Final report RO-2017-103: Potential collision between passenger trains,
Wellington Railway Station, 15 May 2017

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

Final Report

Rail inquiry RO-2017-103
Potential collision between passenger trains

Wellington Railway Station

15 May 2017

Approved for publication: August 2018

Transport Accident Investigation Commission

About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and 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 and the public, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of the final report

This final report has not been prepared for the purpose of supporting any criminal, civil or regulatory action against any person or agency. The Transport Accident Investigation Commission Act 1990 makes this final report inadmissible as evidence in any proceedings with the exception of a Coroner's inquest.

Ownership of report

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 1982 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

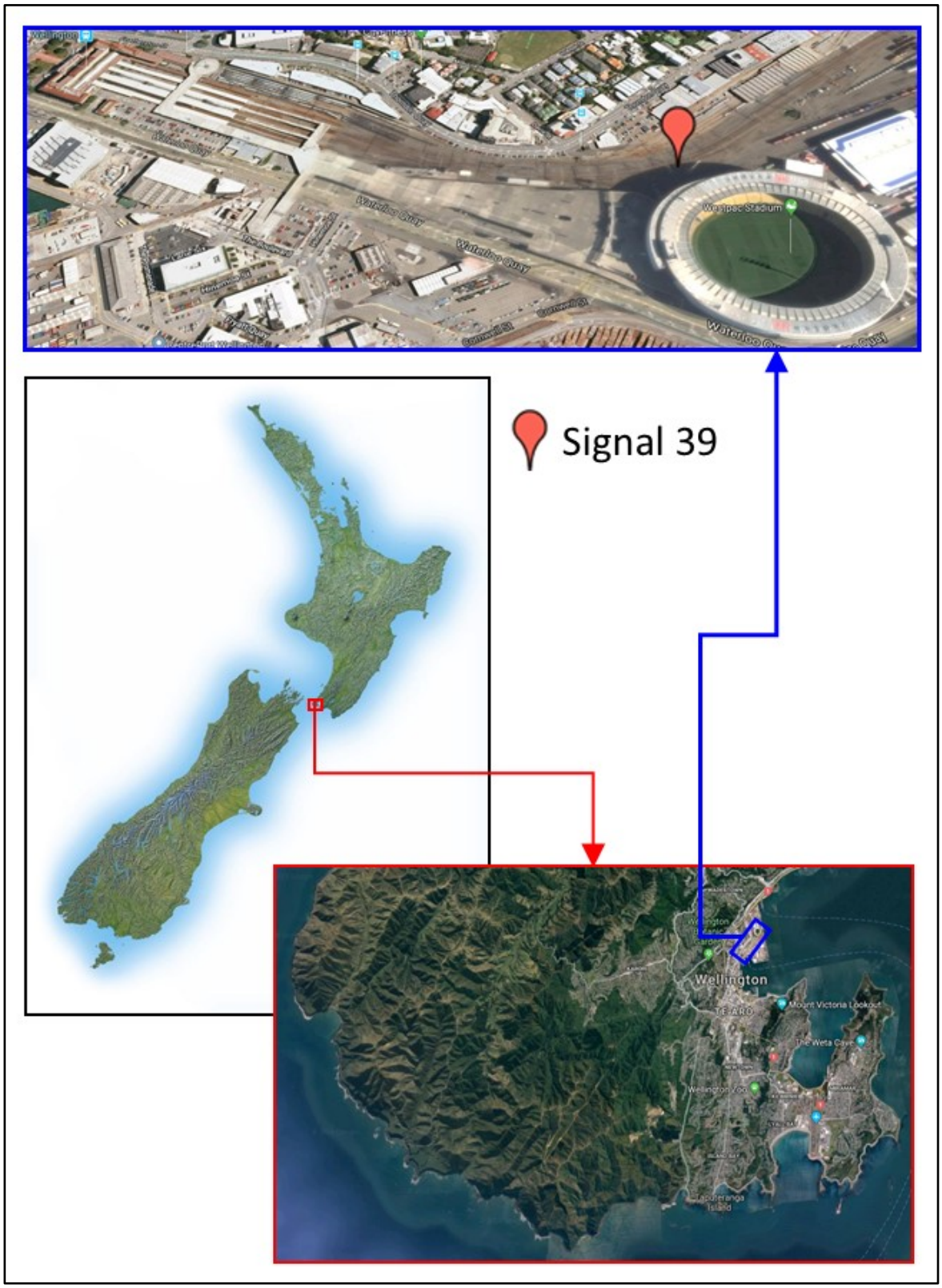
Photographs, diagrams, pictures

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

Verbal probability expressions

The expressions listed in the following table are used in this report to describe the degree of probability (or likelihood) that an event happened or a condition existed in support of a hypothesis.

Terminology (Adopted from the Intergovernmental Panel on Climate Change)	Likelihood of the occurrence/outcome	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	



Location of incident

Sources: Mapsof.net and Google Maps

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Abbreviations

Commission	Transport Accident Investigation Commission
SPAD	Signal passed at danger
Tranzdev	Transdev Wellington Limited

Glossary

bidirectional	a section of track on which trains can be signalled to run in both directions
bogie	a metal frame equipped with two wheelsets, used in pairs under rail vehicles to improve ride quality and better distribute forces to the track
insulated joint	a joint separating two adjacent pieces of rail track so that sensors can detect when a train moves from one section, across the insulated joint, to the next section of track
mimic screen	an electronic display that shows the status of signalling equipment and the locations of trains within a specific area
platform maintainer	a train maintenance person assigned to resolving maintenance issues while trains are at station platforms
track circuit	an electrical device used to detect the absence of a train on rail tracks, to inform signallers and control relevant signals
train monitoring system	a computer screen on Matangi trains that shows the status of the various systems on board the trains, including brakes, speed and doors open/closed
TrainStop	a device that ensures compliance with a signal displaying a stop aspect by automatically applying the train brakes should the train pass the signal at red

Data summary

Vehicle particulars

Train type and number:	six-car electric multiple unit Matangi passenger train
Classification:	electric multiple unit
Manufacturer:	Hyundai Rotem, Korea
Operator:	Transdev Wellington Limited
Date and time	15 May 2017 at 1815[1]
Location	Wellington Railway Station – Signal 39
Persons involved	train driver, platform maintainer and signaller
Injuries	none
Damage	none

Figure 1
A Matangi train at Wellington Railway Station

[1] Times in this report are New Zealand Standard Time (Co-ordinated Universal Time +12 hours) and are expressed in the 24-hour mode.

