

**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 WONG CHI CHIU
FOR
MTR CORPORATION LIMITED**

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

1. I am currently a Site Representative in the Property Division of MTR Corporation Limited (“**MTRCL**”). From June 2013 to October 2015, I was an Inspector of Works (Civil) (“**IOW**”) for Contract 1112 on the Shatin to Central Link Project (“**SCL Project**”), and from November 2015 to March 2018, I was a Senior Inspector of Works II (Civil) (“**SIOW II**”) for Contract 1112 on the SCL Project.
2. I have previously given a witness statement dated 20 August 2018 **[B1/B417-B447]** in connection with the 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 (“**Commission of Inquiry**”).
3. I understand that MTRCL is now in receipt of the witness statements submitted by the other involved parties in the Commission of Inquiry. I am providing this second witness statement in order to respond to a number of matters raised in the witness statements submitted by Leighton Contractors (Asia) Ltd (“**LCAL**”), Intrafor Hong Kong Ltd (“**Intrafor**”) and by the Government. In particular, I will be addressing the following issues raised:
 - 3.1. **Construction of the diaphragm walls** – paragraph 45 of the first witness statement of Mr Karl Speed (General Manager of LCAL) **[C11/C7605-C7606]**, paragraphs 138 to 139 of the witness statement of Mr Jean-Christophe Jacques-

Olivier Gillard (Director of Intrafor) [F1/F61-F68], and paragraphs 13 to 28 of the second witness statement of Mr Gillard [F34/F19764-F19765];

3.2. **Comments on photos and videos in media reports** – paragraphs 53 to 70 of the witness statement of Intrafor’s Mr Gillard [F1/F42-F45]; and

3.3. **Honeycomb concrete at the soffit of the East West Line (“EWL”) track slab** – paragraph 72 of the witness statement of Mr Lok Pui Fai (Senior Structural Engineer of the Buildings Department (“BD”) seconded to the Railway Development Office (“RDO”)) [H7/H2207].

4. 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.

Construction of the diaphragm walls

5. I have read the summary of the construction methodology of the diaphragm walls in paragraph 45 of the first witness statement of LCAL’s Mr Karl Speed [C11/C7605-C7606], and paragraphs 138 to 139 of the witness statement of Intrafor’s Mr Jean-Christophe Jacques-Olivier Gillard [F1/F61-F68].

6. I have previously set out a high-level summary of the construction sequence of the diaphragm walls in very general terms in paragraph 24 of my first witness statement [B1/B422-B424]. I would like to take this opportunity to go into a bit more detail on the construction sequence set out in the relevant method statement and clarify what I have previously outlined:

6.1. I am aware that the method statement for diaphragm wall construction has evolved between July 2013 and April 2014 in order to adapt the works to on-site conditions. For present purposes, it is sufficient to focus on the last method statement submitted by LCAL on 4 April 2014 under Contractor’s Submission Form (“CSF”) no. 1112-CSF-LCA-FDN-000009B [B5/TS18-TS192] (“Method

Statement”), which is the version referred to in paragraph 24.1 of my first witness statement [B1/B423].

- 6.2. In respect of paragraphs 24.2 to 24.4 of my first witness statement [B1/B423-B424], I should make it clear that the rebar cages were fabricated either in advance in the bending yard, or in-situ at the panel location. In either case, the steel rebar cages were fixed and fabricated before being lowered into the trench at the panel location.
- 6.3. For steel rebar cages with not more than 2 layers of reinforcement (generally in the lower portion of the panels), the cages were typically fabricated in the bending yard on L-frame workbenches (see **Image 1** below) with all coupler connections and necessary links, as described in paragraph 6.10.2 of the Method Statement [B5/TS59]. The transportation of these cages to the panel location is described in paragraph 6.10.3 of the Method Statement [B5/TS61-TS62].

