

新聞稿

Press Release

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MTR Fully Implementing Recommendations about Enhanced Maintenance Regime and Contingency Arrangement following Train Incident at Yau Ma Tei Station

MTR Corporation today (12 January 2023) makes public the investigation report on the Tsuen Wan Line (TWL) train incident at Yau Ma Tei Station which took place on 13 November last year. The Corporation is implementing all the improvement actions recommended in the report, and making every effort to implement the comprehensive review on the asset management and maintenance regime, as well as the comprehensive trackside infrastructure and equipment survey, which was carried out earlier in response to the Yau Ma Tei Station incident and Tseung Kwan O Line incident on 5 December last year. These measures aim to further enhance the company's asset management.

Regarding the TWL train incident investigation, the improvement actions include upgrading or replacing all metallic protection barriers of similar nature, implementing specific inspections of all metallic protection barriers, completing a comprehensive trackside infrastructure and equipment survey as well as exploring using technology to provide real time monitoring on and alert for trackside installations. Modifications will also be made to ensure effective contingency arrangements during incidents. When the modifications are completed, trains will send a direct alert to the Operations Control Centre when the detrainment ramp is operated.

On 13 November 2022, a TWL train from Mong Kok Station hit a permanent fixed metallic protection barrier on the trackside which had dislodged, as it was entering Platform 2 of Yau Ma Tei Station. This has led to the front wheel axle of the train's first car moving off the rail and two pairs of train doors disengaged. After the incident took place, staff arranged passengers on board to leave the train to the platform at Yau Ma Tei Station. Meanwhile, some passengers used the rear end detrainment ramp of the train and walked to Mong Kok Station along the evacuation path along the track. TWL Line service between Lai King and Jordan stations was suspended and resumed on the following morning after recovery works.

The Corporation is greatly concerned about the incident and an Investigation Panel with three external experts was set up to identify the cause of the incident and make recommendations for improvement.

Investigation revealed serious corrosion at the mounting bolts and nuts of the metallic protection barrier at its base frames on the ground and on the tunnel wall, causing structural instability of the barrier. The barrier finally leaned over and intruded into the train path in the incident.

The metallic protection barrier including its components is a permanent fixed structure and is not directly connected to normal train operation. The barrier is an independent structure mounted on ground and does not need to support any load, structure, or equipment. This type of barriers is not often found in the railway network.

The Panel considered that the Corporation's asset management system does not have adequate granularity in categorizing civil structure assets for addressing metallic protection barriers specifically and there is no registration of the incident barrier and those of similar design intent in the system. There was hence no specific maintenance instruction to staff for inspection of the barriers. The Panel also made various recommendations to MTR on the maintenance regime and improvement measures.

"Safety has always been of utmost importance to MTR and we have always adhered to internationally recognised standard. In the wake of the recent incidents, the Corporation is conducting the comprehensive reviews on our asset management and maintenance regime, as well as the comprehensive trackside infrastructure and equipment survey, to reassure that we maintain the highest safety standard," said Dr Tony Lee, Operations Director of MTR Corporation.

Dr Tony Lee added, "We will try our very best to eliminate the potential risk of such incidents and are fully implementing the recommendations from the Panel related to the structural integrity risk of metallic protection barriers and focused maintenance arrangement. We are progressively upgrading or replacing all 57 metallic protection barriers of similar nature and conducting specific maintenance on the barriers. Our comprehensive trackside infrastructure and equipment survey will also explore using vision sensing/IoT technology to provide real time monitoring and alert on potential intrusion of trackside installations into the train path."

Investigation showed that when passengers were arranged to leave the train, the Public Announcement made on the train did not adequately express the intended message of detrainment to the platform of Yau Ma Tei Station. Due to the train's control cable being damaged in the incident, the train captain was not immediately notified when the detrainment ramp was opened by passengers.

Based on the recommendations of the Panel, the Corporation has taking action to add a function on all trains to send a direct alert to the Operations Control Centre when the detrainment ramp is operated. Training for Operations Control Centre and train personnel has also been reinforced including using standard phraseology during incident communication for effective detrainment. The Corporation will also enhance the dissemination of passenger information at stations and free shuttle bus routes during incidents.

