

**COMMISSION OF INQUIRY INTO THE DIAPHRAGM WALL AND PLATFORM
SLAB CONSTRUCTION WORKS AT THE HUNG HOM STATION EXTENSION
UNDER THE SHATIN TO CENTRAL LINK PROJECT**

**REPLY WITNESS STATEMENT OF FU YIN CHIT
FOR
MTR CORPORATION LIMITED**

I, **FU YIN CHIT**, of MTR Corporation Limited, MTR Headquarters Building, Telford Plaza, 33 Wai Yip Street, Kowloon Bay, Hong Kong, **WILL SAY AS FOLLOWS:**

1. I am the Construction Manager–SCL Civil of the Shatin to Central Link Project ("**SCL Project**") of MTR Corporation Limited ("**MTRCL**"). I am duly authorised by MTRCL to make this statement on its behalf.
2. I first joined MTRCL in June 1994 as an Assistant Resident Engineer (Civil) on the Lantau Airport Rail ("**LAR**") project, and I remained in that position until March 1995. Thereafter:
 - 2.1. From April 1995 to June 1998, I was a Construction Engineer (Civil) ("**ConE**") on the LAR project.
 - 2.2. From July 1998 to December 1998, I was a Senior Construction Engineer (Civil) ("**SConE**") on the LAR project.
 - 2.3. From January 1999 to August 2002, I was a SConE for the Tseung Kwan O extension project. Thereafter, I left MTRCL and returned in November 2005.
 - 2.4. From November 2005 to October 2007, I was the Civil Construction Manager on the Shanghai (L9) project.
 - 2.5. From October 2007 to December 2009, I was the Civil Construction Manager on the Shenzhen (L4) project.

- 2.6. From January 2010 to February 2012, I was the Chief Construction Manager–Civil on the Shenzhen (L4) project.
- 2.7. In March 2012, I was assigned to Contract 1111 of the SCL Project as the Construction Manager–SCL Civil. From 30 May 2016 to this date, I have been the Construction Manager–SCL Civil on Contracts 1111 and 1112.
3. I obtained a Bachelor’s Degree in Engineering from the University of London, UK in 1983. I have been a member of the Hong Kong Institution of Engineers since August 1993, and I was previously a Chartered Engineer of the Engineer Council, UK, a member of the Institute of Civil Engineers, and a member of the Institution of Engineers, Australia.
4. I am providing this reply witness statement in response to the matters raised in the witness statement of Mr Lok Pui Fai (Senior Structural Engineer of the Buildings Department (“**BD**”) seconded to the Railway Development Office (“**RDO**”)), which I understand was submitted by the BD for the purposes of the Commission of Inquiry into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the SCL Project (“**Commission of Inquiry**”).
5. In this statement, I will specifically address the background and recent developments regarding the issue of honeycomb concrete at the soffit of the East West Line (“**EWL**”) slab, which was raised in paragraph 72 of the witness statement of Mr Lok Pui Fai submitted by the BD to the Commission of Inquiry **[H7/H2207]**.
6. Whilst I am aware of the matters discussed in this witness statement based on my first-hand observations and personal involvement in the SCL Project, and I confirm that the contents of this statement are true to the best of my knowledge and belief, there are occasions when I can only speak to matters by reference to MTRCL’s documents due to the lapse of time, in which case I believe the contents of those documents are true and correct.

Completion of the track slabs and snagging process

7. As explained in paragraph 14 of the witness statement of Mr James Ho (SConE) **[B1/B324]**, which I have had the chance to review, the last concrete pour of the EWL

track slab took place in August 2016, and the last pour of the North South Line (“NSL”) track slab took place in May 2016.¹ In other words, it was only in August 2016 that the EWL and NSL track slabs were both completed, and in or around late 2016, MTRCL was in a position to begin the process of checking the EWL/NSL track slabs and the diaphragm walls for snags and defects.

