Final Report

CROSS-PASSAGE DOOR INCIDENT ON CHANGI AIRPORT LINE

10 SEPTEMBER 2025

TIB/RAI/CAS.017

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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<u>The Transport Safety Investigation Bureau of Singapore</u>

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ABBREVIATIONS

ATPM	Automatic Train Protection Mode
CAL	Changi Airport Line
CC	Chief Controller
CGA	Changi Airport Station
CP	Cross-passage
EB	Eastbound
EMM	Engineering Maintenance Manager
OCC	Operations Control Centre
SM	Station Manager
SOP	Standard Operating Procedure
TC	Train Captain
TDM	Track Distance Marker
TNM	Tanah Merah Station
TSC	Train Service Controller
TSR	Temporary Speed Restriction
WB	Westbound
XPO	Expo Station

SYNOPSIS

At 1757 hours on 10 September 2025, the Train Captain of train T101 reported to the rail operator's Operations Control Centre that he heard a thumping sound when his train was travelling past Track Distance Marker (TDM)+8 in the tunnel between Expo Station and Changi Airport Station on the eastbound (EB) track of Changi Airport Line.

The thumping sound arose when T101 moved over an object lying on the left running rail of the EB track. The object was subsequently removed from the track and identified to be a metal cladding that had detached from a nearby cross-passage door.

The Transport Safety Investigation Bureau of Singapore classified this occurrence as an incident.

1 FACTUAL INFORMATION

(Note: Diagrams are not to scale)

1.1 Sequence of events

1.1.1 The Changi Airport Line (CAL) comprises three stations: Tanah Merah Station (TNM), Expo Station (XPO) and Changi Airport Station (CGA)[1]. It was served by two passenger trains at the time of incident: T101 and T102. The eastbound (EB) track from TNM to CGA is separate from the westbound (WB) track from CGA to TNM.

1.1.2 On 10 September 2025, a metal cladding of a cross-passage (CP) door in the tunnel of CAL was found on the EB track of CAL. Table **1** below summarises the sequence of events leading to the recovery of the CP door.

Time (hours)	Event
1757	T101 was travelling EB from TNM to CGA. The Train Captain (TC) of T101 reported to the Train Service Controller (TSC) in the rail operator's Operations Control Centre (OCC) that he heard a thumping sound when his train was travelling past Track Distance Marker[2] (TDM)+8 between XPO and CGA.
1805	T102, the next CGA-bound train, was travelling EB in manual mode from TNM to CGA. As directed by the Chief Controller (CC), TSC arranged for the station manager (SM) of XPO to board T102 at XPO in order to investigate the thumping sound.
1810:31 to 1811:50	T102 TC stopped the train at TDM+8 when T102 TC and XPO SM saw an object on the track in front of them. XPO SM started taking photos of the object. In the meantime, TSC noticed from the control panel that T102 had stopped and asked T102 TC if there was any problem moving his train. T102 TC replied to TSC that XPO SM was taking photos and that he would move T102. At this moment, TSC was still not aware that

[1] CAL is a turnaround service line with CGA and TNM being the end stations.
[2] TDM is a reference post or sign placed alongside the track to help railway staff pinpoint locations on the railway. TDM+8 in this case indicates to the TC that he is 800 metres away from CGA.

	there was an object on the track in front of T102. T102 TC assessed that the object would not obstruct his train's movement and moved his train forward. TSC asked XPO SM what photos were being taken and if there was anything on the track. Around the same time, T102 started to move and T102 TC did not notice any abnormal noise when T102 moved over the object. T102 TC stopped the train after the train had moved 12m and the object was now under the middle part of the first car of T102. After the train had stopped, XPO SM replied to TSC that there was something on the track, but he was not sure what it was and that he had taken a photo which he would send to CC (referring to the photo sent at 1813 hours).
1812	XPO SM reported to TSC that it was safe for T102 to proceed[3]. CC then authorised T102 to proceed to CGA. T102 TC did not notice any abnormal noise when T102 moved past TDM+8.
1813	XPO SM sent the following photo (**Figure 1**) to CC.  Figure 1: Photo of the object taken by XPO SM from T102 TNM SM boarded T101, the next CGA-bound train, to check for any abnormalities on the track. This was arranged by TSC earlier (at around 1809 hours), as directed by CC.

[3] According to XPO SM, he reported to TSC that it was safe for T102 to proceed because T102 had already moved over the object and he had not noticed any abnormality as the train moved over it.

