

RAIB Bulletin 10/2010

Train collision with level crossing gate, Stow Park, Lincolnshire, 20 February 2010

Description of the accident

- 1 At 06:45 hrs on Saturday 20 February 2010, the 05:39 hrs train from Sheffield to Lincoln, formed of two-car diesel multiple unit number 144009, struck the up¹ side gate at Stow Park level crossing, which had become partly open, at a speed of about 49 mph (79 km/h).
- 2 The timber crossing gate was destroyed by the collision and the upper rail of the gate penetrated the cab of the train through the nearside marker light fitting. This caused minor injuries to the driver's legs and damage to the electrical cubicle mounted behind the driver's seat (figure 1). The driver narrowly avoided being seriously injured by the penetrating pieces of timber from the gate and none of the five passengers on the train were injured.
- 3 The driver applied the emergency brake and the train stopped about 60 metres past the crossing (figure 2).



Figure 1: Cab interior following collision with level crossing gate

¹ The up direction is towards Lincoln



Figure 2: Train involved in the accident at Stow Park crossing

Description of the crossing

- 4 The level crossing at Stow Park is protected by manually controlled gates. It is located where the railway from Lincoln to Gainsborough is crossed by the A1500 road (Tillbridge Lane), and is worked from the adjacent signal box. The signaller operates a wheel to open and close the gates and operate the gate stops. Drive from the wheel is taken through a system of rods and cranks underneath the road surface to the gates and gate stops themselves. The gate wheel is interlocked with the signal levers so that the signals can only be cleared for trains to pass if the gate wheel has been fully operated to close the gates to the road, and if the gate stop lever has been operated locking the gates and stops in position.
- 5 There are two gate stops for each gate to retain the gates in position; either across the railway when the road is open to road traffic, or across the road when the railway is open to trains. Each gate stop includes a front tumbler which acts as a latch to allow the gate to enter and should prevent it moving back across the railway or road. Each gate stop should also prevent the gate swinging too far (figure 3 shows the down side gate stop).
- 6 In order to move the gates, the raised gate stops first have to be lowered, which occurs through the system of cranks and rodding operated by the gate wheel. As the gates complete their travel, the cranks and rodding cause the gate stops at the new position to rise above the surface of the road so that a metal plate on the bottom corner of the gate can engage with the front tumbler of the gate stop.
- 7 In order for the gates to be retained in position, and to prevent them swinging back, there has to be sufficient overlap between the front tumbler of the gate stop and the bottom corner of the gate (figure 3). This has to be maintained to take account of all normal changes in temperature occurring during the year which affects the height of the bottom corner of the gate.