The Corporation reiterates that provision of a safe, reliable and efficient railway service for the people of Hong Kong is always the top priority. MTR strives to enhance the asset management regime through conducting a comprehensive trackside infrastructure and equipment survey, and a comprehensive review on the asset management and maintenance regime.

The detailed findings of the investigation are set out in the Appendix.

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About MTR Corporation

To Keep Cities Moving, MTR makes encounters happen and rendezvous for a more connected tomorrow. As a recognised world-class operator of sustainable rail transport services, we are a leader in safety, reliability, customer service and efficiency.

MTR has extensive end-to-end railway expertise with more than 40 years of railway projects experience from design to planning and construction through to commissioning, maintenance and operations. Going beyond railway delivery and operation, MTR also creates and manages dynamic communities around its network through seamless integration of rail, commercial and property development.

With more than 40,000 dedicated staff*, MTR carries over 13 million passenger journeys worldwide every weekday in Hong Kong, the United Kingdom, Sweden, Australia and Mainland China. Together, we Go Smart and Go Beyond.

For more information about MTR Corporation, please visit www.mtr.com.hk.

*includes our subsidiaries, associates and joint ventures in Hong Kong and worldwide

Executive Summary

On 13 November 2022 (Sunday) at around 09:30 hours, a Tsuen Wan Line (TWL) passenger train from Mong Kok station (MOK) arriving at Yau Ma Tei station (YMT) Platform 2 came to a stop with approximately two train cars having entered the platform. The front wheel axle of the first train car was found off-the-rail. TWL train service between Lai King (LAK) and Jordan (JOR) stations was suspended as a result. Alternative railway routes were available for passengers at most of the TWL stations during the incident except Sham Shui Po (SSP), Cheung Sha Wan (CSW) and Lai Chi Kok (LCK) stations. TWL full line service was resumed at the start of traffic on 14 November 2022 after extensive recovery works. A total of 943 minutes of service suspension was recorded for the incident.

An Investigation Panel (“the Panel”) with external experts was established to investigate and identify the cause of the incident.

The investigation concluded that when the train was approaching YMT platform, a permanent fixed metallic protection barrier on trackside dislodged and the train hit the barrier leading to the first wheel axle of the train going off rail, and consequentially causing trackside equipment damages and two pairs of doors of the first train car being disengaged.

Post incident inspection on the incident barrier revealed serious corrosion at its mounting bolts and nuts at the two base frames on the ground and on the tunnel wall due to water seepage at the tunnel area. A more extensive corrosion occurred at the unexposed cavities inside the base frame and its mounting bolts, resulting in loss of mounting grip of the bolts to the ground and structure instability. As the two corroded mounting bolts on the tunnel wall eventually broke, the incident barrier leaned over and the train hit the barrier.

The permanent fixed metallic protection barrier was designed back in 1978 to guard against any off-the-rail train from entering the niches in the tunnel.

Currently there are established maintenance regimes with inspection of civil structures and reporting of defects. The Panel considered that, the incident barrier, by nature of it being a steel structure, should be covered under such classification. However, investigation revealed that there is

no registration of the incident barrier and those of similar design intent in the asset management system due to inadequate granularity in categorizing the civil structure assets for addressing them specifically and hence there is no specific maintenance instruction to staff for inspection of such, nor regular asset condition and train operation impact assessment conducted specific to the barrier. The current inspection regimes of civil structure had been focusing on civil structural issues such as concrete spalling resulted from water seepage, and their impact on critical equipment for train operation. Therefore, while rebar corrosion and concrete spalling with obvious severity to train operation in the vicinity were identified and followed up, the impact of water seepage on the incident barrier did not draw particular staff's attention for reporting.

There is a need to address the specific integrity risk of the barrier arising from corrosion and its consequence under the asset management system and call upon focused maintenance arrangement accordingly.

