



Australian Government
Australian Transport Safety Bureau

Level crossing collision between the *Spirit of Queensland* tilt train and a road vehicle

Denison Street, Rockhampton, Queensland | 15 July 2017



Investigation

ATSB Transport Safety Report
Rail Occurrence Investigation
RO-2017-006
Final – 29 January 2018

Cover Photo: Google Maps

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Publishing information

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Addendum

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What happened

At 0901 Eastern Standard Time¹ on 14 July 2017, the *Spirit of Queensland* (tilt train V976) departed Cairns bound for Roma Street station in Brisbane. The train travelled largely on schedule apart from some minor delays at Tully, Townsville, Bowen Junction, Proserpine, and Mackay.

At about 0047 hours (about 8 minutes ahead of schedule) on 15 July 2017, the train approached the intersection of Denison and William Streets, Rockhampton at 21 km/h (below the posted train speed limit of 25 km/h). Both of the train's drivers identified that the intersection and its approaches were clear. When the train was in the intersection, both drivers heard a loud bang and a jolt to the power car² cab. The operating driver immediately applied the brakes and the train stopped after travelling about 40 m. The driver alighted from the train and found that the train had struck a road vehicle, a white Toyota Camry (Figure 1).

Figure 1: Vehicle and train front cowling damage



Source: Queensland Rail

The train struck the driver's side of the vehicle causing it to spin and collide with the right-hand side of the train in the direction of travel.

Shortly afterwards, the Queensland Police Service (QPS), Queensland Ambulance Service (QAS) and Queensland Fire and Emergency Services attended the scene.

There were four occupants in the vehicle, two females and two males. The three passengers were conveyed by QAS to Rockhampton Base Hospital with non-life-threatening injuries. The vehicle's driver was breath tested by QPS and returned a reading below the blood alcohol concentration limit. The vehicle driver also underwent drug testing returning a zero reading. The QPS issued the driver of the road vehicle with a traffic infringement notice.

Both train drivers underwent a QPS breath test for alcohol at the scene, and were also tested for alcohol and other drugs by an authorised Queensland Rail (QR) tester, at Rockhampton station. All tests returned zero readings.

Road vehicle

The vehicle involved was a white, 2015 Toyota Camry rental vehicle. A suitably licensed driver was operating the vehicle. The driver did not live in Rockhampton but visited regularly for work. The driver had previously used another active level crossing over Denison Street but had never used the passive William Street intersection.

¹ Eastern Standard Time is Coordinated Universal Time (UTC) + 10 hours.

² A vehicle that contains the equipment and facilities necessary to produce, convert or distribute the power required for propulsion, control and auxiliary purposes.

According to the driver, the vehicle's windows were open at the time of the incident. Its occupants were actively engaged in conversation and none of them heard the train's horn. The driver stated that the vehicle was slowed almost to a stop as it approached the intersection before accelerating to cross it. Neither the driver nor the passengers noticed the train until immediately before the collision.

Train V976

Train V976 was the QR-operated tilt train passenger service travelling from Cairns to Roma Street station, Brisbane. The train consisted of two power cars and seven passenger cars, in a push-pull configuration (that is, power car, seven passenger cars, power car). It had a gross mass of 448 t and a length of about 200 m. The train was carrying 148 passengers, with six QR on-board personnel and two drivers.

The train was fitted with a forward-facing video camera and a data event recorder. The video camera footage (Figure 2, sequential frames as identified) showed that the:

- A. Train entered a clear crossing with no signs of approaching traffic.
- B. Vehicle (indicated by the red arrow) entered the crossing from William Street, ahead of the approaching train.
- C. Vehicle continued across the intersection.
- D. Vehicle continued with no indication of slowing.
- E. Vehicle moved in front of the train, just prior to impact.
- F. Train collided with the right-hand side of the vehicle (the smashed glass from the vehicle sprayed over the train windshield).

The data event recorder from the train records various parameters, including time, speed, horn, and lights. The recorded data confirmed that the train's:

- speed was 21 km/h (below the limit of 25 km/h)
- driver used the horn in accordance with the rules and procedures, including the approach to the William Street intersection
- headlight was on and the flashing visibility lights were activated
- driver reacted immediately by applying the brake.

Figure 2: Forward-facing train video camera sequential frames (red arrow shows the position of the road vehicle)



Source: Queensland Rail, annotated by ATSB

The level crossing

The level crossing at William Street, Rockhampton was a public level crossing located at the 639.805 km mark on the North Coast Line, Rockhampton. The North Coast Line at this location consisted of a single bi-directional track, which runs between and parallel to the two vehicle carriageways on Denison Street. The designated maximum track speed was 25 km/h. There were about 28 train movements per day on this section of the track. The majority of those movements were freight.