1. Executive summary

1.1. At about 1810 on 15 May 2017, a loaded metropolitan passenger train departed Wellington Station bound for Waikanae. The driver thought there was an issue with the train brakes, so stopped the train within the approaches to Wellington Station. After a discussion with maintenance staff, it was decided to return the train to Wellington Station.

1.2. The train was under the control of a signal box operator (signaller). The signaller referred to the mimic screen[2] and noted that it was showing the train occupying a single section of track between Signals 37 and 39. However, the rear of the train had not quite passed Signal 39. It had cleared an insulated joint in the rail that marked the end of one section and the start of the next on the signaller's mimic screen, but the insulated joint was eight metres away from the actual signal. The rear of the train had come to rest between the insulated joint and the actual signal.

1.3. The signaller planned to use Signal 39 to hold the train until another inbound train was clear. However, when the driver changed driving ends, Signal 39 was just behind the driving cab. When the signaller authorised the driver to proceed back to Signal 39, the driver moved the train forward in search of the signal, towards the same set of crossover points as the other inbound train.

1.4. No sooner had the train begun moving than it crossed back over the insulated joint in the rail. The signaller saw on the mimic screen that the train had passed Signal 39 and was heading towards the inbound train. The signaller called the driver to stop the train. The train stopped about 120 metres past the red signal. There was no collision and nobody was injured.

1.5. The Transport Accident Investigation Commission (Commission) found that the situation was created because the signalling system was giving information to the signaller that did not match what was happening in the field. The eight-metre separation between the signal and the insulated joint had not been identified as an issue when the lines in the area were modified and upgraded in 2010.

1.6. The Commission identified two safety issues that had been identified in a previous inquiry:

- there is a heightened risk of trains colliding within the approaches to Wellington Station because limited space makes the track layout congested
- a number of reasonable measures had not been taken to further reduce the risk of trains colliding in the approaches to Wellington Station.

1.7. The issues were also relevant to this inquiry. As recommendations had already been made to address the safety issues, no new recommendations have been made.

1.8. The key safety lesson arising from this accident is that trains should not be unnecessarily authorised to proceed up to red signals in congested areas, because the reduced safety margins in these areas increase the risk of a collision if a signal is passed at danger.

[2] An electronic display that shows the status of signalling equipment and the locations of trains within a specific area.

2. Conduct of the inquiry

2.1. The incident occurred on Monday 15 May 2017 at 1815. The NZ Transport Agency notified the Transport Accident Investigation Commission (Commission) soon after the incident occurred. The Commission opened an inquiry under section 13(1) of the Transport Accident Investigation Commission Act 1990 to determine the circumstances and causes of the occurrence, and appointed an investigator in charge.

2.2. On Wednesday 17 May 2017, Commission investigators started the site investigation with a re-enactment of the incident to determine the position of the train in relation to the track and signalling equipment.

2.3. Commission investigators interviewed the:

- train driver
- signaller on duty at the time of the incident
- driver who had driven the same Matangi train prior to the incident
- platform maintainer[3]
- signals engineer.

2.4. The Commission obtained the following documents and records for analysis:

- the closed-circuit television (CCTV) recordings from the cameras on board the train
- the signals data downloaded from the Wellington Station signalling system
- the training records of and medical details for the train driver
- the historical 'signal passed at danger'[4] (SPAD) data for the Wellington Station area
- the Tranzlog[5] data from the train
- the recordings from the Wellington signal box Channel 1 radio communications between the train driver and the signaller for the time period of the incident.

2.5. On 23 May 2018 the Commissioners considered a draft report and approved it to be sent to 16 interested persons for consultation.

2.6. Two submissions were received. The Commission considered the submissions, and changes as a result of those submissions have been included in the final report.

2.7. On 24 August 2018 the Commission approved the final report for publication.

[3] A train maintenance person assigned to resolving maintenance issues while trains are at station platforms.
[4] When a train passes a perfectly displayed Stop signal without authorisation.
[5] An on-board data recorder that logs details of a train's speed, location and control settings (see www.otari.co.nz).

3. Factual information

3.1. Narrative

3.1.1. On 15 May 2017 the driver boarded the train approximately 10 minutes before its scheduled 1800 departure from Wellington, bound for Waikanae. The driver checked the cab maintenance logs for any issues.

3.1.2. The driver noticed that the platform maintainer[6] was in the rear of the cab investigating an apparent brake fault that the previous driver had reported. The train monitoring system[7] screen was showing an excessively high brake gauge reading for the rearmost bogie[8] (see Figure 2). In spite of this, the previous driver had stated that the brakes had operated normally.

