Statens haverikommission

Tram accident at Avenyn, Gothenburg

The Swedish Accident Investigation Authority has investigated a tram accident in Gothenburg, Västra Götalands county, on 20 june 2025

2026-05-12

Final report

SHK 2026:06e

About the Swedish Accident Investigation Authority

The Swedish Accident Investigation Authority (SHK) investigates accidents and incidents from a safety perspective regardless of whether they occurred on land, at sea or in the air. The authority's accident investigations are intended to disseminate knowledge and provide a basis for actions by authorities, companies, organizations, and individuals that improve safety and reduce the risk of accidents. The activities should also contribute to people feeling secure and having trust in society's institutions and the confidence in transportation systems. The mission also includes assessing the efforts made by the rescue services in connection with an accident. However, the investigations should not assign blame or liability, whether criminally, civilly, or administratively.

The investigations by SHK aim to answer three questions:

- What happened?
- Why did it happen?
- How can a similar accident/incident be avoided in the future?

The report is also available on the Swedish Accident Investigation Authority's website: www.shk.se.

ISSN 1400–5743

File number: J-9/25

Content

1. Summary

During the night leading up to Midsummer's Eve, on 20 June 2025, a tram departed from Vasaplatsen tram stop in central Gothenburg. Shortly afterwards, the driver became unable to control the vehicle. The tram accelerated along Vasagatan to maximum speed, derailed on a curve shortly after the Valand stop, and collided with a restaurant in which four people were present. There were ten passengers and a driver on board the tram. In total, eight people were injured, three of them seriously. The tram and the restaurant building suffered extensive damage.

Causes of the accident

The immediate cause of the accident was that the tram was travelling at excessive speed through a curve, which resulted in the tram derailing. The excessive speed occurred because the master controller remained in the power position and the driver's safety device remained activated, even though the driver had suffered a severe impairment of consciousness.

The tram operator, Göteborgs Spårvägar, has not adequately addressed the risk that the tram's safety functions would fail to stop the vehicle if the driver was suddenly to suffer an impairment of consciousness.

There are currently no other technical systems for monitoring driver vigilance, nor are there any speed-supervision systems capable of intervening in the event that a speed limit is exceeded.

Safety recommendations

The Swedish Transport Agency is recommended to:

- undertake a targeted supervision of how tramway operators and infrastructure managers manage overlapping risks in tramway operations, with particular focus on overspeed and the monitoring of driver alertness (see section 4.3.3).
  (SHK 2026:06 R1)

- review how the approval process can be developed, with particular regard to human-machine–interaction and experience gained from past occurrences, with the aim to improve the safety of tram operations in Sweden (see section 4.3.4).
  (SHK 2026:06 R2)

The City of Gothenburg's Urban Environment Administration is recommended to:

- carry out a review of how speed monitoring systems can be integrated with driver monitoring systems. (see section 4.3.2). *(SHK 2026:06 R3)*

Region Västra Götaland is recommended to:

- review the case management of the accident, and take the actions necessary to ensure that the future management of drivers in similar circumstances is appropriate. (see section 4.4). *(SHK 2026:06 R4)*

2. The Investigation

The Swedish Accident Investigation Authority (SHK) was informed on 20 June 2025 that an accident involving a tram had occurred at the junction of Vasagatan and Kungsportsavenyen in Gothenburg, Västra Götalands County the same day.

On 24 June 2025, SHK decided to investigate the accident on the grounds that it was a serious derailment involving a tram colliding with a restaurant, which resulted in several serious injuries. The circumstances of the accident were also considered to be of potential importance for safety.

The accident has been investigated by SHK represented by Anna Stenberg, Chairperson, Lars Dahlin, Investigator in Charge, Mikael Hillbo, Technical Investigator, Alexander Hurtig, Investigator Behavioural Science, and Marit Lindberg, Investigator Healthcare.

The investigation was followed by Katarina Bjurman of the Swedish Transport Agency and by Mattias Gramsby of the Swedish Work Environment Authority.

Investigation material

SHK has examined and documented the accident site. It has carried out a technical examination of the tram and reviewed data from the tram's recording equipment, CCTV from the Police Authority and images from the tram's on-board security cameras. SHK has also undertaken examinations of other tram types in Gothenburg and Stockholm.

Interviews have been conducted with the tram driver, witnesses and persons injured in connection with the accident, as well as ambulance staff and medical practitioners. SHK has also held meetings with Göteborgs Spårvägar AB, the Swedish Transport Agency, Region Västra Götaland, Health and Social Care Inspectorate (IVO) and the accident investigation authorities in Norway (Statens havarikommisjon) and Finland (Onnettomuustutkinta-keskus/Olycksutredningscentralen), and with the UK Light Rail Safety and Standards Board (LRSSB).

SHK has also reviewed documentation supplied by Göteborgs Spårvägar, the City of Gothenburg's Urban Environment Administration, Västtrafik, the Swedish Transport Agency, Region Västra Götaland and the (LRSSB).

Information from interviews and meetings, together with facts and data from the collected documentation, has been incorporated into this report.

A meeting with the interested parties was held in Gothenburg on 5 November 2025. At the meeting SHK presented the facts discovered during the investigation, available at the time.

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Type of occurrence	Tramway accident
Date and time:	At 00:47 hrs on 20 June 2025
Location:	Junction Vasagatan/Kungsportsavenyen i Göteborg
Type of line:	Street-running track
Infrastructure manager:	The City of Gothenburg’s Urban Environment Administration
Tram operator:	Göteborgs Spårvägar AB
Vehicle owner:	The city of Gothenburg
Special traffic control arrangements:	Göteborgs Spårvägar AB
Tram vehicle:	Tram type M31 nr 379
Speed at the time of the derailment:	61 km/h
Maximum permitted speed for the track:	50 km/h speed limit on Vasagatan 20 km/h speed limit on tram stop (and a mandatory stop at Valand tram stop) 15 km/h over points 352 and the subsequent curve
Weather:	Night, dry, clear, 12 °C
Personal injuries:	Three people were seriously injured and five sustained minor injuries
Damage to tram infrastructure:	Minor damage to infrastructure
Damage to tram vehicles:	Damage mainly to the front part of the tram
Other damage:	Extensive damage was incurred on a restaurant that the tram ran into

3. Factual information

3.1 Background

The accident occurred at the junction of Vasagatan and Kungsportsavenyen (Avenyn). At this location there was a restaurant, Sannegården Kebab, with an associated outdoor seating area. At the time of the accident, the outdoor seating area was empty. One member of staff was in the kitchen, two customers were standing at a serving hatch outside the restaurant and three customers were seated inside the restaurant (see figure 1).

Figure 1. The restaurant before the accident. The image on the left shows the serving hatch and the kitchen. The image on the right shows the serving area where the three customers were located. Source: Sannegården Kebab.

Tram 379, on route 3, was running to time and was heading towards Gothenburg Central Station. It was scheduled to be taken out of service at Ullevi Norra tram stop and then driven into the depot at Rantorget.

Tram 379 is an M31 tram type comprising three sections: the A section with the driving cab, followed by the low-floor C section to facilitate boarding and alighting, and the trailing B section (see figure 2).

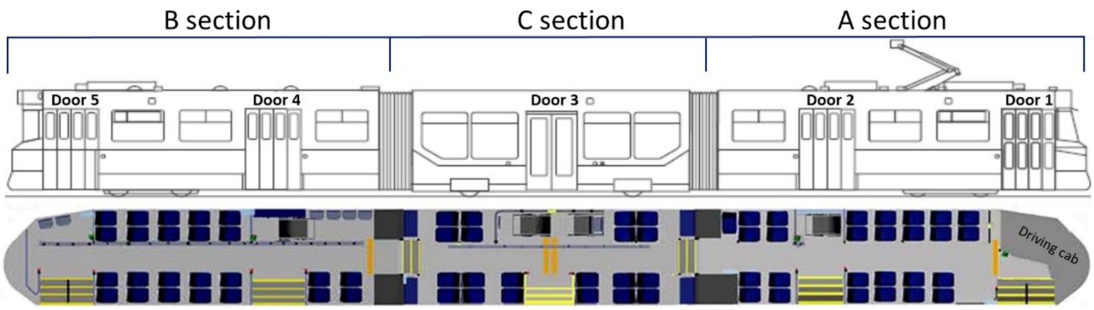


Figure 2. Sketch of the M31 tram type. Annotations added by SHK. Source: Göteborgs Spårvägar and Västtrafik.

The tram was being driven by a qualified tram driver (hereafter referred to as ‘the driver’) employed by Göteborgs Spårvägar. There were ten passengers on board, all seated or standing in the two leading sections, the A and C sections.

3.2 Sequence of events

During the night leading up to Midsummer's Eve, at 00:46 hrs on 20 June 2025, tram 379 stopped at Vasaplatsen tram stop for passengers to alight and board. Four passengers alighted and one boarded. The doors were then closed and the driver began the journey towards the next stop, Valand.

Shortly after tram 379 departed from Vasaplatsen tram stop, the driver became unable to control the vehicle. The tram continued to accelerate along Vasagatan.

One passenger was standing by the doors in the C section, and the remaining passengers were seated.

As the tram passed Chalmersgatan, its recorded speed was 61 km/h. A taxi was travelling slowly in front of the tram and turned right into Teatergatan immediately before the tram passed it (see figure 3). At this point, the tram's recorded speed was 64 km/h.

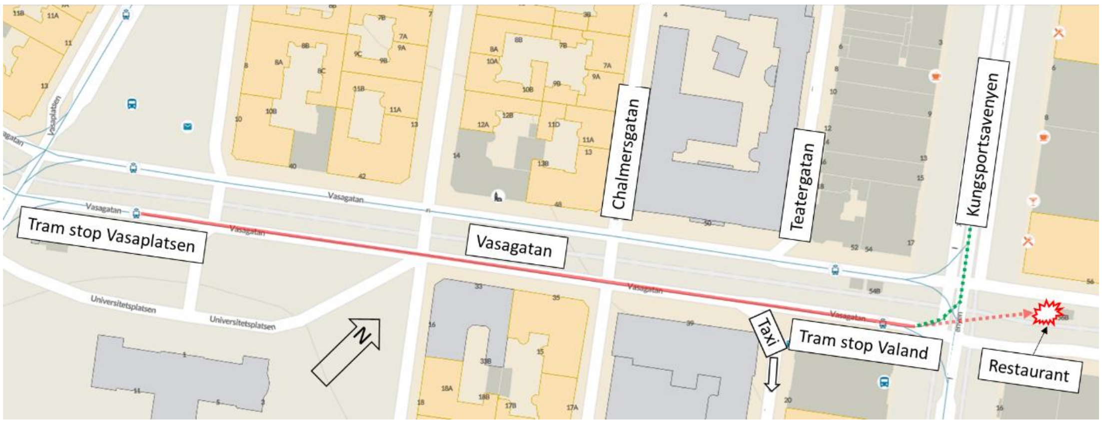


Figure 3. The tram's route along Vasagatan from Vasaplatsen tram stop to Valand, the derailment on the curve onto Avenyn and the collision with the restaurant. The green line shows the intended path of the tram. Annotations added by SHK. Source: Hitta.se.

