



Report 96-110

Train 401

Huntly

13 June 1996

Abstract

On Thursday, 13 June 1996 at about 1035 hours Train 401, the southbound *Geyserland Express* passenger service, struck and killed a signal maintainer working alongside the track. The causes were the signal maintainer's lack of awareness of the train's approach and the absence of any warning to the locomotive engineer of the presence of this staff member. A safety issue identified was the need for the wearing of high-visibility clothing by all staff in such situations to be mandatory.

Transport Accident Investigation Commission

Rail Accident Report 96-110

Train type and number:	Express Passenger, 401 (Silver Fern RM 18)
Date and time:	13 June 1996, 1035 hours
Location:	Huntly, 571.287 km, North Island Main Trunk
Type of accident:	Worker struck by train
Persons on board:	Crew: 3 Passengers: 16
Injuries:	Crew: Nil Passengers: Nil Other ¹ : 1 fatal
Nature of damage:	Nil
Inspector in Charge:	R E Howe

¹ Tranz Rail signal maintainer.

1. Factual Information

- 1.1 On 13 June 1996, Train 401 was the scheduled *Geyserland Express* operated by Tranz Rail Limited (Tranz Rail) between Auckland and Rotorua. The service comprised Silver Fern two-coach railcar RM18.
- 1.2 Train 401 was crewed by a Locomotive Engineer (LE) and two train attendants.
- 1.3 Train 401 left Auckland on time at 0820 hours. When the train passed through Huntly at approximately 1030 hours it was running 40 minutes behind schedule due to delays associated with a signal failure at Amokura.
- 1.4 After passing through Huntly, Train 401's speed was governed by a 25 km/h speed restriction over Tregoweth Lane level crossing between 571.8 km and 571.92 km. The LE did not sound his train whistle as he could see the crossing was clear and that the warning devices were working. The train then negotiated a 400 m radius left hand curve with an authorised speed of 75 km/h. As the train exited this curve the LE's view ahead was partially obscured by a group of toi toi growing on the left side of the track. The LE stated he was looking ahead and concentrating on the track at the time. He did not notice anything unusual and in particular saw no sign of maintenance staff or their vehicles.
- 1.5 The LE recalled seeing a signal location box² ahead of him as he exited the curve. A later reconstruction of view lines from the *Silver Fern* cab showed a clear view of the signal location box 196 m ahead was obtained after passing the toi toi.
- 1.6 The LE estimated his speed at 70 to 80 km/h as he picked up speed on the straight. He stated he saw nothing untoward until he was "right on the box", when he noticed some movement and the blue/black "Swandri" jacket of a person who appeared from behind the box and stepped towards the track. In the "split second" before he lost sight of him he noticed that the person was "sort of just crouched down" and initially was moving forward and looking across the track toward the road, before looking up, seeing the train, and trying to step back.
- 1.7 The LE heard the sound of an impact and made a full service brake application which brought the train to a stop 340 m beyond the point of impact. The LE used his emergency button to contact Train Control and request assistance before leaving his cab and running back to the accident site.
- 1.8 On arrival the LE found a man lying alongside the signal location box with severe head injuries. The LE stated that he detected a faint pulse. Since the person was lying in a natural recovery position the LE crossed the rail tracks to an adjacent Tranz Rail vehicle to see if he could use its mobile radio to contact any other Tranz Rail staff in the area. While the LE was attempting this the length ganger arrived on the scene. They both returned to the victim's side where the LE again checked for a pulse, this time finding no response. Ambulance staff were on the scene shortly thereafter and reported finding no signs of life.
- 1.9 An examination of RM18 following the accident showed indentations and evidence of collision with a person on the front left corner at 1.4 m above rail level.

² Signal location boxes are a standard part of the Tranz Rail signalling infrastructure. They are spaced at regular intervals (in this locality approximately 800m) and house relays and other equipment for signal operation.