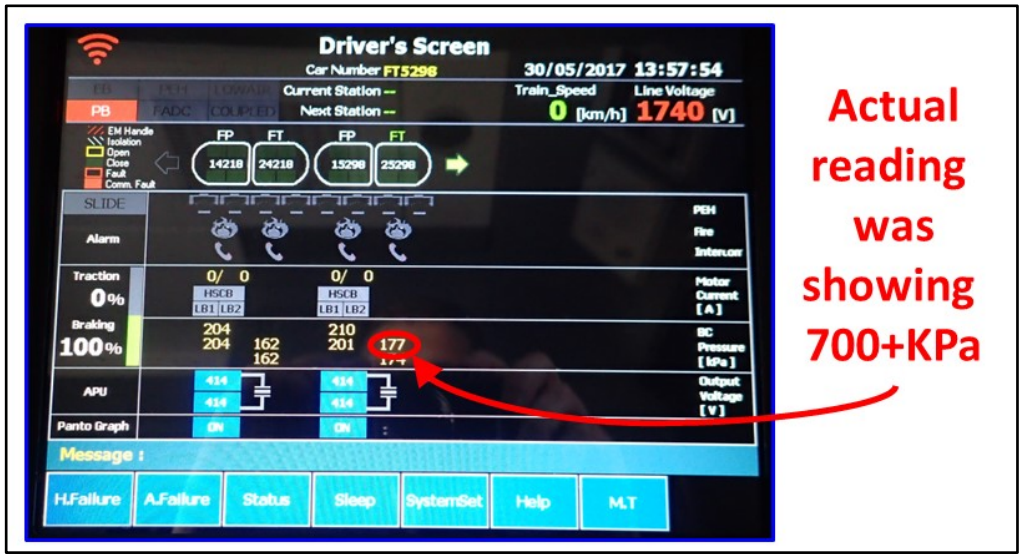

Figure 2
Train monitoring system screen in a sample Matangi train cab

3.1.3. The platform maintainer tested the train at the platform and concluded that the high reading of 700+KPa was not possible to achieve. The new driver was informed that the train was fit for service and that the problem was most likely a sensor fault. The platform maintainer planned to remove the two-car set[9] from service for further investigation at the maintenance depot once the train returned to Wellington later that evening.

3.1.4. Shortly after the train departed the platform, the driver put the train power/brake handle into 'Coast' (no power or brake applied) in order to check that the brakes on the rear bogie were not dragging. The driver felt that the speed of the train slowed, so concluded that the brakes were dragging.

3.1.5. The driver felt it unwise to take the train to Waikanae and back in that condition, so stopped the train and radioed the signaller to advise that there appeared to be an issue with the train brakes. The driver intended to seek advice from the platform maintainer before proceeding any further. The signaller acknowledged this and awaited further details.

3.1.6. The driver contacted the platform maintainer by mobile phone. They discussed whether the driver could exit the train and walk back to cut out the brakes on the affected bogie. However,

[6] A train maintenance person assigned to resolving maintenance issues while trains are at station platforms.
[7] A computer screen on Matangi trains that shows the status of the various systems on board the trains, including brakes, speed and doors open/closed.
[8] A metal frame equipped with two wheelsets, used in pairs under rail vehicles to improve ride quality and better distribute forces to the track.
[9] Each Matangi train is made up of two individual carriages permanently joined by a flexible coupling. The two cars are the FP (powered – north end) and FT (trailer – south end). These two-car sets can be joined together to make a longer train up to an eight-car set.

because it was dark and the train was stopped on a main line during a busy period, the driver did not feel it was safe to do so. They both then agreed that the train should return to Wellington Station where the problem could be addressed.

3.1.7. The driver radioed the signaller to explain that the train needed to return to the station. The signaller looked at the mimic screen and noted that it showed the train occupying the section of track north of Signal 39 (see Figure 3). The signaller planned to use Signal 39 to authorise the train south back to the station.

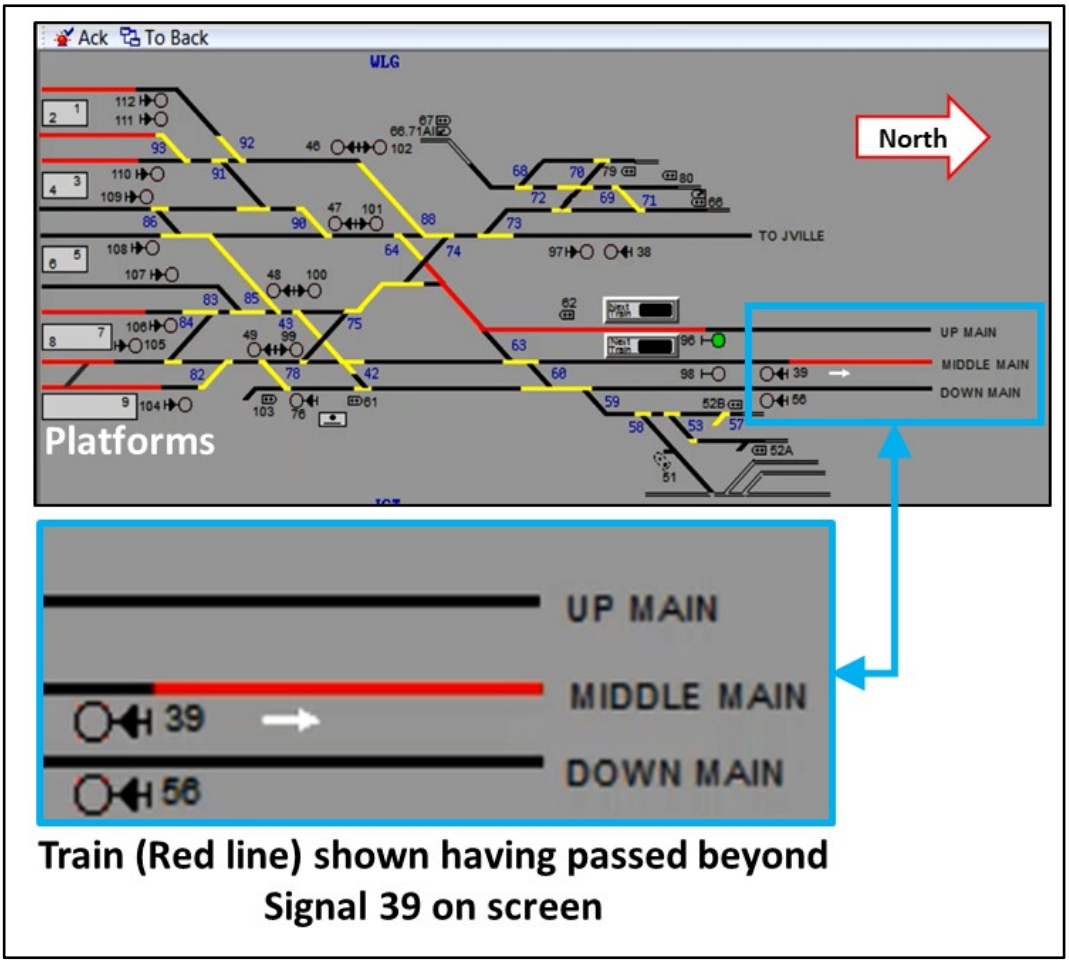

Figure 3
Extract from mimic screen in Wellington signalbox

3.1.8. The signaller confirmed to the driver that the train had passed beyond Signal 39, and that the driver was to change driving ends in readiness for the move back to the platform. However, when the train had stopped, the rear of the train was about four metres short of going passed past Signal 39 (see Figure 4). The insulated joint[10] in the track that marked the end of one section and the beginning of the next section of track was eight metres behind the signal. Because the train had passed over this insulated joint, the signalling system indicated to the signaller that the train had passed north of Signal 39 and fully entered the next section of track on the mimic screen.

