

Report 09-102: Passenger fatality after falling between platform and passenger Train 8125,
Newmarket West station, 1 July 2009

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Final Report

Rail Inquiry 09-102
Passenger fatality after falling between platform and passenger
Train 8125, Newmarket West station, 1 July 2009

Approved for publication: February 2011

Transport Accident Investigation Commission

About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of occurrences with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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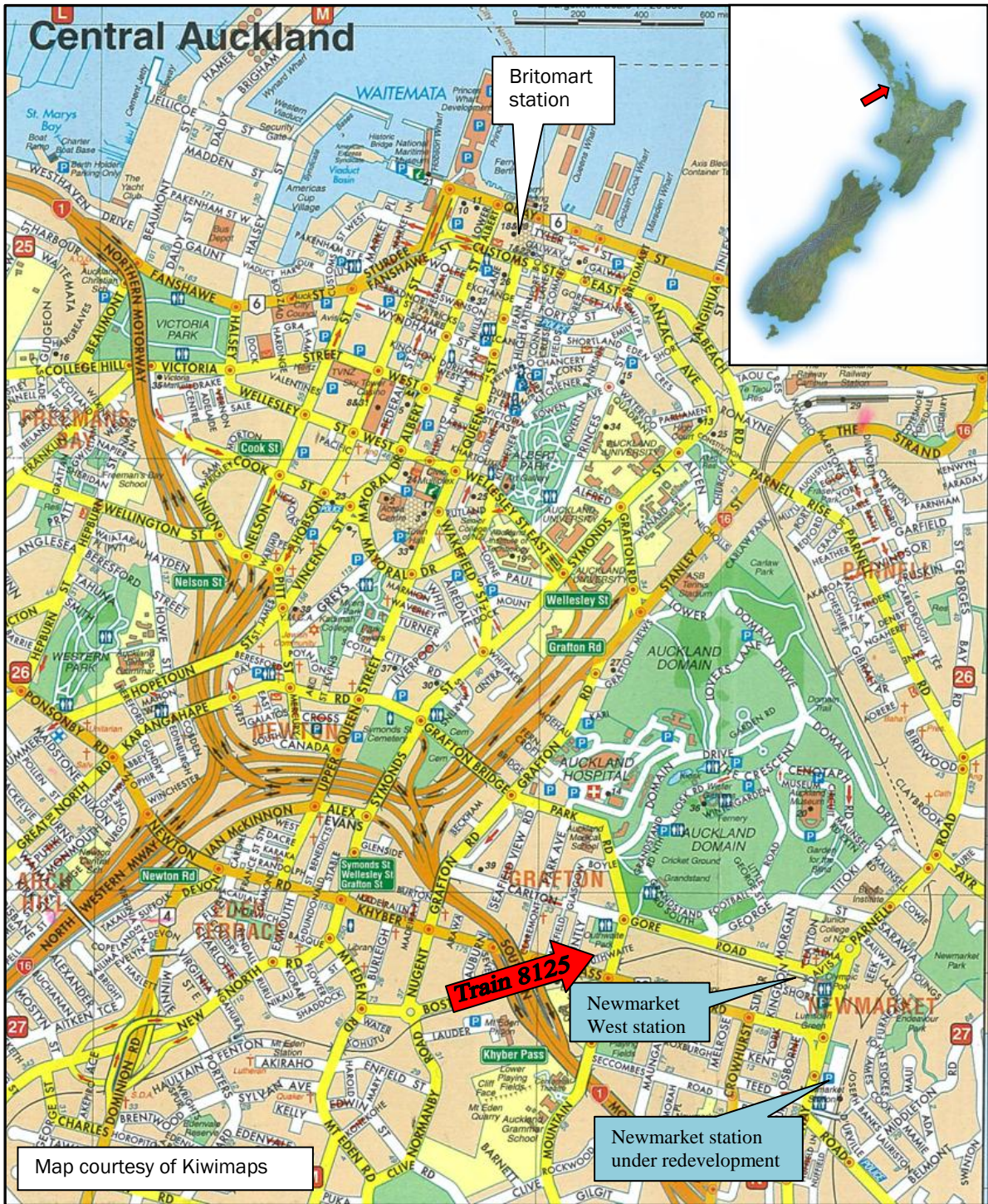
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Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not cited in this final report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1980 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

Unless otherwise specified, photographs, diagrams and pictures included in this final report are provided by, and owned by, the Commission.



Location of accident

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Abbreviations

Blind Foundation	Royal New Zealand Foundation of the Blind
Commission	Transport Accident Investigation Commission
m	metre(s)
mm	millimetre(s)
UTC	universal co-ordinated time
Veolia	Veolia Transport Auckland Limited

Data summary

Train type and number:	passenger Train 8125
Vehicle classes:	SA passenger carriages and SD driving trailers
Year of manufacture:	1972 by British Rail as mk 2 passenger carriages
Year of rebuilding:	between 2004 and 2006 in Toll Rail NZ Consolidated Limited's Hillside workshops in Dunedin
Motive power:	DC class diesel electric locomotives rebuilt between 1978 and 1980 by Clyde Engineering of Australia from DA class locomotives originally built in late 1950s/early 1960s by General Motors of Canada
Date and time:	1 July 2009 at 1311 ¹
Location:	Newmarket West station, 8.50 kilometres Down Main, North Auckland Line
Persons on board:	crew: 5 off duty crew: 2 passengers: about 40 dispersed throughout the train
Injuries:	crew: nil off duty crew: nil passengers: one fatal
Damage:	nil
Operator:	Veolia Transport Auckland Limited (Veolia)

¹ Times in this report are New Zealand Standard times (UTC+12) and are expressed in the 24 hour mode.

1. Executive summary

- 1.1. On Wednesday 1 July 2009, an elderly male passenger who was vision-impaired had just alighted from passenger Train 8125 on the Down platform at Newmarket West station. He was walking along the platform as the train left and he veered into the side of the moving train, spun around and fell through the gap between the train and the platform edge onto the track below. The passenger was fatally injured.
- 1.2. No conclusive reason for the passenger veering into the side of the train could be established, but it was likely related to his impaired vision or, distraction, or a combination of both.
- 1.3. The Transport Accident Investigation Commission (Commission) determined that the passenger exchange at Newmarket West station had been made in average time and in accordance with the operating company's procedures, and that it had been appropriate for the train to move away from the platform when it did.
- 1.4. The design of the platform met the New Zealand and international guidelines for assisting vision-impaired and blind persons.
- 1.5. Newmarket West station was a temporary constructed station pending the build of a new station at Newmarket, and consequently part of the Down platform was constructed on a curved section of track, which meant the gap between the train and the platform edge was wide enough for the passenger to fall through when he walked into the side of the train.
- 1.6. The Commission determined that the gap was as small as practicably achievable within the physical constraints of the station, and that warning signage and operating procedures were reasonable defences against this type of accident occurring.
- 1.7. No practicable safety recommendations were identified that would prevent this type of accident happening again, but the report notes that the trend towards an ageing population with a likely increase in mobility-impaired people travelling on public transport will require designers of transport systems to remain vigilant to this trend. The safety actions noted in this report acknowledge this trend and propose strategies to meet future demand.
- 1.8. The 2 platforms (including an adjacent Up platform) at Newmarket West station were demolished during the 2009/2010 Christmas/New Year holiday period concurrent with the opening of the redeveloped Newmarket station.

