oak level crossing at 70 mph (113 km/h), the train driver saw vehicles passing over the level crossing at a time when he expected the level crossing to be closed to road traffic. The driver then noticed that the level crossing's barriers were raised, so he promptly made an emergency brake application and sounded the train's horn for 6.5 seconds.

At the time of the incident the level crossing was under the control of a Network Rail mobile operations manager. When he heard the approaching train he operated a switch to start the sequence to lower the barriers. The level crossing's amber road traffic signals illuminated about three seconds before the train arrived and its red road traffic signals started to flash as the train arrived at the crossing while travelling at 17 mph (27 km/h). The barriers started to lower five seconds later, just as the train stopped on the level crossing. Road vehicles that were approaching the level crossing at the time also stopped. There was no collision, but the train driver was shaken by what had happened.

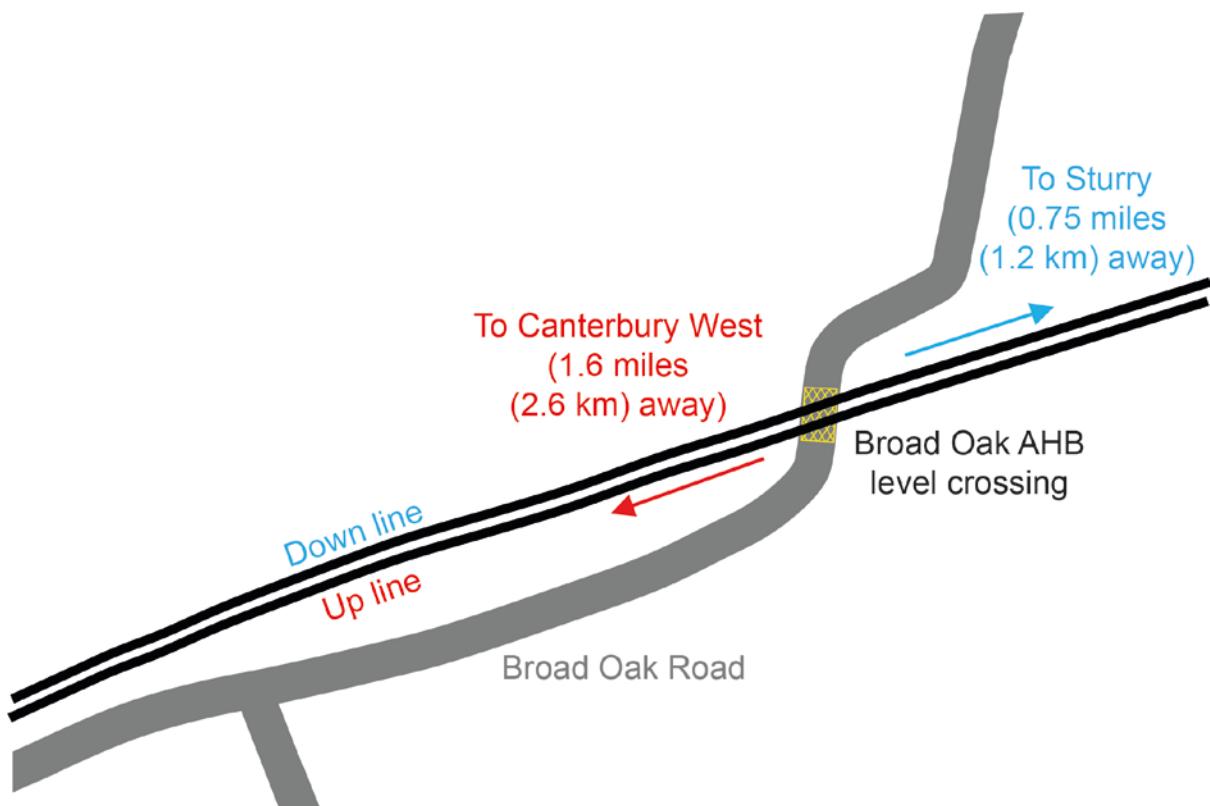


The sequence of events as seen by the forward facing CCTV of the train (images courtesy of Southeastern)