As for the service arrangement, it was observed that the order at affected stations and shuttle bus stops was generally good. Passenger needs had been closely monitored for suitably adjusting the shuttle bus arrangement and train services.

After review of the detrainment arrangement, the communication during the onset between the Operations Control Centre (OCC) and the Train Captain for the intended platform detrainment arrangement was based on different interpretations of the term 「車尾」 and an on-train PA was broadcast advising passengers to leave the train at rear end with staff assistance. The detrainment ramp was operated by passengers without the immediate notice by the staff due to control cable damaged in the incident.

The Panel made the following recommendations on enhancing maintenance, detrainment, and service arrangement for preventing the recurrence of similar incident.

Enhancement on maintenance

- a. Enhance the civil structure maintenance regime with specific maintenance given to all the metallic protection barriers <Completed>
- b. Enhance all metallic protection barriers of similar nature through

upgrading or complete replacement <by May 2025>

- c. Complete a comprehensive trackside infrastructure and equipment survey and formulate enhancement on any associated maintenance regimes whenever necessary <by 12 May 2023> The progress of the survey and enhancement identified would be reported monthly to the Government.
- d. Explore vision sensing/IoT technologies for developing tool to provide real time monitoring and alert on potential intrusion by trackside installations into train path <by May 2024>

Enhancement on detrainment arrangement

- e. Conduct reinforcement training to OCC and train staff on effective handling of detrainment <Completed>, and introduce the use of standard phraseology for communication between OCC and Train Captain on arranging detrainment <Started>
- f. Provide direct alert to OCC on the deployment of detrainment ramp for all passenger trains <by Dec 2024>
- g. Enhance current passenger education campaign with the element to refresh passengers about emergency detrainment arrangements during incident <by March 2023>

Enhancement on service arrangement

- h. Enhance passenger information dissemination at stations through various means including QR Code to update traffic information and recommend alternative train routes and other modes of transport for passengers to consider during incident <by March 2023>
- i. Review the free shuttle bus routes arrangement during incident with due consideration on alternative train routes and other modes of transportation in parallel <by June 2023>

1. Introduction

- 1.1 On 13 November 2022 (Sunday) at around 09:30 hours, a TWL passenger train from MOK arriving at YMT Platform 2 came to a stop with approximately two train cars having entered the platform. The front wheel axle of the first train car was found off-the-rail. TWL train service between LAK and JOR was suspended as a result. Alternative railway routes were available for passengers at most of the TWL stations during the incident, except SSP, CSW and LCK. After extensive recovery works, TWL full line service was resumed at the start of traffic on 14 November 2022.

2. The Investigation Panel

- 2.1 The Corporation was greatly concerned about the incident and therefore set up an Investigation Panel (“the Panel”) with Professor SL Ho (former Associate Vice President (Academic Support) of the Hong Kong Polytechnic University), Professor Ravi Ravitharan and Dr John Matthew Cookson (Monash Institute of Railway Technology, Monash University) to identify the cause of the incident, and make recommendations to prevent any recurrence.

3. The Incident

- 3.1 At around 09:30 hours on 13 November 2022 (Sunday), a TWL passenger train arriving at YMT Platform 2 came to a stop with approximately two train cars having entered the platform. After the incident, the front wheel axle of the first train car was found off-the-rail. Two pairs of doors of the first train car were disengaged with the car body and leaning against the platform edge. Sparks and dusty mist were reported by the Train Captain during the incident.
- 3.2 TWL train service between LAK and JOR was suspended as a result, with two loop services between Central (CEN) and JOR, and between Tsuen Wan Station (TSW) and LAK being maintained throughout. MTR Free Shuttle Bus services were arranged.