2. Conduct of the inquiry

2.1. Inquiry opened

- 2.1.1. On the same day as the accident, the NZ Transport Agency notified the Commission under section 13(4) of the Railways Act 2005. Upon reviewing this notification and making initial enquiries, the Commission formed a belief that either the circumstances of the accident had, or would be likely to have, significant implications for transport safety or the accident gave rise to, or would be likely to give rise to, findings or recommendations that may increase transport safety. Upon forming this belief, the Commission opened an inquiry under section 13(1) of the Transport Accident Investigation Commission Act 1990 to determine the circumstances and causes of this accident. A Commission rail investigator was then assigned as the Investigator-in-Charge.
- 2.1.2. The terms of reference for the Commission's inquiry into this accident were set out in sections 4 and 8 of the Transport Accident Investigation Commission Act 1990. Section 4 required the Commission to determine the circumstances and causes of the accident with a view to avoiding similar occurrences in the future rather than to ascribe blame. To assist it with this purpose, section 8 required the Commission to investigate the accident, including to make such inquiries as it considered appropriate in order to ascertain the cause or causes of the occurrence; and to prepare and publish findings and recommendations (if any) in respect of its investigation.

2.2. Investigation process

- 2.2.1. The day after the occurrence, the investigator-in-charge visited the accident site and examined the accident scene and the train involved in the accident. Over the next 2 weeks, he interviewed 7 (on-duty and off-duty) train crew members on board the train at the time of the accident and 5 platform witnesses. An interview was also held with the family of the accident victim.
- 2.2.2. Discussions were also held with the Royal New Zealand Foundation of the Blind (Blind Foundation) in Auckland and with the Ministry of Social Development in Wellington. These discussions led the investigator-in-charge to make enquiries of people from the Canadian Human Rights Commission.
- 2.2.3. The train was fitted with 2 Tranzlog-type event recorders: one installed on the locomotive pulling the train, and the other installed on the driving trailer at the rear of the train. The Commission obtained the data from the recorder installed on the locomotive to help analyse the movement of the train. Statements of the train crew, on-board passengers and witnesses on the station platform were cross-referenced with data from these recorders, as applicable, to help the Commission to construct an accurate account of events leading up to, and immediately following, the accident.
- 2.2.4. The Commission also obtained footage from station-mounted closed-circuit cameras for a number of the en-route stations between Swanson and Boston Road. The one camera on the Down Main line at Newmarket West station was panning in the opposite direction at the time of the accident, therefore it did not capture the accident sequence.
- 2.2.5. Five months after the accident, the Commission conducted a survey of the time taken for trains to exchange passengers on the Down platform at Newmarket West station. The purpose of this survey was to determine the average dwell time for trains stopping at this station and whether the dwell time experienced by the train carrying the accident victim was comparable with this.
- 2.2.6. The Commission also examined Veolia's right-of-way procedures, which were applicable at the time of the accident. These procedures set out the steps to be followed by on board train staff when passengers were alighting and boarding trains at stations.
- 2.2.7. The Commission also researched international guidelines for platform surface layout design and then compared the design of Newmarket West station with these guidelines to determine its compatibility.

3. Factual Information

3.1. The occurrence

- 3.1.1. On 1 July 2009, Train 8125 was a scheduled Veolia Down passenger service travelling from Swanson station (West Auckland) to Britomart station (central Auckland). The train was a push/pull set travelling in the pull mode (see Figure 1).

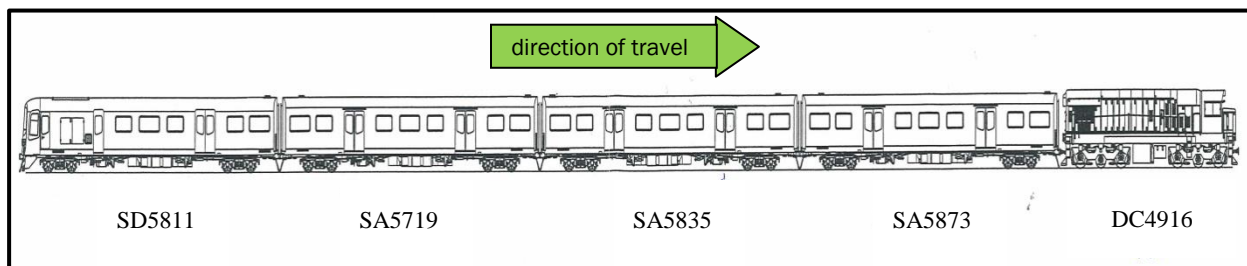


Figure 1
The consist of Train 8125 (drawing obtained from KiwiRail)

- 3.1.2. Train 8125 left Swanson on time at 1225. The crew initially comprised a locomotive engineer, a train manager and one passenger operator, with 2 other passenger operators joining the train later at Henderson. Two off-duty Veolia staff members also joined the train during the journey.
- 3.1.3. At about 1245, a senior male passenger, travelling alone, boarded the second carriage at New Lynn station and sat down on the right side, opposite the forward door (refer seat coloured green in Figure 2). The passenger was aged 69 and was vision impaired but otherwise was reported to be physically well. He had been registered with the Blind Foundation since 2006.
- 3.1.4. Information from the optometrist centre at which the passenger had been treated since 2000 stated that during a consultation in 2008, vision in his left eye was recorded as less than 6/60², and his right eye had chronic retinal detachment. An optometrist from the Centre explained that in general terms he had very poor eye sight and in optometric terms he would be classed as legally blind.
- 3.1.5. In the opinion of the optometrist, it was difficult to assess whether the passenger could have seen the rows of yellow tactile buttons installed on station platforms, and persons with such poor vision would find it very difficult with form definition, recognition, contrast, depth and colour perception. He concluded by saying that in his opinion the passenger would have had “great difficulty” in seeing the rows of buttons.
- 3.1.6. The passenger was travelling to Newmarket West station where he was to transfer to a bus to take him to a routine eye clinic appointment at the Greenlane medical centre. Throughout the rest of the report, the passenger will be referred to as the accident victim.
- 3.1.7. At 1311, Train 8125 arrived at the Down platform at Newmarket West station, 2 minutes behind schedule.

² A statistical calculation that describes visual acuity that a vision-impaired person could see detail from 6 metres that in comparison a normal-sighted person could see from 60 metres.

- 3.1.8. There were a number of witnesses to certain parts of the accident sequence, and with minor variances the descriptions of events were consistent. One key witness was an off-duty Veolia staff member who had earlier boarded the same carriage as the accident victim and sat on the left-hand (platform) side of the carriage in the seat coloured blue in Figure 2. That witness had previously been a caregiver for the elderly and had noticed the accident victim when he stood up before the train came to a stop at the station, and had continued to watch him through the window once he had alighted from the train. She had not realised he might be vision impaired until he stood up and she saw he was carrying a short, expandable white cane, later identified as a “symbol cane”³. The cane was at that time tangled with the handles of the shoulder bag the accident victim was carrying.
- 3.1.9. Other witnesses were seated in the same carriage at seats coloured purple and red in Figure 2, and others were on the platform.