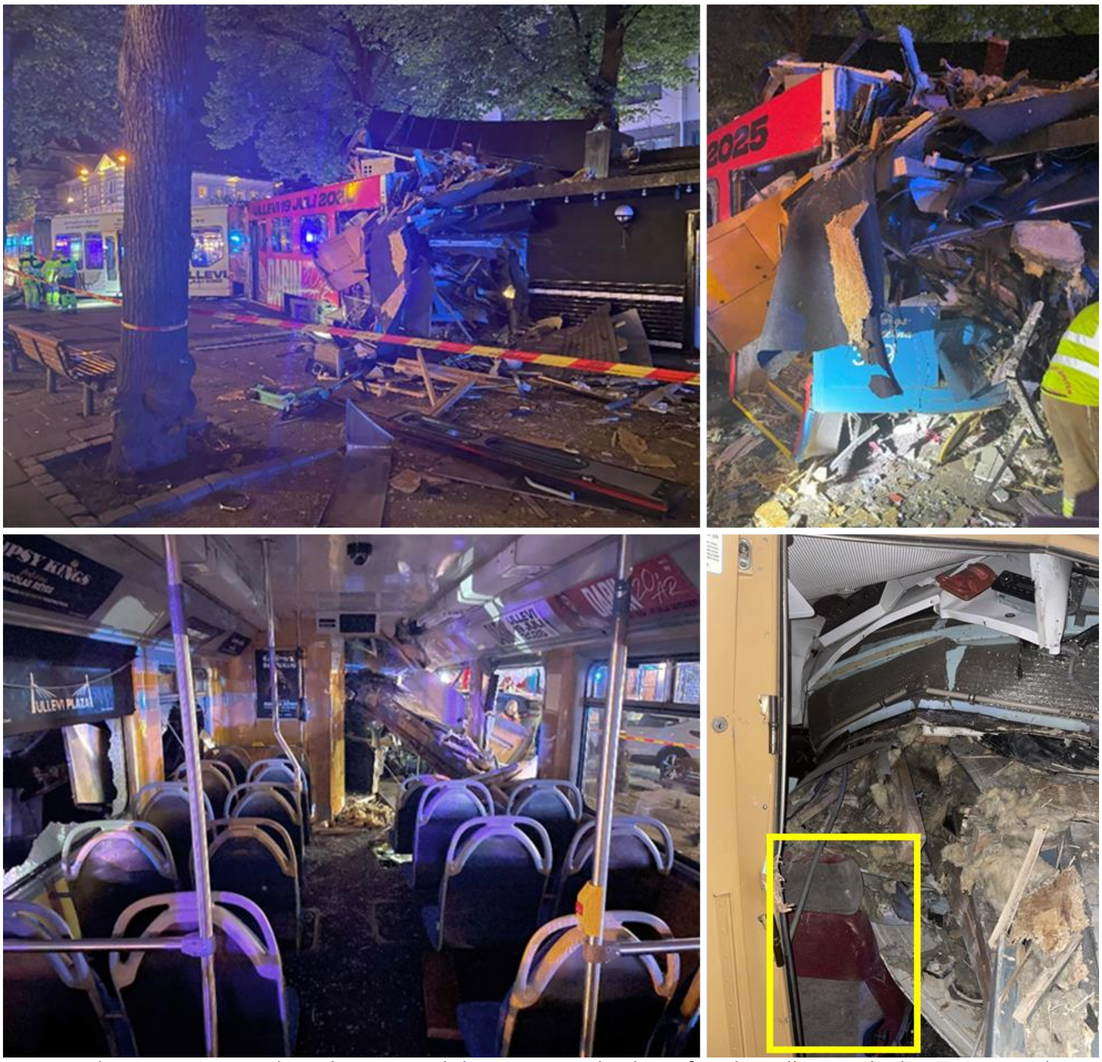
The tram passed Valand tram stop without stopping and continued into a set of points which was in the left-hand position, out onto Avenyn and then north towards Kungsportsplatsen. The A section of the tram initially followed the rail leading into the left-hand curve, resulting in a high lateral force that threw the passengers and the driver to the right. Subsequently, the wheel flanges were unable to follow the curve, instead climbing over the rails and derailing.

The derailed tram continued diagonally across Avenyn towards Sannegården Kebab restaurant, which was located in the middle of the continuation of Vasagatan.

A pedestrian noticed the tram and managed to step aside at the last moment. Two people standing outside the restaurant at a serving hatch also had just enough time to move back before the tram struck the restaurant's kitchen at 00:47:48 hrs.

There was one member of the staff in the kitchen at the time. In an extension of the building, which was not directly struck by the tram, there was a seating area with tables where three customers were present.

Timber studs, insulation and other building materials were forced into the tram's driving cab and passenger saloon (see figure 4).



Figur 4. The upper images show the tram and the restaurant kitchen after the collision. The lower images show the front of the driving cab filled with building materials, and how building materials were forced past the cab into the passenger saloon. The yellow frame marks the driver's seat (see figure 9 for a comparison of driver's workstations). Source: Göteborgs Spårvägar.

3.3 Evacuation of the tram

Several people witnessed the accident and alerted the emergency services. The first emergency call was received at 00:48:12 hrs.

Members of the public who had witnessed the accident quickly arrived at the scene and began assisting with the evacuation of the tram and the restaurant.

The third set of doors on the tram (in the C section) was released using the emergency override immediately after the accident. After two passengers had evacuated, the doors closed automatically. Passengers inside the tram then attempted, unsuccessfully, to reopen the doors. While passengers and members of the public outside the tram were trying to open the doors in the C section, passengers evacuated via the second set of doors in the A section (see figure 2).

After about 40 seconds, the passengers succeeded in using the emergency override to open the third set of doors, and all passengers had evacuated the tram by 00:48:52 hrs, just over one minute after the collision.

During the evacuation, no attempt was made to contact the driver, as the driving cab had been very severely damaged. Shortly afterwards, however, sounds were heard from inside the cab. Members of the public attempted to open the first set of doors from the outside, while others entered through the second set of doors. Once the first set of doors had been opened, they began to remove debris that had fallen onto the floor and on top of the driver.

After just over three minutes, sufficient debris had been cleared for the driver to be pulled out of the cab. With the support of two people, the driver was able to make his way to a nearby park bench.

3.4 Rescue operation

When the first emergency service unit arrived on scene at 00:54:52 hrs, the tram and the restaurant had already been evacuated. The fire and rescue service therefore assessed the extent of the damage and whether there were any persons in need of assistance. They examined the tram and the restaurant and established that the load-bearing parts of the restaurant structure remained intact and that there was no further risk of collapse.

Göteborgs Spårvägar's on-call incident officer informed the fire and rescue service that the overhead line had been isolated, but that it should nevertheless be treated as live until the installation had been isolated and earthed for work. Isolation and earthing were later confirmed by Göteborgs Spårvägar's electrical control engineer.

To ensure that no one was trapped beneath the tram, a recovery vehicle was requested to the scene to lift the front of the tram. The lift commenced at 02:22 hrs. No person was found under the tram.

Four people were taken to hospital by ambulance and a fifth person was transported to hospital by the police.

3.5 Post-accident medical care of the driver

3.5.1 On the site

The members of the public who assisted the driver to a park bench attempted to assess the driver's condition, but did not observe any obvious external signs of serious physical injury. However, the driver appeared to have an impaired level of consciousness, was confused and unable to respond to questions. One of the members of the public, who had medical training, assessed that the driver might be in shock.

A police officer at the scene considered that the driver's level of consciousness varied over time and that the driver was intermittently drowsy and unresponsive. The officer also noted that the driver did not display any obvious external signs of significant injury following the collision. The driver told the police that he did not understand what had happened and stated that "everything went black". The driver had vomited several times. After a period of time, the driver was able to provide his personal details. The officer was instructed by the police incident commander to monitor the driver. A breath test for alcohol was carried out, with a negative result.

When paramedics arrived at the scene, they assessed the driver's condition. They also noted that the driver showed only minimal external signs of injury, in the form of a laceration to the lip. The paramedics, who noted that the driver had vomited, found the driver to be somnolent (drowsy), pale and generally unwell, and observed frequent yawning which they regarded as abnormal. They considered that these features might indicate an underlying medical condition or injury. On several occasions, the driver's level of consciousness decreased and pain stimulus was required to maintain consciousness. The paramedics assessed that the driver might have suffered a stroke or an epileptic seizure prior to the accident. As the initial paramedic crew were required elsewhere at the scene, the driver was handed over to an incoming ambulance crew for transport to hospital.

Before the driver was transported to hospital, a verbal handover was carried out between the two ambulance crews. The first crew informed the incoming crew of their observations and working hypotheses regarding the driver's condition. Some of this information was lost during the handover between the crews. For reasons that are not known, the second ambulance crew, which consisted of a registered nurse and a nursing assistant, formed the impression that the driver had left the cab unassisted and had been unaffected following the collision.

3.5.2 Transfer to hospital

The ambulance crew who conveyed the driver to hospital reported that the driver had been mobile prior to departure and was able to converse during the journey, although he spoke very little. The driver told the ambulance staff that he was experiencing pain on the left side of his chest and that he did not know, or could not remember, what had happened. During the journey to hospital, the nurse monitored the driver's condition and carried out an ECG[1] examination, which showed normal cardiac activity. A police officer accompanied the driver in the ambulance because the driver was suspected of having committed an offence.

3.5.3 In hospital

On arrival at the emergency department, the ambulance crew handed over to the doctor in charge, stating that the ECG and vital signs were within normal limits and that the driver showed no external signs of serious injury. The doctor examined the driver and decided that CT scans of the brain and thorax[2] should be performed. Samples for alcohol and drugs were taken; the results were negative.

The CT scans showed no internal injuries. Taking into account both the physical examination and the CT imaging results, the doctor concluded that no further investigations or observation in hospital were indicated. Following the attendance, the driver's diagnoses (ICD[3]) were recorded as 'laceration of lip' (S015 V82.39) and 'contusion of chest wall' (S202 V82.39). The lip wound was sutured in the emergency department.

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[1] ECG – Electrocardiogram (ECG) is a method of recording the electrical activity of the heart.

[2] Thorax – The chest, including the internal organs.

[3] ICD – International Statistical Classification of Diseases and Related Health Problems. ICD-codes are used in the Swedish healthcare system.

A referral was sent from the hospital to the driver's local health centre for removal of the sutures one week later.

The police officer who had accompanied the driver from the scene of the accident stayed at the hospital throughout the visit, and subsequently took the driver to the police station for interview.

3.5.4 Subsequent management by the primary care centre and the occupational health service

Following the incident, the driver was withdrawn from duty in accordance with TSFS 2019:113[4] and received support from occupational health services in the form of psychological counselling.

At the local health centre, blood tests were taken and the physical symptoms experienced by the driver after the incident (pain in the left shoulder) were followed up. No investigation was undertaken to determine the cause of the driver's impairment of consciousness.

On 30 September 2025, an occupational health physician, acting at the employer's request, assessed the driver in order to determine whether he met the medical fitness requirements set out in TSFS 2019:113, following the episode of impairment of consciousness. In the assessment, the physician concluded that the driver did not meet these requirements and was therefore not permitted to drive a tram.

Subsequently, several months after the accident, a medical investigation was initiated on behalf of Göteborgs Spårvägar with the aim of determining, if possible, the cause of the driver's severe impairment of consciousness.

3.5.5 Observations relating to the medical care provided

Based on interviews and a review of the medical notes, SHK has identified several shortcomings in relation to handover and documentation.

Information from the first ambulance crew at the scene – that the driver had appeared somnolent and confused, and had required pain stimulus in order to be kept conscious – was lost during the handover between the ambulance crews. Since these observations were also not recorded in the ambulance documentation, the information did not reach the doctor in the emergency department.

The emergency department records are generally brief. They state that the driver was operating a tram which had derailed and collided with a pizzeria. In the diagnostic coding[5], the driver was incorrectly recorded as a tram passenger. The doctor recorded in the notes that the driver had no memory of the event and might have been unconscious. However, in an interview, the doctor has stated that the driver had not been unconscious and that he remembered the entire course of events. The doctor also stated that he had considered an

[4] TSFS 2019:113 Swedish Transport Agency regulations and general guidelines on medical examinations and medical fitness for staff undertaking safety-critical duties on metro and tramway systems.

[5] Diagnostic code V82.39 Tram driver or tram passenger injured in collision with other object – activity, unspecified.

underlying medical condition as a possible cause of the accident, but no such consideration was documented in the medical records.

The responsible doctor was undergoing specialist training to become a surgeon, and managed the case independently. The doctor had access to an on-call senior colleague, a more experienced consultant, who could have been contacted for advice. In addition, there was a senior experienced colleague in the hospital who was occupied with stabilising a more seriously injured patient from the same accident.

At the time, all hospital beds designated for trauma patients were occupied. No consideration was given to admitting the driver to a different type of ward.

In the emergency department, no steps were taken to investigate the driver's impairment of consciousness prior to the accident. Both the doctor and the driver have stated that, during the hospital visit, the driver was advised to consult a doctor or dentist independently if needed.

Shortly after 03:00 hrs, the driver was taken to the police station for interview. The driver was then held in a cell for a period of time. An interview commenced at 05:41 hrs and concluded at 06:05 hrs, after which the driver was allowed to go home.