- 3.3 As part of the train was within the platform area, detrainment to platform was arranged with the assistance of staff through the third door of the second train car and the corresponding platform door for an estimate of about 600 passengers. An estimate of about 150 passengers however used the rear end emergency detrainment ramp of the train to descend onto the track and walked to MOK along the TWL track.
- 3.4 Due to the wheels of the first train car's front wheel axle being off the rail, various trackside equipment were damaged. Extensive recovery work was conducted by over 150 maintenance personnel and continued after traffic hours ended to ensure that it was safe for service resumption on the following day.
- 3.5 After post-recovery check was completed, TWL full line service was resumed at the start of traffic on 14 November 2022. A total of 943 minutes of service suspension was recorded for the incident. There were three cases of passenger sickness or injury reported, one was handled locally at station and the passenger left after taking rest, and the other two passengers received treatment in hospital and were discharged on the same day.

4. Cause of the Incident

Train hitting metallic protection barrier

- 4.1 According to the video footage of cab-front camera from the incident train, it was observed that when the train was approaching YMT platform, a permanent fixed metallic protection barrier (about 7 metres wide, 2.4 metres high, and approximately 1,700 kg in weight) at about 50 metres from the platform, had been dislodged from its normal position and intruded into the path of the train as illustrated in Annex. As a result, the train hit the barrier which in turn caused the first wheel axle of the train to move off the rail, and it came to a stop with approximately two train cars having entered the platform.
- 4.2 The detailed technical investigation, based on circumstantial

evidence, confirmed that consequential to the incident, two pairs of doors of the first train car were disengaged when they came into contact with the platform edge, and various trackside equipment were damaged, including trackwork, trackside signalling equipment, trackside power supply, platform screen door components, and different train components.

- 4.3 The train door design of the incident train was in line with relevant industry practice. Maintenance records of the incident train were examined and showed that the incident doors had been maintained according to the established maintenance regime in ensuring their mechanical integrity. The disengagement of the train doors was due to substantial force arising from the impact with platform when the train went off the rail. Benchmarking review will be carried out to explore possible risk mitigation measures for such consequential impact leading to door disengagement.

Dislodgement of the metallic protection barrier

- 4.4 Post incident inspection on the incident metallic protection barrier revealed serious corrosion at its twelve mounting bolts and nuts with five at each of the two base frames on the ground and two on the tunnel wall as illustrated in Annex. Corrosion wastage was apparent above the two base frames each with five mounting bolts and nuts, while with more extensive corrosion at the unexposed cavities inside the base frames and its mounting bolts, resulting in loss of mounting grip of the bolts to the ground. The loss of mounting grip led to structure instability and as the two corroded mounting bolts on the tunnel wall eventually broke, the protection barrier leaned over and intruded into the path of the train.

5. The Metallic Protection Barrier

Usage, wear and tear, and its surrounding environment

- 5.1 The metallic protection barrier including its components is a permanent fixed structure and is not directly connected to normal train operation. The barrier is an independent structure mounted on ground and does not need to support any load, structure or equipment. This type of barriers is not often found in the railway

network and there are 57 of them.

- 5.2 The cause of mounting corrosion of the metallic protection barrier was investigated. Based on technical investigation with external experts, a more concentrated corrosion occurred around the middle portion of the mounting bolts right between the interface of the base frame and mortar. Corrosion in such unexposed interface took place significantly faster than those in the exposed regions due to effects such as differential local reduction of oxygen concentration and stress on the bolts.
- 5.3 Site inspection revealed that there were significant corrosion related deposits and considerable water seepage along the tunnel walls near the incident site. Post investigation testing of water sample at the incident site revealed rich amount of chloride in the water and high electrical conductivity, both of which would lead to accelerated rates of iron corrosion.

Design intent

- 5.4 The metallic protection barrier was designed back in 1978 to guard against any off-the-rail train from entering the niches where it was installed and it may help reduce the damage of other equipment inside the niches in case of incident. It was secured stably by ten mounting bolts on the ground and two on the side wall in a tunnel environment with high humidity.
- 5.5 Detailed technical investigation with external experts revealed that the accelerated metal loss of the mounting bolts caused by corrosion attack from surrounding water with aggressive environmental properties led to loss of integrity of the mounting. The Panel is of the view that for barriers in such aggressive environmental condition, design enhancement shall be re-examined, such as mounting the barrier on raised plinth or with enhanced corrosion protection measure, etc. In addition, the consequence of intruding into the train path due to its falling risk should be assessed and designed out at the time when it was introduced in 1978, i.e., it should not lean to the trackside and intrude into the train path if it falls.