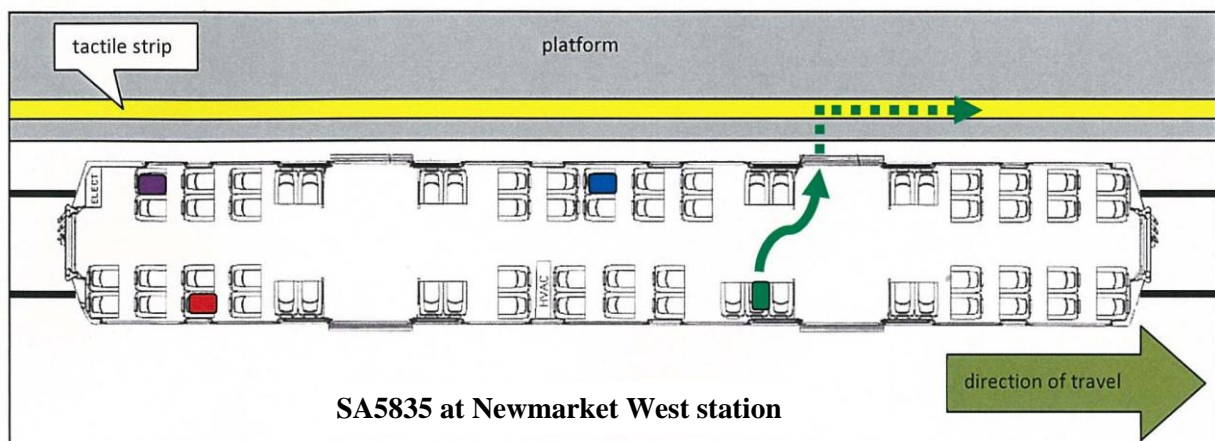


Figure 2
Reported seating positions and movement of accident victim (carriage plan obtained from KiwiRail)

- 3.1.10. The accident victim stood up before the train stopped at the platform and was holding on to the inside grab rail near the forward door to steady himself. When the train stopped and the doors opened he was seen to reach out and use the external grab rail to steady himself as he stepped down onto the platform. He did not appear to have any difficulty achieving this.
- 3.1.11. Once on the platform the accident victim moved about one metre from the platform edge and stopped, standing on the band of yellow tactile buttons installed on the platform surface. He appeared unsteady on his feet as he grappled with extending his symbol cane for a few moments. He then turned and walked parallel with the platform edge for about 5 or 6 steps while the train was still stationary. A second key witness who had alighted from the rear door of the same carriage said that the end of the accident victim’s symbol cane was not in contact with the yellow tactile buttons as he walked.
- 3.1.12. As the train started to move off from the platform, the accident victim was seen to continue walking but veer right towards the moving train, where-upon he leaned against it, spun around and fell through the gap between the moving train and the curved platform, and onto the ballast below. Figure 3 shows the gap between the train and the curved part of the platform.
- 3.1.13. The accident victim was then seen to be caught up in the carriage bogies for some distance until the passenger emergency stop device had been pushed in one of the carriages, stopping the train. The accident victim was lying adjacent to the rear bogie on SD5811 when the train stopped.

³ A shorter collapsible cane meant to signal to others that the user has a vision impairment; different from a “mobility cane” which is fixed in length and used to sweep the path ahead for obstacles. The symbol cane was about one metre long and was not designed to assist the user with orientation and mobility function.

3.1.14. A first-aid kit was handed down to the second key witness, who attempted to administer first aid. Emergency services were called and the Police arrived 6 minutes later, followed by the ambulance service 17 minutes later. Ambulance medics declared the accident victim dead at the scene. A post-mortem showed that he died from multiple injuries sustained in the accident.

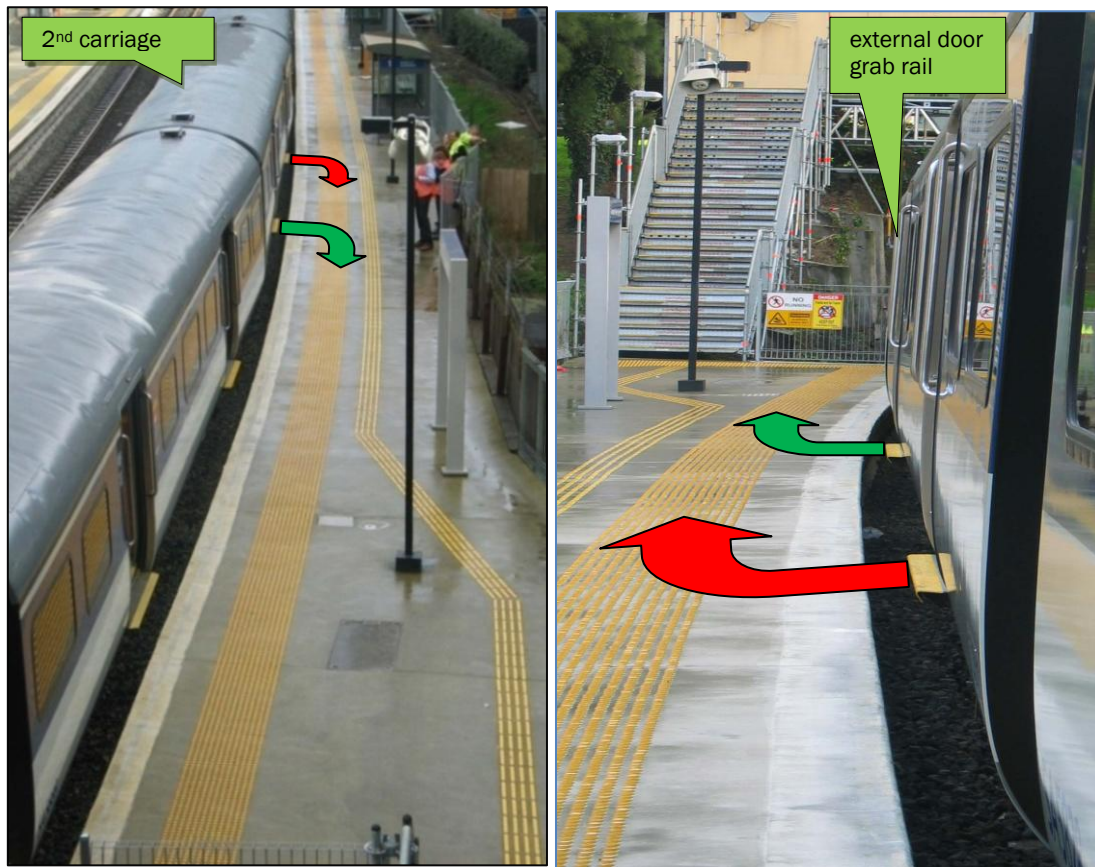


Figure 3

(Left) a push/pull train standing at Newmarket West station and (right) the platform and approximate movement of the accident victim (green arrow) and second key witness (red arrow)

3.1.15. From the train crew's perspective, the stop at Newmarket West station had been routine until the train moved off and the accident happened. The train manager had waited for the train to stop completely before he pressed the door-opening button. He said that once the passenger exchange was complete, he saw that a fixed signal, located a short distance in front of the locomotive, was green and from the first carriage he then executed what is referred to as the right-of-way process with the 3 passenger operators from the other 3 carriages.

3.1.16. The train manager said that he clearly saw the 3 passenger operators give him the correct right-of-way signal, after which he closed all of the train doors except his own, stepped out and went across to the other side of the platform from where he could see that all doors were unobstructed, re-boarded the train and signalled the driver that he was clear to depart, then closed his own door. The train manager did not notice anything untoward with the passengers who were on the platform, and could not specifically recall seeing the accident victim.

3.1.17. The train manager first became aware of the accident as he was making his way through to the second carriage and the train came to a stop.

3.2. Right-of-way procedure

3.2.1. The right-of-way procedure describes the process whereby on board train staff, led by the train manager, execute a sequence of defined manual procedures on station platforms at which the train has stopped. During the stoppage, the on board train staff co-ordinate their efforts as a team to ensure that passengers alight and board safely, so that the train and passengers can resume the journey.