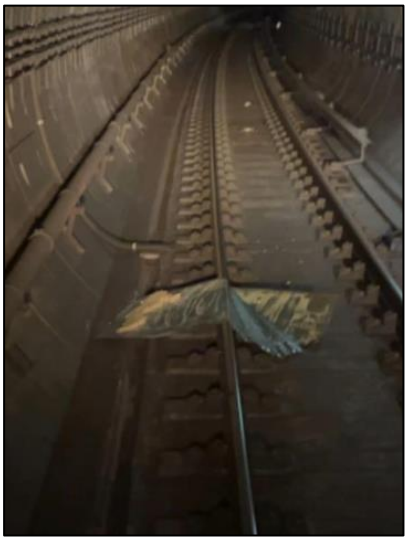
1826 to 1827	When T101 was approaching TDM+8, TNM SM reported to CC that he saw an object on the track. T101 stopped at TDM+8 before the object. Upon further viewing and discussion with T101 TC, TNM SM thought that the object looked like a metallic object. TNM SM reported to CC that there was a metallic-looking object lying on one of the running rails and that it was not safe for T101 to proceed.
1829	TNM SM sent a photo of the object to CC (see **Figure 2**).  Figure 2: Photo of the object taken by TNM SM from T101
1830	The OCC closed the EB track between XPO and CGA, routed T101 back to XPO and ordered detrainment of passengers.

Table 1: Sequence of events

1.1.3 The object was subsequently removed from the track and identified to be a metal cladding that had detached from a nearby cross-passage door (see paragraph 1.5).

1.2 Injuries to persons

1.2.1 No one was injured in the incident.

1.3 Damage

1.3.1 There were multiple train run-over marks on the metal cladding retrieved from the track (see **Figure 3**).

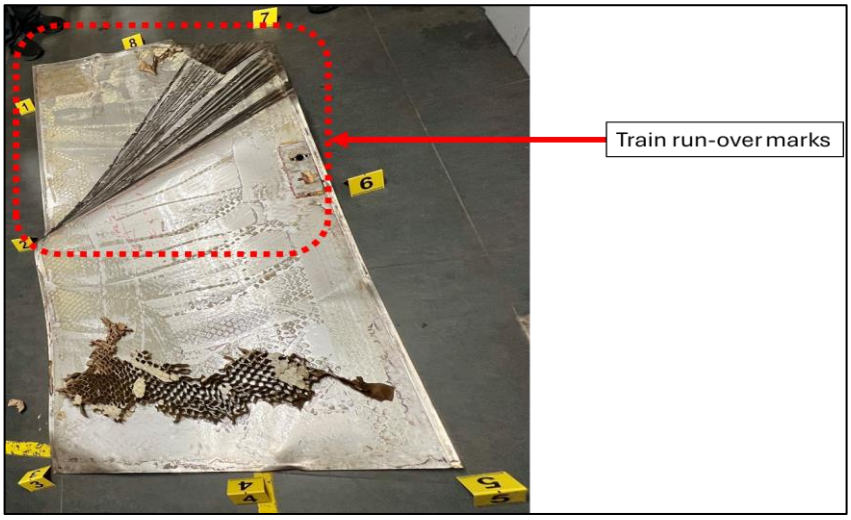


Figure 3: Train run-over marks on the metal cladding retrieved from the track

1.4 Personnel information

1.4.1 **Table 2** below shows the number of years of service with the rail operator of the personnel involved as well as their experience.

Personnel	Length of service at time of incident	Experience as in the role
CC	8 years	3 years
TSC	3 years	3 years
XPO SM	17 years	17 years
TNM SM	9 years	9 years
T101 TC	37 years	37 years
T102 TC	17 years	17 years

Table 2: Personnel information

1.5 Cross-passage (CP) door in CAL

1.5.1 Rail asset owner's specifications for CP doors

1.5.1.1 CAL was opened in two phases. Phase 1 operations, between TNM and XPO,

commenced on 10 January 2001. Phase 2 operations, between XPO and CGA, commenced on 8 February 2002. CAL has a total of 15 cross-passage (CP) doors, including one door for Tunnel Escape Shaft. They were installed in 2001, a few months before Phase 2 operations commenced, by the CAL builder contracted by the rail asset owner. The purpose of the CP doors is to prevent the spread of fire and smoke from one track tunnel to the other track tunnel.

1.5.1.2 The rail asset owner, who owns the CP doors, had the following design specifications for the CP doors:

Fire rating requirement

(a) Fire rating of two hours

Wind load requirements

(b) Ability to withstand a differential pressure of ±2,000Pa[4]

(c) Ability to withstand a cycle load of ±1,000Pa for six million cycles[5]

1.5.1.3 The CAL builder knew about the fire rating and wind load requirements from the rail asset owner. It submitted to the rail asset owner the technical drawings and certificates of compliance with the specifications in respect of the CP doors, both of which would include the fire-rating and wind load requirements. The rail asset owner is unable to locate any records showing whether the technical drawings and certificates of compliance for the CP doors were received from the CAL builder[6]. The rail asset owner does not have records that show these documents were provided to the rail operator. According to the rail operator, it did not receive such documents from the rail asset owner and was not aware of the rail asset owner's wind load requirements. It was aware of the fire rating requirement because it had noticed the CP doors had come with a fire rating certification sticker.

1.5.2 Replacement of CP door

1.5.2.1 One of the 15 CP doors in CAL was replaced by the rail operator in 2016. (The

[4] When a train approaches a CP, the piston effect creates a differential air pressure across the door. This differential air pressure could reach up to ±2,000Pa.
[5] As mentioned in Footnote 6, when trains pass by a CP, the CP door is subject to piston effect which creates differential air pressure across the door. The door endures such cycle of forces during the typical 18 hours of train service a day, 365 days a year.
[6] The handover by the CAL builder was 24 years ago.

replacement door is the subject of the incident in this report and is hereinafter referred to as CP10.) CP10 was a single-swing door which opened towards the EB track (see **Figure 4**).