Maintenance arrangement

- 5.6 Under the asset management system, currently there are established maintenance regimes for inspection of civil structure and reporting of defects, including:
- a. Yearly visual inspection (VI) and 5-year detailed inspection (DI) under the Manual for Inspection of Railway Structures by civil works team and their consultant respectively
 - b. Track patrolling on a 72-hourly basis by Permanent Way (PWay) Patrolman
 - c. An enhanced reporting and action tracking mechanism implemented in early 2022 for managing water seepage and the impact on various equipment using a risk-based approach
- 5.7 The last yearly visual inspection had identified water seepage leading to concrete spalling and corroded rebar at the side wall of the niche at TWL D/T 5.151km, which is in proximity to the incident barrier. Follow-up actions by removing loosened concrete and applying coating on corroded rebar were implemented. Under the enhanced water leakage reporting mechanism, there were records of staff reporting water leakage affecting PWay equipment in the vicinity of the incident site.
- 5.8 Despite the above, there was no specific report of water impact on the incident barrier.
- 5.9 The Panel considered that, the incident barrier, by nature of it being a steel structure, should be covered under such classification. However, investigation revealed that there is no registration of the incident barrier and those of similar design intent in the asset management system due to inadequate granularity in categorizing the civil structure assets for addressing them specifically and hence there is no direct and focused maintenance instruction to staff for inspection of such, nor regular asset condition and train operation impact assessment conducted specific to the barrier. The current inspection regimes of civil structure had been focusing on civil structural issues such as concrete spalling resulted from water seepage, and their impact on critical equipment for train operation such as PWay, overhead line, etc. Therefore, while rebar corrosion and concrete spalling

with obvious severity to train operation in the vicinity were identified and followed up, the impact of water seepage on the incident barrier did not draw staff's particular attention for reporting.

- 5.10 There is a need to address the specific integrity risk of the barrier arising from corrosion and its consequence under the asset management system and call upon more focused maintenance arrangement accordingly.

Other barriers of similar design intent

- 5.11 A post-incident site survey by patrolling the mainline tracks of heavy rail network, high-speed rail and Light Rail was conducted and 57 metallic barriers of similar design intent (including the incident one) were inspected. Corrosive symptoms were found in some barriers in similar tunnel environment, and therefore some barriers have been dismantled as a prudent measure and others with enhancement measures taken and certified by Registered Structural Engineer or replacement planned as appropriate¹.

Comprehensive trackside infrastructure and equipment survey

- 5.12 The Panel supported the commencement of a comprehensive trackside infrastructure and equipment survey which could address if there are similar trackside installations demanding the same risk assessment and maintenance enhancement. Inspections and assessments with reference to the root cause of the incident had commenced, followed by categorization and risk appraisal in consideration of applicable contributory factors and benchmarking study on selected railway operators outside Hong Kong. The survey aims to provide a full snapshot of the current situation to the best possible effort, and from which on-going update monitoring, inspection, maintenance and asset management regimes with adoption of appropriate innovation and technology solutions will be developed with support from external advice and benchmarking.

¹ Enhanced track maintenance would be implemented at track sections on which barriers are dismantled pending replacement.

- 5.13 Apart from the asset management efforts to mitigate the risks at source, the Panel considered that there is a need to explore vision sensing/IoT technologies to provide real time monitoring and alert on potential intrusion into train path by trackside installations.

