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

WITNESS STATEMENT OF KWAN PAK HEI LOUIS

FOR

MTR CORPORATION LIMITED

I, **KWAN PAK HEI LOUIS**, of MTR Corporation Limited, MTR Headquarters Building, Telford Plaza, 33 Wai Yip Street, Kowloon Bay, Hong Kong, **WILL SAY AS FOLLOWS**:

1. I am a Construction Engineer II – 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 joined MTRCL in 2014 as a Construction Engineer (**"ConE"**) III – Civil. During my tenure with MTRCL, I was involved in the SCL Project as a ConE III – Civil from April 2014 to December 2014, and (after I became a Chartered Engineer) as a ConE II – Civil from December 2014 up to this date.

3. I have had personal involvement in the SCL Project from 1 April 2014 up to the date of this witness statement. My primary role for the SCL Project as ConE II – Civil is to inspect the site works and progress. I went on site four days per week (with each visit ranging from 30 minutes to 3 hours depending on the nature and scope of each visit) to conduct routine site surveillance[1] in respect of the works generally, and I was responsible for carrying out hold point inspections of the rebar fixing works in Areas B and C (except for bays C3-2 and C3-3) in respect of the construction of the East West Line (**"EWL"**) slab.

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[1] See PIMS/PN/11-4/A5, 'Monitoring of Site Works', paragraph 5.7.1: *'Site surveillance is to be carried out by site inspectorate teams to monitor day-to-day site works of the Contractor. The intention is to have site issues identified early for prompt remedial action by the Contractor, in additional [sic] to and prior to the formal inspection of the Works [...]'.*

4. I have obtained a Master of Engineering in Civil & Environmental Engineering from Imperial College London. I am a Chartered Engineer and a member of the Institution of Civil Engineers in the United Kingdom.

5. I am providing this witness statement in response to various matters raised in a letter dated 27 July 2018 from Messrs Lo & Lo (**"Letter"**), who I understand are the solicitors acting for 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"**). In this statement, I shall address the matters listed as items 4, 5, 7, 8(a), 8(d), 8(i), 11(d), 11(p), 12(a)-(b), 12(d)-(e) and 13(c) of the Letter.

6. While I am aware of the matters raised in items 4, 5, 7, 8(a), 8(d), 8(i), 11(d), 11(p), 12(a)-(b), 12(d)-(e) and 13(c) of the Letter based on my first-hand observations and personal involvement in the SCL Project from April 2014 to March 2018, 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.

Item 4: Please provide as an exhibit to the witness statement a list of the managers, supervisors and inspectors (with names and contact details) employed or engaged by Your Company who were involved in the steel fixing works and the construction of the steel structures within the diaphragm walls and platform slabs. Identify the type of work and duties undertaken by such managers, supervisors and inspectors.

7. I understand that paragraphs 7 to 13 the witness statement of Mr. James Ho (the draft of which I have reviewed) explain the role of the ConE team as a whole on the SCL Project, which is consistent with my understanding. I will therefore confine myself to explaining in further detail my role as a ConE II reporting directly to Mr. James Ho (Senior Construction Engineer ("**SConE**")) and Mr. Derek Ma (ConE I).

(i) Responsibilities under the Site Supervision Plans

8. Based on the acceptance letters issued by the Buildings Department ("**BD**") for Contract 1112 on the SCL Project, MTRCL had to submit a *'Site supervision plan as defined in section 2(1) of the Buildings Ordinance for the proposed works'* ("**SSPs**") to the satisfaction of the BD prior to the commencement of the works.

9. As a result, various SSPs have been prepared for different parts of the works, and the task of preparing these SSPs was delegated to me:

9.1. Each SSP identifies the relevant individuals assigned as technically competent persons ("**TCP**") of different grades under the Competent Person ("**CP**") stream, the Registered Geotechnical Engineer ("**RGE**") stream, and the Registered Contractor ("**RC**") stream respectively. Grades T1 to T5 refer to the seniority of the TCPs in ascending order, and are associated with respective duties and responsibilities under the BD's Code of Practice on Site Supervision 2009 (**"CoP"**) and Technical Memorandum for Supervision Plans 2009 ("**TM**"), although TCPs of higher grades may take up the responsibilities of those of lower grades and the duties of TCPs may be combined. These five grades are largely based on the qualifications and relevant working experience of the relevant TCP as set out in Table 2 in Part III of the TM.

