SHERIFFDOM OF LOTHIAN & BORDERS AT EDINBURGH

[2025] FAI 22

EDI-B449-24

DETERMINATION

ΒY

SHERIFF D R G KEIR

UNDER THE INQUIRIES INTO FATAL ACCIDENTS AND SUDDEN DEATHS ETC (SCOTLAND) ACT 2016

into the death of

CARLOS HERNAN CORREA PALACIO

Edinburgh, 7 May 2025

Determination

The sheriff, having considered the information presented at the Inquiry, determines in terms of section 26 of the Inquiries into Fatal Accidents and Sudden Deaths etc. (Scotland) Act 2016 ("the 2016 Act") that:

In terms of section 26(2)(a) of the 2016 Act (when and where the death occurred):
 Carlos Correa died at approximately 1244 hours on 11 September 2018 at the Non Motorised User ("NMU") crossing of the Edinburgh tramline at a point between the
 Balgreen and Saughton tram stops, near to Stenhouse Drive, Edinburgh.

2. In terms of section 26(2)(b) of the 2016 Act (when and where any accident resulting in death occurred): The accident resulting in the death of Mr Correa occurred

at approximately 1210 hours on 11 September 2018 when he was struck by Tram 260 at the NMU crossing detailed above.

3. In terms of section 26(2)(c) of the 2016 Act (the cause or causes of death): Mr Correa died of head trauma due to a collision with Tram 260.

4. In terms of section 26(2)(d) of the 2016 Act (the cause or causes of any accident resulting in death):

- Mr Correa moved directly into the path of Tram 260 when it was about
 18 metres away from the crossing.
- 2) Mr Correa was seemingly unaware of the approaching tram until he was in its path due to a combination of him not looking out for the tram prior to him stepping onto the crossing and the tram's bell not being sufficiently audible when it was sounded as a warning.
- 3) The driver of the tram was unable to stop the tram before it reached the crossing when it became clear that Mr Correa was going to walk into the crossing.

5. In terms of section 26(2)(e) of the 2016 Act (any precautions which (i) could reasonably have been taken, and (ii) had they been taken, might realistically have resulted in death, or any accident resulting in death, being avoided):

 Edinburgh Trams Ltd ("ETL") could reasonably have carried out the following risk assessments:

- (a) a suitable and sufficient risk assessment of the layout of the crossing to ensure that it provided sufficient notice and warning to pedestrians of the crossing itself;
- (b) a suitable and sufficient risk assessment of the audibility of tram warning devices;
- (c) a suitable and sufficient risk assessment of the emergency braking distances of its trams, taking account of known hazards, in particular pedestrians in the immediate vicinity of crossings who may not respond to the sounding of warning bells and warning horns of approaching trams and to identify and implement adequate control measures to address such hazards; and
- (d) ensuring that said risk assessments were regularly and periodically reviewed to ensure that they were still valid in September 2018.
- Such risk assessments would, in turn, have identified the following measures that could reasonably have been taken:
 - (a) Design and layout of the crossing

The NMU crossing could have been designed in such a way to ensure that a pedestrian was adequately warned that they were entering an area of higher risk. The following measures could have been taken:

• Delineation/demarcation of the crossing by marking out the higher risk area in a colour to alert the pedestrian and make it clear that the crossing was not a continuous path.

- Signage placed on the ground alerting pedestrians who may have been looking down to the fact they were entering an area of higher risk and to look both ways.
- Bollards, chicanes, fencing or pedestrian guard rails installed to slow the pedestrian down and guide them to face oncoming trams before they crossed the track.
- (a) Audible warning devices

ETL could have taken steps to increase the audibility of the tram warning devices, in particular that of the horn, and thereafter used the warning horn as the primary mode of warning in off-street areas, as envisaged by the applicable industry guidance. Had the warning horn been sufficiently audible above the background noise and been used in the off-street area, it might realistically have alerted Mr Correa at the point of first sighting at 73 metres from the crossing. This would have allowed him sufficient time to react and step out of the path of the tram.

(b) Line speed and braking distances

Additional warning signs to tram drivers to brake could have been introduced to address the hazard of the unresponsive pedestrian. Such signage could have been placed on the tramway to alert drivers to the final point at which emergency braking would bring the tram to a stop prior to reaching the mid-point of an NMU crossing.

6. In terms of section 26(2)(f) of the 2016 Act (any defects in any system of working which contributed to the death or the accident resulting in death):

- ETL's failure to carry out a suitable and sufficient risk assessment of the layout of the crossing to ensure that it provided sufficient notice and warning to pedestrians of the crossing itself;
- ETL's failure to carry out a suitable and sufficient risk assessment of the audibility of tram warning devices;
- 3) ETL's failure to carry out a suitable and sufficient risk assessment of the emergency braking distances of its trams, taking account of known hazards, in particular pedestrians in the immediate vicinity of crossings who may not respond to the sounding of warning bells and warning horns of approaching trams, and to identify and implement adequate control measures to address said hazards; and
- ETL's failure to ensure that said risk assessments were regularly and periodically reviewed to ensure that they were still valid.

7. In terms of section 26(2)(g) of the 2016 Act (any other facts which are relevant to the circumstances of the death): other facts which are relevant to the circumstances of the death are discussed below.

Recommendations

(1) In terms of section 26(1)(b) of the 2016 Act (recommendations (if any) as to (a) the taking of reasonable precautions, (b) the making of improvements to any system of

working, (c) the introduction of a system of working, (d) the taking of any other steps, which might realistically prevent other deaths in similar circumstances): no recommendations are made.

NOTE

Introduction

[1] This Inquiry was held into the death of Carlos Hernan Correa Palacio ("Carlos Correa") who died on 11 September 2018. Preliminary hearings in the Inquiry were held on 31 May 2024, 22 August 2024, 4 November 2024 and 3 February 2025. The Inquiry took place over five days between 24 March 2025 and 28 March 2025 together with a hearing on submissions on 24 April 2025.

[2] The parties were represented as follows:

- 1) Mr Goddard KC, Advocate, represented the Crown;
- 2) Mr Gray KC, Advocate, represented Edinburgh Trams Ltd ("ETL");
- 3) Mr Crabb, Advocate, represented the Office of Rail and Road ("ORR");
- 4) Mr Cowan, Advocate, represented the Rail Accident Investigations Branch ("RAIB");
- 5) Ms McNeil, Solicitor Advocate, represented the UK Tram and Light Rail Safety and Standards Board ("LRSSB").

[3] The representatives had responsibly agreed a considerable amount of evidence in a comprehensive Joint Minute of Agreement supplemented by Notices to Admit. As such, it was not necessary for the participants to present information at the Inquiry concerning the facts and productions detailed therein which resulted in the need for oral evidence to be significantly reduced.

[4] The inquiry heard oral evidence from the following witnesses:

- 1) PC Gordon Orlovski
- 2) Colin Kerr
- 3) Michael Powell
- 4) Sarah Singh
- 5) Andrew Conway
- 6) Patrick Toner
- 7) Simon Kay
- 8) Dominic Long

[5] The statements of a number of witnesses formed part of the Notices to Admit

lodged by the Crown, the contents of which were not disputed, and are listed as follows:

- 1) Ian McDermott
- 2) PC Paul Ewing
- 3) Andrew Conway
- 4) Callum Fairgrieve
- 5) PC Cameron McDonald
- 6) Colin Kerr
- 7) Evelyn Kiernan
- 8) Hugh Barton
- 9) John White
- 10) Kevin Duffy
- 11) Dr Lorenzo Bandieri
- 12) PC Mark Spiden
- 13) Marlene Pearson
- 14) Patrick Toner
- 15) PC Alan Beattie
- 16) Sarah Singh
- 17) Stuart Abbott
- 18) Simon Kay
- 19) Stephen Brake
- 20) PC Gordon Orlovski
- 21) Steven Webb
- 22) Steven Short
- 23) Jorge Piqueras Serran
- 24) Carl Williams
- [6] A number of productions formed part of the first Notice to Admit lodged by the

Crown as follows:

1) Crown Production ("CP") 1 - FPMR and Toxicology Report

- 2) CP2 Police Collision Investigation Report
- 3) CP4 RAIB Report 09 of 2019
- 4) CP5 Report on Dynamic Testing of Braking Systems on Tram 260
- 5) CP6 Report of Acoustic Tests on Edinburgh Tram 260
- 6) CP7 UN ECE Regulation 28
- 7) CP8 LRG 2.0 Guidance on Tramway Crossings
- 8) CP9 LRG 5.0 Guidance on Tramway Audible Warning
- 9) CP11 RAIB Urgent Safety Advice Saughton
- 10) CP14 1970 EC Directive 388 audible warning devices for motor vehicles
- 11) CP15 Book Photographs dated 9 November 2019
- 12) CP58 LRSSB LRG 1.0 Tramway Principles and Guidance
- 13) CP59 UK Tram Segregated Tramway Crossings Guidance Part 1
- 14) CP60 UK Tram Segregated Tramway Crossings Guidance Part 2
- 15) CP62 LRSSB Non-motorised Tramway Crossing Guidance
- 16) CP63 LRSSB Tramway Audible Warning Acoustic Test Guidance
- 17) CP64 ORR RSP2 Guidance on Tramways
- 18) CP65 UK Tram Tramway Principles Guidance
- 19) CP67 HSE Risk Assessment A Brief Guide 2014
- 20) CP68 Highway Agency Design Of NMU Routes
- 21) CP69 ORR Supporting Guidance to RSP2
- 22) CP70 ORR A Guide to ROGS 2006 (2014)
- 23) CP71 EC reg audible warning devices 70388EC
- 24) CP72 Memorandum of Understanding between ORR UK Tram regarding the transfer of RSP2
- 25) CP128 Supporting Guidance to RSP2 (December 2009)

The legal framework

[7] This Inquiry was held in terms of section 1 of the 2016 Act. It was a discretionary

inquiry held in terms of section 4, in that the death occurred in circumstances giving rise

to serious public concern. The Inquiry is governed by the Act of Sederunt (Fatal

Accident Inquiry Rules) 2017 ("the 2017 Rules") and was an inquisitorial process. The

Crown represented the public interest.

[8] The purpose of the Inquiry was, in terms of section 1(3) of the 2016 Act, to

establish the circumstances of the death of Mr Correa and to consider what steps (if any)

might be taken to prevent other deaths in similar circumstances. It was not the purpose of the Inquiry to establish civil or criminal liability. The manner in which evidence is presented at an inquiry is not restricted. Information may be presented at an inquiry in any manner and the court is entitled to reach conclusions based on that information.

[9] Section 26 of the 2016 Act sets out what must be determined by the Inquiry:

"The sheriff's determination:

- (1) As soon as possible after the conclusion of the evidence and submissions in an inquiry, the sheriff must make a determination setting out:
 - (a) in relation to the death to which the inquiry relates, the sheriff's findings as to the circumstances mentioned in subsection (2), and
 - (b) such recommendations (if any) as to any of the matters mentioned in subsection (4) as the sheriff considers appropriate.
- (2) The circumstances referred to in subsection (1)(a) are:
 - (a) when and where the death occurred,
 - (b) when and where any accident resulting in the death occurred,
 - (c) the cause or causes of the death,
 - (d) the cause or causes of any accident resulting in the death,
 - (e) any precautions which:
 - (i) could reasonably have been taken, and
 - (ii) had they been taken, might realistically have resulted in the death, or any accident resulting in the death, being avoided,
 - (f) any defects in any system of working which contributed to the death or any accident resulting in the death,
 - (g) any other facts which are relevant to the circumstances of the death.
- (3) For the purposes of subsection (2)(e) and (f), it does not matter whether it was foreseeable before the death or accident that the death or accident might occur:
 - (a) if the precautions were not taken, or
 - (b) as the case may be, as a result of the defects.
- (4) The matters referred to in subsection (1)(b) are:

- (a) the taking of reasonable precautions,
- (b) the making of improvements to any system of working,
- (c) the introduction of a system of working,
- (d) the taking of any other steps, which might realistically prevent other deaths in similar circumstances."

Summary

[10] This summary is drawn from the Joint Minute of Agreement, the Notices to Admit, the witnesses' written statements, the oral evidence and productions.

Background to Edinburgh Trams

[11] ETL was incorporated on 3 June 2013 and is the current operator and infrastructure contract manager of the Edinburgh tramway. The City of Edinburgh Council ("CEC") are the owners of the tramway and the trams. ETL manages the maintenance of infrastructure and vehicles under delegated authority from CEC.

[12] CEC had direct control of the Edinburgh Tram Project and were the "responsible person" in terms of the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS) between 9 September 2011 and 30 May 2014 after which ETL commenced that role when passenger operations started on 31 May 2014.

[13] In March 2013 when the tram system was being commissioned, tram drivers had reported that people working on and around the track were not responding to the tram bell. CEC conducted measurements at the tram depot and compared the sound pressure levels of the tram bell and tram warning horn against the horn of a Lothian bus. Some measurements were also taken during an informal test of one of the trams before it was delivered to Edinburgh. The actual test conditions for both of these are not known but the reported sound levels were similar to those measured by the RAIB following the accident.

[14] Following the measurements taken at the Edinburgh depot, CEC documented that the tram horn was comparable to that of a bus and it was considered by those working on the tram project to be "adequate". There is no evidence to indicate that any consideration was given to the applicable guidance available at the time (detailed more fully in paragraphs [40] to [42] below) or that a tram has an increased braking distance compared to that of a bus at any given speed or that off-street trams generally run faster than on-street buses.

[15] At the time of the accident on 11 September 2018 the tramway route extended for around 8.7 miles from Edinburgh Airport to York Place, Edinburgh. There were 16 tram stops along the route and there were 13 Non-Motorised User Crossings ("NMUs").

Applicable tram driver training

[16] At the section of tramway in question, between the Balgreen and Saughton tram stops, tram drivers were initially advised to travel at around 50 km/h to 55 km/h. The maximum permitted line speed was increased to 70 km/h in 2017. Drivers were instructed to drive in accordance with the "line-of-sight principle" and "the conditions" at all times. The "line-of-sight principle" requires drivers to be prepared to stop before reaching any foreseeable stationary object using the service brake in a similar way to road vehicles being driven on the highway. Outwith this, tram drivers need to react to emerging hazards using their emergency brake.

The circumstances surrounding the death

[17] Carlos Correa was 53 years old at the date of his death. He lived in Eskbank, Edinburgh and was married. He had two sons and a daughter. He was employed as a bus driver by Lothian Buses. At the time of his death, he was in good health and was not on any regular medication.

[18] On Tuesday 11 September 2018 he left his home address at around 0730 hours.He parked his vehicle on Saughton Mains Street and commenced his shift as a busdriver at the Longstone Depot, Edinburgh at 0956 hours.

[19] At around 1203 hours, Mr Correa alighted from a Lothian bus at Stenhouse Grove, Edinburgh. He walked to an NMU crossing of the Edinburgh tramline at a point between Balgreen and Saughton tram stops, near to Stenhouse Drive, Edinburgh.

[20] At around 1210 hours, Mr Correa was struck by the front nearside of Tram 260 and was thrown to the nearside. The tram stopped a short distance beyond the crossing.

[21] The location where Mr Correa was fatally struck was an NMU crossing at an offstreet section of the Edinburgh Tramway near to the Saughton tram stop. At this site trams run in a generally east/west direction. The section of tram track is parallel to Stenhouse Drive and Saughton Main Street. There are two separate tracks and the trams utilise the UK Driving Convention for driving on the left-hand side where there are parallel tracks. At the time of the collision, Tram 260 was travelling towards Edinburgh Airport between the Balgreen and Saughton tram stops.

[22] There are three NMU crossings along this particular off-street section of tramway between the Balgreen and Saughton tram stops. These crossings are uncontrolled and allow pedestrians and other crossing users to cross both tracks. The tram tracks are recessed into a raised pedestrian kerb footpath with concrete tactile blister paving on the north and south limits of the crossing.