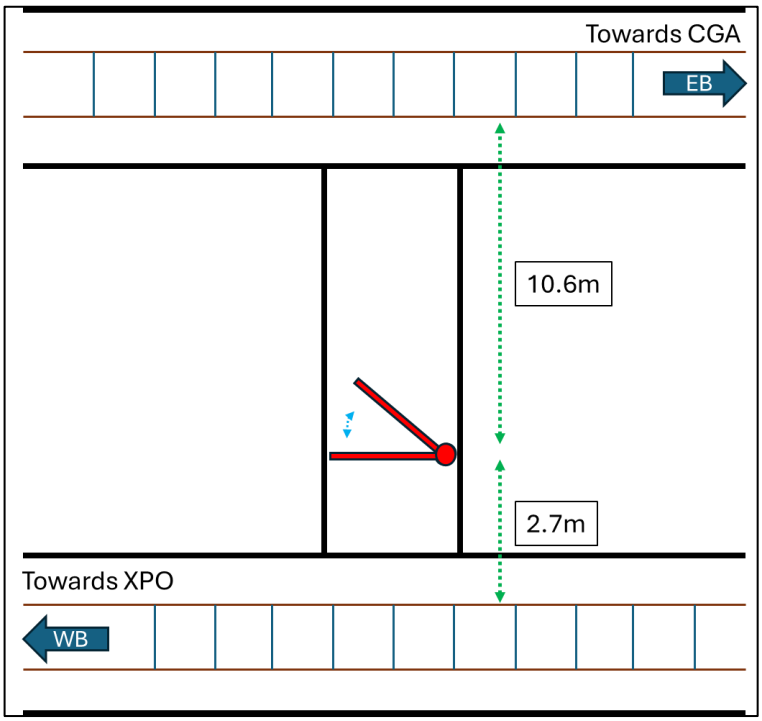


Figure 4: CP10 opening towards the EB track

1.5.2.2 The rail operator contracted a door supplier (hereinafter referred to as DS) to provide the door. The specifications for the door stated in the rail operator's contract with DS included a two-hour fire rating, door dimensions, door closer, lockset, and door handles. The contract did not specify any wind load requirements[7]. The rail operator believed that it was a straightforward one-to-one replacement of door with no modification involved. It did not ask the rail asset owner for permission to replace the door and did not check with the rail asset owner regarding the design drawings or the specifications for the CP door. According to the rail asset owner, rail operators were not required to inform or seek the approval of the rail asset owner when replacing an infrastructure asset (such as a CP door) on a one-to-one basis, provided the replacement adhered to the original specifications and there were no modifications to the asset's design or function.

[7] As mentioned in paragraph 1.5.1.3, the rail operator was not aware of the wind load requirements.

1.5.2.3 DS in turn contracted a door manufacturer (hereinafter referred to as DM) to manufacture CP10. DS conveyed the rail operator's contract requirements for CP10 to DM (e.g. two-hour fire-rating, door dimensions, door closer, lockset, and door handles). CP10 was installed by DS.

1.5.2.4 The construction of CP10 is shown in **Figure 5**. CP10 had a metallic frame structure of top rail, bottom rail[8], hinge stile and lock stile[9]. This frame structure was filled with paper honeycomb. The frame structure and honeycomb core were glued between two metallic skin claddings. There is no evidence that the metallic skin claddings were fastened or welded onto the metallic frame structure. The door is hinged to the door frame in the cross passage. CP10 had a lockset and a door closer for self-closing. CP10 had a sticker stating that it had a two-hour fire rating. The metal cladding found on the CAL EB track was from the side of CP10 facing the WB track.