The driver's episode of impairment of consciousness was first considered by a doctor in late September 2025, when an occupational health physician assessed whether the driver met the medical fitness requirements to operate a tram. Following this, the healthcare services initiated an investigation into the driver's medical condition.

It may also be noted that neither the emergency department doctor, the occupational health service nor the local health centre made any assessment against the Swedish Transport Agency's regulations and general guidelines on medical requirements for holding a driving licence, etc. (TSFS 2010:125), as to whether it was appropriate for the driver to continue driving a car after the accident.

3.6 Injuries

The driver sustained minor injuries as a result of the accident.

Two passengers who were located at the front of the tram were seriously injured. A passenger seated just in front of the second set of doors (see figure 5) sustained minor injuries and subsequently sought medical attention independently.

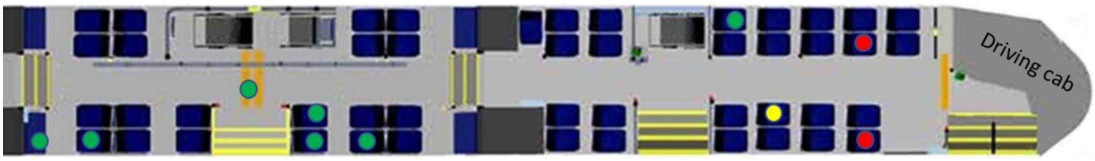

Figure 5. Location of passengers at the time of the accident. Red shading indicates the positions of the seriously injured passengers, yellow shading indicates the position of the passenger who was slightly injured, and green shading indicates the positions of the other passengers. The driver was located in the driving cab. Annotations added by SHK. Source: Västtrafik.

The member of staff working in the restaurant kitchen was seriously injured as a result of the accident. Three customers who were in the dining area sustained minor injuries.

3.7 Damage

3.7.1 The tram

The bogies and underframe were damaged when the tram derailed and travelled across Avenyn. The front end, driver's cab, body structure and electrical systems of the A section sustained major damage in the collision with the restaurant building. The damage to the tram was assessed as repairable.

3.7.2 The infrastructure

The overhead contact line, catenary wires, droppers and associated fittings were damaged in the derailment. There was also damage to the road surface, kerbs, traffic islands and lighting columns.

3.7.3 The restaurant building

The restaurant building sustained severe damage and was demolished following the accident.

3.8 Examination of the accident site

3.8.1 Examination of the accident site

On the night of the accident, SHK maintained contact with Göteborgs Spårvägar's investigator at the scene and received information and photographs from the initial fact-finding (see figure 6). SHK also maintained contact with the police regarding the extent of the accident and the technical examination of the tram. On the basis of this initial information, SHK authorised clearance of the accident site. The tram was recovered to the depot at Rantorget for further technical examination.

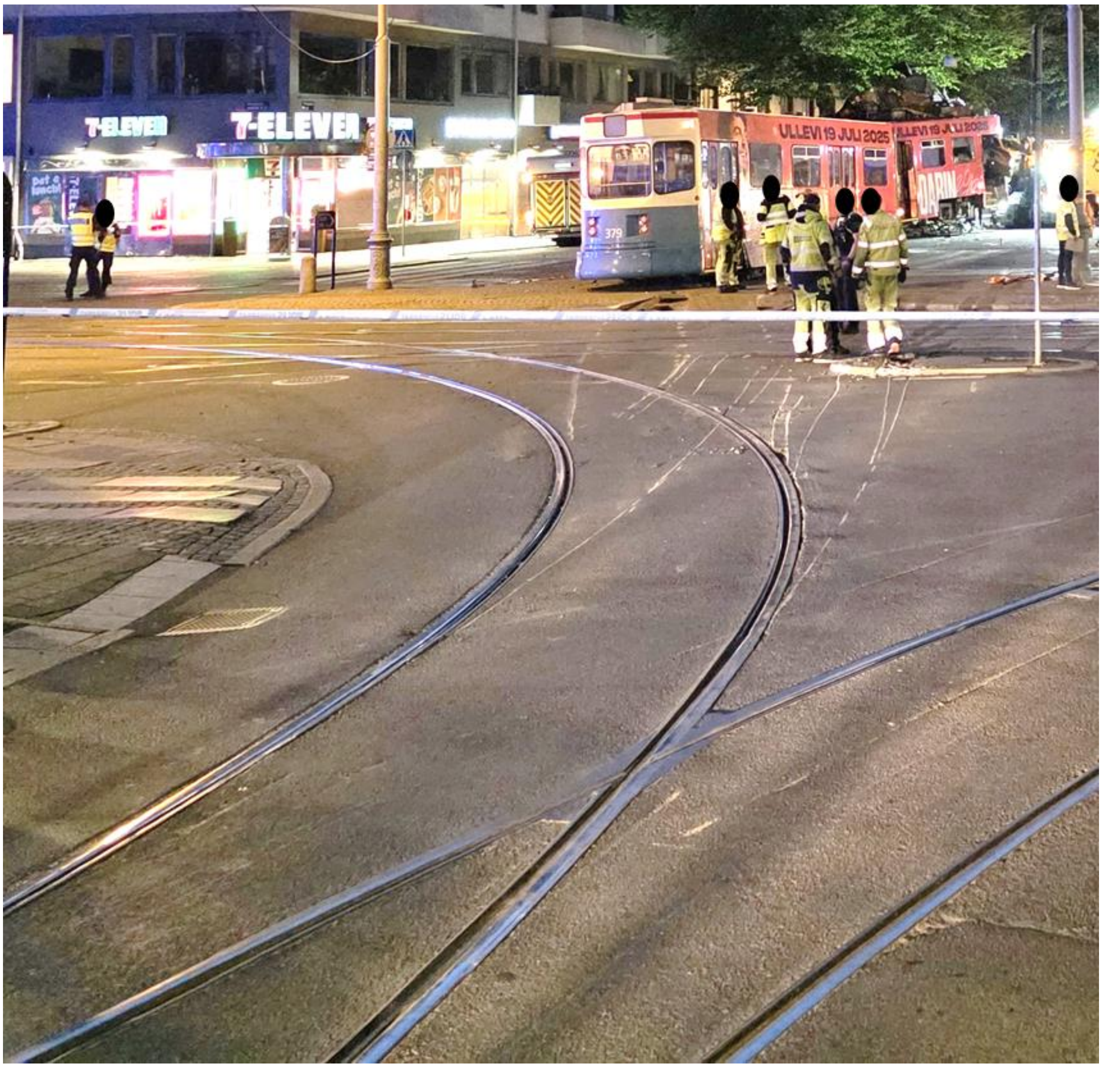

Figure 6. The left-hand curve after the Valand stop and the marks from the derailed wheelsets leading up to the tram in the background. Source: Göteborgs Spårvägar.

SHK began a technical examination of the tram on 21 June and visited the accident site on the morning of 22 June. By then, the site had been partly restored. During the examination, information was collected on the tram's route from Vasaplatsen to the restaurant (see figure 7). Further information was obtained on distances, signage, visibility, and the remaining damage to the track and roadway.

Figure 7. From SHK's site visit, showing the remains of the restaurant and the marks left by the tram's two leading wheelsets.

3.8.2 Examination of video evidence

SHK has reviewed video footage from the police CCTV cameras and from Göteborgs Spårvägar's on-board security cameras inside the tram. There was no camera installed in the driving cab to record the driver's actions or provide a forward-facing view. It is also not possible to see the driver with sufficient resolution in the police CCTV footage.

The material reviewed captured much of the sequence of events:

- The tram's stop at the Vasaplatsen stop.
- The positions and movements of the passengers within the tram.
- The tram's movement along Vasagatan.
- The derailment on the curve beyond the Valand stop.
- The tram's passage across Avenyn.
- The collision with the restaurant building.
- The evacuation of the tram.

From the reviewed material, it is evident that none of the passengers noticed or responded before the derailment; this is also confirmed by interviews. Nor did any passenger activate the passenger emergency brake.

Examination of the derailment sequence

The video footage shows the movement of the tram in connection with the derailment. Analysis of this footage, together with the marks at the derailment site, indicates that:

- The A section heeled markedly to the right as the tram entered the left-hand curve (see figure 8).
- The leading bogie followed the curve for a short distance before the wheel flanges climbed over the rails and derailed, passing just to the left of the traffic island in Avenyn.
- The wheelsets of the C section derailed slightly earlier in the curve and passed over the traffic island.
- The B section and the trailing bogie followed the already-derailed parts of the tram.
- The tram crossed Avenyn and then ran into the restaurant building.

Figure 8. The tram captured on one of the police CCTV cameras. The A section has entered the left-hand curve and has heeled markedly to the right, in the direction of travel. The leading bogie has already derailed and is about to pass just to the left of the traffic island. The grey areas are masked zones in the police camera system. Source: Swedish Police Authority.

3.9 The driver

The driver was 59 years of age at the time, held car[6] and bus driving licences, and was qualified to operate tram vehicles in accordance with the requirements of TSFS 2019:113. The driver had undergone a medical examination on 28 August 2024 with no adverse findings, and was at that time assessed as meeting the requirements for working as a driver.

The driver had extensive experience of operating trams and had previously also worked as a bus driver since the mid-1990s.

The driver's work pattern mainly comprised afternoon and evening duties on a rotating roster. In the period leading up to the accident, the driver had worked as shown in table 1.

Table 1. Driver's work pattern prior to the accident.

Date	Working hours
12 June	Rest day
13 June	Rest day
14 June	15.56–2.02
15 June	15.07–0.19
16 June	15.16–23.57
17 June	Rest day
18 June	16.16–0.19
19 June	15.46–1.03. (the accident occurred at 00.47)

The driver would normally go to bed after a shift and sleep until late morning, usually 7–9 hours per day. The driver was content with working afternoon and evening shifts. On the morning of 19 June, the driver woke at around 10.00 and commenced the shift at 15.46.

The driver reported feeling in normal good health throughout the day. Eating and drinking habits had been normal and the driver did not feel tired. Around the time of the accident, nothing in the driver's daily life had occurred that differed from the usual routine.

The driver has stated to SHK that he suffered a sudden deterioration in his state of health after departing from Vasaplatsen and lost consciousness. The driver's next memory is of sitting on a park bench and receiving pain stimulus from ambulance staff. The driver has stated that he had not previously suffered any similar medical condition.

SHK has reviewed information contained in the driver's incident report, according to which the driver reported experiencing dizziness and nausea at the tram stop Vasaplatsen. In interviews with SHK, the driver has stated that this is not an accurate description and that he does not remember anything out of the ordinary occurring during the stop at Vasaplatsen.

[6] Under section 9 of the Ordinance (1990:1165) on safety in metro and tramway operations, a tram may only be driven by a person holding a category B driving licence.

3.10 Track infrastructure

3.10.1 The accident site

The accident site is located at the junction of Vasagatan and Avenyn. The location contains several sets of points and track connections, which are used by several tram routes. The routes that pass the Valand stop from Vasagatan normally use points 352 set to the left-hand position. The left-hand curve beyond points 352 has a radius of 20 metres.

Points 352 are fitted with a logging function which shows that they were in the left-hand position, i.e. set for movements towards Kungsportsplatsen. The points are street-embedded points of type EV1211 and are subject to periodic inspection, most recently on 13 March 2025. The maximum permitted speed through the curve with the points in the left-hand position is 15 km/h, as specified in the Traffic Safety Instruction for tram operations in Gothenburg and Mölndal (TRI).

Vasagatan is on a falling gradient from Vasaplatsen towards the Valand stop and Avenyn, with a height difference of approximately 5 metres. All trams are required to stop at the Valand stop.

3.10.2 Infrastructure manager

The City of Gothenburg's Urban Environment Administration is the infrastructure manager and is therefore responsible for the tramway infrastructure. Tram operations in Gothenburg are conducted on a line-of-sight basis, meaning that drivers regulate their speed in accordance with the applicable rules (TRI), speed restriction signs and prevailing traffic conditions.

In Sweden, tram operations are generally conducted without any train protection or comparable system that supervises maximum permitted speeds on street-running sections.

The Urban Environment Administration has stated that it is continually exploring options for technical systems to monitor tram speeds, but that at the time of publication of this report no decision had been taken to implement such a system.