9.2. I was responsible for compiling the CP stream. MTRCL is responsible under the CP stream for T3 to T5 site supervision – there are no T1 TCPs from MTRCL. For the excavation and lateral support ("**ELS**") works on the EWL track level, MTRCL's T4/T5 TCP alternatives were the Construction Manager (i.e. Mr. Kit Chan until he left the SCL Project) and the SConE (i.e. Mr. James Ho). In particular, Mr. Chan acted as the CP Representative on site. MTRCL's T3 TCPs were myself and Mr. Derek Ma – we acted as T3 alternatives, in case one of us went on leave or was otherwise unavailable. Under the CP stream, records of each site inspection carried out by a TCP have been signed and maintained contemporaneously, and are kept on site to this date for inspection by the BD.

10. By and large, I was responsible for preparing the CP stream section in the SSPs submitted to the BD, and I did so based on the CoP and the TM issued by the BD.

11. In particular, I calculated the supervision requirements (i.e. the minimum frequency of site inspection) of the TCPs assigned using Form C appended to the CoP, and with specific reference to (amongst other things):

11.1. Paragraph 6.1 of the TM, which provides that the *'minimum requirements on the grades of TCPs and frequency level of inspection appropriate to various types of building works or street works are set out in Table 1 in this Technical*

Memorandum. The number of TCPs and their frequency level of inspections should be increased with the complexity of the works. [...] Details of the method of assessment of complexity and the extent that the number of TCPs and their frequency level of inspections should be increased are set out in the Code of Practice'.

11.2. Paragraph 8.1 of the CoP, which provides (consistent with paragraph 6.1 of the TM) that the *'grades of TCP and their minimum frequency level of site inspections required for each functional stream for various types of building works or street works are set out in Table 1 of the Technical Memorandum'.*

11.3. Paragraphs 8.4 to 8.8 of the CoP, which provide that the *'effect of the scale of the works should be considered in determination of supervision requirements'* by reference to a scale factor for each type of work, i.e. *'the ratio of the estimated value of the measurable item of the works to the basic value'* as assessed according to Table 8.1 in the CoP.

11.4. Paragraphs 8.9 to 8.11 and Tables 8.2 to 8.3 of the CoP, which divide the minimum frequency levels of inspection into Levels 1 to 5 (based on man-days per month), and then describe increases to the level of supervision input where a scale factor exceeds one – by multiplying the scale factor to the minimum frequency level of inspection required for the respective type of works.

11.5. Paragraphs 8.12 to 8.17 and Tables 8.4 to 8.11 of the CoP, which explain how one should calculate the combination of TCPs for one or more types of building works.

11.6. Paragraph 6.2 and Table 2 of the TM and paragraphs 8.18 to 8.21 of the CoP, which set out the minimum qualifications and experience required for each grade of TCP.

12. For my part, as far as the construction of the EWL slab was concerned, I was assigned as a TCP of grade T3 under the CP stream – see e.g. the SSP for *'ELS Works and Substructure (Grid 22/40 and K/N) at EWL Track Level for Hung Hom Station'* submitted by MTRCL on 18 June 2015 and accepted by the BD on 6 August 2015.

13. In respect of the EWL slab works specifically, Mr. Derek Ma and I were assigned as T3 alternatives under the SSP, such that we collectively discharged the duties of a grade T3

TCP for the EWL slab works under the CP stream. Looking at the TM, our duties as grade T3 TCP were as follows:

13.1. Paragraph 5.8 of the TM states that TCPs of grades T1 to T3 are responsible for carrying out *'routine safety supervision'*, which includes *'monitoring that the site operations and working methods meet safety standards set out in the Buildings Ordinance and respective code of practice'*, *'checking that general and minor safety aspects of the building works'* are properly carried out, and *'checking that work carried out on site complies with the approved, accepted or submitted method statements and precautionary and protective measures'*.