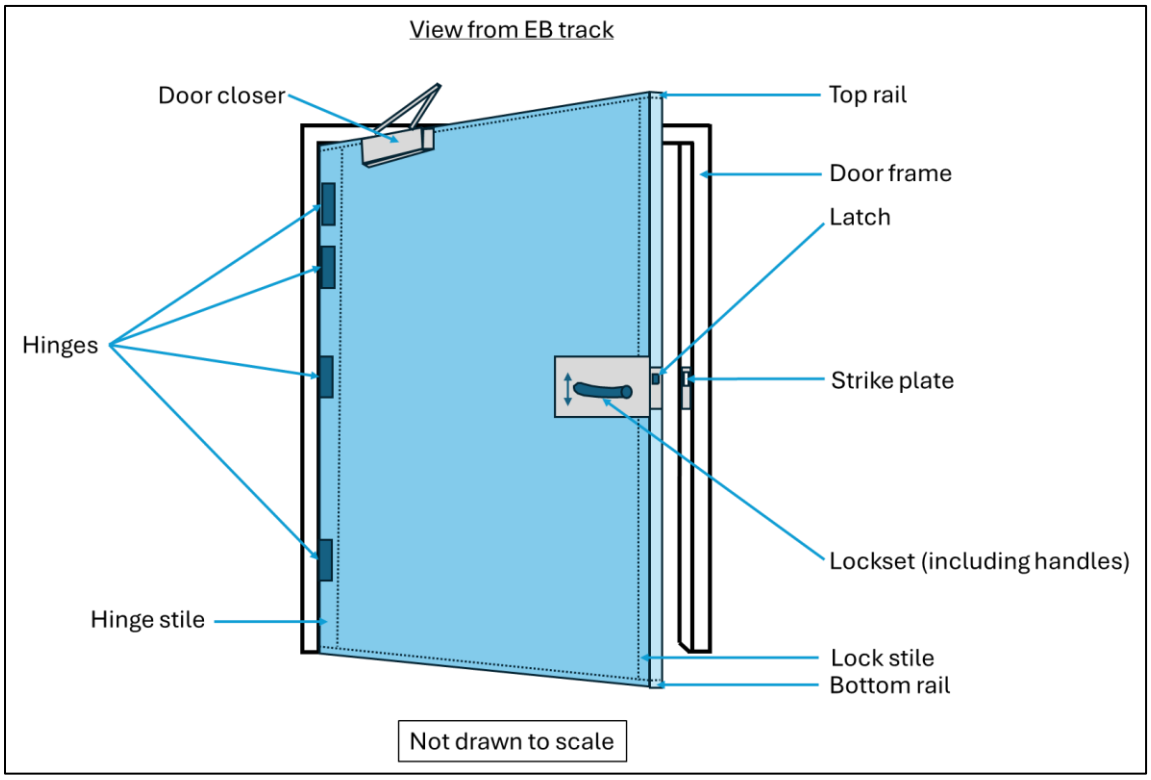


Figure 5: Construction of CP10

[8] A rail is a horizontal segment across the width of a door. A door can have a top rail, bottom rail and mid-rail depending on its design.
[9] A stile is a vertical segment of a door.

1.5.3 Lockset of CP10

1.5.3.1 CP10 was fitted with a lockset whose latch would engage a strike plate installed on the door frame. The construction of the lockset is shown in **Figure 6**.

(a) A spindle connected the two door handles.

(b) The handles were secured onto the spindle by two grub screws which would prevent the handles from slipping off the spindle.

(c) The spindle and handles assembly were secured onto the CP door with two mounting screws, one on each side of the door.

(d) The mounting screws should be inserted through the unthreaded bushings of one handle assembly to engage the threaded bushings on the other handle assembly.

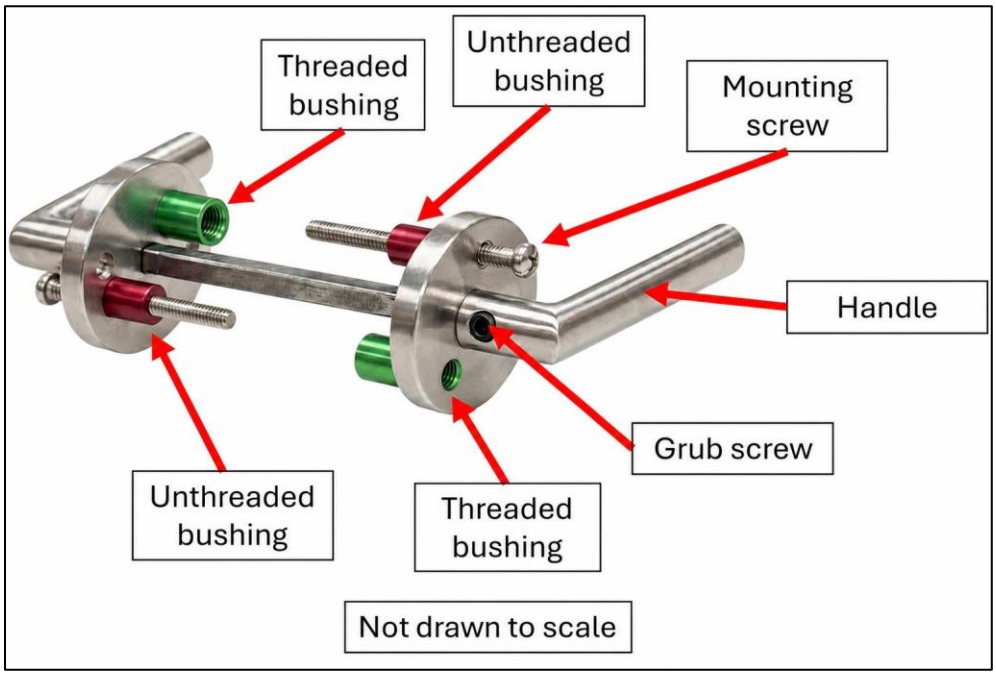
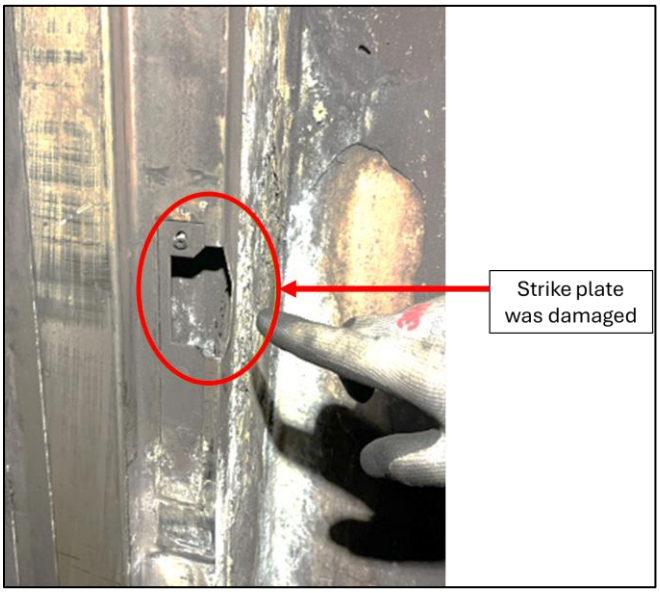