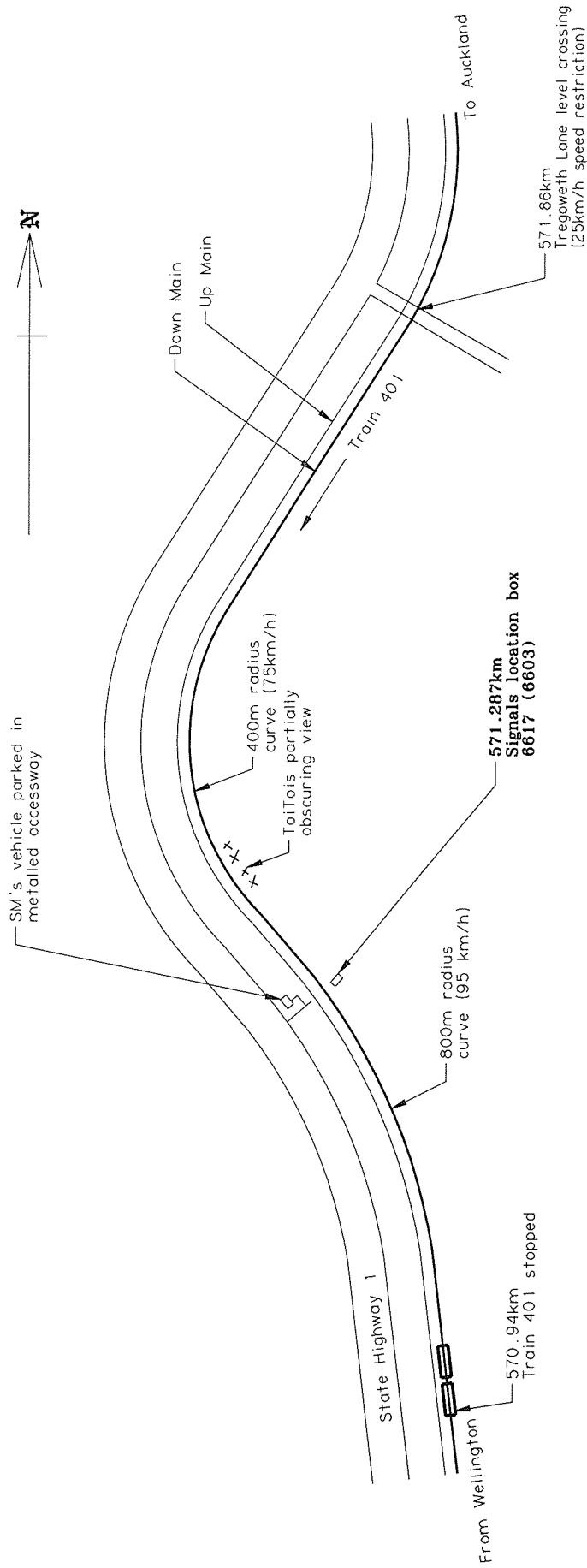


Figure 1
Locality diagram, (not to scale)