13.2. Typical *'routine items'* for TCPs of grade T3 under the CP stream (equivalent to the *'AP'* stream referred to in the CoP) are set out in Table 5.1 of the CoP. Those items include establishing systems for coordinating, compiling and filing of reports, forwarding reports to the CP in case of non-conformances, checking the safety of hoardings, covered walkways, scaffolding, catch fans, and checking that monitoring check points are installed and readings are taken in time.

(ii) *General responsibilities as a ConE II*

14. In conjunction with my responsibilities under the SSPs, my role as a ConE II includes (amongst other things) the following tasks in practice:

14.1. Considering safety as the primary objective at all times.

14.2. Supporting the contractor as much as possible to enable the works to be successfully implemented;

14.3. Conducting regular site surveillance to uphold the site safety standards, checking the quality of works, identifying any unsafe act on site and monitoring the work's progress;

14.4. Understanding and performing the duties as detailed in the Project Health and Safety Manual;

14.5. Assisting the ConE I in reviewing the contractor's submissions and drafting

Engineer's Instructions, responding to Requests for Information ("**RFI**"), preparing Non-Conformance Reports ("**NCR**"), and assisting with any other duties as requested;

14.6. Assisting the ConE I in liaising with Government departments, utilities companies, and interfacing with designated contractors, in order to ensure the smooth delivery of the SCL Project; and

14.7. Attending regular meetings (and other meetings when required), and preparing weekly progress reports to the SConE. These meetings and reports do not deal with quality matters, but generally concern issues such as site safety and progress of the works.

15. I should add that I generally conduct routine site surveillance on my own. The site supervisors from Leighton Contractors (Asia) Ltd ("**LCAL**") would only accompany me if:

15.1. LCAL had requested a hold-point inspection for permission to progress to the next stage of the works, typically by submitting a Request for Inspection / Survey Check ("**RISC**") form; or

15.2. I had identified minor defects or non-conformances during my routine site inspections, in which case I would request LCAL to ask its sub-contractors to rectify the issue. To be clear, and in line with general industry practice, I would not deal with LCAL's sub-contractors directly, and all my requests would be made to LCAL who would then deal with their sub-contractors as appropriate.

Item 5: Describe and explain the steps, procedures and timeline in the construction and completion of the steel fixing works in the diaphragm walls and platform slabs. With reference to the said steps, procedures and timeline, please describe and explain the respective roles and involvement of the Government, Your Company, Leighton, Fang Sheung, Intrafor and China Technology and elaborate on the interaction and relationship between Your Company and these parties on site and on a day-to-day working basis.

16. I refer to paragraphs 14 and 15 of the witness statement of Mr. James Ho for an overview of the relevant method statements for the construction of the EWL and NSL slabs, which is consistent with my understanding, and I will not repeat those details here.

17. For the purposes of the rebar fixing works in the EWL slab, in addition to the method statement, the drawings were also an important source of information for both LCAL and MTRCL's ConEs. All the relevant drawings were prepared by Atkins (China) Ltd ("**Atkins**") (Team A), MTRCL's Detailed Design Consultant, and these consisted of two different sets of drawings:

17.1. Approved drawings, which were submitted to and approved by the BD and reflected the approved design intent of the works. The detailed process is addressed in the witness statement of Mr. Andy Leung, who is the Design Manager for Contract 1112 on the SCL Project; and

17.2. Working drawings, which were issued by MTRCL to LCAL for construction, and importantly, these drawings were also issued to MTRCL's ConE team when carrying out RISC inspections for the rebar fixing works.

18. In essence, the EWL slab in Areas B and C is three metres thick, whereas the EWL slab in Areas A and the Hong Kong Coliseum ("**HKC**") is one metre thick. The three-metre slab in Areas B and C consists of layers of rebars at the top and the bottom of the slab which are then encased in concrete, and the rebars were fixed from the bottom-most layer upwards. The spacing and number of layers of rebars in each area/bay were shown on the working drawings issued for construction, and there were separate working drawings for the top and bottom layers respectively.