8. The Inspectors of Works (“IOWs”) were responsible for carrying out visual inspections of (amongst other things) Areas A to C on the EWL and NSL track level in order to snag the completed works, and for compiling ‘Snag Lists’ for the EWL and NSL track levels respectively – these Snag Lists are updated on a weekly basis.
9. I refer to paragraphs 17 to 24 of the second witness statement of Mr Kobe Wong (SIOW II) (which I have reviewed in draft), where Mr Wong explains that during MTRCL’s snagging process, the IOWs identified occurrences of honeycomb concrete which were visible at the soffit of the EWL track slab between gridlines 22 to 43 (i.e. Area C). This is attributable to the inadequate workmanship of China Technology Corporation Ltd (“CTCL”), who was the concreting subcontractor engaged by Leighton Contractors (Asia) Ltd (“LCAL”) for Contract 1112.
10. Based on my experience in the construction industry for over 30 years, workmanship issues in concreting works are not uncommon, and such issues could result in honeycomb concrete. These issues are often identified and rectified as part of the snagging process after the completion of the concreting works.
11. As explained in paragraphs 22 to 23 of the second witness statement of Mr Kobe Wong, remedial works were carried out to rectify the honeycomb concrete identified by MTRCL’s IOWs, and the close-out of this Snag List item was recorded in a Request for Inspection / Survey Check (“RISC”) form (RISC no. 1112-CIV-012398) in June 2017. The snagging process at the EWL and NSL track levels is still ongoing as at the date of this witness statement.

¹ The last concrete pours for the EWL track slab were in the area under the Hong Kong Coliseum (“HKC”), as Area HKC was excavated and constructed using a bottom-up methodology (i.e. from the NSL track slab upward to the EWL track slab): see the relevant pour dates as set out in the summary of dates for the EWL track slab [B5/B2904] and the NSL slab [B5/B2903] respectively.

Testing of EWL track slab concrete

(i) Pull-out test at soffit of EWL track slab

12. On top of the ongoing snagging process by MTRCL, from around February to December 2017, LCAL and its sub-contractor for architectural builder's works and finishing ("ABWF") carried out extensive pull-out tests at the EWL and NSL levels, and in particular, the tests on the NSL level were carried out at the soffit of the EWL track slab. The satisfactory completion of these tests was a prerequisite for the installation of the front-of-house metal ceiling system and ceiling-mounted signage.
13. I refer to paragraphs 25 to 27 of the second witness statement of Mr Kobe Wong, which explains that the pull-out tests were carried out by Qualitech Testing & Consultancy Ltd, and were witnessed by MTRCL's IOWs as recorded in ^{Tab S3-S8} a number of RISC forms. These RISC forms were expressly subject to the issuance of the final test reports for MTRCL's recordkeeping.
14. On 29 August 2018, LCAL submitted the final pull-out test reports for the NSL and EWL platform levels respectively under ^{Tab S2} Contractor's Submission Form ("CSF") no. 1112-CSF-LCA-ABWF-000674. In particular, reports no. 1701662-1 dated 8 February 2017, 1703534-1 dated 20 March 2017, and 1703613-1 dated 21 March 2017 were in respect of the soffit of the EWL track slab. Having now reviewed these test reports, it is clear to me that the results of all of the pull-out test reports were satisfactory, and there was no indication in these test reports of the existence of any concrete defect or honeycombing in the EWL track slab soffit at the locations tested.

(ii) In-situ concrete coring and compressive test

15. In addition to the extensive pull-out tests, LCAL carried out a series of in-situ concrete coring and compressive tests between October 2017 and January 2018 for concrete works with pulverised fuel ash ("PFA") contents >25% and <35%, in order to ensure that the concrete strength in the EWL and NSL track slabs was satisfactory.
16. As explained in paragraphs 14 to 17 of the second witness statement of Mr Louis Kwan (ConE II) (which I have reviewed), three random concrete core samples were taken from the top of the EWL track slab in October 2017, and another three core samples

were taken from the top of the NSL track slabs in December 2017, and those core samples were then tested at MTRCL's HOKLAS accredited project laboratory in Tsueng Kwan O.