3.2.2. Veolia's train managers' manual dated July 2008, specified the steps to follow when operating the doors on push/pull sets. The manual said in part the following:

- Prior to the time the train is to depart step onto the platform to a position that allows you a clear view of all the doors on the train.
- Check both directions to ensure there is no one attempting to board/alight or in the near vicinity of the train door.
- Receive and acknowledge the ALL CLEAR signal from all Passenger Operators (if provided).
- Close all doors except the door that you are working from.
- Step back onto the platform to a position that allows a clear view of all doors in operation on the train and check that they are closed and not obstructed.
- Rejoin the train, check that the Green all doors closed light is illuminated, if illuminated, and give the Right Of Way signal to the Locomotive Engineer.
- If the green light at your Local door panel does not illuminate check the adjacent door control panel first as it may be that the bulb has failed.
- Immediately that the train starts to move check the platform and close the local door and continue to visually check outside through the local door window until the train is clear of the platform.

REMEMBER: Safety of the customer is paramount at all times.

3.2.3. The procedure was reiterated in diagrammatic form as illustrated in Figures 4 and 5:

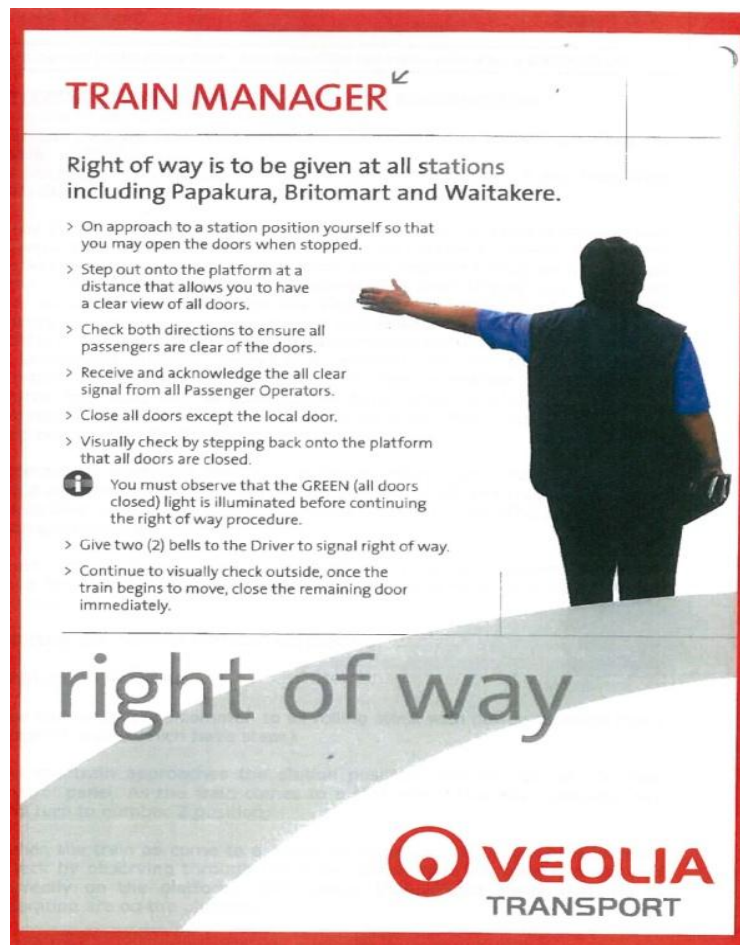


Figure 4
Veolia's right-of-way process for train managers

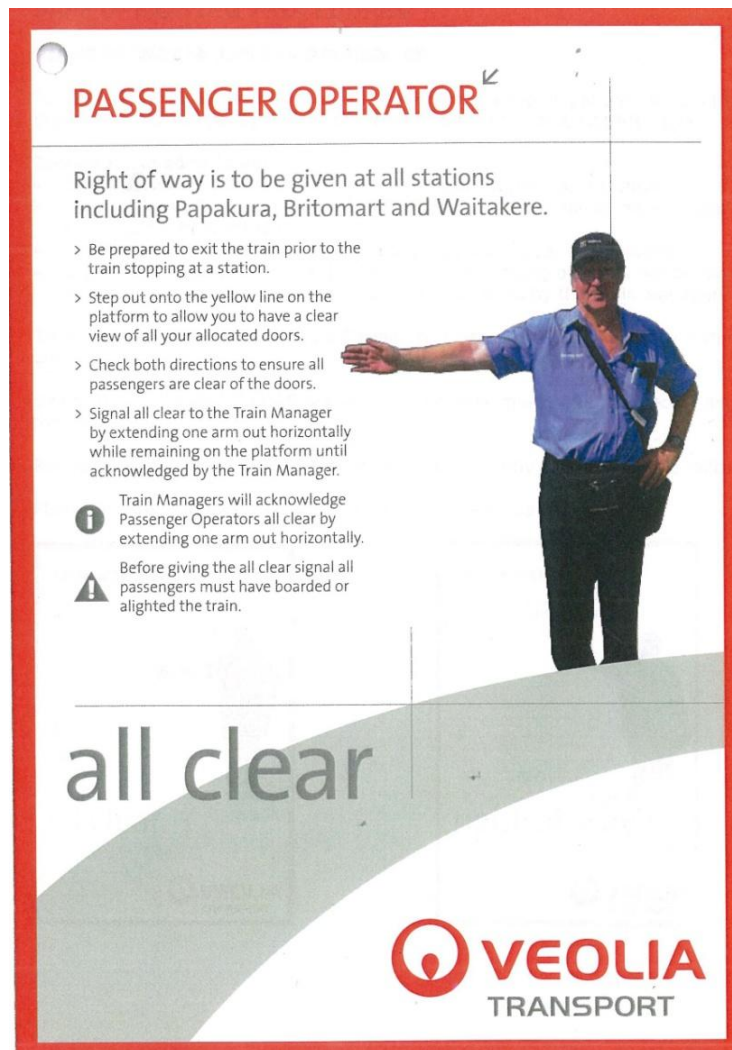


Figure 5
Veolia's right-of-way process for passenger operators

3.3. Veolia staff

- 3.3.1. The train manager was employed by Veolia in February 2007 as a passenger operator and was appointed train manager in February 2008. His certification was current.
- 3.3.2. The locomotive engineer joined Tranz Rail from overseas in 2003. He transferred to Veolia when it took over management of the suburban rail system in Auckland. The locomotive engineer was competent to drive the push/pull sets and his certification was current.
- 3.3.3. All 3 passenger operators held current Veolia certification for their positions.
- 3.3.4. The train manager, passenger operators, locomotive engineer and 2 off-duty staff members had attended a one-day disability awareness training course. The training course had been co-presented by a member of the Blind Foundation and a member of CCS Disability Action. The course had followed material covered in Veolia's training manual for train managers and passenger operators. The CCS Disability Action member had covered issues that affected people with disabilities other than vision impairment.

3.3.5. The training manual explained how Veolia on-board train staff were to meet the needs of the community, with particular reference to passengers with disabilities including those with mobility and vision impairment. The manual explained in part the following:

5.1 DISABILITY AWARENESS

The purpose of the training was to help onboard staff:

- Gain a basic understanding of disability and the diverse needs of people with disabilities
- Learn the fundamentals of sighted guiding of vision-impaired people and assistance on, off and within trains of mobility impaired people.
- Feel comfortable and competent with, and better anticipate how and when to assist customers with disabilities.

The training also includes the use of appropriate language and 'etiquette' when assisting people with disabilities.