[23] An uncontrolled crossing has no pedestrian light signals and requires pedestrians to look out for approaching trams and cross only when it is safe to do so. To alert pedestrians to the presence of the tramway and the crossing, two double-sided square-shaped warning signs with white text and blue background were situated at both sides of the crossing. There were also rows of tactile blister paving on each side of the crossing. An image showing the configuration of the crossing at the time of the accident is produced in Appendix I.

[24] This section of the tramway is considered "off-road" and the speed limit on this section was 70 km/h. Trams operating "on-road" are subject to normal road speed limits.

[25] Tram 260 was travelling at between 61 km/h and 66 km/h at the time the driver first saw Mr Correa. The driver was 73 metres from the crossing and Mr Correa was approaching the crossing at that time. The driver applied his bell 53 metres from the crossing and began to slow the tram. He applied his bell again a further three times over the next 27 metres. Mr Correa did not react. The driver applied the emergency brake 18 metres from the crossing. Application of the emergency brake automatically sounds the warning horn. At the point of applying the emergency brake, the tram was travelling at 61 km/h. Mr Correa looked up moments before being struck by the tram. At the time of the collision the tram was travelling at 53 km/h (33 mph). The accident was captured by CCTV systems on the tram.

[26] At the time of the accident the weather was clear and dry. Records indicate that there was a gusty wind ranging from 37 km/h to 58 km/h blowing along the tram tracks from a south westerly direction, namely towards the approaching tram.

[27] At around 1211 hours, a call was made to the emergency services via 999 call handling services.

[28] Dr Lorenzo Bandieri was an off-duty medical doctor who was on board Tram 260 as a passenger. Dr Bandieri provided medical assistance to Mr Correa including CPR.

[29] Shortly after 1215 hours, Police Constables Mark Spiden and Gordon Orlovski attended the locus. PC Spiden took over CPR while Dr Bandieri opened Mr Correa's airways.

[30] The Scottish Ambulance Service dispatched paramedic Steven Short, who arrived at the scene at approximately 1220 hours. Mr Short paused CPR and confirmed Mr Correa was in cardiac arrest. Mr Short asked PC Spiden to recommence chest compressions and applied his defibrillator. He confirmed a cardiac arrest rhythm of asystole. The decision was then made to move over onto the managing traumatic cardiac arrest protocol with priority of reversing hypovolaemia, oxygenation and treating tension pneumothorax. Chest compressions were continued by PC Spiden.

[31] After around 15 minutes, further crew from the Scottish Ambulance Service arrived at the locus. Advanced Life Support ("ALS") was continued but it was becoming obvious that Mr Correa had a non-survivable head injury. In total he had now had 20 minutes of ALS and the reversible causes of traumatic cardiac arrest addressed. It was decided that the correct decision was to terminate any further resuscitation attempts.

[32] Mr Correa was pronounced life extinct at the scene at approximately 1244 hours.
[33] At around 1315 hours on 11 September 2018, police officers conveyed the tram driver to Corstorphine Police Station. He provided a specimen of breath which tested negative for alcohol.

[34] The body of Mr Correa was later conveyed to Edinburgh City Mortuary. A postmortem examination of the body was carried out on 14 September 2018. The final cause of death was stated in the report as:

1a Head Trauma

1b Collision with a tram (pedestrian)

[35] A post-mortem Toxicology Report was subsequently prepared. The analyses carried out provided negative results.

Investigation by Police Scotland

[36] The relevant findings from the investigation into the collision carried out by Police Scotland are:

- (i) sightline analysis established that there was a clear and unobstructed view for a tram driver of the crossing for over 0.2 miles (322 metres) in a westbound direction along the tramway;
- (ii) the tram tracks were found to be in a good state of repair with no defects which could be considered to have been a causal or contributory factor in the collision;
- (iii) Tram 260 was mechanically examined on 1 October 2018 and found to have no defects; and
- (iv) following tests carried out on the braking system of Tram 260 by an independent consultant, the brake performance on Tram 260 was found to be of an appropriate standard.

Previous incidents at Saughton

[37] Prior to the accident, ETL had recorded five incidents involving the application of a tram's emergency brake at the general location categorised as "Saughton" as follows:

- 30 June 2014 at 1529 hours the incident was described as "passenger walked out in front of the tram".
- 2) 9 September 2014 at 1900 hours the incident was described as "Children ran onto the track at SGT near Carrick Knowe Bridge".

- 10 October 2014 at 2025 hours the incident was described as "Pedestrian walked out in front of tram".
- 4) 1 September 2016 at 0839 hours the incident was described as "driver was travelling between Saughton and Balgreen at 0837 and applied the emergency brake, due to a cyclist not stopping for the tram".
- 5) 29 November 2016 at 1208 hours the incident was described as "pedestrian walking out in front of tram".

[38] While each incident was investigated by ETL, no action was taken in relation to either the audibility of the tram warning devices or the layout of the crossing as neither was believed to be a factor. No steps were taken to review the risk assessments for the relevant crossings.

[39] A further incident highlighted at the Inquiry involved a collision between a tram and a pedestrian at Lochside Avenue on 6 July 2015 that bore some similarity to the index accident albeit it did not occur at an NMU crossing. The tram driver had sounded the warning bell multiple times before applying the emergency brake which activated the warning horn. The speed of the tram at the point of impact was 42 km/h. The incident was investigated by ETL and no fault was attributed to the tram driver. Again, no steps were taken to review the risk assessment for the crossing.

Applicable guidance available to the UK tram industry prior to 11 September 2018

[40] 2006 - Railways Safety Publication 2 - Guidance on Tramways ("RSP2"). The relevant sections for the purposes of this Inquiry are:

"Crossing layouts

68 Fencing or pedestrian guard rails should be provided where necessary, to guide pedestrians to face oncoming trams before they cross the track or to direct their attention to pedestrian crossing lights.

Audible warnings

276 Trams should be fitted with an adequate audible warning device at the driving ends. The warning emitted should be in keeping with the environment in which the tram runs. The warning should be loud enough to indicate the approach of a tram without causing injury or undue alarm to those in the proximity.

277 The warning device should have two levels of sound where trams run both on-street and off-street:

- (a) the lesser level, for use on-street to alert people of the tram's presence, should produce a sound that is distinctive compared with that emitted by other road vehicles; and
- (b) the greater sound level, for use in emergencies and off-street, should be adequate to warn staff who are working on the track that a tram is approaching."

[41] 2010 - Tramway Technical Guidance Note 6 ("TTGN6") published by the ORR to

provide additional supporting guidance to RSP2. The relevant clauses are:

"Clause 276

Some guidance may be derived from the EC Directive 70/388/EC. It may be necessary to consider the sound level of the warning device such that it will be audible to staff or pedestrians on the track at the service braking distance of the approaching tram.

Clause 277

For on-street use the warning required under item 277(a) might be provided by using a single stroke gong which can be rung at different rates depending upon how rapidly the operating pedal or button is depressed. A horn similar to those of buses or cars would not normally be considered suitable for this function.

For off-street use and emergencies on street as required under item 277(b) this might be provided by a horn.

Some additional guidance can be taken from Annex I to EC Directive 70/388/EEC."

[42] EC Directive 70/388/EEC detailed the approximation of the laws of the Member States relating to audible warning devices for motor vehicles. Annex I section 2 was headed "Characteristics of the audible warning device when fitted to the vehicle" and in relation to acoustic testing of such audible warning devices stated that the maximum sound pressure of such a warning device should not be less than 93 dB(A).

[43] 2010 - UK Tram published Segregated Tramway Crossings Guidance.

[44] 2014 - Guidance to the Railways and Other Guided Transport Systems (Safety)Regulations 2006 (ROGS) published by the ORR.

[45] 2018 - Tramway Principles & Guidance published by UK Tram. This guidance

contained a section on audible warnings at paragraphs 8.24 to 8.28 which broadly

mirrored the content of the guidance previously available in RSP2 and TTGN6.