3. Cause of the incident

The incident occurred during signalling maintenance work when the level crossing was under local control. In such cases, the Rule Book requires the signaller to place railway signals to danger, to protect the level crossing, but this was not done. Before agreeing that work can start on signalling equipment, the Rule Book also requires the signaller to come to a clear understanding with the maintainer about how long the work will take and the time by which it must be completed, but this did not happen.

Broad Oak level crossing is an automatic half barrier (AHB) crossing and is located between Canterbury West and Sturry stations. Trains operate over the level crossing in the down direction towards Sturry and in the up direction towards Canterbury West, with a permitted speed of 70 mph (113 km/h) for trains on both lines. Broad Oak Road, which is a single-carriageway road that is subject to the national speed limit, crosses the railway at this location.



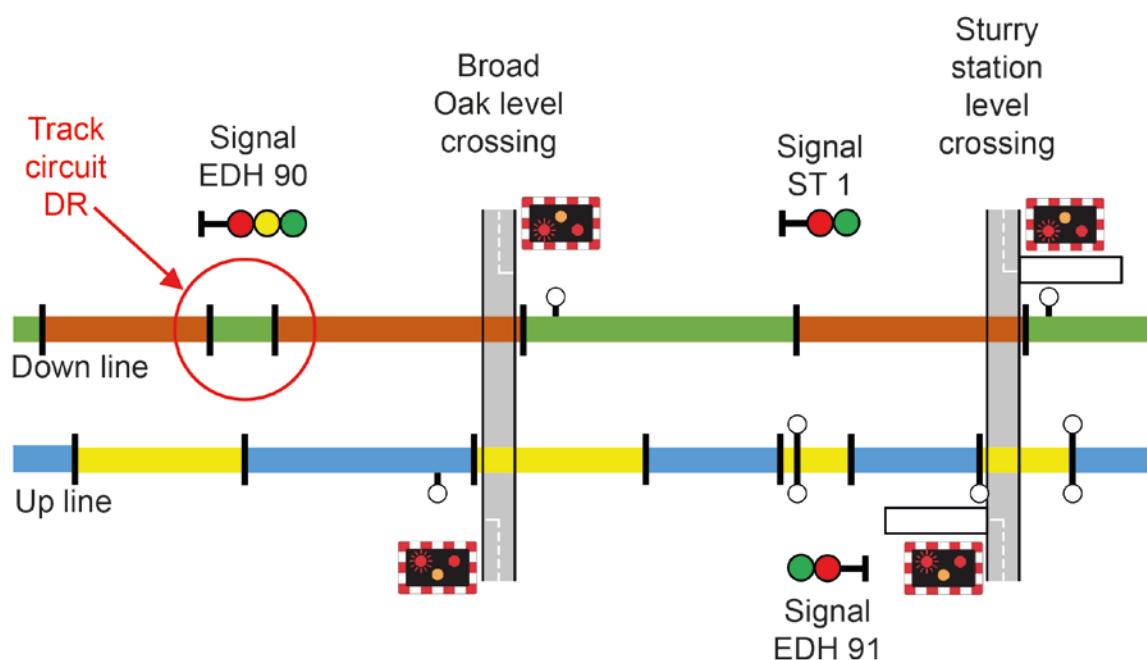
Layout of Broad Oak level crossing

The level crossing is protected by two half barriers positioned on the left-hand side of the road in each direction. When lowered, they only extend across the entrance to the crossing, leaving the exits clear. The barriers, road traffic signals, and audible warning devices (for pedestrians), are triggered automatically by approaching trains. When a train approaches, track circuits change to their occupied state. As well as being part of the signalling system, they are also part of the level crossing's control circuits. The level crossing closure and opening sequences are triggered by treadles located on both sides of the crossing, which are operated by a train's wheels. In normal operation, there is a minimum of 27 seconds between the road traffic signals first showing an amber light and a train arriving at the crossing.