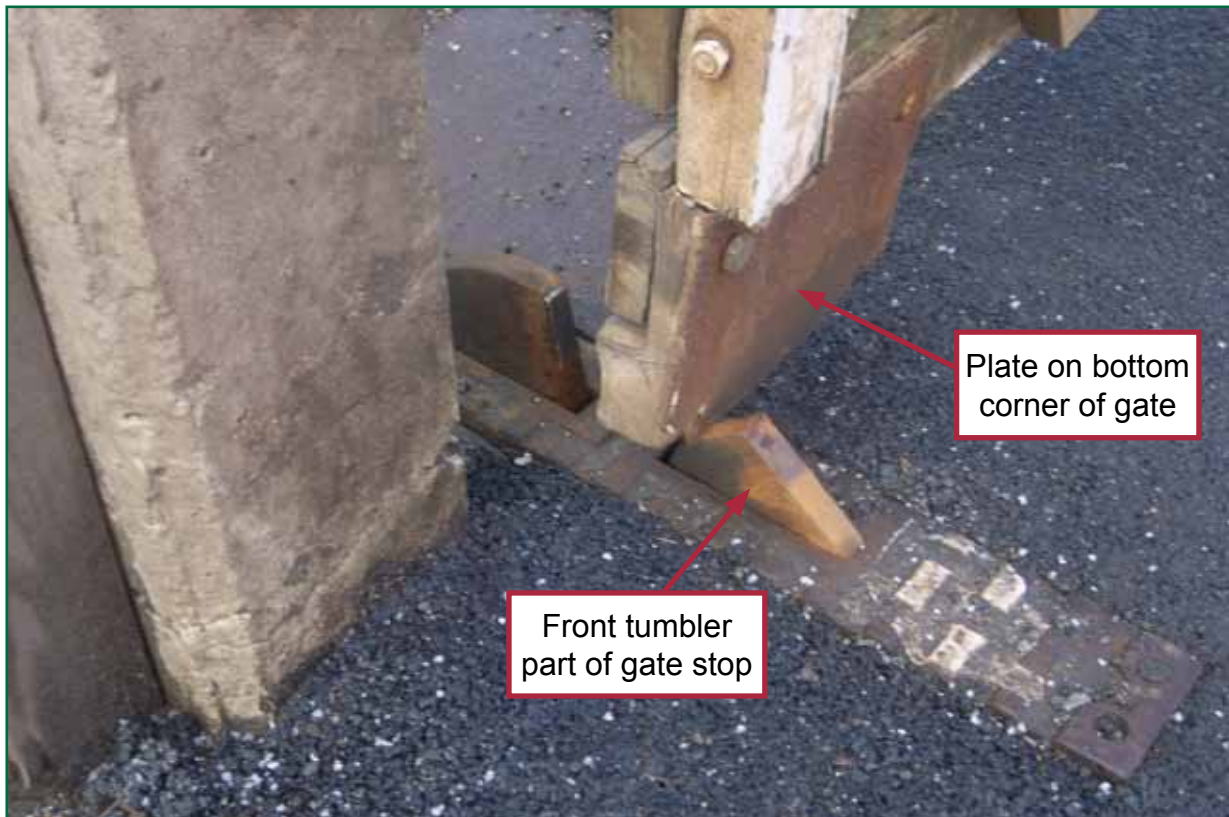


Figure 3: Down side gate stop with gate in position across the road

- 8 Of the approximately 6500 level crossings of all types on Network Rail's managed infrastructure, there were 183 manually controlled gated crossings remaining in active use at the end of 2009. The number has been steadily reducing over the years due to upgrading to more modern forms of protection such as manually controlled barriers. Seventeen manually controlled gated crossings have the same type of gate stop arrangement as is fitted at Stow Park crossing.

Findings of the RAIB

- 9 The RAIB's investigation found that the up side gate was not securely held in position across the road because there was insufficient overlap between the front tumbler part of the gate stop and the bottom corner of the gate. The gate had therefore been able to swing back into the path of the train.
- 10 This was not able to be observed by the signaller due to a mirror mounted on a plywood backboard on a post outside the signal box restricting his view of the up side gate stop. The purpose of the mirror was to enable the signaller to see road traffic approaching the up side of the railway and therefore help him with the operation of the gates.
- 11 The mechanical equipment is simple but regular replacement of wearing parts is necessary. An inspection by Network Rail in 2008 found that some cranks were worn, and as a result rodding and gate stops were renewed in November 2008, although the available records do not describe the full extent of the work carried out. The gate stop lever was reported as stiff to pull on 20 March 2009, and a crank on the up side was replaced the same day. On 18 April 2009 the up side gate was hit by a freight train, because it was not retained by its gate stop, and the gate had to be renewed.

- 12 Following this, Network Rail maintenance staff experienced difficulty in maintaining the up side gate stop and gate so that the gate was securely held by the stop, and at the same time did not drag on the road surface. Three times (in May, August and December 2009) the gates and/or stops were adjusted to try and correct this problem in response to a reported fault, in addition to three routine maintenance visits (which may have involved adjustments to the setting of the stops and gate, but there are no records of this).
- 13 The maintenance standard applicable to level crossing gates does not specify how much overlap there should be between the front tumbler of the gate stop and the bottom corner of the gate. It states: 'check the gates are held in position and no over-riding can occur'. The amount of overlap is difficult to specify because changing environmental conditions during the course of a year affect the height of the bottom corner of the gate.
- 14 The probable cause of the accident was that the travel of the up side gate stop had been reduced when the crank was replaced and it no longer rose sufficiently far above the surface of the road to reliably prevent the gate from being able to ride over the gate stop and swing back across the railway. The low temperature of the previous night was also likely to have been a factor in causing the height of the bottom corner of the gate to increase (paragraph 7).
- 15 Since the accident occurred, Network Rail has renewed the up side gate and adjusted the gate drive. It has also removed the backboard to the mirror, and shortened the post on which the mirror was mounted, to improve the signaller's view of the up side gate stop.

Learning points

- 16 The RAIB has identified the following learning points for maintenance staff and management:
 - Repeated occurrences of the same or closely related faults are likely to be a symptom of an underlying problem. Systems should be in place to identify repeated faults and to implement effective remedial action.
 - Maintenance requirements, particularly those applying to equipment connected with safety (such as the maintenance of gate stops (paragraph 13)), should not be left to local interpretation but should be determined by a competent person and recorded in a maintenance document.
 - It is important that signallers and crossing keepers at crossings of this type are given an unobstructed view of the gates, where it is practicable to do so.

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