Figure 6: Lockset of CP10

1.5.3.2 The strike plate installed on the door frame of CP10 was found after the incident to have been damaged (see **Figure 7**).



(Source: Rail operator)

Figure 7: Damaged strike plate

1.5.3.3 The investigation team also noted the following as regards the mounting screws on CP10's lockset (see **Figure 8**):

(a) The mounting screws were inserted through the threaded bushings instead of being inserted through the unthreaded bushings to engage the threaded bushings in order to secure both handles together.

(b) The length of the mounting screws was of an incorrect length. Even if the mounting screws were installed correctly through the unthreaded bushings, the mounting screws were not long enough to engage the threaded bushings completely to secure the handles together.

(c) The mounting screws were self-tapping screws[10], which were not of the correct type of screw for the purpose of securing the handles. According to DM, who manufactured CP10, the mounting screws should be of the machine screw type[11] (see **Figure 9**).

[10] Self-tapping screws are fasteners designed to create their own threads as they are driven into materials eliminating the need for pre-tapped holes.
[11] Machine screws have precise threads for metal-to-metal connections, often used with nuts, pre-drilled holes or threaded bushings.

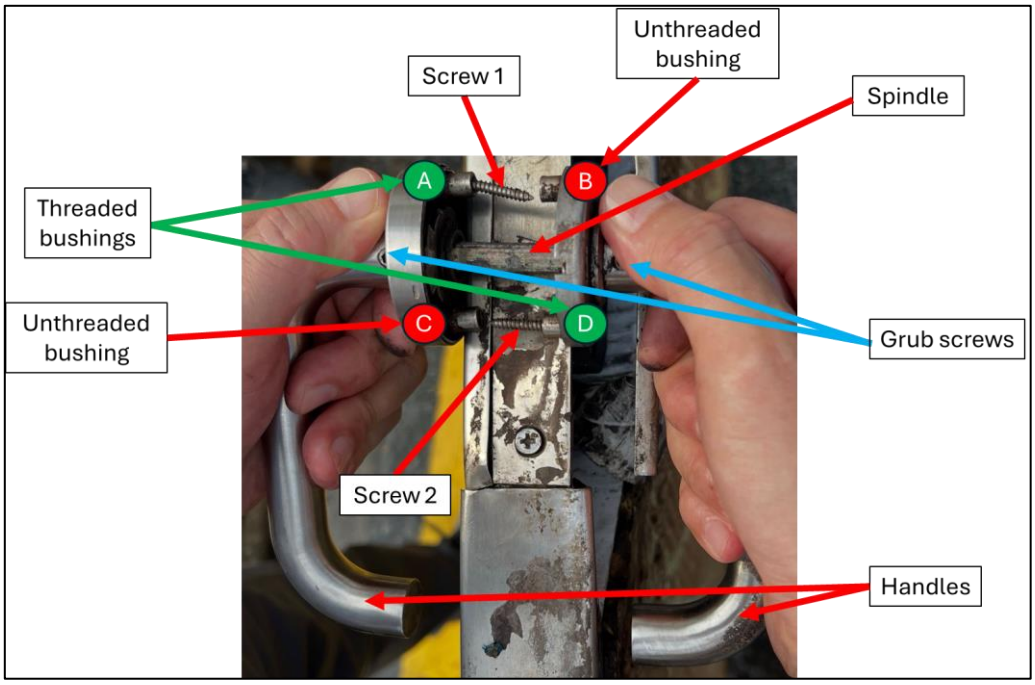


Figure 8: Lockset of CP10

Figure 9: Self-tapping screw (left) and machine screw (right)

1.6 Maintenance of cross-passage door

1.6.1 The CP door manufacturer and the CAL builder who installed the CP doors on CAL did not have a maintenance manual for the CP doors. They did not provide documents to the rail asset owner that would enable the latter, if it so wished, to draw up maintenance guidance for the CP doors, e.g. assembly drawings,

parts lists, troubleshooting or inspection instructions. The rail asset owner did not require the CP door manufacturer or the CAL builder to provide such documents.