The intersection of Denison and William Streets was a level crossing with passive controls (stop and warning signs), Figure 3. Queensland Rail defined passive control as:

Control of the movement of road vehicles or pedestrians across a crossing by signs and devices, none of which are activated by the approach of a train and rely entirely on the road user / pedestrian observing the signs and detecting the approach or passage of a train by observation.

Figure 3: The level crossing intersection (the red arrow indicates the train movement and the yellow arrow indicates the movement of the road vehicle)



Source: Google Maps

There were warning signs on William Street situated appropriately along the road in the approach to Denison Street (Figure 4). The designated speed limit on Denison Street was 50 km/h and 60 km/h on William Street. Queensland Rail found the approach signage was serviceable and appropriate.

Figure 4: Intersection signage



Source: Google Maps

Additionally, the required sighting distances met the minimum requirements for the type of protection and road rail approach speeds. The intersection of Denison and William Streets level crossing had undergone regular inspections and maintenance by QR.

Figure 5: Intersection sighting



Source: Google Maps

Previous incident

At 0225 on 23 February 2012, the southbound tilt train collided with a vehicle at the intersection of Denison and William Streets. Three occupants of the vehicle suffered non-life-threatening injuries. The circumstances of that past incident were very similar to this one in 2017.

Following that occurrence, on 22 March 2012, QR surveyed the intersection using the Australian Level Crossing Assessment Model (ALCAM). The survey identified several minor non-conformances with sighting distance and signage. Queensland Rail and the Rockhampton Region Council resolved these issues by March 2013.

Safety analysis

Level crossings are the physical interface between road and rail traffic. Both modes of transport operate as separate entities and have different rules, procedures, characteristics and operational limitations. Most importantly though, neither vehicle has advance knowledge of when the other will be encountered at the crossing.

Level crossings with active warning devices are intended to provide road users with a higher level of safety. Even at crossings with active devices (for example, flashing lights and bells), however, the warning of an approaching train is available to the motorist at, not in advance of, the crossing.

Passive control level crossings control the movement of vehicular or pedestrian traffic using signs and devices (such as Give Way and Stop signs), none of which are activated during the approach or passage of a train. These controls rely on motorists (and pedestrians) detecting the approach or presence of a train by direct observation. There are more than 6,000 passive level crossings in Australia. This type of protection is generally used where the volume of road and rail traffic makes the risk of a collision relatively low.

Stop sign traffic control is used at level crossings where the sighting distance is such that a motorist is unable to see an approaching train in time to stop before its arrival at the crossing. This traffic control method requires a motorist to stop at the crossing, visually look in both directions and, if no train is seen or heard, then safely proceed. If a train is seen or heard, the motorist must remain stationary at the Stop sign until it is safe to proceed. Motorists are required to have this knowledge for a driver's license and drivers encounter Stop signs routinely and follow the same process of stop, check, and wait/go. Despite that requirement, there have been many accidents at Stop sign-protected crossings because of the motorist's failure to stop.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- The driver of the road vehicle did not see or hear train V976 approaching the level crossing and drove in front of the train immediately before the collision.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Queensland Rail

Queensland Rail has advised the ATSB that the Manager, Road Rail Interface will conduct a review of the level crossing at the intersection of Denison and Williams Streets, Rockhampton.

Safety message

This incident is a reminder that all road vehicle drivers using railway level crossings equipped with passive controls need to be vigilant, observe road-warning signs, obey road rules and look out for trains.

For more information about level crossing safety, see the ATSB publication [Railway Level Crossing Safety Bulletin](#).

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry.



General details

Occurrence details

Date and time:	15 July 2017 – 0047 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Level crossing collision	
Location:	Denison Street, Rockhampton QLD	
	Latitude: 23° 22.925' S	Longitude: 150° 30.684' E

Train details

Train operator:	Queensland Rail	
Registration:	V976, <i>Spirit of Queensland</i>	
Type of operation:	Passenger	
Persons on board:	Crew – 8	Passengers – 148
Injuries:	Crew – nil	Passengers – nil
Damage:	Minor damage to the front of the train	

Road vehicle details

Type:	2015 Toyota Camry
Persons on board:	1 driver, 3 passengers
Injuries:	Minor injuries to two occupants.
Damage:	Significant damage to vehicle

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

Australian Transport Safety Bureau

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Investigation

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