5.1.4 CONSIDERATIONS WHEN ASSISTING A MOBILITY IMPAIRED CUSTOMER

The Foundation of the Blind offers some hints and tips on how best to interact with blind, deaf/blind, and vision impaired passengers

- If the passenger needs assistance at the end of the journey, ask them how you can help. You may need to guide them to the nearest shelter, steps, lift or ramp.

3.4. Locomotive event recorder

3.4.1. Data from the event recorder installed on locomotive DC4916 was retrieved. The following table shows the timing of key events when Train 8125 arrived at and departed from Newmarket West station:

Time	Event explanation
1310:44	Train 8125 arrives at station
1310:44	Locomotive engineer operates door release
1311:04	Train manager enters door close command
1311:10	Trainline ⁴ shows all doors (other than local door) closed correctly. The system was not programmed to record when the local door was subsequently closed
1311:15	Train manager enters electronic right-of-way signal to driver
1311:22	Locomotive engineer advances throttle to notch 1 and train begins to move
1311:24	Locomotive engineer advances throttle to notch 2
1311:29	Locomotive engineer advances throttle to notch 3
1311:34	Locomotive engineer retracts throttle from notch 3 to 2
1311:52	Passenger emergency stop button operated
1311:54	Locomotive engineer moves brake handle to emergency position
1311:56	DC4916 is powered off automatically
1312:03	Train 8125 stops

3.4.2. Train 8125 stopped at Newmarket West station for 38 seconds. The Commission undertook a survey of the time taken for trains to exchange passengers at the same platform. The survey showed that for 27 train movements the average dwell time was 36 seconds. The survey included the early morning and early evening peak-hour periods.

⁴ A cable that extends the length of a train for the transmission of electronic signals.

3.5. Newmarket West station

3.5.1. The Auckland Regional Council issued a document titled “Rail Station Upgrade Policy and Specification” in March 2004 which set out guidelines for the planning, design and scope of upgrades and provided outlines of further detailed technical specifications for the construction of suburban railway stations.

3.5.2. The document referred to a key component of station design being that the facility had to be comfortable and safe for all members of the community. It stated that pedestrian access should be safe and well lit and convenient for use by the disabled and visually impaired: that access to stations and trains for disabled people should be provided in accordance with the Auckland Regional Passenger Transport Plan and the New Zealand Disability Strategy; and that provision should include:

- (a) matching platform height and train floor
- (b) minimising the gap between train and platform
- (c) tactile strips and other measures for the visually impaired.

It also stated that the appropriate allowances for cant and vehicle throw should be made for curved tracked platforms, and that in order to minimise the step distance between the platform and the train, the track should be straight through the platforms where possible.

3.5.3. Two temporary stations were built at either end of Newmarket to allow for the redevelopment of Newmarket station into a multi-platform exchange facility. Newmarket West was one of those temporary stations.

3.5.4. Newmarket West station was officially opened for public use on 29 January 2008 and it was closed and the temporary platforms removed during the 2009/2010 Christmas/New Year holiday period when the redeveloped Newmarket station was opened.

3.5.5. The construction detail of the Down platform at Newmarket West station in the direction of travel for Train 8125 was as follows:

Feature	Length in metres (m)	Radius in m
Straight	45	
Transition to curve	20	
Curved	30	450
Total	95	

3.5.6. The station was constructed to cater for the passage of freight trains (on average about 4 trains per day). KiwiRail Network’s T200 infrastructure engineering handbook, dated 31 October 2001, showed the approved minimum clearance tolerances at main-line platforms that applied nationally. KiwiRail Network advised that there was a differently designed track interface policy in Auckland. The policy differences were detailed in the “Auckland Suburban Station Construction Clearance Drawing” which specified minimum platform clearance tolerances in the Auckland suburban area. Figure 6 shows the 2 sets of clearances for comparison purposes and the end profile measurements of the SA/SD vehicles and the USL class of log wagon, permitted to travel on the line.

3.5.7. The end elevation of the USL wagon shows that at about platform height, this class of freight wagon was 129 millimetres (mm) wider than an SA/SD carriage (refer Figure 6).

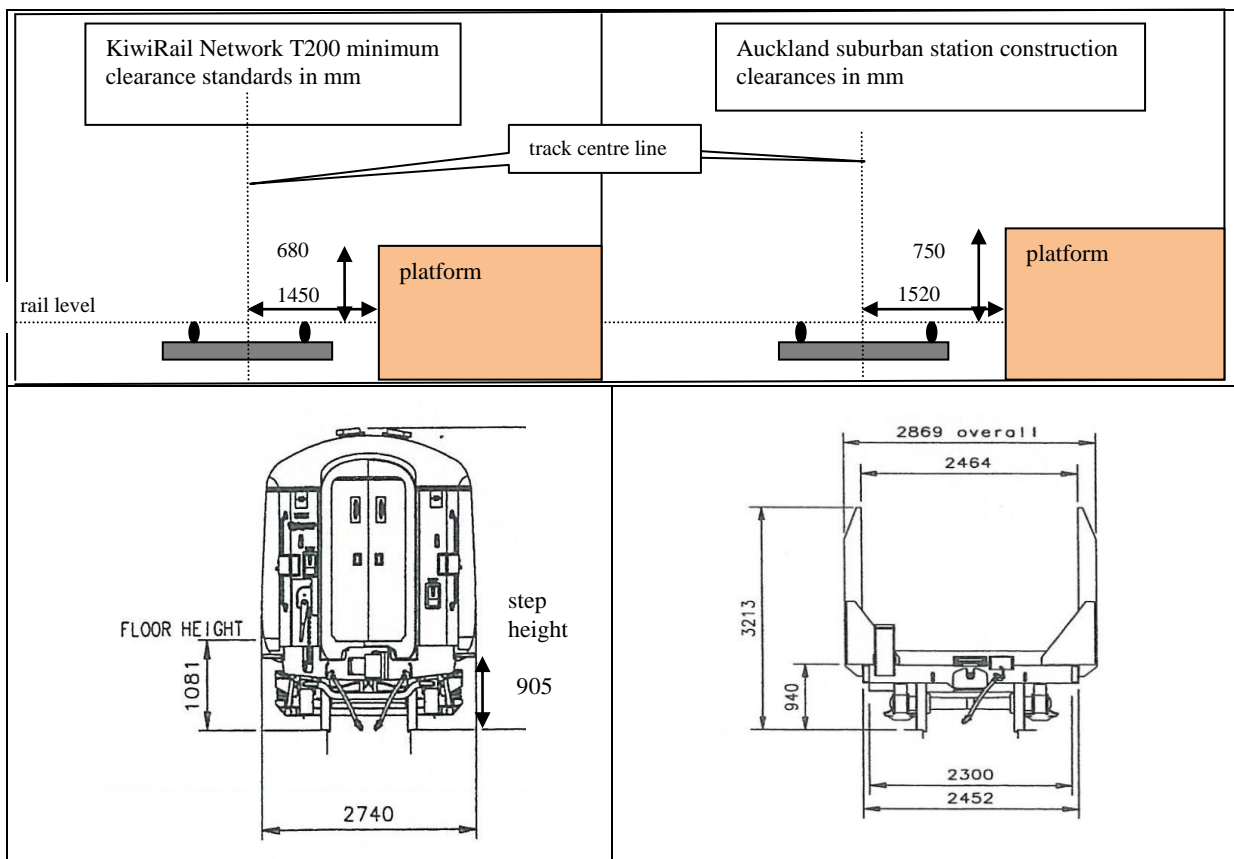


Figure 6
Platform clearances at top, and bottom, the end elevation of an SA/SD vehicle (left) and a USL wagon (right), (drawings not to scale)

3.5.8. Following the accident, clearances at 2 m spacing over a 12 m distance back from the end of the platform (where the accident occurred) were measured and were found to be compliant with both sets of minimum clearances.