3.1.9. The driver walked through the congested train, answering passengers' questions on the way. It was dark outside and the brightly lit interior of the train made it difficult for the driver to see anything outside. The driver took a moment to update the train manager, who then made an announcement to the passengers over the public-address system that the train was returning to

[10] A joint separating two adjacent pieces of rail track so that sensors can detect when a train moves from one section, across the insulated joint, to the next section of track.

the station platform. Once the driver had changed ends, Signal 39 was about four metres behind the driving cab outside the driver's forward view.

3.1.10. The driver contacted the signaller. The signaller authorised the driver to "come around to the signal". The signaller was referring to Signal 39 and the driver correctly understood that the train could move as far as Signal 39. Signal 39 was set to 'All Red – Stop'.

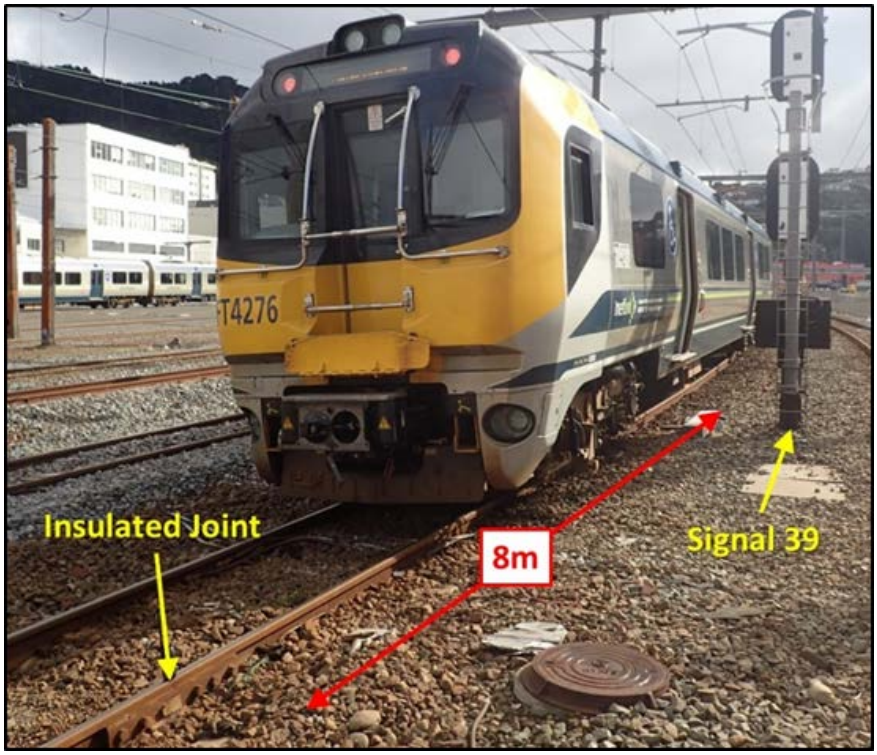

Figure 4
Photograph showing position of the rear of the train in relation to Signal 39

3.1.11. Not realising that the train was already past Signal 39, the driver moved the train in the direction of the Wellington Station platform looking for the signal. Once on the move, the driver talked on the radio with the signaller regarding the options for the passengers back at the platform.

3.1.12. Shortly after having this conversation, the signaller noticed that the mimic screen indicated the returning train had entered the section of track south of Signal 39, and was on a potential collision course with another train travelling in the same direction on the adjacent Down Main Line. The two trains were travelling towards the same set of crossover points ahead.

3.1.13. The signaller called the train to "stop, stop, stop". The driver stopped the train 121.7 metres past Signal 39.

3.2. Key personnel

3.2.1. The train driver was employed by Transdev Wellington Limited (Transdev) and based at Wellington. At the time of the incident the driver had 12 years' experience driving passenger trains on the Wellington network, held current certification and had a clean driving record. In accordance with Transdev's policy, the driver underwent a post-incident drug and alcohol test, which came back negative (clear).

3.2.2. KiwiRail's initial assessment was that the driver had passed Signal 39 at red. Based on that assessment, it did not require either the signaller or the platform maintainer to undergo a post-incident drug and alcohol test. The signaller was employed by KiwiRail and had 12 years' signalling experience, the previous six years split between the National Train Control Centre and

the Wellington signalbox. The signaller had an incident-free record and held current certification at the time of the incident.

3.2.3. The platform maintainer was employed by Transdev, had six years' experience maintaining the Matangi fleet in Wellington and held current certification for the role.

4. Analysis

4.1. Introduction

4.1.1. The incident resulted in a potential collision with another passenger train in the approaches to Wellington Station. The area is subject to a permanent speed restriction of 20 kilometres per hour. Nevertheless, a potential collision between two loaded passenger trains is a serious issue.

4.1.2. This analysis discusses what happened and then the following safety issues that have been identified in a previous report published by the Commission[11]:

- there is a heightened risk of trains colliding within the approaches to Wellington Station because limited space makes the track layout congested
- a number of reasonable measures had not been taken to further reduce the risk of trains colliding in the approaches to Wellington Station. When the line was upgraded to bidirectional[12], the eight-metre separation between the insulated joint and the signal was not identified as a potential issue.

4.2. What happened

4.2.1. The incident sequence began when the driver elected to stop the train owing to a perception that the brakes on the last carriage were 'dragging' (partially applied). A subsequent maintenance examination revealed no fault with the actual brake system, and an update of the train monitoring system BIOS[13] resolved the high-brake-pressure reading.

4.2.2. It is about as likely as not that the apparent dragging the driver felt was caused by resistance as the rear of the train ran through sets of points. Train brakes are a safety-critical system and the driver was right to check them on departure from the platform.