Reference was made to additional guidance being available in Annex I to EC Directive

7/388/EEC. It also contained detailed guidance relating to the management of

pedestrians at tram crossings as follows:

"Appendix F – Pedestrian Issues

Active and passive guidance measures should be considered in the design as necessary depending upon location... Methods of pedestrian control should be coherent throughout the system and include:

- Provision and delineation of pedestrian crossings;
- Signage;
- Active deterrents such as barriers, paving, planting etc. Where deterrents are provided to separate pedestrians and trams the deterrents should not also introduce potential trapping hazards with the tram body (side or front) or underside. Passive deterrents such as marking the tramway path should be considered."

Accident Investigation – Rail Accident Investigation Branch

[46] The RAIB is the independent railway and tramway accident investigation organisation for the UK. The purpose of its investigations is to improve the safety of railways and tramways, and to prevent further accidents from occurring. RAIB's investigations are entirely independent from those of other agencies and are focused solely on safety improvements. It does not apportion blame or liability nor enforce law or carry out prosecutions.

[47] The RAIB carried out an extensive investigation into the accident which included a review of the data taken from the on-tram event recorder, CCTV recordings from Tram 260 and a Lothian bus on a nearby road, site photographs and measurements, and an expert acoustic report in relation to the audibility of the warning horn and bell of Tram 260.

[48] On the basis of the acoustic tests carried out, the sound pressure levels from the warning bell and horn were found to be below the minimum specifications detailed in both EC Directive 70-388-EC and UN ECE Regulation 28 (the general standard for motor vehicles in force at the time of the accident).

[49] As a result, the RAIB issued an Urgent Safety Advice to ETL on 14 February 2019 in the following terms:

"The warning horn on the Edinburgh Tram fleet does not provide a sound pressure level in line with current industry guidance. Furthermore, it does not generate a greater sound pressure level than the tram bell."

[50] The RAIB published its full report on the circumstances of the accident inJuly 2019. In line with established practice, the participants to the Inquiry were asked to

identify any matter contained within the report with which issue was taken prior to the Inquiry commencing. The only issue identified, by ETL, was the conclusion at paragraph 64 of the report that the poor audibility of the tram's bell "almost certainly" explained why Mr Correa did not respond to it being repeatedly sounded as the tram approached the crossing. The content of the remainder of the report was agreed.

[51] Adopting the approach taken by Sheriff Principals Turnbull and Pyle at previous Inquiries, my assessment of the evidence before this Inquiry, and of the submissions made by the participants, is that there is no credible evidence to suggest that the RAIB investigation into the accident was incomplete, flawed or deficient. This Inquiry had the benefit of hearing evidence from the RAIB lead inspector for the accident, Simon Kay. He gave his evidence in a measured, detailed and professional manner. It is significant to note that his evidence was not challenged. I accept his evidence as credible and reliable. While ETL highlighted other evidence that suggested other possible reasons why Mr Correa might not have responded to the approaching tram, I do not consider that this amounted to a challenge to the RAIB investigation and, in any event, I prefer the evidence given by Mr Kay which was based on a comprehensive investigation into the accident. Accordingly, I am satisfied that there is no basis upon which the RAIB's findings and conclusions should not be adopted in full.

The RAIB Report

[52] The report contained the following conclusions:

"Immediate cause

[Mr Correa] moved into the path of the tram as it approached the crossing. **Causal factors**

- a) [Mr Correa] was seemingly unaware of the approaching tram until he was in its path. This causal factor arose due to a combination of the following:
 - i. [He] did not appear to look out for trams during the time the tram was visible, prior to him stepping onto the crossing; and
 - ii. The tram's bell was not sufficiently audible when it was sounded as a warning.
- b) The driver was unable to stop the tram before it reached the crossing when it became clear that the pedestrian was going to walk onto the crossing.

Underlying factors

- a) During both the tramway's design and operation, the risks associated with the crossing's layout, mutual visibility, tram audibility, line speed and braking distance, had not been adequately assessed;
- b) There was an absence of clear guidance on the audibility requirements for tram warning devices;
- c) The modifications to tram horns at West Midlands Metro did not result in a change to the horns on the Edinburgh trams; and
- d) The project's safety verification process did not robustly capture and manage the issue of tram warning audibility."

[53] I would highlight the following findings from the RAIB report that were relied upon to support these conclusions.

[54] From the CCTV footage available, both from Tram 260 and a nearby Lothian bus,

there is no evidence to indicate that Mr Correa looked towards the approaching tram

before stepping onto the crossing. Consideration was given to the potential for issues

with Mr Correa's eyesight and hearing, unfamiliarity with using the crossing, and any

possible fatigue condition, but the RAIB was satisfied that none of these contributed to the accident. I accept that conclusion.

[55] In terms of mutual visibility at the crossing, airport-bound trams and users of the crossing were only clearly visible to each other when closer than 6 metres from the crossing. At longer distances from the crossing, clear mutual sighting was affected by foliage along the side of the tracks.

[56] In terms of audibility of the warning devices on Tram 260, the acoustic tests carried out demonstrated that the bell was not loud enough to be reliably detected above the background noise level at the crossing. As such, it is likely that Mr Correa only became aware of the presence of the tram when the warning horn was sounded on the application of the tram's emergency brake.

[57] In terms of the design and layout of the crossing, the risks associated with its layout, mutual visibility, tram audibility, line speed and braking distance had not been adequately assessed.

[58] The report also highlighted certain recommendations made by the RAIB following previous investigations that were relevant:

- 1) Accident at Bayles and Wylie's footpath crossing, Nottingham [RAIB report 19/2013]:
 - (i) Recommendation 1 was to review the most effective means of warning persons who may be in the path of a tram. This recommendation had been implemented by the operators of the six tramways operating at the time of the publication of the report. As ETL had not been in the scope of the RAIB at that time, while they had been made aware of the recommendation, no formal reply had been required.

- (ii) Recommendation 2 was to review the marking of the boundary of pedestrian crossings crossed by segregated tramways where trams run at relatively high speeds. Again, while ETL were made aware of this recommendation, no formal reply had been required and ETL were unable to confirm what actions had been taken in the light of that recommendation.
- (iii) Recommendation 3 was for the ORR to amend its guidance on the design of pedestrian crossings crossed by segregated tramways where trams run at relatively high speeds. The ORR had agreed that this guidance would be transferred to UK Tram whom the ORR had expected would review it and bring it into line with best practice. However, when UK Tram issued a guidance document in January 2018, no additional guidance had been included over that contained within RSP2.
- 2) Accident at Sandilands junction, Croydon [RAIB report 18/2017]
 - (a) Recommendation 1 was to improve the management of safety risk in the UK Tram industry by the ORR working with the UK Tram industry to develop a body to enable more effective UK-wide cooperation on matters relating to safety, and the development of common standards and good practice guidance. The LRSSB was subsequently established to implement this recommendation.
- [59] The RAIB made four recommendations in relation to the index accident:
 - 1) To improve the audible warnings provided to pedestrians by trams in Edinburgh, ETL should:
 - (a) increase the audibility of its tram warning horns so that they provide effective warning of approaching trams to pedestrians, in particular at foot crossings on off-street sections of its network. The warning horns should be clearly discernible above the background noise at relevant locations and take into consideration sighting distances and line speeds; and
 - (b) develop/document instructions and brief/train its drivers in relation to which situations drivers are expected to use the horn as an audible warning.
 - 2) To improve the safety of pedestrian crossings on off-street sections where trams run at relatively high speeds, ETL should:

- (a) undertake risk assessments of all of its pedestrian crossings on offstreet sections and identify any necessary control measures. The assessment should include consideration of the crossing layout, sighting distances, line speed, tram braking distances and the audibility of the tram warning horns. Control measures for consideration should include the following safety features:
 - improved demarcation of the crossing; and
 - barriers, chicanes, or similar, to turn pedestrians' direction of travel, just before crossing, to face oncoming trams on the nearest track.
- (b) develop and implement a procedure for monitoring that the control measures identified remain valid.
- 3) To establish improved industry guidance for the audibility of warning horns and bells fitted to current and future UK trams:

LRSSB should develop the guidance for audible warnings devices on both current and future UK trams, so that they provide effective warning of approaching trams. The guidance should define a process so that each tram operator can establish appropriate sound pressure levels and frequencies for warnings that are clearly discernible above background noise and which take into consideration sighting distances, tram braking characteristics and line speeds.