1.6.2 The rail asset owner did not provide any guidance to the rail operator regarding maintenance of the CP doors. As such, the rail operator established on its own a 6-monthly preventive inspection schedule for CP doors and an inspection checklist for CP doors to be used by its maintenance teams. The checklist covers the following:

(a) Check the general conditions of the door, including door panel, hinge, handle, door closer, lockset and frame structure[12].

(b) Check the door panel for any signs of damage (e.g. cracks, dents, warping, corrosion, stain) and ensure that the door panel is in its original position.

(c) Check the door hinge for any signs of damage (e.g. corrosion, stain) and ensure that the hinge and the screw pins are in place.

(d) Check that the door handle is in place and ensure that its screw and cover plate are in place.

(e) Check that the door closer and lockset are in place and ensure that the door can be closed automatically when the door handle is released.

(f) Check the door frame structure for any signs of damage (e.g. corrosion) and ensure that the door can be closed automatically when the door handle is released.

The inspection checklist did not include checks specifically addressing cladding delamination as the rail operator at that time did not yet understand the potential risks associated with cladding delamination.

1.6.3 Maintenance teams may carry out repairs on doors during their inspections. The inspection checklist has a Remarks column for recording the defects found. However, the maintenance personnel will only record defects that cannot be rectified during the inspection, such as missing components, warped door skin

[12] According to the rail operator, strike plates are expected to be inspected as part of the door frame.

or corrosion[13]. After each inspection, a maintenance team will provide a report to a designated Chat group that includes the maintenance management team and the Engineering Maintenance Manager (EMM) (more about EMM in paragraph 1.6.4). The report summarises the inspection work carried out and indicates the defects found during the inspection that cannot be rectified during the inspection. As in the case of the inspection checklist, defects found that have been rectified during the inspection are not reported to the Chat group. The maintenance teams will also input into a maintenance database what they have recorded in the inspection checklist.

1.6.4 The inputs of the maintenance teams in the maintenance database are reviewed by the EMM. The EMM will decide whether the defects that have not been rectified during the inspection can be deferred until the next 6-monthly preventive inspection or will need more urgent actions. After the review, the EMM will sign off the checklist electronically in the maintenance database[14]. The EMM will inform the party that needs to take follow-up actions.

1.6.5 The investigation team reviewed the last two 6-monthly preventive inspections of CP10 carried out on 27 January 2025 and 24 July 2025. The investigation team noted the following:

(a) The remarks on the inspection checklists for 27 January 2025 and 24 July 2025 did not indicate any defect on CP10. However, the rail operator managed to find a photo taken by a maintenance team during the preventive maintenance on 24 July 2025 which showed that the maintenance team was rectifying the lockset of CP10 which had been found loose[15].

(b) The remarks on the inspection checklist for 27 January 2025 indicated that the bottom side of a CP door (CP4) was detached from the door and that there was corrosion on the door frame structure.

[13] The rail operator does not require its CP door maintenance personnel to record CP door defects that were found and rectified during inspections. As a result, it is not known whether small fixes (e.g. tightening of screws, replacement of parts or parts that were found loose repeatedly at each maintenance inspection) were ever made.
[14] The inspection of the 15 CP doors may be done over several days depending on track access availability and the condition of the door inspected. The EMM reviews the maintenance team's daily records and will only sign off electronically in the maintenance database after all the 15 CP doors have been inspected as an inspection package.
[15] According to one maintenance team member who had conducted the 24 July 2025 inspection, he could not recall the specific condition of the lockset during that inspection. Both he and another maintenance team member who are involved in CP door inspections said that they had not received training on lockset design specifications. They were also unaware of the distinction between threaded and unthreaded bushing designs.

1.6.6 The investigation team also noted that the remarks on the inspection checklist for 24 July 2025 indicated defects on three CP doors (CP4, CP9, CP12).

(a) For CP4, there was the same defect as found on 27 January 2025.

(b) For CP9, there was corrosion at the bottom side of the door.

(c) For CP12, there was missing lockset and handle, and the door was stuck and could not be opened. The EMM decided that a door replacement was needed.

1.6.7 The checklist of 24 July 2025 was not signed off by the EMM. According to the rail operator, follow-up action had been taken nevertheless (i.e. the EMM made the necessary request to a manager in charge of logistical arrangement to follow up to have CP12 replaced)[16].

1.7 Track circuit detection system

1.7.1 The railway signalling system has a track circuit detection system that can detect a metallic foreign object lying across both left and right running rails (thus completing the electrical detection circuit), and generate an alarm in the OCC.

1.7.2 In this incident, the metal cladding rested only on the left running rail and not across both left and right running rails. Hence, no alarm was generated in the OCC.

1.8 Additional information

1.8.1 The rail operator reviewed train video footages during the one hour before 1757 hours (when T101 TC reported the thumping sound at TDM+8 to the OCC) and noted that there were five train passes (2 x T101 + 3 x T102) over the TDM+8 track location. An object was captured in the trains' front-facing video cameras during the five passes, but the train captains did not notice anything unusual when the trains rolled over the object[17].