4.2.3. The problem arose because the train stopped with its rear bogie positioned within the eight-metre length of track between the insulated joint and Signal 39. The location was unfortunate. Having passed over the insulated joint, the track signalling system displayed to the signaller on the mimic panel that the rear of the train had passed Signal 39, when in fact it had not. The mimic screen showed the signaller that the train had stopped somewhere within the 368-metre section of track between Signal 39 and the next signal (see Figure 5). The signaller had no reason to doubt the accuracy of the information being presented on the mimic screen.

[11] Report RO-2016-101, signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016.
[12] A track on which trains can be signalled to run in both directions.
[13] Software stored in permanent memory that is used when a computer is turned on.

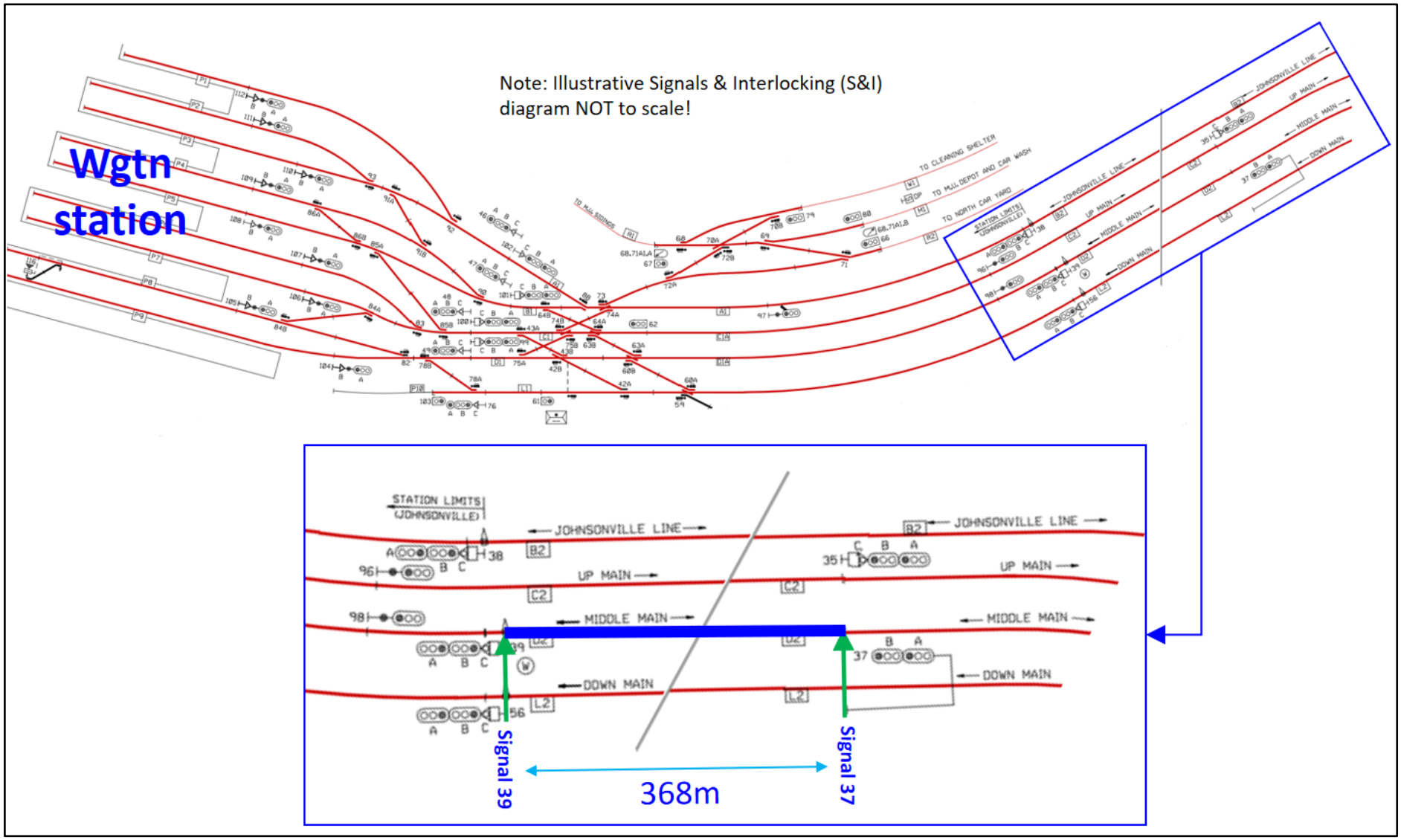

Figure 5
Section of track occupied by the train as seen on the signaller's mimic panel

4.2.4. After changing driving ends, the driver did not notice that Signal 39 was just behind the driving cab. The driver would have walked past the signal while walking through the train, stopping to converse with the train manager and answer some passengers' questions. In response to the signaller's instruction to "come around" to Signal 39, the driver moved the train southward in a potential conflicting movement with another passenger train heading into Wellington Railway Station.

4.2.5. Fortunately the signaller saw on the mimic screen that the train had entered the next track section, and radioed the driver to stop.

4.3. Signalling system

Safety issue – There is a heightened risk of trains colliding within the approaches to Wellington Station because limited space makes the track layout congested. When the line was upgraded to bidirectional[14], the eight-metre separation between the insulated joint and the signal was not identified as a potential issue.

4.3.1. KiwiRail signallers, drivers and signals engineers spoken to all confirmed their understanding that a train being 'clear of a signal' meant that the whole train had moved past the physical signal post and that the signal would then be visible to a driver operating from the other end of the train.

4.3.2. When Signal 39 was installed, the track was dedicated to trains travelling inbound to Wellington. As part of a significant project to increase capacity into and out of Wellington Station in 2010, a third main line was added and the now middle main track was made bidirectional. This allowed trains to be routed along the middle main track either outbound from or inbound to Wellington depending on demand. The insulated joint associated with Signal 39 was modified and a TrainStop[15] installed as part of the project.