4) To improve current industry guidance for pedestrian level crossings on UK tram systems, by including lessons from this accident and previous similar accidents:

LRSSB should update and improve the current industry guidance for the design, layout and management of off-street pedestrian level crossings on UK tram systems contained in 'Tramway Principles and Guidance' January 2018. The new guidance should consider lessons from this and previous similar tramway accidents. It should as a minimum include guidance on routine risk assessments of crossings, taking into account sighting distances, line speed, tram braking characteristics and the audibility of warning horns.

Criminal proceedings against ETL

[60] Criminal proceedings were initiated against ETL in 2022. These resolved on 24 August 2023 when ETL pled guilty at Edinburgh Sheriff Court to a contravention of the Health and Safety at Work etc. Act 1974, sections 3(1) and 33(1)(a), in the following terms:

- 1) on various occasions between 30 May 2014 and 11 September 2018, both dates inclusive, at a section of tramline at Saughton Tramstop, Edinburgh, and elsewhere you EDINBURGH TRAMS LIMITED being an employer within the meaning of the aftermentioned Act did fail to conduct your undertaking in such a way as to ensure, so far as was reasonably practicable, that persons not in your employment and who may have been affected thereby were not exposed to risks to their health or safety in that you did fail to make a suitable and sufficient assessment of the risks to the health and safety of pedestrians, to which they were exposed whilst in the immediate vicinity of the non-motorised user crossing at said Saughton Tramstop, and in particular you did:
 - (i) fail to carry out a suitable and sufficient risk assessment of the layout of said crossing, and to ensure that the layout of the said crossing provided sufficient notice and warning to pedestrians of the crossing itself;
 - (ii) fail to carry out a suitable and sufficient risk assessment of the audibility of the audible warning devices on trams which may approach said crossing;
 - (iii) fail to carry out a suitable and sufficient risk assessment of the emergency braking distances of trams approaching said crossing, taking account of known hazards, in particular pedestrians in the immediate vicinity of said crossing who may not respond to the sounding of warning bells and warning horns of trams approaching said crossing, and to identify and implement adequate control measures to address said hazard; and
 - (iv) fail to ensure that said risk assessments were regularly and periodically reviewed to ensure that said risk assessments were still valid and in consequence of (i), (iii) and (iv) hereof, on 11 September 2018 Carlos Hernan Correa Palacio, whilst using said crossing, was

struck by a tram, fleet number 260 operated by you, in consequence of which he died of his injuries.

ETL Response to the accident/RAIB recommendations

[61] In December 2018, in conjunction with CEC, ETL removed vegetation which was restricting the clear view of the tram lines to the east of the footpath approaching the Saughton crossing.

- [62] By 26 February 2019 ETL had:
 - (i) commenced work with the tram manufacturer (CAF) to increase the sound pressure level of the tram horns;
 - (ii) issued an urgent operating notice to its drivers to use both the bell and the horn as a warning when the bell alone was not getting the desired response; and
 - (iii) implemented four temporary speed restrictions of a maximum speed of 40 km/h (25 mph) in both directions, covering seven of its footpath crossings where the maximum permitted speed had previously been 70 km/h (44 mph), including the five unprotected crossings.

[63] By 22 April 2019 ETL had implemented a series of risk mitigation measures at the tram crossings. These included the use of ground markings and the installation of timber 'knee rails' (a low fence) on either side of the footpath where it intersected the tramway in order to improve the demarcation of the crossings to pedestrians.

[64] By 3 July 2019 ETL had agreed a delivery programme to implement additional control measures to all of its off-street NMU crossings and by the end of that month had carried out the following improvements:

- (i) modified the horns on all but one of its trams;
- (ii) undertaken background sound measurements at all off-street NMU crossings; and
- (iii) updated its driver training materials regarding the correct use of the tram audible warnings devices.

[65] ETL provided an update to the ORR in relation to the work carried on 11

November 2019 which can be summarised as follows:

[Recommendation 1]

- New horns had been fitted to all trams these horns met the requirements of the applicable guidance;
- The horns were configured for single continuous sound but would be further modified to provide pulsed two tone sound with the aim of increasing the likelihood of a pedestrian to acknowledge the presence of the tram. This modification would be implemented by the end of December 2019.
- Specialist acoustic testing confirmed that the new horns complied with British Standard BS EN 15153-4 and LRSSB LRG 5.0. The tests demonstrated that at the 70km/h emergency braking distance of a tram (90 metres approximately), the horn was likely to be discernible at a level at least three times higher than the background sound pressure level.
- Tram Driver training had been reviewed as follows:
 - On-street areas: due to the close proximity of pedestrians and lower speeds, tram drivers will sound a warning with the bell (the horn being sounded automatically if the emergency brake is applied).
 - Off-street areas: whenever tram drivers identify that there is a person on or approaching the tram infrastructure, they will sound the horn in

the first instance and prepare to stop by entering brake mode. If there is no acknowledgement from the crossing user by the time the tram reaches the crossing warning signage then the driver will apply the emergency brake (with the horn sounded continuously automatically if the emergency brake is applied).

 The off-street signs warning tram drivers that there is a crossing will be positioned at the distance from the crossing that provides a suitable visual indication to the driver that if an unresponsive pedestrian has not acknowledged the presence of a tram or stopped entering the hazard zone, then the driver should apply full emergency brake mode and the unresponsive pedestrian will still have enough time to get from one place of safety to another before a tram using the emergency brake reaches the crossing.

[Recommendation 2]

- A full review of all risk assessments for NMU crossings had been carried out in accordance with LRSSB guidance.
- The revised risk assessments considered the following areas:
 - Number of lines crossed
 - Track geometry
 - Line speeds
 - Average usage
 - Photographs of crossing approaches and surrounding environment
 - Sighting distances and identification of any sighting restrictions and associated recommended action
 - Site specific background sound pressure readings and average horn discernibility level
 - Distance from the crossing of the crossing warning signage dependant on line speed to provide a visual indication to the tram driver when to apply the emergency break if an unresponsive pedestrian has not acknowledged the approaching vehicle despite audible warnings
 - Incident history

[66] On the basis of the comprehensive measures taken, the ORR was satisfied that

ETL had fully implemented the requirements of both Recommendations 1 and 2 and

issued a letter to the RAIB dated 10 December 2019 confirming that position.

[67] The ORR carried out their own inspection of the NMU crossings on the tramway in September/October 2024. As part of this inspection, the ORR assessed the content of the risk assessments for each NMU crossing. The assessments were considered to be suitable and sufficient and consistent with the most recent LRSSB guidance. The ORR also visited all of the NMU crossings accessible by the public both in hours of daylight and darkness. The ORR was satisfied that the various control measures specified in the risk assessments were in place, were being adequately maintained, regularly inspected and that the risks arising at each crossing had been reduced as far as was reasonably practicable.

[68] It is relevant to note that since the accident, there have been no reported incidents involving contact between a pedestrian and a tram at any of the NMU crossings and no reported near-misses.

UK Tram Industry Response to the RAIB recommendations

[69] The LRSSB was established in 2018 as part of the light rail sector's response to the RAIB's earlier report in November 2016 (see paragraph [58] above). It is the central body responsible for coordinating advances in tramway safety and setting recognised industry standards. It works closely with statutory bodies such as the ORR (the industry regulator and enforcing authority for health and safety) to drive continuous safety improvements across the light rail sector. It has responsibility for management of the light rail industry's Guidance and Standards (including the creation of new standards) and the responsibility for the upkeep and maintenance of Tramways Principal Guidance.

[70] The RAIB report into the index accident made two recommendations to the LRSSB as detailed in paragraph [59] above.