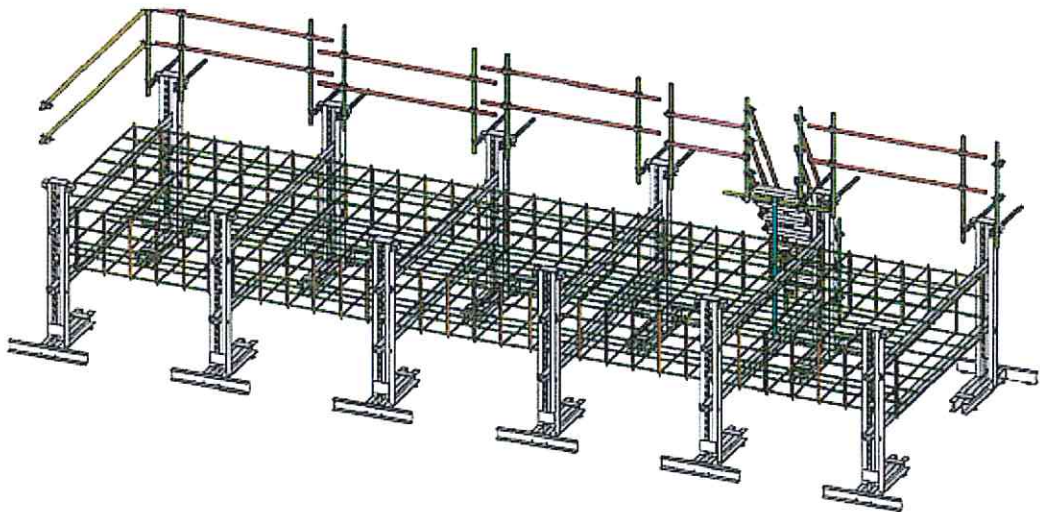


Image 1: Method Statement figure 6.10.2.1 showing L-frame workbench

- 6.4. For steel rebar cages with 3 or more layers of reinforcement, the fixing of the cages were typically completed in-situ at the panel location. Paragraph 6.10.1 of the Method Statement sets out three splicing options (depending on the number of layers of main bars to be fixed in-situ) [B5/TS55-56], as shown in **Image 2** below.

- **OPTION 1 –**

- There is good access for steel fixers to tighten the couplers and spacing bars provides good support to help positioning the bars better alignment.
- However usage of this option is restricted because of the presence of many starter bars. Fitting reinforcement layer through the starter bars may be difficult and bring damages to starter bar couplers.

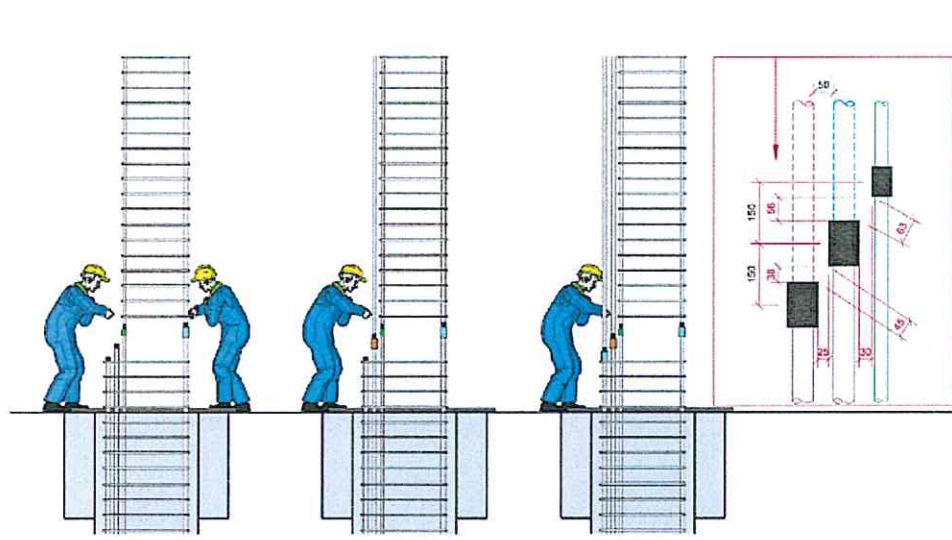
- **OPTION 2 –**

- There is no access problem for steel fixers to tighten the vertical coupler bars and spacing bars.
- This alternative is believed involves more in-situ tightening compare to option 1. However, more flexibility has provided on install horizontal starter bars together with the main bars tightening.

- **OPTION 3 –**

- This alternative is believed involves in-situ tightening of short connection bars (700mm – 1000mm). Compared to full face of reinforcement in Option 1, it is believed to be faster for fixing but increases the coupler quantity demand.

6.5. Due to spatial constraints and/or low headroom, suitable lifting cranes were used for lifting and lowering the steel rebar cages into the trench. Each cage with 3 or more layers of reinforcement was fabricated in-situ while the fabricated cages below were supported with suspending bars/beams sitting on the guide wall. This is described in paragraph 6.10.4 of the Method Statement [B5/TS63], and can be illustrated by the figures in the Method Statement showing splicing options 1 and 2 (see **Image 3 to 4** below).