4.3.3. Signal 39 is protected by a TrainStop for inbound Wellington trains. The device was installed next to the signal and was designed to activate the brakes of an inbound train automatically if it passed the signal at red. It is a means of protecting the busy and congested approaches to Wellington Station from trains that do not stop at red signals. The device works via a lever that is raised when the signal is at red and the last set of train wheels has passed over the insulated joint associated with the signal. This raised lever catches on a trip lever device mounted on the side of the train and activates the train brakes (see Figure 6).

[14] A track on which trains can be signalled to run in both directions.
[15] A device that ensures compliance with a signal displaying a stop aspect by automatically applying the train brakes should the train pass the signal at red.

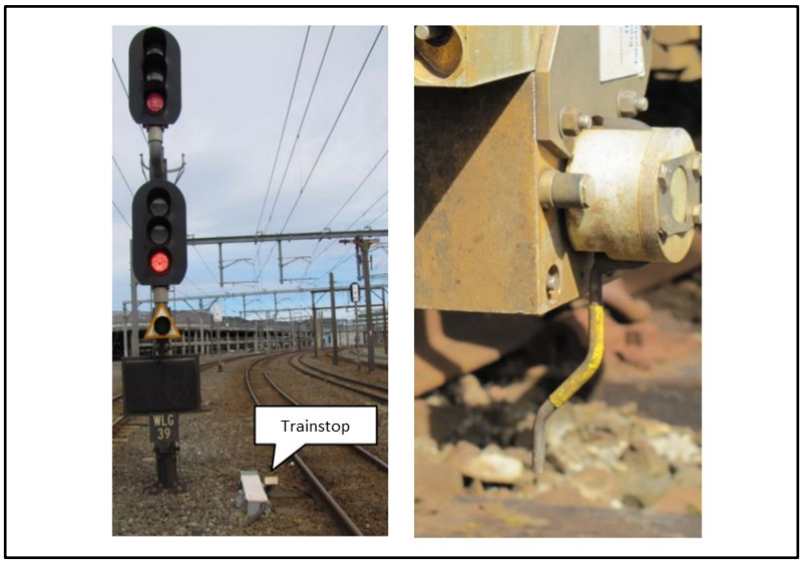

Figure 6
Example TrainStop (left) and trip lever on a Matangi train (right)

4.3.4. The insulated joint was placed eight metres behind the TrainStop device (and the signal) so that any part of the train that was overhanging the last set of wheels would not catch on the raised TrainStop lever and damage the device (see Figure 7).

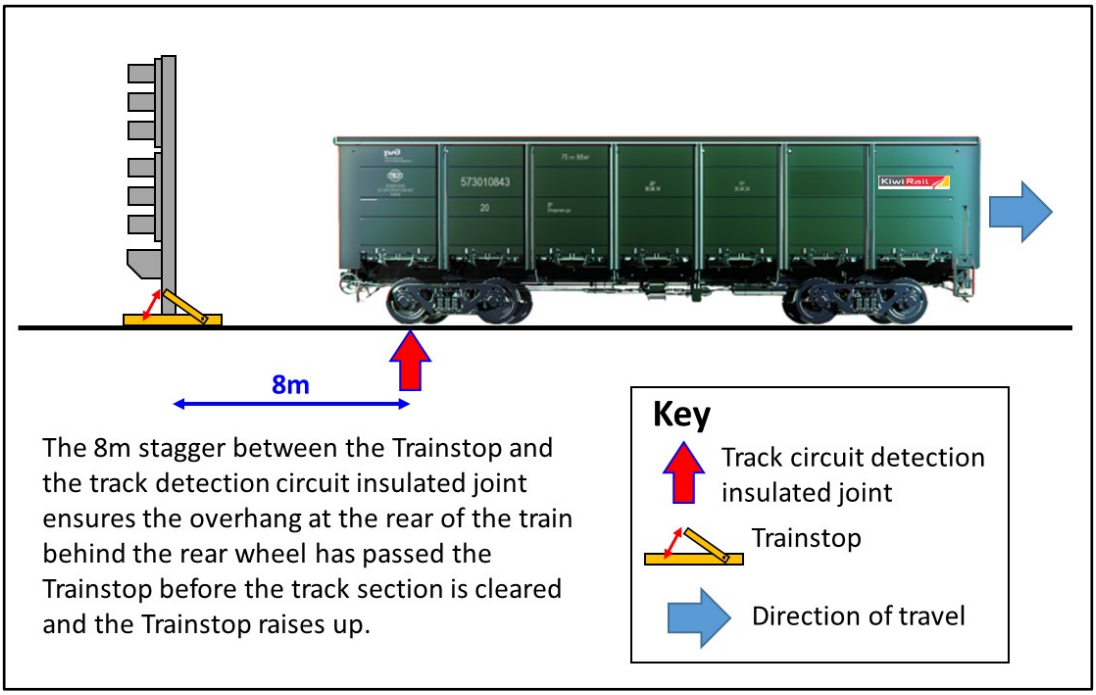

Figure 7
Signal and TrainStop position diagram

4.3.5. In its report on another potential collision in the vicinity of Wellington Railway Station (Inquiry RO-2016-101)[16], the Commission noted the safety issue of the heightened risk of trains colliding within the approaches to Wellington Station because limited space makes the track layout congested.

[16] Rail inquiry RO-2016-101, signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016.

4.3.6. In response to a recommendation from the Commission, KiwiRail agreed to develop a long-term strategy for improving the safety of the track and infrastructure in the Wellington Station area.

4.3.7. In response to this incident, KiwiRail has modified the signalling system at Signal 39 and similar signals in the Wellington area (see section 6).

4.4. Communication and procedures

Safety issue – A number of reasonable measures had not been taken to further reduce the risk of trains colliding in the approaches to Wellington Station.

4.4.1. The signaller had two options for recovering the train back to the Wellington Station platform. The first was to leave the train where it was until a clear route could be set for it to move the full distance back to the platform. The second option was to verbally authorise the train to move up to Signal 39 at 'All Red – Stop' where it would be held until the remaining route to the platform could be set, which was the intention in this case.