[71] In response to the first recommendation, the LRSSB published "LRG 5.0 – Tramways Audible Warning Acoustic Test Guidance" on 1 December 2020. This guidance documents the test procedure based on British Standard EN 15153-4:2019 and is designed to be used by light rail systems and maintainers in order to validate that the light rail system meets the essential requirements as defined in "LRG 1.0 Tramway Principles & Guidance" (formerly RSP2). This guidance is regularly updated with the most recent review taking place on 14 May 2024.

[72] In response to the second recommendation, the LRSSB published "LRG 2.0 – Guidance on Tramway Crossings for Non-Motorised Users" on 2 July 2021. This guidance is for the design and ongoing assessment of all formalised crossings of tramways at a grade which will be utilised by crossing users (NMUs). It provides comprehensive guidance for the safe design, risk assessment and maintenance of crossings. Again, this guidance is regularly updated with the most recent review taking place on 8 May 2024.

[73] The ORR are responsible for ensuring that any recommendations made by the RAIB to Operators or Industry Bodies are implemented. In relation to the recommendations directed to the LRSSB, the ORR wrote to the RAIB on 10 December 2019 confirming that it was satisfied that the LRSSB had fully implemented those recommendations.

Submissions

[74] All parties lodged written submissions supplemented by oral submissions on
 24 April 2025. The Crown directed the court to the Notices to Admit, the Joint Minute of
 Agreement and the accompanying statements and productions.

[75] The background to, and mechanism of, the accident which resulted in Mr Correa's death were not in dispute.

[76] In terms of the cause of the accident, there was no dispute that the immediate cause was that Mr Correa moved into the path of the tram as it approached the crossing. The Crown highlighted the underlying causes identified by the RAIB in its report, namely that Mr Correa appeared to be unaware of the approaching tram until he was in its path and that the tram driver was unable to stop the tram before it reached the crossing when it became clear that the pedestrian was going to walk onto the crossing. While the Crown did not formally adopt the RAIB's additional finding that the audibility of the tram's warning devices was a causal factor, it recognised that it was a matter for the court to draw such conclusions as it thought fit. ETL invited the court to reject this finding. I will return to this point below.

[77] In terms of precautions which could reasonably have been taken and, if taken, which might have prevented the accident being avoided (section 26(2)(e)), the Crown highlighted the absence of location-specific risk assessments for the crossing which, had

they been completed in accordance with the applicable guidance, would have identified the need to implement a variety of measures to adequately control the risks where pedestrians used NMUs in off-street areas of the tramway and trams ran at relatively high speeds. These risks arose from the following issues:

- (i) The design and layout of the crossing
- (ii) Mutual visibility of tram/crossing user
- (iii) Audibility of tram warning devices
- (iv) Line speed and braking distance

[78] ETL accepted that there were a number of precautions that could reasonably have been taken which might reasonably have resulted in the accident being avoided. In doing so, ETL highlighted the multiple failures in respect of its risk assessment process that it had accepted in relation to the criminal proceedings. However, ETL challenged the inclusion of the mutual visibility issue as a reasonable precaution. This is discussed in more detail below.

[79] Turning to any defects in the system of working (section 26(2)(f)), the Crown invited the court to consider making a finding that ETL had failed to carry out any location-specific risk assessments on its NMU crossings and thereafter regularly review those assessments, with the result that the risks arising from each crossing were not appropriately managed. ETL accepted such a finding.

[80] In relation to other relevant facts (section 26(2)(g)), the Crown invited the court to consider the wider issue of guidance and information sharing within the tram industry, albeit no formal finding was sought.

[81] Finally, in relation to recommendations (section 26(1)(b)), the Crown did not invite the court to make any formal recommendations standing the detailed recommendations made by the RAIB following its investigation and the subsequent comprehensive and wide-ranging changes made by both ETL and the wider tram industry to implement those recommendations. This position was adopted by the other participants in the Inquiry.

Discussion and conclusions

Section 26(2)(a) of the 2016 Act (when and where the death occurred)

[82] It was a matter of agreement that Mr Correa died at approximately 1244 hours on 11 September 2018 at the NMU crossing of the Edinburgh tramline at a point between the Balgreen and Saughton tram stops, near to Stenhouse Drive, Edinburgh.

Section 26(2)(b) of the 2016 Act (when and where any accident resulting in death occurred)

[83] It was a matter of agreement that the accident resulting in the death of Mr Correa occurred at approximately 1210 hours on 11 September 2018 when he was struck by Tram 260 at the NMU crossing detailed above.

Section 26(2)(c) of the 2016 Act (the cause or causes of death)

[84] It was a matter of agreement that Mr Correa died of head trauma due to a collision with Tram 260.

Section 26(2)(d) of the 2016 Act (the cause or causes of any accident resulting in death)

[85] The immediate cause of the accident was not disputed. Mr Correa moved directly into the path of Tram 260 when it was about 18 metres away from the crossing.

[86] However, as per the RAIB report (paragraph [52] above), the accident occurred due to a combination of the following two causal factors:

- Mr Correa was seemingly unaware of the approaching tram until he was in its path; and
- (ii) the driver of the tram was unable to stop the tram before it reached the crossing when it became clear that the pedestrian was going to walk onto the crossing.

[87] In terms of Mr Correa's lack of awareness of the approaching tram, I am satisfied from the evidence available, with particular reference to the CCTV footage taken from the tram, that Mr Correa did not look towards the approaching tram prior to stepping onto the crossing.

[88] In relation to the audibility of the tram's warning devices, I accept the finding in the RAIB report that the tram's bell was not sufficiently audible when it was sounded as a warning. The bell had been repeatedly sounded by the driver as the tram approached the crossing without producing any visible response from Mr Correa. It was only when the warning horn was sounded as a result of the application of the emergency brake that Mr Correa could be seen to respond. Specialist acoustic testing was carried out following the accident to investigate the audibility of the bell as the tram approached the crossing. The tests involved taking measurements at the crossing while the tram sounded its bell and horn at different distances from the crossing. These distances included the points at which the driver had sounded his bell on the day of the accident, namely between 53 metres and 26 metres from the crossing. These tests clearly demonstrated that the bell was not sufficiently loud to be reliably detected above the background noise level at the crossing at distances of greater than 20 metres. The warning horn was sounded when the tram was 18 metres from the crossing by which point it was too late to avoid a collision. It was only at that point that Mr Correa became aware of the presence of the tram. As such, I am satisfied that it is more likely than not that the tram's bell was not sufficiently audible to Mr Correa when it was sounded as a warning as the tram approached the crossing.

[89] In relation to the driver being unable to stop the tram before it reached the crossing, the tram was travelling at between 61 km/h and 66 km/h at the time the driver first saw Mr Correa. This was below the maximum permitted speed for that section of the line (70 km/h). The driver was 73 metres from the crossing and Mr Correa was approaching the crossing at that time. The driver sounded his bell several times on his approach to the crossing before he applied the emergency brake. It is relevant to note that had the driver applied full service braking at a distance of 73 metres when travelling at 66 km/h, the tram would not have been able to stop before it reached the crossing. However, it would have passed over the crossing more slowly and would also have given Mr Correa more time to react to the tram's approach. The tram's emergency braking distance at a speed of 70 km/h was measured to be 54 metres. While this

indicates that the tram could have stopped before the crossing if the driver had applied the emergency brake when he first saw Mr Correa, I accept the evidence that it is not practical to drive trams using the emergency brake every time a pedestrian approaches a crossing. There is therefore no criticism of the actions taken by the driver in the circumstances leading to the accident.

Section 26(2)(e) of the 2016 Act (any precautions which (i) could reasonably have been taken, and (ii) had they been taken, might realistically have resulted in death, or any accident resulting in death, being avoided)

[90] The task of this Inquiry is to consider, with the wisdom of hindsight, whether there were any precautions which could reasonably have been taken which might realistically have resulted in the accident being avoided. It is well established that a precaution might realistically have resulted in the accident being avoided if there was a real or lively possibility that it might have done so.