6. Incident Handling

Service arrangement

- 6.1 During the incident, TWL train service between LAK and JOR was suspended, with two loop services between CEN and JOR, and between TSW and LAK being maintained throughout. Additional Tung Chung Line (TCL) train service between Hong Kong and Tsing Yi stations was arranged to strengthen the alternative railway routes via TCL at LAK. During the incident, LAK, Mei Foo, Prince Edward (PRE), MOK and YMT stations were still served by TCL, Tuen Man Line (TML) and Kwun Tong Line respectively and remained open throughout the incident.
- 6.2 According to the established plan, MTR Free Shuttle Bus (S-Bus) Route T8 commenced operation between LAK and JOR in both directions since 10:12 hours and the operation of S-Bus was continuously monitored. In response to the passenger loading at PRE, additional single directional trips from PRE to LAK was arranged since 15:17 hours. To cater for passenger demands at affected stations (SSP, CSW and LAK) where alternative railway routes are not available, a special circular route linking up these three stations to Nam Cheong Station, where passengers can take TML and TCL, commenced service at 18:45 hours. About 900 bus trips were operated with over 40,000 passengers carried on the day.
- 6.3 Over 350 additional staff were deployed to strategic locations at stations and S-bus stops to provide customer caring to the affected passengers and assist in passenger flow management and S-bus operation. It was observed that the order at affected stations and shuttle bus stops was generally good.
- 6.4 Information on service arrangements was disseminated via various channels including Public Announcement (PA) systems,

Passenger information Display System at stations, “Traffic News” on MTR Mobile and the media.

- 6.5 The Panel is of the view that there are opportunities for further enhancing passenger information dissemination at stations with various means including QR Code to update traffic information and recommend alternative train routes and other modes of transport for passengers to consider during incident.

Detrainment arrangement

- 6.6 Upon assessing the site situation with part of the train berthing in YMT Platform 2, OCC arranged to detrain the passengers, with the assistance of staff, through the train doors and platform screen doors at the rear part of YMT Platform 2. Detrainment to the platform for majority of the passengers was conducted smoothly.
- 6.7 During the onset, the communication between OCC and the Train Captain for the intended platform detrainment arrangement was based on different interpretations of the term 「車尾」. According to radio communication records, in communicating the intended platform detrainment arrangement to the Train Captain on the onset of the incident, Traffic Controller of OCC said that the detrainment would be arranged at the tail end 「車尾」² together with the platform screen door to be manually opened as well as staff assistance to be provided. By that the Traffic Controller meant the tail end location of YMT platform on which the passengers were to be detrained. The Train Captain acknowledged that the detrainment would be at the tail end 「車尾」³ but the interpretation of the Train Captain is the tail end of the train, and PA was made accordingly. As reported by an off-duty staff on the incident train, on-train PA was broadcast advising passengers to leave the train at tail end 「車尾」 with staff assistance to be provided, and did not express the intended message adequately of detrainment to platform. Thereafter, some passengers used the rear end detrainment ramp of the train, which is designed to be a ‘self-help’ facility in case of emergency, to walk to MOK station along the evacuation path along TWL track.

² Tailend ‘車尾’ was referred by the Traffic Controller of OCC as the tail end location of YMT platform.

³ Tailend ‘車尾’ was referred by the Train Captain as the tail end of the train.

- 6.8 As the indication of the rear end detrainment ramp deployment did not reach the Train Captain because its control cable was damaged in the incident, the ramp deployment only came to the notice of an on-board YMT staff member assisting platform detrainment about eight minutes after its deployment. Thereafter, OCC arranged to stop the Kwun Tong Line (KTL) train movement from MOK to YMT as there is a TWL / KTL crossover area along TWL track from YMT to MOK. Staff at MOK were deployed to assist passengers to board the MOK platform. OCC also arranged track check between MOK and YMT to ensure that all affected passengers have safely boarded the platform.
- 6.9 As there is a time gap of around ten minutes between the detrainment ramp deployment and train holding, those passengers who walked along TWL track towards MOK would see trains running along KTL track at the cross-over area in opposite direction. All passengers had reached MOK orderly.
- 6.10 The Panel considered that additional direct alert to OCC on the deployment of the detrainment ramp, on top of the existing alert at the driving cab, should be provided and relevant emergency response arrangement for such alert should be enhanced. In order to aid communication clarity on detrainment arrangement, the use of standard phraseology between OCC and Train Captain is recommended. Current passenger education campaign should also be enhanced to incorporate the element to refresh passengers about emergency arrangement, including detrainment, during incidents. Provision to record on-train PA being broadcast will also be planned for implementation.