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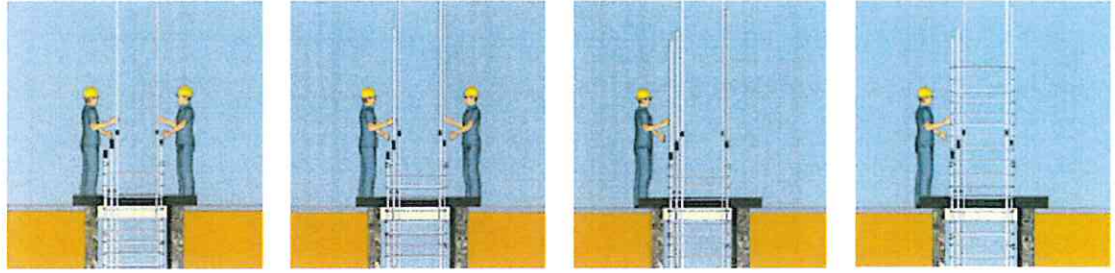


Image 4: figure in Method Statement showing splicing option 2

- 6.6. The items referred to in paragraphs 24.2.1 to 24.2.4 of my first witness statement [B5/B423] had to be inspected by an IOW/AIOW/Works Supervisor upon the fabrication of each cage, whether it was a cage fabricated in the bending yard or a cage fabricated in-situ at the panel location. Further, as I have said in paragraph 24.3 of my first witness statement [B5/B423], the cage-to-cage connections and installation process were also inspected by an IOW/AIOW/Works Supervisor. It was on this basis that the shop drawings for each panel were typically countersigned by MTRCL's IOWs/AIOWs/Works Supervisors.
7. Based on the process outlined in paragraph 24 of my first witness statement [B1/B422-B424] and further clarified above:
- 7.1. In relation to Mr Gillard's statement at paragraph 269 of his witness statement [F1/F93] and paragraphs 15 and 59 of Mr Gillard's second witness statement [F34/F19764, F19771], I am confident that most coupler connections between rebar cages for the diaphragm walls were systematically inspected and signed off by MTRCL, which was over and above the requirements of '*Quality Supervision Plan on Enhanced Site Supervision & Independent Audit Checking by MTRC & RC for Installation of Couplers (Type II – SEISPLICE Standard Ductility Coupler)*' ("QSP") [B5/B2659] (i.e. supervision by MTRCL of 20% of coupler connections).
- 7.2. Although I am aware that some shop drawings now disclosed by Intrafor appear to show cages which have not been countersigned by MTRCL's IOW/AIOW/Works Supervisor, I do not recall any occasion when LCAL/Intrafor omitted to request MTRCL to inspect the coupler connections of the cages on site, and my recollection is that a cage would not be lowered into the trench without

MTRCL having inspected the coupler connections beforehand. In any event, there would typically be a RISC form confirming the inspection of all the cages in a given panel.

8. As explained in paragraphs 41 to 44 of my first witness statement [B1/B431-432], the quality control supervisor's record sheets for the coupler splicing assemblies in the diaphragm walls were signed by Intrafor (e.g. its engineer, Mr. K.W. Tang) and often by LCAL (e.g. its Sub-Agent, Mr Kobe Law), and a portion of these record sheets were further countersigned by MTRCL's IOW/AIOW/Works Supervisor in accordance with the QSP. I understand that some of these record sheets (the original copies of which were kept by Intrafor at the time of the diaphragm wall construction) have now been disclosed by Intrafor to the Commission of Inquiry [F23/F16527-F33/F19741], and this is consistent with what I have said in my first witness statement.
9. I should point out that at the time of the construction of the diaphragm walls and EWL slab from 2013 to 2016, I have only been provided with the QSP submitted by LCAL to MTRCL under CSF no. 1112-CS-LCA-CB-000007A dated 23 August 2013 (accessible through the ePMS), which was expressly said to be applicable to the '*installation of couplers for Diaphragm wall and barrettes by BOSA*' [B5/B2659]. The QSP did not contain any reference to the East West Line ("EWL") slab, and I was never instructed by my superiors (whether Mr Dick Kung (SIOW) or his successors) to keep or countersign any record sheets for the coupler splicing assemblies in the EWL slab.

Comments on photos and videos in media reports

10. I note the detailed commentary on the media reports in paragraphs 53 to 70 of the witness statement of Intrafor's Mr Gillard [F1/F42-F45]. In general, I agree with Mr Gillard's observations, which are consistent with my own observations as previously outlined in paragraphs 89 to 90 of my first witness statement [B1/B443-B444]. I would like to provide some further information in support of these observations, based on my review of some of the site photos stored on MTRCL's project server.
11. In relation to the video published by HK01 on 12 July 2018, the video appears to show the mock-up/trial in the bending yard which was carried out in July 2013 (as demonstrated by the yellow beam which was present at the bending yard but not at any of the panel locations), involving the connection of all pre-fabricated cages set out

horizontally on the L-frame workbench. As Mr Gillard has rightly pointed out, this trial made use of all the pre-fabricated rebar cages for the first panel of the diaphragm wall, namely panel EM 98 in Area C3. I refer to **Images 5 to 7** below which show the trial in progress and appear to correspond to the footage in the video published by HK01.