3.5.9. Height and width measurements at a second carriage of an empty push/pull train and the Down platform edge at Newmarket West station are shown in Figure 7.

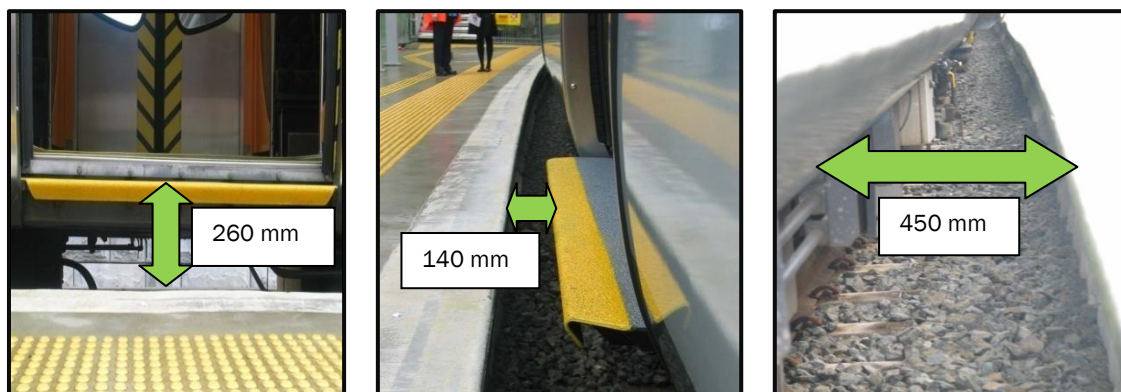


Figure 7
Height and width measurements taken at rear door and mid way along the second carriage

3.6. The Royal New Zealand Foundation of the Blind

- 3.6.1. The Blind Foundation described its role and purpose as being a provider of advice, as requested, relative to the needs of its blind and partially sighted members living in the community. This advice was based on experience working with such people and understanding national and international guidelines and best practice. The Blind Foundation saw itself as an organisation that influences and persuades and provides advice to better inform decision-making such as it had achieved with the Auckland Regional Council and the Auckland Regional Transport Authority in railway station platform design in recent years.
- 3.6.2. The Blind Foundation provided services such as home help with using appliances and; orientation and mobility training free of charge to its members, but the members were free to choose whether to use these services.
- 3.6.3. The Blind Foundation's records showed that the accident victim was issued with a symbol cane in 2006. He was instructed on the correct technique for its use after identifying that he had no training objectives related to mobility. Records also showed that the accident victim had not approached the Blind Foundation after that date to request reassessment or further training in orientation and mobility.

3.7. New Zealand guidelines for blind and vision-impaired pedestrians

- 3.7.1. The NZ Transport Agency first issued a document titled "RTS 14 Guidelines for facilities for blind and vision-impaired pedestrians" (the Guidelines) in 1997 and revised it in September 2003. The Guidelines said that the purpose of the document was to provide best-practice design and installation principles for pedestrian facilities that assisted blind and vision-impaired people. The Guidelines were not mandated by law. The Guidelines said that standardised pedestrian facilities would give consistent directional and warning messages to blind and vision-impaired people, as well as increasing their safety while crossing roads and throughout the entire walking journey.
- 3.7.2. The first edition of the Guidelines was produced following representation by organisations including the Blind Foundation and a petition submitted to parliament by the New Zealand Association of the Blind and Partially Blind, which concluded there was a need for consistency at road crossings throughout New Zealand.
- 3.7.3. The Guidelines specified the design, installation and performance standards for new pedestrian facilities and those that were being upgraded. There were 2 features that were installed for blind and vision-impaired people: tactile ground-surface warning button indicators and directional strip indicators. Figure 8 shows examples of each type installed at Newmarket West station platform.

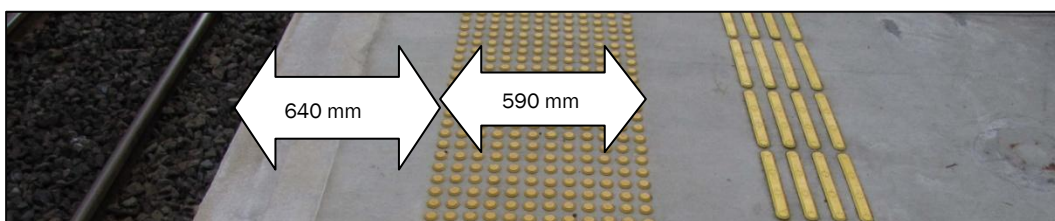


Figure 8
Ground surface indicators on the Down platform at Newmarket West station

- 3.7.4. The Guidelines said that a 2001 disability snapshot estimated that about 94 000 people in New Zealand were either blind or had vision limitations. Such people rely on visual, audible and sensory (tactile) information from the surrounding environment for their orientation. Most vision-impaired people are able to see in colour and the Blind Foundation said that yellow was visually the best colour for such people, hence the inclusion of that colour into the tactile warning and directional indicators. Contrast between the walking surface and surrounding environment was also critical for vision-impaired people for orientation, distinguishing the limits of footpaths, recognising hazards and gathering information.

- 3.7.5. The Guidelines said that those blind or vision- impaired people who move around independently will do so making the most of their residual sight and mobility aids. The most commonly mobility aid used by pedestrians with impaired sight to facilitate their independent mobility is a long white cane. The cane is used to sweep the ground in an arc from one side to the other to detect potential hazards. White cane users are trained to use a method whereby the end of the cane maintains constant contact with the ground as it is swept.
- 3.7.6. The Blind Foundation had also provided input to the Auckland Regional Transport Authority when standards were being developed for platform layout to ensure that new, temporary and upgraded stations could be used safely by blind and partially sighted people. Specifically, the Blind Foundation gave advice to Ontrack (the predecessor to KiwiRail Network) regarding accessibility at Newmarket West station.

3.8. International guidelines

- 3.8.1. To compare the New Zealand guidelines a document titled “International Best Practices in Universal Design, A global Review” dated March 2006 issued by the Canadian Human Rights Commission was researched. The document was a culmination of research into accessibility codes and standards from the United Kingdom, the United States of America, China, Japan, Australia, the Nordic countries and Fiji. Examples of best practice in landscapes, such as platforms, were included in the document.
- 3.8.2. The document acknowledged that the number of people worldwide living with at least one disability is increasing because of a multitude of factors such as survival rates, an ageing population, and improvements and increases in the accessibility of medical facilities and people being saved from traumatic injuries. As populations are ageing, an increasing percentage of these populations is living independently.
- 3.8.3. The document said that hazard indicators (ground-surface indicators) are required to be organised in a regular pattern, to be colour contrasted and to be installed at regular intervals from the edge of a hazard. The Canadian government required the edge of the hazard indicators to be located 600 mm to 650 mm back from the edge of the hazard. The provision of both hazard (warning) indicators and directional indicators is an area where international collaboration is required to ensure that a uniform surface is used to warn people. This is particularly important for people who are blind or have low vision.
- 3.8.4. To conclude, the document said that it was not intended as an international standard but rather a compilation of existing specifications. The International Organization for Standardizations said that it was working to develop a standard but it was under development at the time the Commission’s report was being compiled.