[16] According to the EMM, he was unable to sign the checklist due to a computer connection issue that prevented him from logging into the maintenance database. He then went on leave for three days and after that he forgot about the outstanding sign-off tasks. According to the rail operator, the EMM was counselled and reminded of his responsibilities which include signing off the checklist after his review.

[17] According to the rail operator, the operational lighting condition in the tunnel was such that the TCs might not be able to see the object.

2 ANALYSIS

The door cladding that had detached from CP10 and fallen onto the EB track was the cladding on the side of CP10 facing the WB track. This suggests that the door was in an opened position at the time of the cladding detachment. Had the door been closed, it would not have been possible for the door cladding to travel through the cross passage to reach the EB track.

The TSIB investigation team looked into the following:

(a) Why CP10 was in the opened position

(b) Detachment of CP10 door cladding

(c) Design specifications for CP doors

(d) Recording of CP door defects

(e) Trains' obstacle deflector and track circuit system

2.1 Why CP10 was in the opened position

2.1.1 CP doors in train tunnels are to be closed during normal train operations. There are two possible reasons that CP10 was opened:

(a) As mentioned in paragraph 1.5.9.2, the strike plate on the CP10 door frame structure was found after the incident to have been damaged. The damage was such that the latch of the lockset could not be retained by the strike plate on the CP10 door frame structure and CP10 was thus not effectively closed. However, it could not be established whether the damage to the strike plate pre-dated the incident or happened at the time of the incident.

(b) CP10's lockset was loose and the latch of the lockset was not engaging the strike plate and CP10 was thus not closed. The lockset appeared to have been repaired or reinstalled in an incorrect manner during maintenance inspections of CP10 in the past (i.e. mounting screws having been inserted through the threaded bushings, use of mounting screws of incorrect length, and use of self-tapping screws instead of machine screws). The lockset managed to stay integral probably thanks to the two grub screws that secured the handles onto the spindle, but

these grub screws were unlikely able to withstand the continual wind load on CP10 in the tunnel over a long period of time.

2.1.2 The investigation team is unable to determine the exact reason of CP10 becoming open.

2.2 Detachment of CP10 door cladding

2.2.1 As mentioned in paragraph 1.5.2.4, CP10 had a paper honeycomb core within a metallic frame structure of top and bottom rails and hinge and lock stiles, all of this being glued between two metallic skin claddings. The investigation team noted that the metallic claddings were not secured onto the metallic door frame structure through such means as mechanical fasteners or tag welding.

2.2.2 The investigation team doubts that metal-to-metal glueing would provide the necessary structural strength for CP10 to withstand the wind loads experienced by the door. The glue that bonded the claddings to the door frame structure and honeycomb core had most likely deteriorated. This resulted in delamination of the door cladding in this incident. It is unlikely that the delamination occurred suddenly as it would take time for the glue to deteriorate. The inspection checklist developed by the rail operator did not include checks specifically addressing cladding delamination as the rail operator at that time did not yet understand the potential risks associated with cladding delamination. As such, there was no information in the maintenance database pertaining to any delamination of the CP door cladding.

2.2.3 The investigation team wishes to highlight that while surface delamination that manifests visibly (e.g. bubbling, warping or separation at the edges) may be observable, there could also be subsurface or internal delamination that does not present any visible signs. For this latter type of delamination, special detection techniques may need to be considered (e.g. tap test, non-destructive testing).

2.3 Design specifications for CP doors

2.3.1 A contributing factor in the detachment of the door cladding is the inadequate design of CP10 to take the wind loads. There is evidence that CP10 had not been designed to meet the wind load requirements as the wind load requirements were not included in the door specifications that the rail operator

provided to DS. As mentioned in paragraph 1.5.1.3, the rail operator did not know that there were wind load requirements for the CP doors.

2.3.2 According to the rail asset owner, the document containing the CP door design specifications had been made available online since 2010, and it was the rail operators' responsibility to take note of the document and any specifications therein. However, the rail asset owner was unable to locate records informing the rail operators that the document was available online.

2.3.3 Making a document online to facilitate easy access by rail operators or members of the public is a commendable voluntary action on the part of the rail asset owner. However, rail operators are not obligated to access and review materials placed online unless specifically required to do so by the rail asset owner.

2.3.4 The rail asset owner was also of the view that, even if the document was not made available online, it would still expect the rail operators to request for a copy of the document from the rail asset owner. The investigation team opines that this may not be a reasonable expectation. Firstly, the rail operators would not have known what to ask for if they had not been aware that there was such a document. Secondly, it is incumbent upon the rail asset owner to clearly communicate its requirements and expectations to rail operators, rather than to assume that rail operators will proactively request for documents they do not know exist.