In the event of a failure of level crossing equipment, or if maintenance work is required, the level crossing can be placed under local control. A person, known as a level crossing attendant, will open a cabinet at the level crossing and use a switch inside the cabinet to manually operate the sequences to lower or raise the barriers.

The signaller at Canterbury West signal box is responsible for the operation of Broad Oak level crossing. Indications showing the position of the barriers, and the health of the level crossing and its power supply, are displayed in the signal box. The Canterbury West signaller can control the railway signals either side of the crossing to make them show a red (stop) aspect.

On 20 June 2017, remote condition monitoring equipment detected that track circuit 'DR', which is near to Broad Oak level crossing on the down line, had a high probability of failing. This resulted in the local Network Rail signalling maintenance team being tasked with testing the track circuit. As track circuit 'DR' is part of the level crossing's control circuits, the signalling maintenance team knew that their testing would require the level crossing to be taken under local control.



| - Boundary between track circuits

○ - Treadle operated by passing trains

Schematic showing the level crossing, signals EDH 90 and EDH 91, and track circuit DR

At 08:11 hrs on 29 June, the signalling maintenance team leader called the signaller to explain the planned work to test track circuit 'DR' that day, and the need for Broad Oak level crossing to be taken under local control. They agreed that this work could take place at about 10:00 hrs during gaps between trains. At 09:36 hrs, the team leader called the signaller to say he was now in place to carry out the tests. Shortly afterwards, the mobile operations manager called the signaller to say he was at the Broad Oak level crossing and ready to act as a level crossing attendant when needed.

At 09:48 hrs, the signaller called the team leader in readiness for completing forms to take a line blockage. The team leader explained that this was not necessary as he had lookout protection in place for him and his team while working. The signaller agreed to call the team leader back once a train had passed on the down line.

At 09:57 hrs, the signaller called the team leader to say there was now a gap between trains so testing could start. At 09:58 hrs the signaller authorised the mobile operations manager to take the level crossing under local control. Once this had happened, the team leader began testing track circuit 'DR'. Testing stopped at 10:05 hrs and the level crossing was placed back in its automatic mode by 10:09 hrs, in time for a train to pass over the level crossing at 10:11 hrs towards Sturry. Once this train had passed, the signaller followed the same process as before and at 10:12 hrs he spoke to the team leader to say work could resume. However, they did not come to a clear understanding about a time by which the work should be completed. With the level crossing back under local control, testing resumed at 10:13 hrs. At 10:17 hrs the team leader called the signaller to say that testing was complete but then called back a minute later to ask for further time. The signaller knew a train was due on the up line so refused this request, but they did discuss when further testing could take place. Meanwhile the level crossing remained under the local control of the mobile operations manager.

The train due on the up line was the 09:53 hrs service from Margate to London St Pancras International, reporting number 1J25. It was operated by Southeastern and formed by a 6-car class 395 electric multiple unit. At 10:19:20 hrs, train 1J25 passed through Sturry station and operated the first treadle for Broad Oak level crossing. Nine seconds later, train 1J25 passed automatic signal EDH 91 on the approach to the crossing, which was displaying a green (proceed) aspect. As the train continued, it occupied track circuits and operated treadles in a sequence that would normally cause the level crossing's road traffic signals to operate and its barriers to lower. However, the level crossing did not operate automatically in this way, as it was still under local control.