4. Analysis

4.1. Introduction

- 4.1.1. Looking at the sequence of events leading up to the accident victim falling between the platform and the moving train, he had boarded the train and, seated himself without any assistance, and without any of the train crew or the other passengers spoken to realising that he was vision impaired. He then recognised that the train was approaching Newmarket West station where he wanted to get off, and before the train stopped he stood up and crossed to the doorway ready to alight.
- 4.1.2. Once the train had stopped and the doors opened the accident victim negotiated the step down to the platform, albeit unsteadily, and moved about one metre away from the train, standing on the warning band of yellow buttons. He then started walking along the platform with the intention of using the stairs exiting from the platform.
- 4.1.3. The report examines four main issues:
 - (a) why the accident victim suddenly veered into the side of the moving train
 - (b) whether it was appropriate for the train to be given right-of-way to depart
 - (c) whether the station platform was well enough designed to cater for vision-impaired and blind persons
 - (d) whether the interface between the train and the platform was well designed.

4.2. The accident

- 4.2.1. There are a number of possible reasons for the accident victim walking into the side of the moving train. His visual impairment is the most probable reason, but others are explored as well.
- 4.2.2. With his last recorded level of vision, the accident victim would have had some difficulty but might have been able to recognise the yellow tactile buttons and the yellow route-guidance strips. If he could have followed either, he would have remained clear of the train. That he didn't suggests that he did not see the tactile buttons or his attention might have been directed elsewhere when he started walking.
- 4.2.3. The train was on his right side as he walked along the platform, which was on the side that he had the least vision, his right eye. Without a field of vision on that side, known as peripheral vision, it is possible that the train would not have been visible beside him unless he turned his head and looked directly at it. If he did not look in the direction where the train was moving off, it is feasible that he simply veered towards it until he made contact with it, throwing him off balance.
- 4.2.4. Preoccupied people walking into objects or into the path of danger is not unheard of. Observe a busy street for long enough and there is a good chance of seeing minor or near collisions caused by people talking on or texting from mobiles phones for example, or people looking the wrong way before crossing a one-way street; these examples usually involve people with normal vision.
- 4.2.5. The accident victim was seen to stop and was preoccupied with extending his symbol cane. It was not known if the accident victim had intended to sweep the platform surface with the cane, but it was not designed for that purpose. It could not be determined whether he had fully extended and secured it before walking off, but preoccupation with the cane could have been another reason for his veering off his intended path. Being vision-impaired would have increased the chance of this happening because he would not have had the same peripheral cues to guide him as a person with normal vision would.
- 4.2.6. The post-mortem results detected no other pre-existing medical condition that could have caused the accident victim to move in the direction of the train, and the toxicology tests showed no substance impairment.

Finding Post mortem (including toxicology) results did not reveal any pre-existing medical condition that could have contributed to the accident victim's death, other than his vision impairment.

Finding Why the accident victim veered into the side of the departing train could not be conclusively established, but the quality of his vision had probably degraded to a point where he was becoming increasingly reliant on sighting the yellow tactile buttons to guide his progress along the platform, and he did not appear to have established his position in relation to these before walking along the platform, or had done so and then become distracted for some reason.

4.3. Right-of-way

- 4.3.1. The accident victim had not displayed any obvious outward signs of being vision-impaired. He was not wearing any identification normally carried by a registered blind person and although he was carrying a white symbol cane it was folded away and obscured by the shoulder bag that he had with him while he was seated on the train.
- 4.3.2. Nobody noticed anything untoward when he boarded the train at New Lynn and he only came to one passenger's notice when she saw the cane as he stood up when the train was nearing Newmarket West station, which he did so with relative ease.
- 4.3.3. When the accident victim stepped onto the platform, there would have been little to indicate to the train crew that he needed assistance. To them he would have looked like any passenger who had alighted and was preparing their personal effects for walking rather than riding a train. At that point the train crew's focus would have been on ensuring no-one else was trying to get on or off the train, so that they could close the doors and allow the train to continue its journey.
- 4.3.4. All staff had received training in how to recognise and assist mobility- and vision-impaired passengers. There was nothing to suggest that in this case, without the benefit of hindsight, they should have acted any differently.
- 4.3.5. Train 8125 was nearly on time and the dwell time at the station was 2 seconds longer than the average measured over one day. Therefore there was no evidence or reason to suggest it had been a rushed departure. From the crew accounts the stop at Newmarket West station was none other than routine.
- 4.3.6. Data from the on-board event recorder confirmed there was nothing out of the ordinary with the station transit. The train was being driven normally and the right-of-way procedure was followed in the correct sequence and within normal time frames.
- 4.3.7. Twenty seconds elapsed from the time of doors-open to doors-closed, with a further 11 seconds before right-of-way was given to the driver to depart, during which time the train manager had to step back out onto the platform and check that all doors were closed and unobstructed. At that time the accident victim was already walking along the platform clear of the train. The driver then took 7 seconds to release the brakes and start to accelerate the train away from the platform. A further 30 seconds elapsed before the emergency train brake was activated, and from a speed of 21 kilometres per hour the train took 11 seconds to stop, 148 m from the platform.

Finding Because the accident victim was not displaying the white symbol cane, meant that the train crew did not identify that he might need assistance.

Finding The train stop at Newmarket West station was routine and conducted in accordance with Veolia's standard procedures. When the right-of-way was given for the train to move off, the accident victim could have appeared as a normal passenger walking along the platform on the yellow tactile buttons, about one metre clear of the train.

4.4. Platform ergonomics

- 4.4.1. At the time of this accident there was no applicable standard for how public places such as station platforms should be designed to meet the needs of the vision impaired, but a standard was being prepared and internationally guidelines had been produced. New Zealand, through the NZ Transport Agency and in consultation with organisations such as the Blind Foundation, had been applying those guidelines to achieve consistency not only throughout New Zealand but also with the rest of the world, so that vision-impaired or blind persons visiting New Zealand could expect consistency with standards they were used to overseas.
- 4.4.2. The Auckland Regional Council has carried that theme through to the design of its new and to-be-modified station platforms. The result has been the construction of stations, including temporary stations such as Newmarket West, that meet the guidelines and have received approval from the Blind Foundation.
- 4.4.3. The tactile warning buttons and guidance strips placed on the platform surface met the guidelines and should have assisted a vision-impaired or blind person to remain clear of the platform edge while exiting or entering the station platform

Finding Newmarket West station was laid out and marked in accordance with the guidelines catering for vision-impaired and blind persons, to the satisfaction of the Blind Foundation.

4.5. Interface between train and platform

- 4.5.1. Auckland, like cities elsewhere, did not have the benefit of a rail network totally dedicated to its metropolitan passenger service, so Newmarket West station had to cater for both passenger trains and freight trains. Freight wagons were wider than the passenger carriages. The standard platform height above the rail had to be greater to try to keep to a minimum the step down from the passenger carriages, but not so great that it encroached into the wider cross-section of the freight wagons.
- 4.5.2. If the platforms were too low, the step up to board a passenger carriage would be too high. If the centreline of the track were moved too far out to allow the passage of freight wagons without overhanging the platform edge, the gap between the passenger train doors and the platform would be too wide for passengers to cross safely. Finding the right balance was crucial, and the right balance was never going to be ideal.
- 4.5.3. The result was a step up from the platform of 260 mm, which is 80 mm higher than the maximum 180 mm height for a stair riser allowed by the New Zealand building code for access by persons with disabilities.
- 4.5.4. The height of the step down from the train onto the platform however, was not a factor in this accident, because the accident victim successfully made it onto the platform before the accident happened.
- 4.5.5. The gap between the step and the edge of the platform was 140 mm. A world-wide search for standards relating to the maximum gap between a train boarding step and the platform edge revealed no meaningful data that could be used to compare with the New Zealand practice. Getting across onto the platform was not the issue with this accident; it was the gap between the body of the train and the edge of the platform where the accident victim fell, the gap that opened to as much as 450 mm owing to the curvature of the platform.
- 4.5.6. The policy of the Auckland Regional Council had been to where possible avoid curved platforms, but when modifying an existing rail network within an established city, this might not always be feasible, and in this case the platform was temporary pending the completion of the new Newmarket Station, which was fitted with straight platforms.
- 4.5.7. The question is; how wide a gap is safe? Logically there must be some gap; otherwise the train would hit the platform. If the gap were small enough to prevent someone falling to the track below, then that would be safer and might have prevented a death on this occasion.