2.3.5 The rail asset owner is unable to locate any records showing whether the technical drawings and certificates of compliance for the CP doors were received from the CAL builder. The rail asset owner does not have records that show these documents were provided to the rail operator. According to the rail operator, it did not receive such documents from the rail asset owner. The rail asset owner has informed the investigation team that it has introduced a process in 2015 to record all handovers from 2015 onwards between the rail asset owner and rail operators (including handover of documents such as the CP door design specifications) as well as the rail operators' acknowledgements of handover. The rail asset owner believes that this process should help ensure that rail operators have the necessary technical documents such as the CP door design specifications. In this occurrence the CP door design specifications were not in the possession of the rail operator.

2.3.6 This situation underscores the importance of proper recording of a handover

process. There should be clear records of what was transferred from infrastructure builders to the rail asset owner and from the rail asset owner to the rail operator. Effective transfer should include clear issue and clear acknowledgement of receipt of the documents transferred.

2.4 Recording of CP door defects

2.4.1 The rail operator's practice of documenting only defects that could not be rectified immediately resulted in limited traceability of historical maintenance records. In this case of CP10, there is no way to determine whether the screws securing the lockset or strike plate had ever been replaced or removed during maintenance after the replacement door was installed in 2016. By not recording defects that were found and rectified during inspection, opportunities were missed for identifying recurrent issues across CPs (e.g. through tracking any trend in why certain CPs required more frequent screw replacements or tightening than others), which might have prompted closer monitoring and targeted troubleshooting.

2.4.2 The importance of proper record keeping cannot be over-emphasised. Proper maintenance records would facilitate a better understanding of the maintenance history of the items concerned. Without comprehensive records, the investigation team could only postulate that, in this incident, the lockset could have been repaired or reinstalled incorrectly during maintenance inspections.

2.5 Trains' obstacle deflector and track circuit system

2.5.1 Trains are equipped with obstacle deflector at the front of the trains in the form of a horizontal bar positioned about 105mm above the running rails. When a foreign object is sufficiently large, its impact to the deflector will trigger the train's emergency braking system and generate an alarm in the OCC.

2.5.2 The CP10 door cladding was 1mm thick and was flat. Its size and shape were such that it did not manage to trigger the train's emergency braking system. The track circuit system also could not detect the cladding, as the cladding rested only on the left running rail and not on both left and right running rails, a condition for creating a short circuit situation between the two running rails that would indicate an object's presence on the track. The cladding remained undetected through five consecutive train passes prior to T101 TC noticing a

thumping sound at 1757 hours.

2.5.3 The obstacle deflector and track circuit system have limitations in detecting thin and flat objects on tracks. These objects are a hazard to train operation and have the potential to cause a derailment. The investigation team opines that the early detection of such objects could reduce operational safety risks and prevent minor incidents from escalating into serious accidents. It would be desirable that technologies be harnessed to enable identification of such foreign objects on tracks. The rail asset owner has indicated to the investigation team that it is exploring ways to detect thin and flat objects on the track, e.g. mounting suitable sensors on passenger trains.

3 CONCLUSIONS

From the information gathered, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

3.1 The investigation team is unable to determine the exact reason of CP10's becoming opened but identified two possible reasons:

(a) The strike plate on the CP10 door frame was damaged and CP10 was thus not effectively closed.

(b) CP10's lockset was loose and the latch of the lockset was not engaging the strike plate and CP10 was thus not closed.

3.2 The detachment of CP10 door cladding could be due to the following:

(a) Delamination of the door cladding due to degradation of the glue that bonded the cladding.

(b) CP10 not being able to withstand the wind load requirements.

(c) Inadequate maintenance inspection of the door cladding condition.

3.3 According to the rail operator, at the time it replaced CP10, it was not aware of the CP door design specifications in terms of fire rating and wind load requirements. There is no evidence that the rail asset owner provided these specifications to the rail operator. It was aware of the fire rating requirement because it had noticed the CP doors had come with a fire rating certification sticker.

3.4 The rail asset owner published fire rating and wind load requirements for CP doors online but did not inform rail operators that these requirements are available online. The rail operators are not obligated to access and review materials placed online unless specifically required to do so by the rail asset owner.

3.5 There was limited traceability of historical maintenance records on CP doors as the rail operator did not require its CP door maintenance staff to record CP door defects that were found and rectified during inspections.

3.6 The obstacle deflector and track circuit system have limitations in detecting thin and flat objects on tracks.

4 SAFETY ACTIONS

Arising from discussions with the investigation team, the organisation(s) has/have taken the following safety action.

4.1 The rail operator:

(a) Inspected all the CP doors and reinforced the claddings of those CP doors found with cladding delamination issue using bolts to mitigate the risk of further delamination.

(b) Included in the checklist for CP doors a check specifically for CP door delamination.

(c) Required the recording of all defects identified during inspections, whether or not they are rectified on-site.

(d) Required managers involved in CP door maintenance to conduct monthly sampling checks of CP doors work records and checklists to ensure proper endorsement and compliance.

4.2 The rail asset owner sent an email to rail operators on 20 July 2026 informing them that the specifications of critical infrastructure (such as CP doors) are available online and providing a link to access them.

5 SAFETY RECOMMENDATIONS

In view of the safety actions taken by the rail operator and rail asset owner, the investigation team has no safety recommendation to propose.