Recovery

- 6.11 Extensive recovery works were conducted by over 150 maintenance personnel and continued after traffic hours ended to ensure that it was safe for service resumption on the following day. Key recovery works included:
- a. jacking the off-the-rail wheels back onto the rail,
 - b. arranging the incident train to leave the site for assessing

- damages along the corresponding track, and
- c. repairing the damaged rail supports, signalling equipment, power cables and platform screen doors

Before the resumption of service on the following day, the maintenance team inspected the relevant components of other urban line trains and also conducted checks on similar barriers on TWL, KTL and the Island Line.

- 6.12 Upon the review by the Panel, it was considered that the recovery works had been conducted in an effective and orderly manner, and necessary measures have been taken to ensure that it was safe for service resumption.

7. Conclusion

- 7.1 The Panel concluded that when the train was approaching YMT Platform 2, a permanent fixed metallic protection barrier on trackside dislodged from its normal position and intruded into the path of the train. The train hit the barrier leading to the first wheel axle of the train going off rail, which in turn damaged various trackside equipment and two pairs of doors of the first train car were also disengaged as a consequence.
- 7.2 Post incident inspection on the incident metallic protection barrier revealed serious corrosion at its mounting bolts and nuts at the two base frames on the ground and on the tunnel wall. Corrosion wastage was apparent above the two base frames, with more extensive corrosion at the unexposed cavities inside the base frames and the mounting bolts, resulting in loss of mounting grip of the bolts to the ground. The loss of mounting grip led to structure instability and as the two corroded mounting bolts on the tunnel wall eventually broke, the protection barrier leaned over and intruded into the path of the train.
- 7.3 Under the asset management system, currently there are established maintenance regimes with inspection of civil structures and reporting of defects. The Panel considered that, the incident barrier, by nature of it being a steel structure, should be covered under such classification. However, investigation

revealed that there is no registration of the incident barrier and those of similar design intent in the asset management system due to inadequate granularity in categorizing the civil structure assets for addressing them specifically and hence there is no direct and focused maintenance instruction to staff for inspection of such, nor regular asset condition and train operation impact assessment conducted specific to the barrier. The current inspection regimes of civil structure had been focusing on civil structural issues such as concrete spalling resulted from water seepage, and their impact on critical equipment for train operation. Therefore, while rebar corrosion and concrete spalling with obvious severity to train operation in the vicinity were identified and followed up, the impact of water seepage on the incident barrier did not draw particular staff's attention for reporting.

- 7.4 As for the incident handling, the communication between OCC and the Train Captain during the onset for the intended platform detrainment arrangement was based on different interpretation of the term 「車尾」 and an on-train PA was broadcast advising passengers to leave the train at rear end with staff assistance, and the detrainment ramp was operated by passengers without the immediate notice by the staff due to control cable damaged in the incident.

8. Recommendations and Follow-up Actions

The Panel made the following recommendations on enhancing maintenance, detrainment, and service arrangement for preventing the recurrence of similar incident.

Enhancement on maintenance

- a. Enhance the civil structure maintenance regime with specific maintenance given to all the metallic protection barriers <Completed>
- b. Enhance all metallic protection barriers of similar nature through upgrading or complete replacement <by May 2025>
- c. Complete a comprehensive trackside infrastructure and

equipment survey and formulate enhancement on any associated maintenance regimes whenever necessary <by 12 May 2023> The progress of the survey and enhancement identified would be reported monthly to the Government.