- 4.5.8. Nevertheless, the gap was present and could not feasibly be engineered out without a major realignment of the track and platform, so the next best option was to minimise the risk of someone falling into the gap. In this case, as with any train station, passengers were warned by signage to keep clear of the platform edge until the train had stopped. The warning tactile buttons were designed to do that for the benefit of vision-impaired and blind persons.
- 4.5.9. The right-of-way process was a defence against the train moving off while doors or any part of the train was obstructed. This would not, however, prevent someone approaching the platform edge as the train was approaching, or once the train was departing. In other words, in spite of best endeavours, absolute protection for the public on rail platforms cannot be guaranteed by the rail operator, meaning there will be a level of expectation that platform users will generally comply with signage and protocols.
- 4.5.10. The same can be said for other forms of transport, such as the road, where many pedestrian deaths are recorded every year. Deaths or serious injuries at metropolitan railway stations in New Zealand are rare, which indicates that the safety of passengers at the train/platform interface is not a wide-spread or significant safety issue.
- 4.5.11. Research by the Canadian Human Rights Commission together with several other countries acknowledges that populations are ageing with improvements in medical standards, meaning that this country's transport infrastructure will have to be designed to cope with an increasing number of people with disabilities. This will need to be taken into account when designing future transport facilities. With the level of infrastructure development within the Auckland rail network, the current focus on this issue would seem to have struck a reasonable balance, but there will always be room for improvement, as highlighted in this report. The Commission has no meaningful recommendations that could have prevented this death.

Finding Newmarket West station complied with the allowable minimum clearance distance between track and platform edge, and the resultant gap between SA/SD carriages and the curved portion of the platform edge was as small as achievable within the physical constraints of the station.

Finding The procedures for departing trains and the warnings incorporated into the platform design were as good as were practicably achievable to prevent the public being inadvertently caught up on a train at the time of departure, but there would not be any practicable physical or procedural defence that would guarantee protection from injury for people encroaching on the rail corridor once a train was moving.

5. Findings

The following findings are not listed in any order of priority.

- 5.1. Post mortem (including toxicology) results did not reveal any pre-existing medical condition that could have contributed to the accident victim's death, other than his vision impairment.
- 5.2. Why the accident victim veered into the side of the moving train could not be conclusively established, but the quality of his vision had probably degraded to a point where he was becoming increasingly reliant on the yellow tactile buttons to guide his progress along the platform, and he did not appear to have established his position in relation to these before walking along the platform, or had done so and then become distracted for some reason.
- 5.3. Because the accident victim was not displaying the white symbol cane, meant that the train crew did not identify that he might need assistance.
- 5.4. The train stop at Newmarket West station was routine and conducted in accordance with Veolia's standard procedures. When the right-of-way was given for the train to move off, the accident victim would have appeared as a normal passenger walking along the platform on the yellow tactile buttons, about one metre clear of the train.
- 5.5. Newmarket West station was laid out and marked in accordance with the guidelines catering for vision-impaired or blind persons, to the satisfaction of the Blind Foundation.
- 5.6. Newmarket West station complied with the allowable minimum clearance distance between track and platform edge, and the resultant gap between SA/SD carriages and the curved portion of the platform edge was as small as achievable within the physical constraints of the station.
- 5.7. The procedures for departing trains and the warnings incorporated into the platform design were as good as were practicably achievable to prevent the public being inadvertently caught up on a train at the time of departure, but there would not be any practicable physical or procedural defence that would guarantee protection from injury for people encroaching on the rail corridor once a train was moving.

6. Safety actions

General

- 6.1. The Commission classifies safety actions by two types:
- (a) safety actions taken by the regulator or operator to address safety issues identified by the Commission that would otherwise have resulted in the Commission issuing a recommendation; and
 - (b) safety actions taken by the regulator or an operator to address safety issues that would not normally have resulted in the Commission issuing a safety recommendation.
- 6.2. The following safety actions are not listed in any order of priority.

Right-of-way train departure process and disability awareness training

- 6.3. On 12 February 2010, as part of its continuous improvement policy, Veolia updated its “right-of-way” train departure process, which included the requirement for the local door operated by the train manager to be closed before the electronic bell code was sent to the locomotive engineer. By adopting this process, Veolia said that it had aligned its “right-of-way” process to that practised by Tranz Metro in Wellington.
- 6.4. On 21 October 2010, Veolia advised that it intended to institute an ongoing disability awareness refresher training package for its train managers and passenger operators with the first course beginning before Christmas 2010.
- 6.5. The Blind Foundation said that it welcomed Veolia's ongoing commitment to ensuring that Veolia staff were aware of how to provide services to passengers with disabilities and the Foundation noted the critical importance of ensuring that such training included specific instruction on vision impairment.

Auckland Transport appoints accessibility adviser

- 6.6. On 3 February 2011, Auckland Transport advised that it had noted comments in the report regarding the likely increase in mobility-impaired and vision-impaired people travelling on public transport and agreed that designers of transport systems and facilities needed to take cognisance of this. It is standard practice for Auckland Transport to engage with mobility-impaired groups and the Blind Foundation in developing designs for new stations and station upgrades. Further to this Auckland Transport was pleased to inform the Commission that it has recently recruited the services of an accessibility adviser to ensure full consideration was given to all access issues and facilities around public transport.
- 6.7. The adviser commented that in her view for both the temporary and new Newmarket railway stations, full and appropriate consultation had been undertaken with the blind and other disabled groups over station design, and all requirements had been implemented. Going forward, Auckland Transport is putting in place an advisory group representing the various disabled communities to ensure it gives appropriate consideration to these issues in all its planning and operations.

7. Recommendations

General

- 7.1. The Commission may issue, or give notice of, recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues depending on whether these safety issues are applicable to a single operator only or to the wider transport sector.
- 7.2. In the interests of transport safety it is important that these recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

Recommendations

- 7.3. There are no recommendations in this report.

8. Works cited

KiwiRail's, T:200 infrastructure handbook, effective 31 October 2001.

KiwiRail's, mechanical engineering design fleet and equipment information catalogue, effective 29 February 1996.

Auckland Regional Council's rail project office, rail station upgrade policy and specification document No.1214, issued 26 March 2004.

NZ Transport Agency's, RTS 14 Guidelines for facilities for blind and vision-impaired pedestrians, first issued June 1997 and revised September 2003.

New Zealand Department and Housing's compliance document for New Zealand building code, clause D1, access routes, second edition, effective 1 July 2001.

Veolia's train manager and passenger operator training manual specifying the right of way procedures, effective July 2008.

Veolia's train manager and passenger operator training manual specifying disability awareness requirements, effective January 2009.

Canadian Human Rights Commission's, international best practices in universal design document, a global review, revised edition August 2007.



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Price \$26.00

ISSN 1178-4164 (Print)
ISSN 1179-9102 (Online)