- 1.10 The locomotive event recorder was disconnected following the accident and data was extracted at 1727 hours on 13 June 1996. The event recorder was reconnected following this extraction. When attempting to print out the data extracted Tranz Rail found that there had been an extractor failure. By the time this became known, and arrangements were made for further disconnection and extraction at 1344 hours on 14 June 1996, additional recording meant no short log output³ was available for the period before the accident. The long log output which was available gave maximum speed at 10 second intervals. This confirmed the LE's estimate of speed, indicating a maximum speed of 79 km/h at impact, and showed a general speed between 70 and 79 km/h in the two minutes before impact.
- 1.11 The deceased was a signal maintainer employed by Tranz Rail. On Thursday, 13 June 1996 he had been working alone carrying out a series of standard code inspections required by Tranz Rail covering various signal location boxes in the Huntly area.
- 1.12 Such code inspections were a standard part of the workload of the four staff under the control of the senior signals technician at Hamilton. The requirements of the inspections included housekeeping aspects, such as cleaning and spraying for insects, as well as technical checks.
- 1.13 Records maintained by the signal maintainer and recovered after the accident showed his programme for that day had resulted in signal location boxes 6537⁴ and 6567 being signed off as checked.
- 1.14 The Tranz Rail length ganger saw the signal maintainer at signal location box 6567 some 10 minutes prior to the accident. The signal maintainer appeared in good health and waved to the ganger.
- 1.15 The accident occurred at signal location box 6617 at 571.287 km (although officially recorded as signal location box 6617 the box was stencilled with the number 6603 from a previous location). Figure 1 shows the features in the accident locality.
- 1.16 Signal location box 6617 was found locked after the accident. A check showed the box had been cleaned and recently sprayed, indicating the signal maintainer had completed his internal check of the box prior to the accident.
- 1.17 The normal aids for such inspections included two brushes and a can of insect spray. A small brush was still in the signal maintainer's hand following the collision, the box key and a larger half brush were found within 600 mm of his hand, and the spray can was in the immediate vicinity.
- 1.18 The signal maintainer was not wearing high-visibility clothing, either when last seen working north of the accident site or at the time of the accident. His external clothing comprised overalls with a blue "Swannndri" jacket worn over.

Weather

- 1.19 The weather was fine and visibility was good on the morning of the accident. The wind direction was opposite to that of the approaching train.

³ short log output gives a variety of parameters, including speed, throttle position and brake pressure, at one second intervals for six minutes prior to the last disconnection

⁴ the numbers of the signal location boxes referred to their old mileage from Auckland to Wellington prior to metrication. Thus 6537 was at 65 mile 37 chain and north of 6567 at 65 miles 67 chain



Figure 2
Signal location box 6617 (6603). General view looking south showing relativity to rail.



Figure 3
Signal location box 6617 (6003). View looking south showing earth wire at the north end and the rough terrain behind the box.

Personnel

- 1.20 The LE had 41 years railway experience, 33 years as an LE of which the last 15 had included driving the Silver Fern. He was appropriately certified for his duties. His recreation and sleep patterns were normal. His health was good and he was not under medication.
- 1.21 The signal maintainer had 19 years railway experience, all of which had been in the Hamilton signals area. He was designated Signal Maintainer Grade 2 and held the appropriate current Operating Certificate for these duties. He was reported to be in good health and not under medication. His fellow workers stated he was his usual self on the morning prior to the accident. His manager described him as a highly motivated and supportive member of the Hamilton signals group.

Signal Location Box 6617

- 1.22 Signal location box 6617 was a typical Tranz Rail installation measuring 1.08 m wide, 0.56 m deep and the top was 1.4 m above rail level (1.66 m above ground level). The front face was 2.75 m from the centre line of the track and conformed with the clearance requirements for such structures laid down by Tranz Rail. The box had double doors opening towards the track and these were padlocked when not in use. Refer Figures 2 and 3.

Inspection procedures

- 1.23 During the course of the investigation a signal staff member advised that the standard inspection and maintenance cycle being carried out by the signal maintainer was originally structured as part of a two-person team function, and that the change to one person occurred approximately eight years ago. This was referred to Tranz Rail for confirmation, and the comparative procedures which may have applied. Tranz Rail's Manager, Signals and Telecommunications included in his reply:

The work being under taken (by the signal maintainer) on 13 June 1996 has never been formally structured as being the output of a multi-person team. Since the 1950's specialist technical, then more recently more general duties have been undertaken by individuals working alone over defined sections of track. Working alone on track or near track has been an accepted practice for many years. Our Company rules and procedures allow for this. The extent to which this has occurred has differed by location and has largely been determined by the nature of the work at hand.