3.11 The M31 tram type

3.11.1 General information

This tram type was originally introduced in the mid-1980s, when it was designated M21 and comprised two sections, A and B. Since then, the type has undergone various upgrades and modifications. In the late 1990s, a low-floor centre section (C section) was installed, and the type was redesignated M31. The A and B sections each have a powered bogie, and the C section has two separate single axles.

The tram is approximately 30 metres long, has a mass of 33 tonnes and a maximum permitted speed of 60 km/h. When this speed is reached, the traction demand is removed and electrical power to the traction motors is cut; this also applies to the newer M32 and M33 tram types.

The tram can accommodate 83 seated and 119 standing passengers.

3.11.2 Braking systems

The tram is equipped with several different braking systems:

- mechanical brake using spring force, compressed air or hydraulics acting on brake discs
- regenerative electric brake using the traction motors
- magnetic track brake which is lowered and magnetically applied directly to the rails

There is also a sanding system which deposits sand ahead of the wheels in order to increase adhesion to the rails. Table 2 describes the available braking modes on the tram.

Table 2. Types of brake and how they are used by the driver

Type of brake	Explanation
Service brake	The driver applies the brakes by pulling the master controller back. The control system commands regenerative electric braking while the motor speed provides sufficient braking effort, after which the mechanical brake is used to bring the tram to a stop.
Emergency brake	The master controller is pulled fully back. All braking systems are then applied at maximum effort, including sanding and an audible warning (tram bell).
Panic brake	The master controller is pushed fully forward, or alternatively the foot pedal is depressed to the bottom of its travel, which activates full mechanical braking, the magnetic track brake, sanding and an audible warning signal.
Magnetic track brake	Can be applied separately by the driver using a button on the driver's desk.
Mechanical (friction) brake	It is applied automatically if the driver's safety device is not operated or, for example, if the passenger doors are open or enabled for opening.
Passenger emergency brake	Passenger emergency brake handles are provided at several locations in the passenger saloon, and one is located above the driving position.

Brake lights

The brake lights at the rear of the tram's B section are controlled and illuminated in two ways: either when the master controller is placed in the service brake position, or when the mechanical brake is applied. The brake lights illuminate in the latter case even if the master controller is not in the service brake position.

3.11.3 The driving cab

The tram is driven from the driving cab. The cab door opens outwards from the cab. Within the cab there are buttons and displays used to control and monitor the various functions of the tram. The tram is driven using a master controller located on the driver's left-hand side. The buttons for enabling, opening and closing the doors are located on the right-hand side.

The driving seat is adjustable in height and can be moved forwards or backwards, and the backrest can be set in various positions. This enables the driver to adjust their driving position ergonomically.

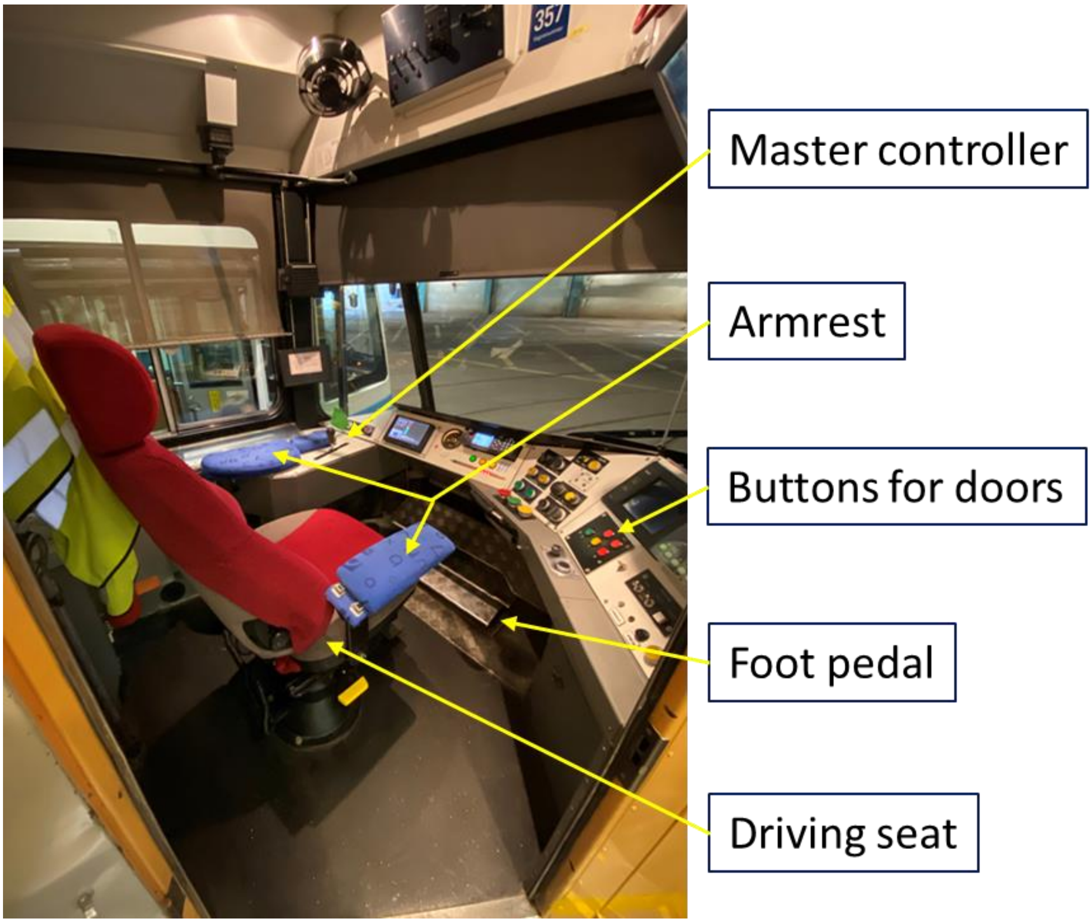

Figure 9. Driving cab of tram M31 357.

To improve the ergonomics of the driving position and assist the driver in carrying out their duties, armrests are provided on both sides of the seat: one on the left-hand side adjacent to the master controller, and one on the right-hand side. Both armrests are adjustable laterally and fore-and-aft (see figure 10).


Figure 10. Master controller and armrest on an M31 tram. The yellow markings indicate the range of adjustment of the armrest. The master controller is in the neutral position. On the right, the armrest is shown rotated and adjusted in line with the movement of the master controller.

The master controller has four positions in addition to neutral. Service braking is commanded by moving the controller backwards, with the emergency brake position at the rearmost end. Traction power is commanded by moving the controller forwards. The controller is spring-returned from traction to the neutral position. At the forward end there is a fixed position for the panic brake. Depressing the handle of the master controller operates a driver's safety device. See section 3.11.4.

On the floor in front of the driving seat there is a foot pedal and two fixed footrests, enabling the driver to vary the position of their feet (see figure 11).

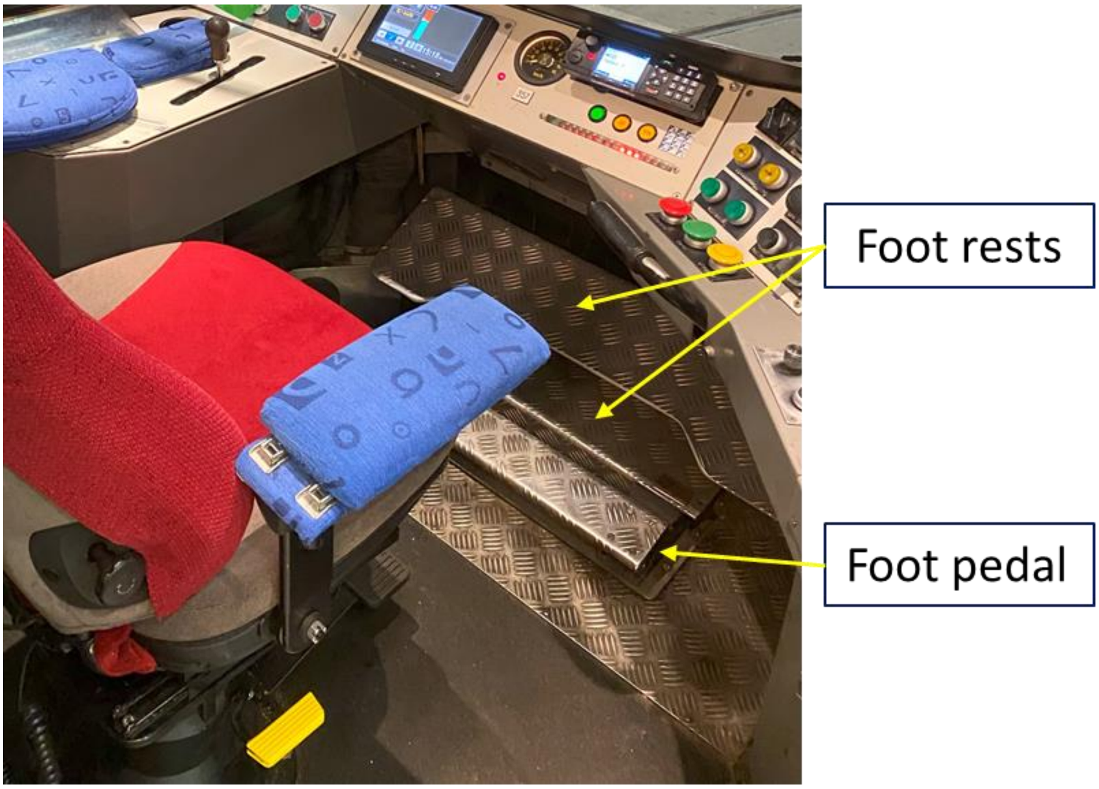

Figure 11. Location of the foot pedal and the footrests positioned in front of and above the pedal.

The foot pedal has three positions: rest (no load), raised and panic. In the raised position it operates the driver's safety device, and in the panic position it operates the panic brake.

3.11.4 Driver's safety device

In order to drive the tram, the driver must operate a driver's safety device. When the safety device is not operated, full mechanical braking is automatically applied. The driver can operate the safety device either by depressing the handle of the master controller or by holding the foot pedal down in the raised position (see figure 12).

Figure 12. The driver's safety device on the master controller and foot pedal is operated by pressing down with the hand, or by holding the foot pedal in the raised position. The blue arrow indicates the direction of the applied force.

3.11.5 Operation and maintenance of the tram

Maintenance of trams in Gothenburg is carried out at defined intervals and is based on a system of different levels of inspection and periodic overhaul.

Periodic overhaul level 2 involves a more extensive technical examination than routine running maintenance. A level 2 periodic overhaul includes checking the master controller, the operation of the driver's safety device, and the positions for the emergency brake and the panic brake. This overhaul also includes confirming that the controller returns to the neutral position from traction under spring force. As part of the brake test it is also confirmed that operation of the foot pedal's panic position results in application of the mechanical brake, the magnetic track brake and sanding, and that an audible warning is activated.

Tram 379 had undergone the prescribed maintenance within the specified intervals. The most recent level 2 overhaul was carried out on 26 May 2025. On that occasion a number of defects were identified and rectified, including adjustment of the magnetic track brakes height to compensate for wear that had occurred since the previous level 2 overhaul on 23 April the same year. Wheel diameters and wheel profiles were within the approved tolerances.

Before entering the tram into service, technically qualified personnel always carry out a preparation of the tram. The preparation includes a check of the brake system, the master controller and the foot pedal, including the function of the driver safety device. The driver then carries out a check of the preparation of the tram before it is put into service.

Before the accident, earlier in the evening at around 21:00, a brake fault was reported on the C section of the tram. The fault, which was related to a wheel slip indication, could be reset and the tram was cleared to continue in service.

There were no known defects or damage to the tram that are deemed to have contributed to the accident.

3.12 Technical examination

3.12.1 Technical examination of the tram

Göteborgs Spårvägar and the police carried out initial technical examinations and documented the tram at the accident site.

A more detailed technical examination was carried out in the depot at Rantorget. SHK, together with engineers from Göteborgs Spårvägar, examined the tram both internally and externally.

All of the damage observed can be explained by the derailment and collision, or by the subsequent rescue operations and recovery of the tram. SHK has not identified any technical faults on the tram that are assessed as having influenced events prior to the accident.