4.4.2. The benefit of moving the train to Signal 39 was that the signaller would know exactly where the train was, rather than somewhere within the 368-metre section of track between Signal 39 and Signal 37 (see Figure 5). However, in this situation there may have been some benefit in the signaller and the driver conversing to establish the exact location of the train before any movement was authorised. Had they done so, they may have realised that the train was not clear of Signal 39, and the situation would have been resolved without any conflict with other trains. The communication they did have and the actions they took were based on the false information provided by the mimic panel.

4.4.3. The potential for train drivers to fail to stop at 'All Red – Stop' signals is a known and foreseeable risk. This risk would have been mitigated had the train remained where it was until there was a clear (green) route back to the station platform.

4.4.4. A balance needs to be achieved between mitigating the risk of signalling trains up to a red signal and achieving efficiencies for the metropolitan train system, particularly during peak hours.

4.4.5. Ideally, a track-signalling system should be able to provide a sufficient safety separation between train movements so that a train inadvertently passing a signal at red would be less likely to be involved in a collision with another train. In this case the train was returning to the platform through an area where limited available space made for a congested track layout. This meant there were fewer opportunities to create the ideal safety separation between train movements.

4.4.6. The Commission raised this issue in its report into another potential collision in the vicinity of Wellington Railway Station (Inquiry RO-2016-101), noting that, "There is a heightened risk of trains colliding within the approaches to Wellington Station because limited available space makes the track layout congested. The existing layout means there are fewer safety overlaps designed into this area and fewer fail-safe back-up systems in place in the event of a driver failing to stop at a red light".

4.4.7. The previous report had also noted that any increase in commuter train services into and out of Wellington through this tight track layout increases the pressure on this bottleneck area, and in turn increases the underlying risk of relying on train drivers to stop at red lights.

4.4.8. Although the circumstances of the previous incident and this one are different, the arising safety issue is the same. The Commission has recognised the need to take long- and short-term approaches to mitigating any risks.

4.4.9. In its previous report the Commission recognised that decongesting and modernising the track and signal infrastructure at Wellington Station will require significant resources, and that this is unlikely to occur in the near future.

4.4.10. Further, noting that there will likely be future increases in rail patronage and that the system is already congested, there are a number of reasonable measures that had not been taken to further reduce the risk of trains colliding within the approaches to Wellington Station, such as:

- providing better recognition of signals
- standard procedures for signalling trains through the area
- better communication between train drivers and persons controlling the trains.

4.4.11. The Commission has previously recommended that:

- KiwiRail liaise with Greater Wellington Regional Council to develop a long-term strategy for the metropolitan rail system, with a view to identifying and addressing the current safety issues with the track and signalling infrastructure in the Wellington Station area [033/17]
- KiwiRail conduct a review of current arrangements and take any opportunities it can to further reduce the risk of train operations in the area until a more suitable longer-term solution can be made. [034/17]

4.4.12. Refer to section 7 of this report (Recommendations) for the full text and KiwiRail's responses to the recommendations.

5. Findings

5.1. The driver stopping the train and the decision to return to the platform were in accordance with the principles of safe train operations.

5.2. Where the train stopped was not accurately represented to the signaller on the mimic screen. The mimic screen gave the signaller a false indication that the train was north of Signal 39.

5.3. The eight-metre separation between Signal 39 and the insulated joint had not been identified as a potential issue when the lines in the area were modified and upgraded in 2010.

5.4. There is a heightened risk of trains colliding within the approaches to Wellington Station because limited available space makes the track layout congested. The existing layout means there are fewer safety overlaps designed into this area and fewer fail-safe back-up systems in place in the event of a train passing a red light.

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6. Safety actions

General

6.1. The Commission classifies safety actions by two types:

(a) safety actions taken by the regulator or an operator to address safety issues identified by the Commission during an inquiry that would otherwise result in the Commission issuing a recommendation

(b) safety actions taken by the regulator or an operator to address other safety issues that would not normally result in the Commission issuing a recommendation.

Safety actions addressing safety issues identified during an inquiry

- In response to the incident, Transdev Wellington Limited (the operator):
  - partnered the driver with a tutor and provided remedial training
  - briefed all staff on the importance of safety-critical communication
  - implemented random radio audits to assess the practice of safety-critical communication between train drivers and KiwiRail signallers and controllers
  - held a meeting with KiwiRail and the NZ Transport Agency to discuss the management of risk in the Wellington Railway Station limits.
- In response to the incident, KiwiRail:
  - completed a review of similar track layouts in the Wellington metro area
  - implemented additional track circuit sequencing for Signal 38 and Signal 39 (see diagram below):
    - for 38 signal – track circuit 38T will not show unoccupied until 97T is unoccupied for Up trains
    - for 39 Signal – track circuit 98T will not show unoccupied until 37BT is unoccupied for Up trains
  - relocated the axle counter head for Signal 205 at Petone so that it is aligned with the signal.