Whenever a signaller allows a level crossing attendant to take local control of a level crossing, Rule Book module TS9 (GE/RT8000/TS9) requires the signaller to first make sure that the protecting signals on the railway are at danger. Similarly, the Rule Book module TS9 requires the signaller to make sure that the same protecting signals are at danger before allowing a signalling technician to carry out any routine maintenance of equipment that could interfere with the normal operation of the level crossing. At no point during the time that the level crossing was under local control were either of the protecting signals for Broad Oak level crossing (EDH 90 on the down line and EDH 91 on the up line) replaced to danger by the Canterbury West signaller. Although both are automatic signals, the signaller does have a facility to replace each signal to danger.

The signaller was new to this role. He had received the initial training to become a signaller over 11 weeks from the end of January 2017 to the end of April. After this he spent about four weeks training at Canterbury West signal box, in accordance with the signal box training plan, to gain experience of how to operate this signal box. During this time, records kept by the signaller show him taking level crossings under local control during a possession and communicating with level crossing attendants. He passed an assessment to operate Canterbury West signal box on 23 May. The work on 29 June was the first time that the signaller had encountered a situation where testing was taking place that affected the operation of an automatic level crossing, by a maintenance team that was working under lookout protection (so the signaller had no need to use signals to protect people working). The testing was also taking place between trains, so the signaller took no action to prevent trains from continuing to run as normal.

While the testing was taking place, Rule Book module TS9 required the signaller to place and keep the protecting signals to danger, so that if a train did approach while the level crossing was under local control, he could instruct its driver to approach the level crossing at caution and tell the level crossing attendant to lower the barriers before the train arrived. The signaller had been trained on Rule Book module TS9 and was aware that he needed to carry out these actions whenever a level crossing was taken under local control during a line blockage or a possession. However, the signaller had not come across this particular scenario before, either during his initial training or during the time he spent training to operate the signal box, so he did not realise what actions he needed to take. After this incident, the signaller received further training and now understands that he needs to apply these rules whenever he allows a level crossing to be taken under local control, whatever the situation.

The training for new signallers covers Rule Book module TS9 on one day of the eleven week course. The training material focuses on taking a level crossing under local control for a line blockage or possession. It briefly mentions other circumstances when this might happen, including when ‘a train is to pass over the crossing while maintenance work is taking place that affects its normal operation’. The signaller’s actions that day, and the report he gave after the incident, suggest he might not have remembered this specific point from his training.

The signaller and team leader arranged for track circuit ‘DR’ to be tested during gaps between trains and so both considered this testing to be work that would not affect the normal passage of trains. The rules for work on signalling equipment (Rule Book module TS11 (GE/RT8000/TS11) for the signaller and handbook 19 (GE/RT8000/HB19) for the signalling technician) still required them to come to a clear understanding about how the signalling equipment would be affected, how long the work would take and the time by which work must be completed. It also includes reaching a clear understanding how any other equipment would be affected. The signaller did not appreciate how the testing would affect signal EDH 90. Each time the testing caused track circuit ‘DR’ to change state, this signal (being an automatic) changed between displaying a green or red aspect. This is another reason why the signaller should have placed this signal to danger.



Once a level crossing attendant has been instructed by a signaller to place a level crossing under local control, Rule Book handbook 18 (GE/RT8000/HB18) requires the level crossing attendant to make sure a red flag is displayed at each side of the crossing so that it is clearly visible to the driver of any train that may approach. However, no red flags can be seen in the vicinity of the level crossing when viewing the forward facing CCTV footage recorded by train 1J25.

4. Previous similar occurrences

The RAIB published a bulletin for a derailment at Doncaster on 23 July 2008 ([RAIB bulletin B03/2008](#)). This describes how a signaller and signalling maintenance staff made verbal arrangements to take local control of a set of points so that work could be carried out on them. The signaller did not follow the correct procedures as defined by the Rule Book when arranging the protection, which led to a train being routed towards the points. The staff working on the points had to quickly move out of the way and the train then derailed on the points as they were in an unsafe position. This accident also highlighted the importance of signallers and maintainers coming to a clear understanding about the work taking place and the importance of signallers placing signals at danger to provide protection.