The driver stated that he primarily used the foot pedal as the driver's safety device, and that the foot pedal was likely also in use at the time of the accident. In light of this information, SHK has carried out a technical examination of the foot pedal. The master controller was also included in the examination in order to provide a comprehensive picture of the condition and performance of the driver's safety devices.

3.12.2 Examination of the foot pedal

The current foot pedal is fitted with dual so-called resistance triggers[7], in contrast to the version with only a single resistance trigger, which was originally proposed and subsequently approved for testing (see section 3.14.2). This means that the current pedal requires greater force to reach the panic brake position than the pedal introduced in 1999. Göteborgs Spårvägar lacks documentation explaining why this change was implemented, as well as any supporting material for a risk assessment of the modification.

SHK has reviewed documentation describing the maintenance and overhaul of the foot pedal. An overhaul of the pedal in question was carried out by Göteborgs Spårvägar in March 2025, and the pedal was installed on tram 379 on 23 April.

When SHK came to test all of the functions, the entire console with the foot pedal and footrests was removed from the tram and transferred to a dedicated test rig in the workshop. The inspection was carried out in accordance with instruction *310 02 Revision Foot Pedal M31-657 301*.

[7] In this context, a mechanical component that resists a certain load before being compressed.

Excerpt from instruction 310 02 Revision Foot Pedal:

> **Panic brake**
> Press the pedal **firmly** to the bottom position.
> *According to the supplier, the force required from the rest position to the raised position is 10 N (1 kg), and to reach the panic brake position 200 N (20 kg).*

The instruction further specifies that each pressure point is to be checked by measurement.

> *The pressure elements shall withstand a load of 17 kg; any that do not are to be scrapped and replaced.*

The examination established the following:

- all electrical functions and contacts operated correctly
- no mechanical defects or wear could be identified
- a substantially higher force than the 200 N specified in the instruction was required to move the pedal into the panic position
- the force required to reach the raised and panic positions varied depending on where the load was applied to the pedal

  The variation in force can be explained by the fact that the transverse pedal rests on two pressure elements, one at each end of the pedal, each of which requires a force of 10 N to reach the raised position plus a further 170 N to reach the panic brake position. When a load is applied at the centre of the pedal, both pressure elements are loaded simultaneously and a force of up to twice this value is required. When the load is applied closer to one side of the pedal, the two elements are loaded in sequence and the force required in each individual position is lower.

As part of the technical examination, SHK tested foot pedals on other M31 trams. It was assessed that a foot can be rested on the pedal while maintaining operation of the driver’s safety device, and that a substantial force is required to depress the pedal further into the emergency brake position (see figure 13).

Figure 13. A foot depressing the foot pedal into the raised position and operating the driver's safety device. The photograph shows tram 352, which was used as the reference vehicle.

3.12.3 Examination of the master controller

An initial physical examination of the master controller was carried out in the driving cab of tram 379. Because of the damage to the vehicle, the electrical functions could not be tested, and was therefore removed and installed in another tram of the same type.

The examination established the following:

- All physical positions of the master controller operated as intended.
- The controller returned under spring force from traction to the neutral position as intended.
- All electrical functions, including the driver's safety device, operated as intended.

SHK has also carried out tests on tram 352, which is of the same type. The master controller measurements correspond to those for the controller on tram 379.

Table 3 shows the measured forces on the master controller for traction, panic brake and emergency brake.

Table 3. Forces in newtons (N) required to operate the master controller on M31 trams. The equivalent values in kilograms are obtained by dividing the force by 10.

Tram	Master controller to traction (spring-returned)	Master controller to panic brake position	Master controller to emergency brake position
M31 379	1.2–2.9 N	12 N	9 N
M31 352	1.4–3.3 N	13 N	9 N

3.12.4 Göteborgs Spårvägar's examination of the operation of the driver's safety device

In October 2025, Göteborgs Spårvägar carried out a number of tests of the driver's safety device on M31 trams as part of the investigation into the collision at Brunnsparken (see section 3.15.1).

The results showed that the driver's safety device remained operated in scenarios simulating loss of consciousness. For the safety device not to be operated, the driver had to be in a very specific seating position, actively tensing the foot and calf muscles and then relaxing the rest of the body. In the vast majority of cases, and taking into account how drivers normally sit and position their foot on the pedal, the safety device remained operated under simulated loss of consciousness. In practice, the driver would have to fall forwards or out of the driving seat for it to release. According to Göteborgs Spårvägar, the function is designed to operate in this way and it is therefore not a deviation from its intended function. Göteborgs Spårvägar has therefore concluded that the results is not reportable to the Swedish Transport Agency (Transportstyrelsen). Göteborgs Spårvägar stated that no similar tests have been carried out on tram types M29, M32 or M33.

3.12.5 Comparison with other tram types

SHK has also examined a further four tram types for reference. Measurements were taken on the foot pedals and master controllers of two tram types in Gothenburg, M32 and M33, and two tram types in Stockholm, A32 and A35.

The cab environments of the different tram types vary, but their operation is broadly similar. The differences relevant to the technical examination are as follows:

- Tram types A32 and A35 do not have a panic position at the forward end of the master controller.
- Tram type M32 does not have a panic position on the foot pedal. Instead, there is a smaller pedal to the right of the foot pedal which is used to apply the magnetic track brake and then the panic brake.
- Tram types A32 and A35 in Stockholm do not have any additional footrest adjacent to the foot pedal.

The forces required to operate the master controllers are low and show little variation. Operation of the foot pedals differs more in terms of both force and function (see table 4). Trams in Gothenburg have foot pedals that require a higher force in the panic brake position than the foot pedals on trams in Stockholm.

Table 4. Summary of forces in newtons (N) required to operate the foot pedals on the different tram types.

Tram type	Foot pedal to raised position	Foot pedal to panic brake position
M31 379	26–54 N	205–410 N
M31 352	39 N	196–294 N
M32	10 N	No panic brake position in the foot pedal
M33	77–87 N	317–333 N
A32 (Stockholm)	25–27 N	146 N
A35 (Stockholm)	25–27 N	147 N

3.13 Recording equipment

3.13.1 On-board data recorder

Tram type M31 is equipped with an older type of data recorder which logs a number of parameters:

- time at which the tram starts or stops (not synchronised to Swedish standard time)
- speed in km/h
- distance in metres (last 500, in steps of approximately 0.5 metres)
- function K1–K6:
    1. panic brake (master controller in panic/emergency brake position, or foot pedal in panic brake position)
    2. no voltage in the overhead line
    3. wheel slip
    4. sanding
    5. magnetic track brake
    6. service brake (master controller in brake position)

The data are read from bottom to top. Figure 14 shows an extract from the recording as the tram enters the left-hand curve beyond points 352 and derails. In addition, the following can be noted:

- the speed decreases from 64 to 61 km/h over 3–4 metres before function K6 (service brake) is recorded
- K1 (panic brake) in this case emergency brake, is recorded 0.5 metres later
- the subsequent recordings of K4 (sanding) and K5 (magnetic track brake) are a consequence of the emergency brake having been applied
- K2 shows that the tram has no high voltage as a result of the pantograph leaving and damaging the overhead line

```
I-----------------------------------------------------------------------
I  K1 (I):                  Panikbroms   K5 (N):                Skenbroms
I  K2 (N):      Linjespaenningsbortfall  K6 (N):                Driftbroms
I  K3 (N):                     Slirning  K7 (N):                   Reserv
I  K4 (N):                     Sandning  K8 (N):                   Reserv
I
         Geschwindigkeit (km/h)                      Geschw    Weg  Kontakte
0    10   20   30   40   50   60   70   80   90   100 (km/h)    (m)  12345678
I----I----I----I----I----I----I----I----I----I----I----I----I-------I---------

                           *                           55      26.6  12 456
                           *                           55      27.1  1  456
                           *                           55      27.6  1  456
                           *                           55      28.1  1  456
                           *                           55      28.6  1  456
                           *                           55      29.2  1  456
                            *                          56      29.7  1  456
                            *                          57      30.2  1  456
                             *                         58      30.7  1  456
                             *                         59      31.2  1  456
                              *                        60      31.7  1  456
                              *                        61      32.2  1  456
                              *                        61      32.7  1  456
                              *                        61      33.2  1    6
                              *                        61      33.8  1    6
                              *                        61      34.3  1    6
                              *                        61      34.8       6
                               *                       62      35.3
                              *                        61      35.8
                               *                       62      36.3
                               *                       62      36.8
                               *                       62      37.3
                               *                       63      37.8
                                *                      64      38.4
```

Figure 14. An extract from the data recorder output. The data are read from bottom to top. The asterisks (*) provide a simple plot of the speed. Source: Göteborgs Spårvägar.

3.13.2 Reconstruction of the sequence of events from available data

SHK has correlated data from the data recorder with observations and timing information from CCTV cameras outside the tram and security cameras inside the tram (see table 5). The distance from Vasaplatsen has also been checked by measurement using digital mapping in Google Earth.

Table 5. SHK's compilation of timing information from the data recorder, CCTV and on-board security cameras.

Time	Event	Recorded speed	Distance to/from Vasaplatsen
-	The tram is travelling towards Vasaplatsen	<30 km/h	-
00.46.17	The tram begins to brake	24 km/h	- 45 m
00.46.27	The data recorder indication for K6 (service brake) ceases – the tram then coasts slowly forward and its speed decreases	6–3 km/h	- 19 m
00.46.35	The tram briefly accelerates	3–5 km/h	- 8 m
	The tram passes the stop marker[8] for the stop at Vasaplatsen		- 7 m
00.46.40	The brake lights illuminate without the data recorder registering K6 (service brake)	3 km/h	- 1 m

[8] The stop marker is a yellow reference mark indicating where the tram should stop with the driving cab/leading door.

00.46.41	The tram comes to a stand 7 metres beyond the stop marker for the Vasaplatsen stop (the leading door opened adjacent to the pedestrian crossing in front of the platform)	0 km/h	0 m
00.46.42	The doors open immediately as the tram comes to stop Four passengers alight from the C and B sections and one boards in the C section	-	-
00.46.54	Boarding and alighting completed	-	-
00.47.15	The doors close	-	-
00.47.20	The tram departs from Vasaplatsen	0 km/h	0 m
00.47.28	Acceleration from the Vasaplatsen stop	30 km/h	32 m
00.47.40	The tram passes Chalmersgatan	58 km/h	160 m
00.47.40	A taxi turns off Vasagatan into Teatergatan	-	-
00.47.41	The tram passes behind the taxi	64 km/h	225 m
00.47.44	The tram passes the Valand stop	64 km/h	275 m
00.47.45	The tram enters the left-hand curve beyond Valand The speed decreases from 64 to 61 km/h over a distance of 3 metres Passengers in the A section are thrown to the right in the direction of travel; the driver is thrown to the right in the cab (see figure 15) The data recorder registers K6 (service brake) and, 0.5 seconds later, K1 (panic brake/emergency brake) The brake lights illuminate (see figure 16) The tram derails in the curve K4 (sanding) and K5 (magnetic track brake) are recorded as a consequence of the emergency brake having been applied	61 km/h	290 m
00.47.46	The derailed wheelsets lock up and slide along the asphalt surface, so the speed readings become less precise The tram mounts the pavement on the far side of Avenyn The overhead line is torn down The data recorder registers K2 (loss of voltage in the overhead line.	~55 km/h	305 m
00.47.48	The tram collides with the restaurant building	~40 km/h	330 m
00.47.49	The tram comes to rest	0 km/h	340 m

The driver is thrown to the right during the derailment (see red markings in figure 15).

Figure 15. The left-hand image shows the moment before the tram enters the curve, and the right-hand image shows the moment just after the tram has entered the curve. Passengers are thrown to the right. A display in the driving cab is obscured at the same moment, the driver is also being thrown to the right (see the two red circles). Source: Göteborgs Spårvägar.

The brake lights illuminate at the same moment as the A section lurches to the left (see figure 16).

Figure 16. The brake lights illuminate at the same moment as the A section veers to the left. Source: Swedish Police Authority.