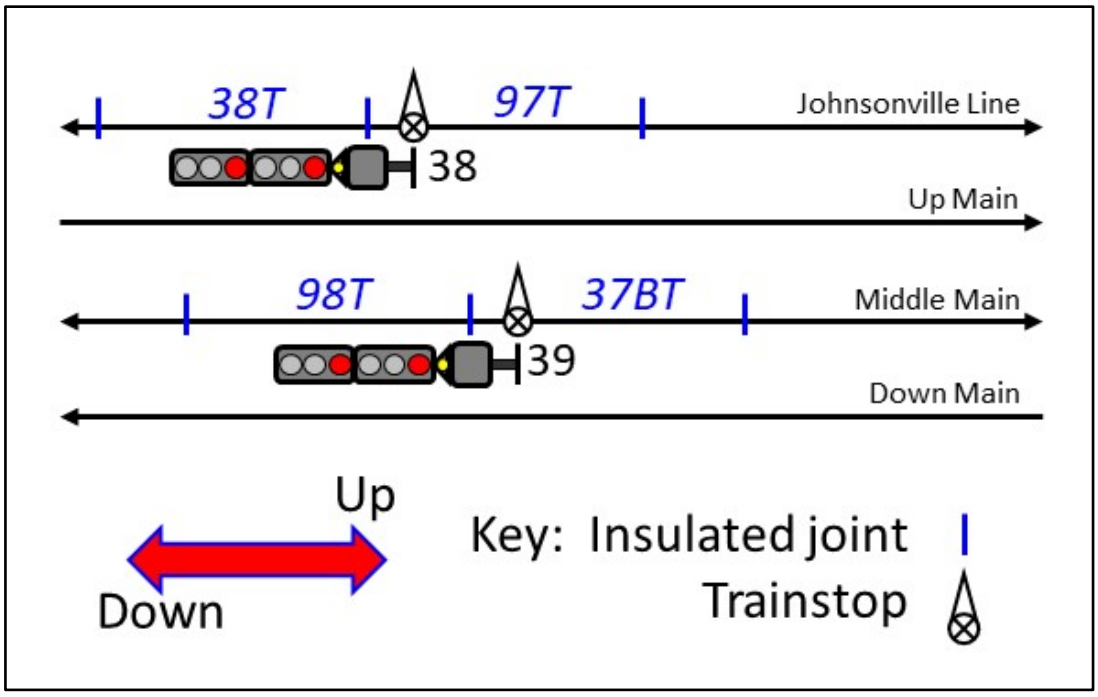

Figure 8
Additional track circuit sequencing for Signal 38 and Signal 39

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. In this case, no new recommendations have been issued.

7.2. In the interests of transport safety it is important that any recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

Previous recommendations to KiwiRail

7.3. There is a heightened risk of trains colliding within the approaches to Wellington Station because limited available space makes the track layout congested. The existing layout means there are fewer safety overlaps designed into this area and fewer fail-safe back-up systems in place in the event of a driver failing to stop at a red light.

Any increases in commuter train services into and out of Wellington through this tight track layout will increase the pressure on this bottleneck area, and in turn increase the underlying risk of relying on train drivers to stop at red lights.

Decongesting and modernising the track and signal infrastructure at Wellington Station will require significant resources, which is unlikely to occur in the near future. However, there will likely be future increases in rail patronage and the system is already congested.

On 15 December 2017 the Commission recommended that the Chief Executive of KiwiRail liaise with Greater Wellington Regional Council to develop a long-term strategy for the metropolitan rail system, with a view to identifying and addressing the current safety issues with the track and signalling infrastructure in the Wellington Station area. [033/17]

7.4. On 23 January 2018 the Chief Executive of KiwiRail replied:

> KiwiRail accepts the recommendation as presented and will be engaging with the Greater Wellington Regional Council (GWRC) for developing a long-term strategy for improving the safety of the track and signalling infrastructure in the Wellington Station area.

7.5. On 6 July 2018 KiwiRail supplied the Commission with the following update:

> KiwiRail and GWRC [Greater Wellington Regional Council] have worked to put a joint funding case to MoT [Ministry of Transport] for improvements to the track and signalling infrastructure in the Wellington Station area which includes the implementation of ETCS [European train control system]. Work is currently underway to produce a development plan for the entire Wellington Metro system – this will include short, medium and longer term strategies for the Wellington throat area.

7.6. There are a number of reasonable measures that had not been taken to further reduce the risk of trains colliding within the approaches to Wellington Station, such as:

- providing better recognition of signals
- standard procedures for signalling trains through the area
- better communication between train drivers and persons controlling the trains.

This incident has shown that more work is required of KiwiRail to further reduce the likelihood of trains colliding within the Wellington Station area.

On 15 December 2017 the Commission recommended that the Chief Executive of KiwiRail conduct a review of current arrangements and take any opportunities it can to further reduce the risk of train operations in the area until a more suitable longer-term solution can be made. [034/17]

7.7. On 23 January 2018 the Chief Executive of KiwiRail replied, in part:

> KiwiRail, GWRC and Transdev Wellington already co-operate closely on operating and strategic matters. This is required by the Wellington Network Agreement and is supported by an MOU between the three organisations.
>
> KiwiRail are in agreement to conduct a review of current arrangements in order to try to identify opportunities for attempting to reduce the risk to train operations in the Wellington station area.

7.8. On 6 July 2018 KiwiRail supplied the Commission with the following update:

> A route risk review of the Wellington 'throat' area is currently nearing completion.

New recommendations

7.9. No new recommendations have been made as a result of this inquiry.

8. Key lesson

8.1. Trains should not be unnecessarily authorised to proceed up to red signals in congested areas, because the reduced safety margins in these areas increase the risk of a collision if a signal is passed at danger.

Recent railway occurrence reports published by the Transport Accident Investigation Commission (most recent at top of list)

RO-2017-102	Signalling irregularity, Wellington Railway Station, 3 April 2017
RO-2016-101	Signal passed at danger leading to near collision, Wellington Railway Station, 28 May 2016
RO-2016-102	Train 140 passed Signal 10R at 'Stop', Mission Bush Branch line, Paerata, 25 October 2016
RO-2015-103	Track occupation irregularity, leading to near collision, between Manunui and Taumarunui, 15 December 2015
RO-2014-105	Near collision between train and hi-rail excavator, Wairarapa Line near Featherston, 11 August 2014
RO-2013-101	Derailment of freight Train 345, Mission Bush Branch line, 9 January 2013
RO-2015-102	Electric locomotive fire at Palmerston North Terminal, 24 November 2015
RO-2014-104	Express freight train striking hi-rail excavator, within a protected work area, Raurimu Spiral, North Island Main Trunk line, 17 June 2014
RO-2013-103 and RO-2014-103	Passenger train collisions with Melling Station stop block, 15 April 2013 and 27 May 2014
RO-2015-101	Pedestrian fatality, Morningside Drive pedestrian level crossing, West Auckland, 29 January 2015
RO-2014-101	Collision between heavy road vehicle and the Northern Explorer passenger train, Te Onetea Road level crossing, Rangiriri, 27 February 2014
RO-2012-103	Derailment of freight Train 229, Rangitawa-Maewa, North Island Main Trunk, 3 May 2012
RO-2012-105	Unsafe recovery from wrong-route, at Wiri Junction, 31 August 2012
RO-2013-107	Express freight MP16 derailment, Mercer, North Island Main Trunk, 3 September 2013
RO-2012-104	Overran limit of track warrant, Parikawa, Main North line, 1 August 2012

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