[91] In the present case, the majority of the evidence was either agreed or undisputed and a significant proportion of the court's findings are based on that evidence. The main issues which emerged from the evidence presented at the Inquiry were the consequences of ETL's failure to adequately assess the risks for the crossing with a particular focus on the following:

- 1) The design and layout of the crossing
- 2) Mutual visibility of tram/crossing user
- 3) Audibility of the tram warning devices

4) Line speed and braking distance

[92] There was no dispute that there were a number of precautions which could reasonably have been taken which might realistically have avoided the accident that resulted in Mr Correa's death. The bedrock for identifying those precautions should have been ETL's risk assessment process and the specific measures that could reasonably have been taken would have been identified by carrying out:

- a suitable and sufficient risk assessment of the layout of the crossing to ensure that it provided sufficient notice and warning to pedestrians of the crossing itself;
- a suitable and sufficient risk assessment of the audibility of tram warning devices;
- 3) a suitable and sufficient risk assessment of the emergency braking distances of its trams, taking account of known hazards, in particular pedestrians in the immediate vicinity of crossings who may not respond to the sounding of warning bells and warning horns of approaching trams and to identify and implement adequate control measures to address such hazards; and
- ensuring that said risk assessments were regularly and periodically reviewed to ensure that they were still valid in September 2018.

[93] ETL highlighted in its submission that responsibility for management of the risk assessment process relative to NMU crossings prior to the accident lay with its Safety and Standards Manager, whose employment was terminated shortly after the conclusion of the investigation into the accident. At the same time, ETL properly

accepted that had there been a greater degree of oversight of the conduct of the said manager, the extensive failures to carry out suitable risk assessments would have been identified and addressed prior to the accident. I would reiterate that the purpose of an Inquiry is not to determine fault or to apportion blame to any particular individual. I should therefore make it clear that the failings attributed to, and accepted by ETL for the purposes of this Inquiry, were at an organisational level. This is consistent with ETL's guilty plea in respect of the criminal proceedings as detailed at paragraph [60] above. [94] Focusing specifically on the design and layout of the crossing, the guidance available in RSP2 detailed at paragraph [40] above provided that fencing or pedestrian guard rails should be provided where necessary to guide pedestrians to face oncoming trams before they cross the track. No such fencing or guard rails were provided at the crossing.

[95] The further guidance published by UK Tram in 2018 detailed how the safe management of pedestrians at crossings should be approached (detailed in paragraph [45] above) with measures including the provision and delineation of crossings, signage, active deterrents such as barriers and passive deterrents such as marking the tramway path. ETL failed to carry out a review of its crossings prior to the accident to ensure they met the standards set out in this guidance.

[96] Additionally ETL was made aware of the RAIB recommendation contained in its 2013 report, namely that tram operators should review the marking of the boundary of pedestrian crossings where trams ran at relatively high speed (see paragraph [58]

above). While ETL was not formally under the remit of the RAIB at that time, there was no evidence that ETL took any action in relation to its NMU crossings.

[97] While it is acknowledged that the previous incidents detailed at paragraphs [37] to [39] above were investigated by ETL at the time, I consider the fact they did not prompt any review of the risk assessments for the crossings involved was a significant missed opportunity and underlines the extent of the failures accepted by ETL.

[98] In relation to the issue of mutual visibility, the Crown referred to the images contained within the RAIB report which showed the view available to Mr Correa on his approach to the crossing and relied upon the finding that there was reduced visibility due to the presence of shrubs beside the footpath and two trees adjacent to the tram lines. In response, ETL highlighted the evidence that a visibility splay check of all NMU crossings, including the crossing at Saughton Mains, had been carried out in September 2017. The methodology applied at that time has since been incorporated into the guidance published by the LRSSB (LRG 2.0 – Guidance of Tramway Crossings for NMUs) and it was considered that there was an acceptable visibility splay provided on both sides of the crossing. The same ETL employee was also present at the time of the RAIB site visit following the accident and remained of the view that there was an acceptable visibility splay. While additional foliage was subsequently removed along the side of the track following the accident, that action had been taken through an abundance of caution. The foliage in question had been located several metres back from the track.

[99] Taking the evidence that visibility splay checks had been carried out both prior to and following the accident in line with the methodology that now forms part of the accepted industry guidance together with the evidence of Mr Correa's movements prior to the accident, I accept ETL's submission that any removal of foliage in the vicinity of the Saughton Mains crossing prior to the accident was not a precaution which could reasonably have been taken which might realistically have resulted in the accident being avoided.

[100] Turning to the audibility of the tram warning devices, the applicable guidance is detailed at paragraphs [40] to [45] above. On the basis of the acoustic tests carried out, the sound pressure levels from both the warning bell and horn were found to be below the minimum specifications detailed in both EC Directive 70-388-EC and UN ECE Regulation 28. As a result, the RAIB issued the Urgent Safety Advice to ETL on 14 February 2019 detailed at paragraph [49] above.

[101] During tram testing in 2013, issues were raised in relation to the audibility of the tram warning devices in that track workers were not reacting to the sounding of the tram bell. Following acoustic tests carried out at the tram depot, the tram horn was found to emit a lower sound than the bell. However, on the basis that it was found to be comparable to the horn of a Lothian bus, it was deemed to be adequate. An assurance was also provided by CAF that the audible warning devices were used elsewhere in Spain and Turkey without issue. However CAF did not advise ETL that trams provided to West Midlands Metro in 2014 had a modified audible warning system fitted to improve the audibility levels.

[102] As a result of the 2013 testing, drivers were instructed to use the bell as the primary mode of warning in off-street areas in recognition of the poorer audibility of the horn. This was contrary to the guidance in RSP2 in relation to the recommended use of the bell and the horn.

[103] ETL accepted that the audibility of the tram's warning devices and, in particular, that of the tram's horn, could have been increased prior to the accident. In so doing, I accept ETL's submission that (i) it had received an assurance from CAF regarding the suitability of the warning devices and (ii) industry guidance on the audibility requirements for such devices was sub-optimal insofar as there was no singular definitive guidance document in that regard. Indeed, the latter issue led the RAIB to make a recommendation to the LRSSB to provide such a guidance document. That said, I accept the Crown submission that there was still sufficient guidance of suitable clarity available to ETL prior to the accident through a combination of the relevant sections of RSP2, TTGN6 and UN-ECE R28 for it to have identified the issue with the audibility of the tram warning devices and taken appropriate steps to increase audibility and also use the warning horn as the primary mode of warning on off-street areas.

[104] Finally, in relation to line speed and braking distances, as detailed in paragraph [89] above, the tram could only have been stopped before the crossing if the driver had applied the emergency brake when he first saw Mr Correa. I accept the Crown submission that it is not practical to drive trams using the emergency brake every time a pedestrian approaches a crossing and, as such, it would not have been reasonable to take such a precaution. [105] However, ETL agreed that another precaution that could reasonably have been taken in this regard was to have introduced additional warning signs to drivers to brake to address the hazard of the unresponsive pedestrian (as per RAIB recommendation 1(b) detailed at paragraph [59] above). This would have consisted of signage placed on the tramway to alert drivers to the final point at which emergency braking would bring the tram to a stop prior to reaching the mid-point of an NMU crossing.