CCTV footage shows that passenger boarding and alighting at Vasaplatsen was completed after 14 seconds. The tram doors then remained open for a further 19 seconds. Logs from the passenger information system record door operation and dwell times for the eight preceding stops as far as Järntorget. The doors were open for an average of 15 seconds per stop, with a minimum of 8 seconds and a maximum of 22 seconds (at Järntorget).

3.13.3 Reference testing of data from the on-board data recorder on tram 379

With the assistance of Göteborgs Spårvägar, SHK conducted two series of reference tests using trams 336 and 352 (tram type M31) on a test track at the Rantorget depot. The purpose was to identify which actions in the driving cab produced the same data recorder indications as those recorded on tram 379 at the time of the accident.

The stop at Vasaplatsen

On the approach to the stop at Vasaplatsen, the braking was slightly prolonged and the data recorder did not register K6 for service braking with the master controller during the final braking to a stand. As shown in table 5, CCTV footage indicates that the tram rolled forward, the brake lights illuminated, the tram came to an abrupt stop and the doors opened immediately.

Five reference tests were carried out with tram 336, as set out in table 6.

Table 6. The five reference tests carried out by SHK with tram 336.

Test	Speed	Event	Comment
1	10 km/h	Service brake to 5 km/h, coasting and final service brake to a stand using the master controller	The data recorder registers K6 (service brake) during the final braking to a stand
2	10 km/h	Coasting to a stand (no further action) No brake application	The data recorder does not register K6 (service brake)
3	5 km/h	Operation of the button to enable the doors Full mechanical braking	The data recorder does not register K6 (service brake) The tram stops abruptly and the doors remain closed
4	5 km/h	Operation of the button to open the doors Full mechanical braking	The data recorder does not register K6 (service brake) The tram stops abruptly and the doors open immediately
5	5 km/h	Release of the driver's safety device (foot pedal) Full mechanical braking	The data recorder does not register K6 (service brake) The tram stops abruptly and the doors remain closed

The only reference test that corresponds both with the data recorder output and with the sequence of events shown on the CCTV footage is reference test 4. This indicates that, contrary to usual practice, the driver did not brake to a stand using the master controller, but that the tram instead came to a stop as a result of the driver operating the door-open button.

The acceleration from Vasaplatsen

The data recorder on tram 379 showed that the tram accelerated through 30 km/h over a distance of 32 metres (an average acceleration of 1.08 m/s^2).

During the four reference tests with tram 352 (see table 7), full power was applied from standstill to speeds above 30 km/h. In these tests, an average distance of 33.5 metres was required to reach 30 km/h (1.03 m/s^2).

A reference run was carried out up to 50 km/h, which required 110 metres of level track (0.88 m/s^2). Tram 379 accelerated through 50 km/h in 95 metres (1.00 m/s^2) and to 64 km/h in 191 metres. The track in Vasagatan falls downhill towards Valand, which assists the tram's acceleration.

The reference tests with full power on level track show lower acceleration than that recorded for tram 379 departing from Vasaplatsen. It is therefore likely that tram 379 accelerated from Vasaplatsen and down Vasagatan with the master controller in the full-power, or close to full-power, position.

The sequence of events at the derailment

The tram is fitted with a function which cuts traction power and the supply to the traction motors slightly above the maximum permitted speed of 60 km/h. This safety system is designed to prevent the vehicle from exceeding the maximum permitted speed.

The data recorder on tram 379 showed a constant speed of 64 km/h over a distance of 90 metres prior to the derailment. Over a distance of less than 4 metres, the speed reduced from 64 to 61 km/h. This reduction coincides with the tram entering the left-hand curve beyond points 352. At 61 km/h, the data recorder registers K6 (service brake) and, 0.5 metres later, K1 (panic brake). After a further 1.5 metres, K4 (sanding) and K5 (magnetic track brake) are recorded.

CCTV footage shows that the tram's brake lights illuminated at the same moment as the A section moved to the left in the curve beyond points 352.

Table 7 shows the reference tests with tram 352.

Table 7. The four reference tests carried out by SHK with tram 352.

Test	Speed	Event	Comment
1	50 km/h	The master controller is moved to service brake and directly on into the emergency brake position All braking systems are applied An audible warning signal is activated	The data recorder registers K6 (service brake), 1 metre later K1 (panic brake), and after a further 0.5 metres K4 (sanding) and K5 (magnetic track brake)
2	40 km/h	The driver's safety device is released Full mechanical braking	No K1–K6 function is recorded
3	40 km/h	The master controller is moved forward into the panic brake position Full mechanical braking, magnetic track braking and sanding are applied An audible warning signal is activated	The data recorder registers K1 (panic brake), 0.5 metres later K4 (sanding) and K5 (magnetic track brake)
4	40 km/h	The foot pedal is depressed to the panic brake position Full mechanical braking, magnetic track braking and sanding are applied An audible warning signal is activated	The data recorder registers K1 (panic brake), 0.5 metres later K4 (sanding) and K5 (magnetic track brake)

Only reference test 1 produced a K6 (service brake) indication and, in other respects, corresponded with the actual data recorder output at the time of the derailment. It is therefore highly likely that the master controller handle was moved rapidly back through the service brake position into the emergency brake position at the moment the tram entered the left-hand curve beyond points 352 at the time of the accident.

Some witnesses reported that the tram's audible warning was operated, which also accords with reference test 1.

3.14 Regulations and regulatory oversight

3.14.1 Safety requirements for operators

In order to operate a tramway undertaking, an authorisation from the Swedish Transport Agency is required. The operation is regulated by the Act (1990:1157) on Safety in Metros and Tramways, together with the Swedish Transport Agency's regulations on safety management and safety rules (TSFS 2013:44).

The operator is responsible for ensuring that:

- the infrastructure and operations are managed so as to prevent harm arising from the undertaking's activities
- all necessary measures and precautions are taken to maintain an adequate level of safety
- the organisation is structured so that operations can be conducted safely
- the infrastructure, vehicles and other equipment used are of such a standard as to prevent harm arising from the undertaking's activities

Each operator must have a safety management system and a safety rules manual setting out the processes and procedures for controlling the risks arising from its operations. For any technical modification, an assessment must be made as to whether the change affects operational safety. If it does, a risk assessment must be carried out and documented, and used as the basis for any necessary mitigating measures.

The Swedish Transport Agency conducts supervision of operators. This supervision is planned annually and is based, among other things, on the Agency's risk assessments of authorisation holders, taking into account the nature of their operations.

The Swedish Transport Agency carried out a supervision of Göteborgs Spårvägar on 25 and 26 March 2025. The supervision identified certain shortcomings in Göteborgs Spårvägar's work on internal audits and the follow-up of action plans, which Göteborgs Spårvägar was expected to address within the framework of its safety management arrangements. A further supervision was carried out on 14 and 15 April 2026.

3.14.2 Approval of tram vehicles

A vehicle may not be operated on a tramway infrastructure without the approval of the Swedish Transport Agency. The Agency assesses and approves tramway infrastructures and vehicles under the Act on Safety in Metros and Tramways and the Swedish Transport Agency's regulations on the approval of infrastructures or vehicles for metros and tramways (TSFS 2010:115). There is no harmonised EU regulation for trams. In its assessment, the Swedish Transport Agency determines whether the statutory safety requirement – that the vehicle is of such a standard that harm arising from the operation is prevented – is met for the vehicle concerned. Manufacturers may use non-binding technical standards as guidance in the design and safety assessment.

An applicant for approval must be able to demonstrate that it has applied a structured and systematic process to identify, assess and manage the risks that may arise in the operation. This must be evidenced by, for example, descriptions of the system, specifications and risk assessments. For certain safety-critical functions, the Swedish Transport Agency requires the applicant to engage an independent assessor to review the applicant's documentation and how the applicant has followed the processes intended to ensure that the vehicle or infrastructure is safe for operation. The independent assessor must be approved by the Swedish Transport Agency.

Under the Act, approval is required for a new vehicle or a major modification to an existing vehicle. In the supplementary guidance to the regulation, published in 2021[9], it is stated that a new type of driver's desk or driver monitoring system is regarded as such a major modification and therefore requires approval from the Swedish Transport Agency. When changes are made to the design of the driving cab, a risk assessment should be undertaken. The analysis should demonstrate that barriers are in place against, among other things, derailments and serious injury to passengers.

It is further stated that the DMI (Driver-Machine-Interface) analysis method is suitable for use when developing new or modified driving cabs and control desks. This is a form of interaction analysis that can be used to study how humans interact with a machine. The Swedish Transport Agency has stated that it has expertise in this area within its organisation, but that it is not normally used in the approval process.

Approval of the M31 tram type

Tram type M21 was rebuilt as M31 in the late 1990s. During the conversion to M31, Göteborgs Spårvägar obtained approval from the then Swedish Railway Inspectorate.

When delivered, the M21 trams were fitted with a driver's safety device only on the master controller. This arrangement created ergonomic challenges for drivers. To address this, in November 1997 Göteborgs Spårvägar submitted an application to the then Railway Inspectorate, advising that it intended to introduce an additional driver's safety device in the form of a foot pedal and trial this on two M21 vehicles. According to the information in the application, the purpose of the modification was to create a more ergonomically suitable driving environment and thereby eliminate the need to manipulate the driver's safety device, which had occurred among some drivers.

Following the completion of the tests, Göteborgs Spårvägar submitted the results and applied for approval to install the foot pedal on M21 and M31 trams. On 4 November 1999, the then Railway Inspectorate determined that the introduction of a foot pedal on tram types M21 and M31 did not require approval. The Swedish Transport Agency has stated that a similar change would now be likely to require approval.

[9] Case number TSJ 2021-2071.

Approval of the M33 tram type

Tram type M33 was delivered to Göteborgs Spårvägar between 2019 and 2023 and has been approved by the Swedish Transport Agency.

When tram type M33 was being developed, the owner (Västtrafik) and Göteborgs Spårvägar drew up a specification of requirements. SHK has examined the sections relating to the driver's safety device and driver vigilance. The specification states that the driver's safety device must be activated by a driver. If the driver does not activate the driver's safety device, the vehicle must be brought to a stop within 2.5 seconds. It is the safety driving control function (i.e. the driver's safety control) that continuously monitors the driver's vigilance during driving.

3.14.3 Comparison with railway vehicles

When railway vehicles are approved for operation on the Swedish part of the EU railway system, with the exception of vehicles used for local, historic and tourist purposes, the requirements for driver monitoring are governed by the Technical Specifications for Interoperability (TSIs).

Under Commission Regulation (EU) No 1302/2014 concerning a technical specification for interoperability relating to the 'rolling stock – locomotives and passenger rolling stock' subsystem of the rail system in the European Union, the following applies, among other things:

A driving cab shall be equipped with a means to monitor the driver's activity, and to automatically stop the train when a lack of driver´s activity is detected. This function shall be subject to a reliability analysis.

The Swedish Transport Agency has supplemented the EU requirements with national regulations. The Agency's regulations and general advice on railway vehicles (TSFS 2022:36) set out requirements for train protection systems and their integration into the vehicle. Railway vehicles that are not fitted with a train protection system must be equipped with a device that limits the maximum permitted speed and must have a driver monitoring function.

3.14.4 Occupational health and safety regulations

The Swedish Work Environment Act (1977:1160) places far-reaching responsibilities on employers for employees' working environment, including ergonomics. These responsibilities are further specified in the Swedish Work Environment Authority's regulations and general recommendations (AFS 2023:10) on risks in the working environment, in particular chapter 6 on ergonomic load.

Under chapter 6, section 5 of AFS 2023:10, tasks and working postures are, as far as it is reasonably practicable, to be organised and designed so that the worker can adopt working postures and movements that are favourable for the body. As part of its systematic work environment management, the employer is to organise, implement and follow up work on the working environment.

3.15 Similar occurrences

3.15.1 Similar occurrences in Gothenburg tramway operations

There have been several occurrences in tram operations in Gothenburg where an underlying cause may have been fatigue, distraction, illness or other conditions affecting the driver's ability to operate the tram. SHK has reviewed five occurrences that have been investigated by the joint investigation function of Göteborgs Spårvägar and the City of Gothenburg's Urban Environment Department.