High-visibility clothing

- 1.24 Tranz Rail advised that they did not have a corporate policy with regard to wearing high-visibility clothing and that requirements were covered by local safety plans. These plans were intended to make the wearing of high-visibility clothing mandatory in defined locations, and with the expectation that staff would identify with, and action, the requirements of a specific safety plan to which they had contributed.
- 1.25 The safety plans covering signals staff in the Auckland, Hamilton, and Wellington areas were reviewed and found to vary in how they dealt with this matter. The Auckland Safety Plan included the following requirement:

High visibility clothing

Any staff member on the ground in the vicinity of any rail track is required to wear High Visibility clothing appropriate to the time of day. This clothing will be supplied on an individual issue basis to all Rail Operations staff.

For the Wellington area the safety plan included the following, under the heading “Local Safety Rules”:

High Visibility vests are to be worn while working on or beside tracks and attending all crossing alarm sites.

The Hamilton safety plan, a comprehensive 24 page document, made no mention of high-visibility clothing.

- 1.26 The perception of local Hamilton signals’ staff was that the wearing of high-visibility clothing by a signal maintainer in that location was over to the individual. There were no local instructions covering the wearing of such clothing.
- 1.27 The signal maintainer had been issued with a high-visibility vest, and six weeks prior to the accident had also been issued with a new standard Tranz Rail “Swannдри” jacket with sewn in high-visibility strips. Both were found in the signal maintainer’s vehicle following the accident. His controlling officer at Hamilton stated he had not seen the signal maintainer wearing the high-visibility “Swannдри” since it was issued, and felt this may have been because of the restrictive wrist fitting details of these particular garments.
- 1.28 The local signals manager at Hamilton advised that there were certain signposted areas where the wearing of high-visibility clothing was required. He stated wearing high-visibility clothing in main-line situations, such as the inspection being carried out on 13 June, was recommended but not mandatory. He estimated that his staff wore high-visibility clothing 50% of the time in such situations.

Protection requirements

- 1.29 The work carried out during the signalling inspection did not interfere with, and was not likely to interfere with, the safe working of trains. As such it was not an obstruction and did not need protection in accordance with Tranz Rail rules and regulations.
- 1.30 By using communication equipment in his vehicle the signal maintainer could either check train movements with Train Control or the local panel, or advise Train Control or the local panel of his work intentions. Reports indicated such checks or advice were sometimes made or given when working for a long period at a specific locality but they were not a normal part of inspections such as those being carried out by the signal maintainer. It was usual for inspection at a specific signal location box to take five to 10 minutes and as many as 20 boxes could be inspected in a day. Signal maintainer’s were not required to contact Train Control or ascertain train movements when making such inspections. Working with due care and attention with the knowledge that trains could be expected at any time was considered a normal part of these duties.

Audibility of train whistles

- 1.31 The traffic noise from the adjacent State Highway 1 prompted a check of the audibility of train whistles in the locality. Observations under similar weather conditions showed that warning whistles from southbound trains were clearly audible when they were at least 100 m from the accident site, and in some cases in excess of 300 m. Traffic conditions were not similar during these observations due to the abnormally heavy traffic flow on the State Highway associated with the Hamilton Field Day on the day of the accident.

Train schedules

- 1.32 The normal down (to Wellington) train pattern for this section of the track meant a clear window was available from 0400 hours until the *Geyserland Express* at approximately 0955 hours (depart Huntly), followed by diesel-hauled Train 201, the *Overlander*, at approximately 1022 hours.

2. Analysis

- 2.1 The two key issues identified during the investigation were that the signal maintainer was not aware of the train's approach, and that the LE had no indication of the signal maintainer's presence until it was too late for any warning to be given.