- d. Explore vision sensing/IoT technologies for developing tool to provide real time monitoring and alert on potential intrusion by trackside installations into train path <by May 2024>

Enhancement on detrainment arrangement

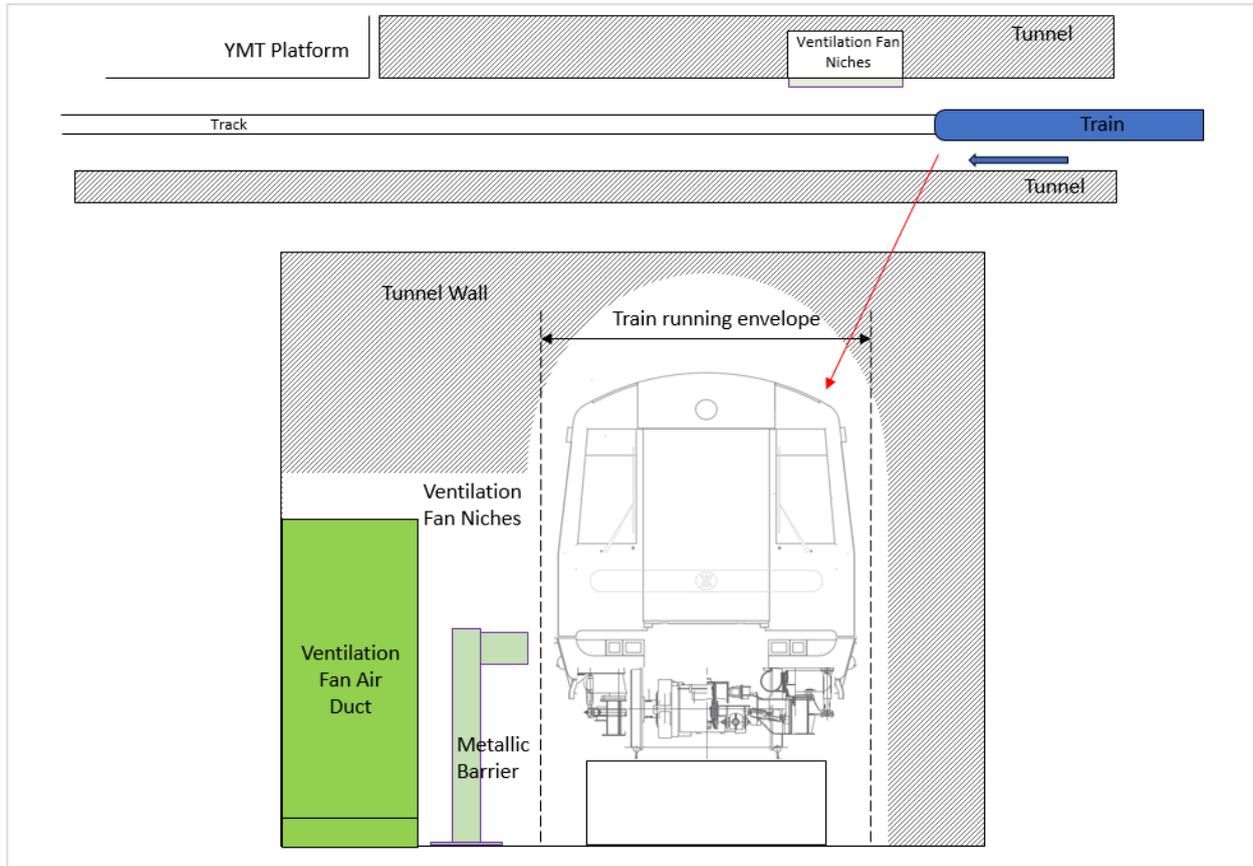
- e. Conduct reinforcement training to OCC and train staff on effective handling of detrainment <Completed>, introduce the use of standard phraseology between OCC and Train Captain on arranging detrainment<Started>
- f. Provide direct alert to OCC on the deployment of detrainment ramp for all passenger trains <by Dec 2024>
- g. Enhance current passenger education campaigns with the element to refresh passengers about emergency detrainment arrangements during incident <by March 2023>

Enhancement on service arrangement

- h. Enhance passenger information dissemination at stations through various means including QR Code to update traffic information and recommend alternative train routes and modes of transport for passenger to consider during incident <by March 2023>
- i. Review the free shuttle bus routes arrangement during incident with due consideration on alternative train routes and other modes of transportation in parallel <by June 2023>

Annex

Illustration of metallic protection barrier



For illustration purpose only