17. The core test reports dated 2 November 2017 (EWL track slab) and 18 January 2018 (NSL track slab) were formally submitted by LCAL to MTRCL under CSF no. 1112-
^{Tab EE1}CSF-LCA-QUM-000185 on 26 January 2018. These core test reports demonstrate that the compressive strength of the concrete tested is satisfactory and, more importantly, that there was no honeycomb concrete at the core locations. These test reports were submitted to the BD's Mr Lok Pui Fai by ^{Tab S9}MTRCL's letter dated 17 July 2018.
18. More recently, in July 2018, MTRCL instructed LCAL to carry out concrete core tests on the EWL track slab, for the purposes of the load test proposed by C.M. Wong & Associates Ltd ("CMA"). These tests were carried out by Fugro Technical Services Ltd, and the ^{Tab S10}preliminary test results of the six core samples were circulated by MTRCL's Mr Raymond Chow (SConE) and copied to me on 31 July 2018. Once again, the test results showed that the compressive strength of the core samples was satisfactory, and there was no indication of honeycomb concrete at the core locations.
19. As such, it is clear that various concrete core tests have previously been performed on the concreting works completed by China Technology Corporation Ltd, and all the test reports indicate that no honeycombing was found at the core sample locations in the EWL and NSL track slabs.

Poor quality concrete identified in August 2018

20. In order to enable CMA to prepare and finalise its load test methodology, MTRCL had to identify potential locations at the soffit of the EWL track slab for the anchoring of the load test equipment. MTRCL therefore had to remove some of the ceiling building services, by erecting working platforms at the NSL platform level to reach the soffit of the EWL track slab.
21. During this exercise, MTRCL and LCAL's site staff observed suspected poor concrete quality at the EWL track slab soffit in or around late July 2018. Upon removing the loose / suspected defective concrete on the soffit surface and inspecting those locations

up close in August 2018, MTRCL identified poor concrete quality concealed above the soffit surface.

22. I have issued three Non-Conformance Reports (“NCR”) to LCAL (with marked-up plans and photos attached) to formally record the poor concrete quality observed on site, and in order to request LCAL to submit a formal remedial proposal for the rectification of the defects:

22.1. NCR no. 1112-NCR-CM(SCLC)-QUM-000258 dated 17 August 2018 [H13/H7499-H7504] – suspected poor concrete quality was observed on 26 July 2018 at gridlines 28 and 30, and loose/suspected defective concrete was removed on 9 August 2018 for further inspection.

22.2. NCR no. 1112-NCR-CM(SCLC)-QUM-000259 dated 17 August 2018 [H13/H7505-H7508] – poor concrete quality was observed at gridline 21 and notified to LCAL on 16 August 2018.

22.3. NCR no. 1112-NCR-CM(SCLC)-QUM-000260 dated 22 August 2018 [H13/H7509-H7515] – upon the trimming by LCAL of the concerned areas of the EWL track slab soffit to investigate the extent of the poor concrete quality, MTRCL carried out a further inspection on 21 August 2018 and observed poor concrete quality at gridlines 29 to 33.

23. In these circumstances, MTRCL and LCAL’s frontline staff are instructed to carry out joint investigations across the EWL track slab soffit, in order to verify whether there are any issues of poor concrete quality at other locations. It is estimated that the investigation of the front-of-house areas (i.e. above the NSL platform area) is likely to be completed around late October 2018, and the investigation of the back-of-house areas is likely to be completed around late November 2018.

24. On 29 August 2018, LCAL has submitted a method statement for the proposed remedial works to MTRCL under CSF no. 1112-CSF-LCA-CS-000964 [H13/H7521-H7675]. In essence:

24.1. For poor quality concrete with a depth of less than 50mm (i.e. shallow peeling concrete), LCAL proposes to trim or clean the affected area of the EWL track

slab soffit until sound concrete is reached, and then patch it up using a single component structural grade polymer modified concrete reinstatement mortar known as 'Renderoc S'.