The signal maintainer's lack of awareness

- 2.2 The signal maintainer was experienced in his duties. He had lived locally at Ngaruawahia for some years, was familiar with the area, and would have been aware of the normal down train pattern for a week day morning.
- 2.3 On the day in question the late running of Train 401 meant its timing at Huntly (1030 hours) placed it very close to the normal running of Train 201.
- 2.4 The Silver Fern railcar is noted for its quiet running and gave little audible warning to track staff of its approach compared to a diesel-hauled train. The signal maintainer's duties on 13 June before the accident required trackside work and road travel, as he inspected several signal location boxes, and it is unlikely that he would have been aware that Train 401 had not passed through on time. His normal expectation when working at signal location box 6617 at that time would have been that Train 201 was in the vicinity.
- 2.5 The LE's report placed the signal maintainer at the south end of signal location box 6617 before he stepped out to cross the line from a crouched position. The LE had a clear view of the signal location box for approximately 10 seconds before the collision and yet saw no sign of the signal maintainer. The width and height of the signal location box were such as to be able to obscure the signal maintainer if stationary, but any movement would have been likely to have been beyond the limits of the signal location box and therefore potentially visible to the LE.
- 2.6 Evidence indicated the signal maintainer had completed his internal check of signal location box 6617 and had locked the box. The only other possible outstanding work requirement was to check the earth wire. This was at the north end of the box (refer Figure 3) and the rough terrain behind the box made access from the south end difficult compared with the north end. No apparent work related reason could be found for the signal maintainer to be relatively stationary for at least 10 seconds at the south end of the box.
- 2.7 A likely explanation for the position of the signal maintainer, the fact that he was relatively stationary, and that he appeared to come from a crouched position was that he had just picked up the hand held articles.
- 2.8 Reports stated that the signal maintainer started to cross the track without looking for any approaching southbound train. This may have been because he did not hear the sound of an expected diesel train.
- 2.9 Although the signal maintainer could have contacted Train Control the nature of his duties at the time did not justify a specific check being made for each signal location box being worked on.

The LE's inability to give a warning

- 2.10 The LE's report indicated that he had a clear view of the signal location box for approximately 10 seconds as he covered the last 196 m prior to the collision. Had he seen any sign of the track worker during this period and sounded his whistle it is highly likely the accident would have been avoided. Tests indicated the signal maintainer would have heard the whistle despite the prevailing wind and traffic noise. The timing of the warning, and his response, would have determined whether the collision was avoided.
- 2.11 The signal maintainer was not wearing any high-visibility clothing. Whether or not this could have enhanced the spotting of the signal maintainer by the LE could not be determined. The Tranz Rail local perceptions of whether the wearing of such clothing was of significant importance to be a mandatory requirement in such circumstances was variable, but the fact that two out of three safety plans required this indicated its importance. While the general advantages of the central approach adopted by Tranz Rail, based on achieving company-wide compliance through local safety plans, is appreciated, this resulted in inconsistent geographical requirements for identical work patterns. It is considered the nature and location of the work justified a mandatory requirement in the appropriate safety plan and staff should have been in no doubt as to the requirement.

Temporary speed restriction

- 2.12 The long log output showed Train 401 had traversed the 25 km/h temporary speed restriction over Tregoweth Lane level crossing at approximately 65 to 70 km/h and this was confirmed by the LE. This was a technical breach of Tranz Rail's requirements and has been followed up accordingly by Tranz Rail. The LE was an experienced driver and aware of the reasons for the speed restriction (protection against possible collision with road traffic awaiting entry into the State Highway after crossing the rail tracks) so he slowed from 74 km/h to 60 to 65 km/h until he saw the crossing was clear, and that the warning devices were operating, before increasing speed.
- 2.13 The likely speed of Train 401 at the point of impact had the 25 km/h speed restriction been observed was calculated using the highest acceleration rate shown for RM 18 on the long log output (thus reflecting the prevailing down gradient in the locality). This showed a maximum speed of approximately 70 km/h could have been reached.