[106] In this regard, I accept ETL's submission that while such steps could reasonably have been taken prior to the accident, this signage was innovative and, prior to its introduction by ETL, had not been implemented in any other part of the light rail sector.
[107] Taking all of this together, I am therefore satisfied that the following precautions could reasonably have been taken that might realistically have resulted in the accident being avoided:

- 1) ETL could reasonably have carried out the following risk assessments:
 - (a) a suitable and sufficient risk assessment of the layout of the crossing to ensure that it provided sufficient notice and warning to pedestrians of the crossing itself;
 - (b) a suitable and sufficient risk assessment of the audibility of tram warning devices;
 - (c) a suitable and sufficient risk assessment of the emergency braking distances of its trams, taking account of known hazards, in particular pedestrians in the immediate vicinity of crossings who may not respond to the sounding of warning bells and warning horns of

approaching trams and to identify and implement adequate control measures to address such hazards; and

- (d) ensuring that said risk assessments were regularly and periodically reviewed to ensure that they were still valid in September 2018.
- Such risk assessments would, in turn, have identified the following measures that could reasonably have been taken:
 - (a) Design and layout of the crossing

The NMU crossing could have been designed in such a way to ensure that a pedestrian was adequately warned that they were entering an area of higher risk. The following measures could have been taken:

- Delineation/demarcation of the crossing by marking out the higher risk area in a colour to alert the pedestrian and make it clear that the crossing was not a continuous path.
- Signage placed on the ground alerting pedestrians who may have been looking down to the fact they were entering an area of higher risk and to look both ways.
- Bollards, chicanes, fencing or pedestrian guard rails installed to slow the pedestrian down and guide them to face oncoming trams before they crossed the track.
- (b) Audible warning devices

ETL could have taken steps to increase the audibility of the tram warning devices, in particular that of the horn, and thereafter used the warning horn

as the primary mode of warning in off-street areas, as envisaged by the applicable industry guidance. Had the warning horn been sufficiently audible above the background noise and been used in the off-street area, it might realistically have alerted Mr Correa at the point of first sighting at 73 metres from the crossing. This would have allowed him sufficient time to react and step out of the path of the tram.

(c) Line speed and braking distances

Additional warning signs to tram drivers to brake could have been introduced to address the hazard of the unresponsive pedestrian. Such signage could have been placed on the tramway to alert drivers to the final point at which emergency braking would bring the tram to a stop prior to reaching the mid-point of an NMU crossing.

Section 26(2)(f) of the 2016 Act (any defects in any system of working which contributed to the death or the accident resulting in death)

[108] The court's determination must set out any defects in any system of working which contributed to the death or any accident resulting in death.

[109] ETL accepted that it failed to have in place a system of work which ensured that a suitable and sufficient risk assessment of the NMU crossing at Saughton Mains was undertaken prior to Edinburgh trams commencing operations on 30 May 2014 and, thereafter, regularly and periodically reviewed to ensure that it remained valid. [110] For the reasons detailed at paragraphs [88] and [100] to [103] above, I consider that this failure also included the failure to carry out a suitable and sufficient risk assessment of the audibility of the tram warning devices.

[111] The result of these failings was that the risks arising both at the crossing and from the audibility issues relating to the tram warning devices were not appropriately identified and controlled. These failings amounted to a defect in the system of work which contributed to the accident which resulted in Mr Correa's death.

Section 26(2)(g) of the 2016 Act (any other facts which are relevant to the circumstances of the death)

[112] The Crown invited the court to consider the wider issues of the effective sharing of safety information and the development of common approaches to the management of risk within the UK tram industry. It was not disputed that these issues had caused concern prior to the accident as demonstrated by recommendations made by the RAIB in previous reports (see paragraph [58] above).

[113] In its 2013 report, the RAIB recommended that the ORR should amend its guidance on the design of pedestrian crossings. However, by the time of the index accident, neither the ORR or UK Tram had issued the additional guidance sought.

[114] In its 2017 report, the RAIB recommended that the ORR, working with the UK tram industry, should develop a body to enable more effective UK-wide cooperation on matters such as safety and the development of common standards and good practice guidance. This recommendation led to the establishment of the LRSSB in 2018.

[115] The Inquiry also heard that despite changes being made in 2014 to the specification for audible warning devices on trams supplied to West Midlands Metro to improve their audibility, there was no evidence that such safety-related information had been formally shared between UK tram operators prior to the index accident.

[116] As detailed at paragraph [69] above, the LRSSB has been the central body responsible for coordinating advances in tramway safety and setting recognised industry standards since 2018. It works closely with the ORR to drive continuous safety improvements across the light rail sector. It has responsibility for management of the light rail industry's Guidance and Standards (including the creation of new standards) and the responsibility for the upkeep and maintenance of Tramways Principal Guidance.

[117] As per the evidence of Dominic Long, the principal inspector at the ORR, where recommendations are made by the RAIB following an investigation, the ORR and the LRSSB will collaborate in relation to their implementation. The LRSSB will produce any appropriate industry guidance documentation for review by the ORR. Provided the ORR are satisfied that the guidance meets the recommendation, the RAIB are updated and the recommendations implemented accordingly across the industry.

[118] Mr Long confirmed that since the inception of the LRSSB, information-sharing and the manner in which tram operators interact with each other has improved. By way of example, he highlighted the LRSSB Tram Accident Incident Reporting database to which all tram operators have access. It logs hazardous events from across the UK to assist operators in managing health and safety priorities.

[119] He also referred to the Memorandum of Understanding agreed between the ORR and the LRSSB in November 2023. This provides a framework for information-sharing which in turn promotes effective communication amongst tram operators to support health and safety in the light rail sector. In particular, where the RAIB has directed certain recommendations to specified organisations, those organisations then require to satisfy the ORR that the recommendations have been implemented so far as reasonably practicable before the ORR, as the industry regulator, will update the RAIB that it is satisfied in that regard.

[120] The oversight of health and safety on tramways is dealt with by a specialist team of ORR inspectors, led by a principal inspector, as part of the ORR's Rail Safety Directorate. They provide advice and guidance on health and safety matters, undertake proactive inspections and respond to incidents and complaints. The ORR also enforces relevant health and safety legislation.

[121] Since 2019, the ORR has monitored how effectively the LRSSB has established itself as a safety and standards body. The ORR conducted a review of the LRSSB's progress in its third year of operation. The ORR's review concluded in its Findings Report dated 28 March 2022 that the LRSSB has been effective by "adding value to the sector by bringing structure to the tram sector's understanding of risk and associated controls".

[122] Finally, as detailed in paragraphs [71] and [72] above, since its inception, the LRSSB has introduced the following industry guidance documents:

- LRG 5.0 Tramways Audible Warning Acoustic Test Guidance (1 December 2020)
- 4) LRG 1.0 Tramway Principles and Guidance (formerly RSP2)
- LRG 2.0 Guidance on Tramway Crossings for Non-Motorised Users (2 July 2021)

[123] It is generally accepted by the tram industry that compliance with this comprehensive guidance will ensure that an operator is complying with its legal requirements and following best industry practice.

[124] Standing these significant improvements, I am satisfied that the issues identified by the Crown have been appropriately addressed. There is a far more comprehensive suite of guidance documentation available to the tram industry now than existed prior to the accident. This is underpinned and strengthened by the close cooperation between the ORR and the LRSSB which facilitates the sharing of information and the implementation of best practice, with particular regard to safety, across the industry in a far more coherent and cohesive manner than previously existed.

Recommendations

Section 26(1)(b) of the 2016 Act (recommendations (if any) as to (a) the taking of reasonable precautions, (b) the making of improvements to any system of working, (c)

the introduction of a system of working, (d) the taking of any other steps, which might realistically prevent other deaths in similar circumstances)

[125] On the basis of the evidence before the Inquiry, I do not consider that any recommendations fall to be made. The accident was fully investigated by the RAIB. It made what it regarded as appropriate safety recommendations in relation to both ETL and the wider UK tram industry. These are detailed at paragraph [59] above. I am satisfied that these comprehensive and wide-ranging recommendations have been fully implemented and have led to significant improvements both at ETL and within the UK tram industry more broadly. I have summarised the steps taken in this regard at paragraphs [61] to [73] above. An image showing the current configuration of the crossing in question is also produced at Appendix I.

[126] I am further satisfied that all of the measures taken since this accident adequately address the concerns identified during the investigation and subsequently raised at this Inquiry. The fact that there have been no reported collisions or near-misses involving trams and pedestrians at NMU crossings on the Edinburgh tramway since these measures have been implemented fortifies this conclusion.

Postscript

[127] At the outset of the inquiry I extended my condolences to Mr Correa's family. I wish to formally repeat my condolences to Mr Correa's family in this Determination.

Appendix I – Images of the NMU crossing at Saughton



At time of the accident on 11 September 2018

Figure 3: The approach to the footpath crossing looking north



The current layout