- 24.2. For poor quality concrete with a depth of over 50 mm (i.e. void/honeycomb with exposed steel rebars), LCAL proposes to use a single component structural grade polymer modified concrete reinstatement mortar known as 'Renderoc LA55' to pressure grout the EWL track slab soffit.
25. On 29 August 2018, MTRCL provided the three NCRs on poor concrete quality to the RDO [H13/H7495-H7515], and on 30 August 2018, LCAL's remedial proposal was submitted to the BD/RDO for comment and approval [H13/H7519-H7675] – this was notified to LCAL by the ^{Tab S11} Engineer's Response dated 4 September 2018. As at the signing of this witness statement, MTRCL is still awaiting BD/RDO's response. Once the remedial proposal has been approved by the BD/RDO, LCAL can proceed to commence the relevant remedial works at the EWL track slab soffit.
26. On 30 August 2018, MTRCL requested its Detailed Design Consultant, Atkins (China) Ltd ("Atkins"), to inspect the locations referred to in the three NCRs and the soffit of the EWL track slab inside the Over Track Exhaust ducts. On 10 September 2018, ^{Tab S12} Atkins issued an inspection note confirming that *'[b]ased on the defects inspected, there is no imminent danger as there are no obvious cracks around these locations'*.
27. Further, LCAL has separately requested an independent engineering consultant, CEEK Ltd to carry out a preliminary study of the defects in the concrete at the bottom face of the EWL track slab, so that the Registered Structural Engineer ("RSE") can issue a statement that the slab is safe to allow the continuation of the construction activities (including the continued running of trains) above and below the slab. On 14 September 2018, the RSE of CEEK Ltd, Mr Peter John Clark, issued a ^{Tab S13} Preliminary Statement of Safety, which confirmed that *'for the purposes of this interim check, as long as the capacity factor is 95% or more and the residual load factor is therefore more than 1.33 it is proposed that there is no urgent need to suspend construction activity in the zones affected'*.
28. In the light of the above, and subject to further investigations and statements/reports, the poor concrete quality observed by MTRCL as at this date does not pose any

material safety or structural risks. I am conscious that this is an ongoing process, and MTRCL will provide information of any relevant further developments in order to assist the Commission of Inquiry.


29. In any event, LCAL has now engaged a specialist subcontractor to remedy the poor concrete quality identified on site, and LCAL's proposed remedial works will address any public concerns arising from the issue of honeycomb concrete.

30. Finally, I would like to mention the following:

30.1. Some of the events in question and which form the subject matter of the Commission of Inquiry took place one to two years ago and my recollection of every detail is not therefore perfect.

30.2. Accordingly, in preparing this witness statement I have reminded myself of the events in question by reference to various hard copy and electronic documents and materials, including contemporaneous email correspondence, contractual documents and other records. I understand these materials were retrieved by MTRCL's Legal Department, with the assistance of the MTRCL's external lawyers, Mayer Brown.

Dated 12th October 2018



FU Yin Chit

Corrigendum to the Reply Witness Statement of Fu Yin Chit
dated 12 October 2018

Page	Paragraph	Content
B13684	22	Replace “I have issued <u>three</u> Non-Conformance Reports (“NCR”) to LCAL (with marked-up plans and photos attached) to formally record the poor concrete quality observed on site” with “I have issued <u>four</u> Non-Conformance Reports (“NCR”) to LCAL (with marked-up plans and photos attached) to formally record the poor concrete quality observed on site <u>at the soffit of the EWL track slab</u> ”
B13684	22.4	Insert new paragraph 22.4: “NCR no. 1112-NCR-CM(SCLC)-QUM-000264 dated 5 September 2018 – upon the ongoing trimming of loose concrete and investigation of the extent of defects at the EWL track slab soffit, MTRCL carried out yet a further inspection on 3 September 2018 and observed additional exposed rebars after the trimming of loose concrete at gridlines 22 to 27, 29 to 32 and 34 to 39.”