3. Findings

- 3.1 The signal maintainer attempted to cross the track despite the immediate presence of the southbound train.
- 3.2 There was no indication that the signal maintainer had seen or heard the train until it was almost upon him.
- 3.3 The signal maintainer attempted to pull clear of the train just prior to impact.
- 3.4 The reason the signal maintainer emerged from behind the signal location box in a crouched position some 10 seconds after the LE obtained a clear view could not be established.
- 3.5 The late running of Train 401 and its coincidence with the timing of Train 201 may have decreased the signal maintainer's alertness to the relatively quiet approach of the Silver Fern railcar.

- 3.6 Tranz Rail local instructions and compliance monitoring accepted working in such situations without high-visibility clothing.
- 3.7 If the signal maintainer had been wearing high-visibility clothing it may have been in view sufficiently, during the 10 second clear view approach, to attract the LE's attention and elicit a warning whistle.
- 3.8 The signal maintainer could have heard a warning whistle from the train at least 100 m away.
- 3.9 If a warning whistle had been given and heard it is almost certain that the collision would have been avoided.
- 3.10 The Tranz Rail local safety plans covering the work of signal maintainers and other staff working alongside the track were inconsistent with regard to the wearing of high-visibility clothing.
- 3.11 The non-compliance with the temporary speed restriction over Tregoweth Lane level crossing did not affect the consequences of the collision.

4. Observation

Single-person inspection

- 4.1 Tranz Rail advised that some aspects of railway inspection that were carried out by more than one person have evolved over the years to become a single-person responsibility without formal restructuring, and that the inspection carried out by signal maintainers fell within this category (refer 1.23). The ability to introduce such changes would be subject to the adequacy of specific procedures in place for each situation to ensure safety standards were maintained to an acceptable level.
- 4.2 During the course of the investigation some factors associated with working in signal location boxes indicated there was a particular risk associated with such single-person inspections. These factors were:
 - 4.2.1 The inability of a signal maintainer working with his back to the track at a signal location box with the doors open to see an approaching train.
 - 4.2.2 The possibility that when working in such a situation under adverse weather conditions or with high road traffic noise that the train, or an audible warning from the train, may not be heard by a signal maintainer until it was too late to take effective, controlled action to ensure safety.
 - 4.2.3 The possibility that even if a signal maintainer had seen or heard the approaching train, but found it necessary to stay within the confines of the signal location box with doors open, that flapping tarpaulins, dragging strops or chains, or other loose objects on the train could place him at unacceptable risk.
- 4.3 During the course of the investigation signals staff confirmed cases where the short warning of a train's approach necessitated allowing it to pass while they were standing at the box with the doors open. Tranz Rail has incidents of damage to lineside equipment caused by loose or dragging equipment. If Tranz Rail carried out a risk analysis of the particular inspections carried

out by signal maintainers it would assist in deciding whether all or some of the following possible ways of reducing this risk are justified:

- No new signal location boxes to be installed between double line tracks.
- All new signal location boxes to have access doors⁵ opening away from the track.
- Existing signal location boxes in localities where noise and/or site considerations create a particularly hazardous environment for inspections to be modified to provide access from the opposite side to the track.

5. Safety Recommendations

5.1 It was recommended to the Managing Director of Tranz Rail Limited that he:

5.1.1 Review the coverage and application of site safety plans to ensure they incorporate the wearing of high-visibility clothing as a mandatory requirement when working on or adjacent to any operating line for signal maintainers carrying out regular lineside equipment inspections, and for other staff subjected to similar risk. (036/96)

5.1.2 Take immediate steps to ensure all staff are made aware that where the wearing of a version of approved high-visibility clothing when working on or adjacent to any operating line is part of a site safety plan the wearing of such gear is mandatory and not elective. (037/96)

5.2 Tranz Rail Limited responded as follows:

The two recommendations have been implemented for all staff when working on or adjacent to any operating line.

16 April 1997

M F Dunphy
Chief Commissioner

⁵ Some boxes have access doors on both front and rear, the rear doors being infrequently used to gain access to the back of signal panels for specific maintenance purposes. The access doors referred to are those used for regular inspections.