Image 5: fixing of steel cages for panel EM 98 during July 2013 trial



Image 6: fixing of steel cages for panel EM 98 during July 2013 trial



Image 7: fixing of steel cages for panel EM 98 during July 2013 trial

12. As shown in the images above, during this trial, all the pre-fabricated cages were first connected horizontally on the L-frame workbench, and at this stage, the coupler splicing assemblies were inspected by myself and/or the other IOWs/AIOWs/Works Supervisors as shown in **Images 8 to 9** below. I recall there were some practical difficulties in aligning and connecting the couplers/rebars with the cages lying horizontally, and for this reason this construction method was not adopted in subsequent panels.



Image 8: inspection of coupler connections during trial in July 2013



Image 9: inspection of coupler connections during trial in July 2013

13. The connected cages were subsequently disconnected and transported to the panel location to be re-connected and lowered into the trench, and as far as the video published by HK01 seeks to suggest that the cages were not properly connected in the panel, that is simply incorrect. I refer to **Images 10 to 11** below which show the disconnection of the horizontally connected cages.



Image 10: disconnection of steel cages for panel EM 98 as part of July 2013 trial



Image 11: disconnection of steel cages for panel EM 98 as part of July 2013 trial

14. Turning to the stills/photographs which were published by HK01 on 12 and 18 July 2018, those photographs were said to be taken in July 2013 and show couplers connecting vertically oriented rebar/cages. It seems to me that the photographs are most likely to show the cages transported to the panel location of panel EM 98, which were reconnected and installed into the trench between 26 and 31 July 2013. In fact,

one of the photographs published show a tremie pipe clearly marked 'EM 98' in chalk. I refer to **Images 12 to 14** below which show the rebar cages and splicing works at the location of panel EM 98.



Image 12: rebar cages being installed at location of panel EM 98



Image 13: splicing works at location of panel EM 98



Image 14: splicing works at location of panel EM 98

15. The above photos show that the splicing works were in progress at the panel location of EM 98 in July 2013. Similarly, the photos published by HK01 appear to be photos of works which were in progress at ground level prior to the lowering of the cages into the trench, and it is not in any way surprising that there were coupler connections which have not been completed yet. Above all, upon completion of the splicing works to connect the cages, the connected cages were inspected by myself and/or other IOWs/AIOWs/Works Supervisors to ensure that all cages were properly connected before being lowered into the trench, as shown by the signed shop drawing for this panel [F1/789]. I refer to **Images 15 to 17** below which record the inspection of the coupler connections between the cages.



Image 15: splicing of 2nd and 3rd steel cages



Image 16: measurement of exposed thread



Image 17: completed splicing assemblies of innermost layer for 2nd and 3rd steel cages
(Note that couplers were properly screwed down but did not have to be flush with each other)

16. In the light of the above, I consider that the photos and videos published by HK01 are misleading and do not in fact show any defective steelworks or improper work practices in relation to the construction of the diaphragm walls. I would stress that the inspection carried out by MTRCL's IOWs/AIOWs/Works Supervisors, as demonstrated by the above site photos on MTRCL's project server, applies equally to all other cages and panels of the diaphragm walls in Contract 1112, and it was on this basis that the shop drawings and RISC forms for each diaphragm wall panel were signed off by MTRCL.

Honeycomb concrete

(i) Snagging process after completion of track slabs

17. Lastly, I would like to briefly address the issue of honeycomb concrete, which was referred to in paragraph 72 of the witness statement of Mr Lok Pui Fai for the BD [H7/H2207]. I understand that this issue is discussed in some detail in the witness statement of Mr Michael Fu, and I will address the snagging process and pull-out tests carried out on site in respect of the soffit of the EWL track slab.
18. By August 2016, the concreting works for both the EWL and the North South Line (“NSL”) track slabs had finally been completed, and this enabled MTRCL to commence the process of checking the EWL/NSL track slabs and the diaphragm walls for snags and defects in or around late 2016. Before then, it was difficult (if not impossible) to carry out a proper inspection and/or capture site photos of the concreted works, due to the confined space, large amount of dust/debris and poor lighting conditions during the ongoing excavation works, as can be seen in Images 18 to 19 below.