Collision Brunnsparken 2025

On 5 March 2025, two trams collided at Brunnsparken in Gothenburg. A tram of type M31 ran into the rear of another tram that was standing at the stop. Both trams sustained damage, but there were no personal injuries. They assessed that a causal factor was the driver suffering an acute medical condition, possibly a "sudden hypoglycaemia", resulting in the driver losing consciousness for a few seconds and regaining it shortly before the collision. The investigation measures that were taken are described in section 3.12.4.

Collision at tram stop Sälöfjordsgatan 2025

On 9 January 2025, two trams collided at the Sälöfjordsgatan stop in Gothenburg. A tram of type M29 ran into the rear of another tram that was standing at the stop. Both trams sustained damage. One passenger is reported to have injured their leg and left the scene before assistance arrived.

The investigation concluded that a contributory factor may have been that the driver experienced a brief "blackout" and therefore initiated braking too late. The investigation did not make any recommendations or propose any follow-up measures.

Collision on the Angered line 2024

On 26 February 2024, two trams collided on the Angered Line in Gothenburg. A tram of type M33 ran into the rear of another tram that was standing between Hjällbo and Gamlestadstorget stops. The speed at the moment of impact was approximately 60 km/h. Sixteen people were injured in the accident, one of them seriously. Both trams sustained extensive damage.

The investigation of the accident concluded that the driver had applied the brakes 0.36 seconds before the collision. The investigation was unable to determine why braking was initiated too late. The investigation considered a number of factors, including whether the driver had fallen asleep, lost consciousness or had their attention directed elsewhere.

The investigation made a number of recommendations, including that the Urban Environment Administration and Göteborgs Spårvägar should examine the possibility of introducing technical driver-assistance systems to reduce the risk of collisions with a preceding tram. Göteborgs Spårvägar has stated that the Urban Environment Administration has an ongoing project on driver support systems capable of providing a warning in the event of a collision risk.

Collision at tram stop Komettorget 2017

On 2 May 2017, two trams collided at Komettorget stop in Gothenburg. A tram of type M29 ran into the rear of another tram that was standing at the stop. Three people were injured and taken from the scene by ambulance. Both trams sustained damage.

The investigation was unable to determine a probable cause of the incident. One proposed measure was to install a CCTV in the driving cab to facilitate future investigations.

Collision at tram stop Beväringegatan 2011

On 8 September 2011, two trams collided at Beväringegatan stop in Gothenburg. A tram of type M29 ran into another tram that was standing at the stop. Forty-seven people were injured, five of them seriously. Both trams sustained extensive damage.

According to the investigation, the immediate cause of the accident was that the driver was inattentive and therefore noticed the tram ahead too late. The driver initiated braking approximately 12–14 metres before the collision. The investigation report states that the driver has no memory of the period after the tram departed the stop, before the collision.

The investigation proposed measures to prevent one tram running into another on segregated alignment[10], such as the introduction of an automatic train protection system (ATC) or some other system to alert the driver to a collision risk.

3.15.2 Tram derailment in Oslo (Norway) 2024

On 29 October 2024, a tram derailed on a diamond crossing in central Oslo and collided with a shop. The driver and three passengers sustained minor injuries. The accident has been investigated by the Norwegian Safety Investigation Authority.[11]

The accident occurred because the tram was being driven at a speed higher than that permitted through a set of points. The high speed was a consequence of the driver becoming acutely unwell and losing consciousness. At the time the driver lost consciousness, the master controller was positioned to full power and the driver's safety device was released.

Immediately before losing consciousness, the driver experienced sudden and very severe abdominal pain and a strong urge to vomit. The medical investigation conducted after the accident showed that the driver had become ill as a result of norovirus (winter vomiting disease). The condition developed acutely and the driver had no opportunity to prevent or avert the loss of consciousness.

The tram was fitted with a driver's safety device intended to stop the tram if the driver becomes unconscious. The system operated technically as designed, but the sequence of events was very short (about eight seconds from full power being applied and the safety device being released, to the collision). Because the system requires ten seconds to apply the brakes, it did not prevent the collision.

[10] Segregated alignment –A continuous length of dedicated track, used solely by tram vehicles. It may be provided with or without level crossings.

[11] Rapport om avsporing med trikk i krysset mellom Nygata og Storgata i Oslo, 29. oktober 2024.

The Norwegian Safety Investigation Authority did not issue any safety recommendations as a result of this accident.

3.15.3 Tram derailment at Croydon (United Kingdom) 2016

On 9 November 2016, a tram derailed on a curve at Sandilands Junction in Croydon, United Kingdom. The tram overturned as a result of the derailment. Of the 69 passengers on board, seven were fatally injured and 19 sustained serious injuries.

The UK Rail Accident Investigation Branch (RAIB) found that the tram was travelling at a speed in excess of the applicable limit for the curve concerned. According to RAIB, the high speed was most likely due to the driver having lost awareness, which in turn was thought to be the result of microsleep.

In its final report, RAIB made 15 safety recommendations. These included, among other things, reviewing technical solutions for monitoring driver vigilance, improving risk management and further developing safety management systems.

Light Rail Safety and Standards Board (LRSSB)

The Light Rail Safety and Standards Board (LRSSB) was established in 2018 in order to bring together the UK tramway industry to address the recommendations made by RAIB in its investigation into the Croydon tram accident. LRSSB works to promote safety improvements within the light rail and tramway sector.

To reduce the likelihood of a serious accident resulting from the overturning or derailment of a tram, LRSSB has published two guidance documents on driver inattention systems[12] and speed management systems.[13] The purpose of these documents is to support enhanced safety on tramways operated on a line-of-sight basis, where the driver is the sole barrier to unsafe operation of the vehicle.

The guidance documents emphasise the importance of cooperation between operators, infrastructure managers and other stakeholders to evaluate and implement systems that can detect reduced attentiveness or impaired performance in drivers, and initiating appropriate measures. LRSSB emphasises that no single measure on its own can provide a comprehensive protection against a lack of driver vigilance or speeding. However, the combined use of technical systems for driver monitoring and speed monitoring, operating in conjunction, offers a clear reduction in risk. LRSSB has informed SHK that there is positive experience of combining driver monitoring with technical systems for speed monitoring.

[12] LRG 17.0 Driver Inattention Systems Guidance.

[13] LRG 18.0 Speed Management Systems Guidance.

3.16 Actions taken

3.16.1 Göteborgs spårvägar

Göteborgs Spårvägar and the City of Gothenburg's Urban Environment Department have investigated the accident. The investigation makes the following recommendations.

- Install CCTV monitoring of the driving cab to facilitate future investigations.
- Complete the ongoing review of the function of the driver's safety device, with the aim of ensuring that the safety device is automatically re-armed after a defined time interval.
- Introduce a safety system similar to that used in cars, whereby a warning is generated if the driver's gaze leaves the instrument panel for a specified period.
- Complete the ongoing work to examine the possibility of more in-depth medical assessment when staff have been involved in an accident in which an acute medical condition may be a direct or indirect cause.

Göteborgs Spårvägar has stated that an investigation has been initiated to identify and assess which technical measures could further enhance safety in Gothenburg's tram operations and improve the ability to investigate accidents and incidents.

The investigation is to provide Göteborgs Spårvägar's management and board with a basis for decisions on technical measures that could reduce the risk of accidents.

Only technical systems related to vehicles and traffic control are included; organisational or legal issues are addressed only where they affect the technical solutions. The work is being carried out internally, with support from external expertise where required. The report is expected to be completed in June 2026.

4. Analysis

This section contains an integrated analysis of roles and responsibilities, rolling stock and technical installations, human factors, and feedback and control mechanisms, including risk and safety management and monitoring processes.[14]

SHK concludes that there were no faults in the infrastructure or technical defects on the tram that contributed to the accident, and that the driver was suitably qualified for the duties being performed.

Nothing has emerged to indicate any overarching systemic shortcomings in the emergency response. SHK has therefore not found grounds to analyse this aspect further.

[14] These items form part of the reporting structure laid down in Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed in the investigation of railway accidents and incidents. In this report, the headings have been adapted to reflect the nature and extent of the accident.

4.1 The accident

There is no evidence of any irregularities during the journey up to the Vasaplatsen stop. However, several deviations from normal operation occurred in connection with the stop at the tram stop. The braking was not carried out using the master controller, as is usual, but by operating the door-open button, and the tram came to a stand well beyond the normal stopping point at the stop.

The tram set off under full power and continued to accelerate until it reached the highest speed of the journey. During this time, the driver was seated in the driving seat with his arm resting on the left-hand armrest and his hand on the master controller in the power position, while the driver's safety device on the foot pedal remained operated. As a result, the tram continued to run at its maximum speed until the derailment occurred.

The tram derailed on the curve beyond the points because the lateral force in the curve exceeded the ability of the wheels to remain guided by the rails. As the derailment occurred, the driver was thrown sideways and pulled the master controller back towards the emergency brake position. The tram then continued in a derailed state across Avenyn until it collided with the restaurant building.

4.2 Why was the tram not brought to a stop?

4.2.1 The driver was the primary safety barrier

Tram operations in Gothenburg are based on line-of-sight working, in which the driver constitutes the primary safety barrier. This means that the driver is required to start and stop the vehicle at the correct locations, regulate its speed, observe and respond to signals and road signs, and remain alert to any potential obstructions on the line.

The driver had completed the training and medical examinations required to operate a tram in Gothenburg. Based on the driver's account of his health status prior to the accident, and on the examinations that have been carried out, there is nothing to indicate that the driver had previously experienced episodes similar to the one occurring in connection with the accident. There is also no evidence to suggest that the driver was affected by microsleep.

The investigation indicates that the driver experienced a severe impairment of consciousness after departing from Vasaplatsen, which resulted in the driver losing the ability to operate the tram. On the basis of the deviations observed in connection with the stop at Vasaplatsen, it cannot be ruled out that the deterioration in the driver's medical condition had already begun at that time.

Regardless of when the first symptoms occurred, it is likely that the driver was unaware of the developing medical condition. It is also unlikely that the driver could have foreseen the rapid and marked deterioration in his condition and the sudden impairment of consciousness.

As the driver constitutes the primary safety barrier against speeding and other accident risks, there has been reason to examine the technical safety systems intended to detect situations in which the human barrier fails. The purpose is to assess whether these systems provide an adequate level of protection to prevent, or mitigate the consequences of, similar events in the future.

4.2.2 The driver's safety device remained operated

To prevent a tram being operated without a driver, trams are generally fitted with a driver's safety device. In many tramway systems, the driver's safety device – typically a foot pedal, a master controller, or both – is the only technical means of monitoring the driver while the tram is in motion.

SHK's tests of the driver's safety device on tram type M31, the type involved in the accident, show that only minimal effort is required to keep the device operated when the driver's foot is resting on the pedal. However, to depress the pedal to its bottom position, and thereby apply the panic brake, an active downward force is required or a significant proportion of the driver's body weight must be borne by the pedal.

As the driver's safety device was the only system installed to monitor the driver's level of consciousness, the tram continued to move forward as long as the driver's foot remained on the pedal and the master controller was held in the neutral or power position. This is also evident from Göteborgs Spårvägar's own tests in October 2025 on tram type M31, where the results showed that the driver's safety device did not ensure that the tram would be brought to a stop in the event of a simulated loss of consciousness.

SHK's tests show that other tram types in Gothenburg which are fitted with a driver's safety device via a foot pedal are similarly not designed to handle situations where the driver suffers a sudden impairment of consciousness. For example, tram type M32 does not have a panic brake position, but instead a separate pedal for the magnetic track brake and panic brake, placed next to the foot pedal. For tram type M33, a significant amount of force is required to press the pedal to its lowest position and thereby activate the panic brake.

This means that the driver's safety device cannot always bring the vehicle to an automatic stop in the event of an acute deterioration in the driver's medical condition. The investigation therefore shows that the risk of an accident is not confined to the driver's safety device on the tram type involved in this accident.

There are no technical monitoring systems capable of detecting fatigue, distraction, illness or other conditions that affect a driver's ability to drive. As a result, important risk factors for impaired driving performance may remain undetected and unmitigated.

4.2.3 Absence of technical speed supervision systems

The speed of tram operations in Gothenburg is currently limited by a technical safety barrier on tram types M31, M32 and M33, which automatically cuts traction power and the supply to the traction motors when the tram reaches 60 km/h. This safety system is designed to prevent the vehicle exceeding the maximum permitted speed. However, the investigation shows that this measure was not sufficient to prevent the accident.