Image 18: site conditions during excavation down to NSL level in Area C2-3



Image 19: site conditions during excavation down to NSL level in Area C2-4

19. The post-pour snagging process involved extensive visual inspections by MTRCL's IOWs/AIOWs/Works Supervisors, and I personally conducted some of these visual inspections in the early stages. Subsequently, I delegated the task to my team of IOWs/AIOWs/Works Supervisors.
20. Snag lists were compiled based on any snags/defects observed on site, with separate lists for the EWL level and the NSL level respectively, and these lists were updated weekly to reflect the progress of closing out the items and/or any new items identified. The snag lists were provided to LCAL, and once LCAL had rectified the snagging items, LCAL requested MTRCL's IOWs/AIOWs/Works Supervisors to inspect the rectified works and close out the items by formally signing off a RISC form.
21. During this snagging process, I recall that occurrences of honeycomb concrete were identified at the soffit of the EWL slab between gridlines 22 to 43 in Area C, and that was around late 2016. This was a snag/defect attributable to the inadequate workmanship of China Technology Corporation Ltd ("CTCL"), LCAL's concreting subcontractor. In my experience, workmanship issues in concreting works are not uncommon and could result in honeycomb concrete. Such issues are often identified and rectified as part of the snagging process.

22. The honeycomb concrete observed by MTRCL on site was recorded in ^{Tab S1} the snag list for the NSL level as snag item no. 320 (LCAL defect ID 890), and LCAL's Mr Andy Ip (Site Agent) was responsible for monitoring the close-out of this item.
23. Ultimately, MTRCL's Mr Tommy Leong (AIOW) inspected the rectification works for the honeycomb concrete (and a number of other snag items) on 13 June 2017, and the items were formally closed out by ^{Tab S1} RISC form no. 1112-CIV-012398 with photographic records of the rectified works attached. Having now revisited and reviewed this RISC form, I remember receiving this RISC form on 16 June 2017 as a late submission after Mr Leong's inspection, and I formally endorsed this RISC form on 24 June 2017.
24. I should add that for the locations where no honeycombing was observed during the post-pour snagging process, there were no visible signs of defects or abnormalities in the concrete surface of the soffit which would be apparent on a visual inspection from a distance, as can be seen in **Images 20 to 21** below which were taken in Area C.



Image 20: general condition of EWL slab soffit after concrete was poured



Image 21: general condition of EWL slab soffit after concrete was poured


(ii) Pull-out tests at soffit of EWL slab

25. From around February to December 2017, I recall that 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, before the commencement of the installation of the front-of-house metal ceiling system and ceiling-mounted signage. The tests on the NSL level were specifically carried out at the soffit of the EWL track slab.
26. The pull-out tests were carried out by Qualitech Testing & Consultancy Ltd, and were witnessed by my team of IOWs, particularly Mr Andrew Lo and Mr Lai Ming Yiu. I recall receiving and later endorsing ^{Tab S3-S8} a number of RISC forms submitted by LCAL to cover the pull-out tests witnessed by MTRCL's IOWs, and the RISC forms relating to the tests on the NSL level i.e. at the soffit of the EWL track slab included:
 - 26.1. RISC form no. 1112-ABWF-000310 (endorsed on 3 March 2017);
 - 26.2. RISC form no. 1112-ABWF-000327 (endorsed on 27 March 2017);
 - 26.3. RISC form no. 1112-ABWF-000330 (endorsed on 27 March 2017); and

26.4. RISC form no. 1112-ABWF-000465 (endorsed on 13 December 2017).

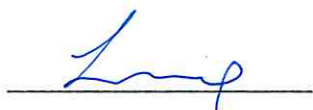
27. I am not aware of any indications of honeycomb concrete revealed by the pull-out tests at the various test locations, and no such issues were recorded in the RISC forms which I have endorsed back in 2017. In fact, I have now been shown ^{Tab S2} CSF no. 1112-CSF-LCA-ABWF-000674, by which LCAL submitted the pull-out test reports for the NSL and EWL levels respectively on 29 August 2018 (i.e. after I had left Contract 1112). I note that 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, and again, none of these reports show any test failures due to issues with the concrete quality (whether honeycombing or otherwise) at the locations tested.

Dated 12th October 2018



Wong Chi Chiu

I certify that I, Lung Yat Cheung, legal assistant of MTR Corporation Limited, MTR Headquarters Building, Telford Plaza, 33 Wai Yip Street, Kowloon Bay, Hong Kong, have interpreted the contents of this witness statement to the person making this witness statement who appeared to understand the same and approved its content as accurate and made his signature in my presence.



Lung Yat Cheung

Date: 12th October 2018