Furthermore, there are no technical safety systems that monitor the operation of the tram at speeds below 60 km/h. Nor is there any technical safety system integrated into both the vehicle and the track infrastructure that limits speed at critical points, such as a train protection system. The driver therefore constituted the only barrier against excessive speeds at critical points, such as when passing through a set of points where the maximum permitted speed in the curve position is 15 km/h.

4.2.4 Summary

The tram was not braked because the driver is responsible for regulating speed in accordance with conditions and thus constitutes the primary safety barrier against accidents. If the driver loses the ability to operate the tram, the driver's safety device is intended to ensure that the tram is brought to a stop.

However, the investigation shows that the driver's safety device in the foot-pedal was not designed to manage situations in which the driver suffers a sudden impairment of consciousness. The investigation further shows that there were no other technical systems, either on the vehicle or in the infrastructure, that monitored the driver's condition or the safe operation of the tram.

There was therefore no barrier capable of preventing the tram from entering the curve at excessive speed and derailing.

4.3 A systems-based perspective is required to improve safety

The accident demonstrates that it is not sufficient to rely on single barriers, such as the driver's actions or an individual technical safety system, to prevent serious incidents in tram operations. This is reinforced by analyses of previous accidents, both nationally and internationally, which show that dependence on a single barrier – particularly where the driver alone provides protection against speeding or derailment – increases the risk that human or technical failures will have serious consequences.

Experience from, among other events, the derailment at Croydon (United Kingdom, 2016), together with other tramway accidents, underlines the importance of introducing multiple independent barriers and of adopting a systems approach in which several barriers operate independently and in combination to prevent accidents.

4.3.1 Risk management should be strengthened when technical safety functions are introduced

SHK's review of the introduction of the foot pedal on tram type M21/M31 shows that the foot pedal with driver's safety device was not designed to detect whether a driver is fatigued, distracted, suffering from a medical condition or affected by any other state that may impair their ability to operate the vehicle safely. This is also confirmed by the examinations carried out by Göteborgs Spårvägar in connection with the investigation into a collision at Brunnsparken in 2025. Comparable limitations have been identified on other tram types, such as M32 and M33.

The analysis of the documentation submitted to the then Railway Inspectorate prior to the conversion of the M31, as well as the technical documentation for M33, shows that risk management has primarily focused on ergonomic aspects. The introduction of a foot pedal on tram type M31 has mainly been regarded as a natural development from an ergonomic perspective, with the principal aim of improving the driver's working environment and discouraging manipulation of the driver's safety device. This focus has meant that the risk of a driver suddenly suffering a deterioration in health, and the vehicle's safety functions then being unable to manage the situation, was not identified and has therefore not been fully addressed.

To ensure a robust level of safety, it is essential that future risk assessments also encompass scenarios in which the driver's health deteriorates acutely, and that the vehicle's safety functions are evaluated in relation to such events. It is important that these risk assessments are based on current knowledge and on methods that take account of human capabilities and limitations (Human Factors/Human–Machine-Interaction), so that both technical and human constraints are properly considered.

Göteborgs Spårvägar has initiated an investigation to identify and assess which technical measures could further enhance safety in tram operations and improve the ability to investigate accidents and incidents. In view of this, SHK does not issue any recommendation.

4.3.2 A comprehensive review of the safety systems is required

A number of incidents have shown that existing safety measures do not adequately prevent the risk of a tram being operated at a speed in excess of the permitted limit. Technical systems for speed monitoring can enhance safety.

Experience from LRSSB in Great Britain indicates that no single measure on its own can provide comprehensive protection against loss of driver vigilance and/or speeding. The introduction of driver- and speed-monitoring systems acting in combination leads to an overall improvement in safety.

It is important that infrastructure managers and operators, from a system-wide perspective, work continuously to improve and develop safety measures in the light of new experience and technological developments. The City of Gothenburg's Urban Environment Administration, as infrastructure manager, should therefore carry out a review of how speed-monitoring systems can be integrated with driver-monitoring systems.

4.3.3 A targeted supervision is required

The Swedish Transport Agency regularly supervises operators and infrastructure managers within the various tramway systems in Sweden. There are four cities in Sweden with tram networks, each with differing characteristics and operating conditions.

The investigation shows that there are differences between tram operations in Gothenburg and Stockholm, including with regard to safety systems. There are also no national requirements or standards to be followed when procuring new trams. These differences may therefore influence how risks are managed and the safety levels that are achieved in the respective systems.

The Swedish Transport Agency should therefore carry out targeted supervision of how operators and infrastructure managers manage overlapping risks in tramway operations, with a particular focus on overspeed and driver alertness.

4.3.4 The Swedish Transport Agency should review how the approval process could be improved

When new or modified safety functions are introduced on trams, such as the driver's safety device, approval from the Swedish Transport Agency is required. The statutory requirement is that the tram must be of such a standard that harm arising from its operation is prevented.

In the absence of clear regulations and guidance, it is, in practice, up to each manufacturer, owner and operator to determine what constitutes an adequate level of safety. This may increase the risk that safety functions are designed in different ways, with varying robustness and effectiveness, which can result in differing safety levels between vehicles. It can also result in functions that have historically been considered safe being incorporated into new vehicles without further risk assessment. For example, SHK's review of the specification of requirements for tram type M33 shows that, although the function of the driver's safety device was described, it was not from the perspective of detecting and managing a deterioration in the driver's state of health.

A key factor in achieving a safer operating environment is that human capabilities and limitations are taken into account both when learning from events and when designing measures to improve safety.

The Swedish Transport Agency has stated that it is appropriate for operators to carry out an analysis of human-machine-interaction as part of the vehicle approval process. The Swedish Transport Agency checks that such an analysis has been conducted, but does not examine the analysis itself in detail. This entails a risk that vehicles may be approved despite inherent shortcomings in the interaction between human and machine.

The Swedish Transport Agency should therefore review how the approval process can be developed, with particular regard to human-machine-interaction and experience gained from past occurrences, with the aim to improve the safety of tram operations in Sweden.

4.4 Conclusions concerning the post-accident medical care of the tram driver

The medical assessment and treatment following the accident were mainly focused on the acute injuries and not on identifying any underlying medical condition in the driver. As a result, the driver's state of health was not examined in greater detail during the healthcare contacts in connection with the accident.

This resulted in limited possibilities to determine the causes of the driver's impairment of consciousness. A more thorough medical examination of the driver immediately after the accident would have provided greater possibilities to clarify the cause, or at least to rule out certain causes.

The investigation has identified shortcomings in clinical handover between healthcare staff, in record-keeping and in the case management of the driver. In addition, no assessment was made of the driver's fitness to drive a car following the accident. It is important that any sudden deterioration in health is examined thoroughly as a possible contributory factor in an accident and that such an investigation is initiated as soon as possible.

Västra Götaland Region should therefore review the case management of the accident, and take the actions necessary to ensure that the future management of drivers in similar circumstances is appropriate. It was also noted that the occupational health service's investigation into a deterioration in health as an underlying cause of the accident was not commenced until several months after the accident.

Göteborgs Spårvägar has a responsibility as an employer to follow up and investigate suspected medical conditions that may affect operational safety. It is important that such an investigation is initiated without delay. In light of the fact that Göteborgs Spårvägar has begun work to improve the process for more in-depth medical assessment, SHK is not issuing any recommendation in this regard.

5. Conclusions

5.1 Findings

a) The accident occurred at the junction of Vasagatan and Avenyn in Gothenburg.
b) No faults in the infrastructure or the vehicle were identified.
c) The tram departed from the Vasaplatsen stop under full power. On board were a qualified driver and ten passengers.
d) After departure, the driver suffered a severe impairment of consciousness and lost the ability to operate the tram.
e) The tram continued to accelerate until it reached the maximum permitted speed for the tram type (60 km/h). The driver's safety device remained operated until the derailment.
f) The tram derailed on the left-hand curve towards Avenyn.
g) The tram then continued in a derailed condition and collided with the restaurant building.
h) Inside the restaurant were four people, one member of staff in the kitchen and three people in the dining area. Two people were standing outside placing an order.
i) Eight people were injured in the accident, three of them seriously. The tram and the restaurant both sustained extensive damages.
j) The medical assessment and treatment following the accident focused mainly on the acute injuries and not on identifying any underlying medical condition in the driver.
k) It has not been possible to establish the cause of the driver's impairment of consciousness.

5.2 Causes

The immediate cause of the accident was that the tram was travelling at excessive speed through a curve, which resulted in the tram derailing. The excessive speed occurred because the master controller remained in the power position and the driver's safety device remained activated, even though the driver had suffered a severe impairment of consciousness.

Göteborgs Spårvägar has not adequately addressed the risk that the tram's safety functions would fail to stop the vehicle if the driver was suddenly to suffer an impairment of consciousness.

There are currently no other technical systems for monitoring driver vigilance, nor are there any speed-supervision systems capable of intervening in the event that a speed limit is exceeded.

5.3 Other observations

5.3.1 Evacuation from the C section

During its investigation, SHK identified that the evacuation was delayed because door pair 3 (C section) closed shortly after two people had evacuated. SHK has therefore examined the emergency door release function in the C section and notes the following.

- To open the door in an emergency, the emergency release handle must be pulled down. The passenger must then pull the doors open manually. The emergency release handle is spring loaded and returns to its original position, which causes the door to close again after a few seconds (see figure 17).

Figure 17. Sequence of images illustrating the emergency door opening function in the C section. Note that, in the final image, the emergency release handle has sprung back to its original position.

- For the emergency release handle to remain in the emergency-open position, thereby keeping the doors open, it must be pulled down carefully (see figure 18).

Figure 18. Emergency opening of a door in the C section, with the emergency release handle still in the emergency-open position. In this condition, the door can be opened and will remain open.

Göteborgs Spårvägar's technical examination identified the following:

An anomaly was noted on door pair three (C section), where the emergency release handle did not always remain in the deployed position when operated briskly. As the doors in this section are electronically controlled, this could result in them returning to the closed position immediately after being operated. The function is to be rectified as part of the forthcoming overhaul of the fleet, in order to ensure a more robust and consistent emergency opening, regardless of how the handle is operated.

In view of the fact that this function is to be modified, SHK does not make any recommendation in this regard.

5.3.2 Strengthening accident investigation capability

Göteborgs Spårvägar has, in several previous accident investigations, been unable to determine the underlying causes, for example whether the driver may have suffered an impairment of consciousness. They have therefore repeatedly highlighted the need for CCTV monitoring of the driving cab to support safety investigations. In their investigation of the present accident, they again proposed the installation of such driving cab CCTV.

Göteborgs Spårvägar has stated that the question of CCTV monitoring of the driving cab has been considered on several occasions, but that the company has chosen not to proceed with implementation. It has now been indicated that the matter will be addressed within the remit of the current investigation directive, which SHK regards as a positive development for future investigative work. Improved opportunities to determine the sequence of events and underlying causes strengthen the conditions for taking measures that enhance safety in tram operations.

6. Safety recommendations

The Swedish Transport Agency is recommended to

- undertake a targeted supervision of how tramway operators and infrastructure managers manage overlapping risks in tramway operations, with particular focus on overspeed and the monitoring of driver alertness (see section 4.3.3).
  (SHK 2026:06 R1)

- review how the approval process can be developed, with particular regard to human-machine–interaction and experience gained from past occurrences, with the aim to improve the safety of tram operations in Sweden (see section 4.3.4).
  (SHK 2026:06 R2)

The City of Gothenburg's Urban Environment Administration is recommended to

- carry out a review of how speed monitoring systems can be integrated with driver monitoring systems (see section 4.3.2). *(SHK 2026:06 R3)*

Region Västra Götaland is recommended to

- review the case management of the accident, and take the actions necessary to ensure that the future management of drivers in similar circumstances is appropriate (see section 4.4). *(SHK 2026:06 R4)*

The Swedish Accident Investigation Authority respectfully requests to receive, by **21 August 2026 at the latest**, information regarding measures taken in response to the safety recommendations included in this report.

On behalf of the Swedish Accident Investigation Authority,

Anna Stenberg Lars Dahlin