19. The construction of the EWL slab typically consisted of the following splicing assemblies:

19.1. The splicing of the starter bars to the cast-in couplers (both top and bottom layers) in the excavation side of the diaphragm wall panels using Type A[2] connections, except for the panels in the east diaphragm wall which were subject to the change in construction detail which I will discuss below in paragraphs 40 to 43. These cast-in couplers form part of the rebar cages in the diaphragm walls, and after the concrete casting of the diaphragm walls, the cast-in couplers had to be exposed

[2] I refer to the explanation of Type A and Type B connections at paragraphs 28.1 to 28.2 of the witness statement of Mr. Kobe Wong, which I have had the opportunity to review and understand to be accurate.

(typically using a hydro-demolition machine) as part of the preparation of the shear key.

19.2. The splicing of starter bars to couplers (both top and bottom layers) at the horizontal construction joints between each bay of the EWL slab, again using Type A connections.

20. In respect of each bay of the EWL slab in Area C, the key hold-points as set out in the Inspection and Test Plan ("**ITP**") contained in Appendix E to the Method Statement of EWL Slab in Area C Construction submitted by LCAL on 19 June 2015[3] were as follows:

20.1. Inspection, sampling and testing of materials delivered to the site, including rebars and couplers.

20.2. Inspection of cementitious corrosion inhibitor on shear key.

20.3. Survey check of soffit level, wall alignment and verticality.

20.4. Inspection of the rebar fixing works (bottom and top layers).

20.5. Pre-pour check (including cleanliness, E&M cast-in items, embedment, starter bars, construction joint, formwork).

20.6. Post-pour check (after concrete pouring, curing and removal of formwork).

20.7. As-built survey check.

21. As far as I can recall, no concrete pouring works were carried out in two or more adjacent bays of the EWL slab (except bays C3-2 and C3-3) at the same time, although it was possible that more than one bay was being constructed concurrently at different stages of the work sequence (e.g. concrete was being poured in one bay while other bays were at the rebar fixing stage).

22. The rebar fixing works and the associated RISC inspections for Areas B and C (excluding the 1875 box culvert in Area C1) were carried out from July 2015 to January 2016, and I

[3] This Inspection and Test Plan was applicable to the EWL slab works in Areas A, B and C generally, as the top-down construction method of the EWL slab applied in largely the same manner to those areas.

understand that a bay-by-bay schedule of dates will be disclosed to the Commission of Inquiry.

Item 7: Describe and explain Your Company's system and measures in place at the material time to ensure that the steel bars in the diaphragm walls and platform slabs were properly installed and connected in compliance with Requirements, Standards and Practice and that any irregularities, non-compliances and defects will be reported and addressed by the appropriate parties and/or persons. Please adduce all related manuals, records and documents on this topic.

(i) Inspection of rebar fixing works and coupler connections

23. In the paragraphs to follow, I will address the division of labour in practice (between IOWs and ConEs) in relation to the site surveillance and inspection of the diaphragm walls and EWL slab.

24. I was not responsible for any of the RISC inspections in respect of the diaphragm walls, and it was the IOWs who conducted site surveillance and RISC inspections in respect of the pre-fabrication and installation of the steel rebar cages, including the coupler connections between those cages. My responsibility, as far as relevant to this Commission of Inquiry, was inspecting the rebar fixing works in the EWL slab in Areas B and C.

25. At the time of the EWL slab works, I was not aware that a document entitled *'Quality Supervision Plan on Enhanced Site Supervision & Independent Audit checking By MTRC & RC for Installation of Couplers (Type II – SEISPLICE Standard Ductility Coupler)'* ("**QSP**") was issued by LCAL and submitted to the BD in 2013. This was because the QSP was not discussed in the induction when I first joined MTRCL in April 2014, or in any other training session or meeting which I have attended.

26. Nevertheless, I was aware of the requirements in the BD's acceptance letters in relation to quality supervision of coupler splicing assemblies. Further, I was aware of the practice in Contract 1112 which had already been put in place by the time I joined in 2014, namely that the IOWs were responsible for routine site surveillance in respect of splicing assemblies using couplers in the diaphragm walls.

27. When it came to the construction of the EWL slab upon the completion of the diaphragm walls, the ConEs (and not the IOWs) were responsible for inspecting the rebar fixing works and signing off the RISC forms for that hold-point.

28. At the time, I took this division of labour to mean that the ConEs would inspect the top and bottom layers of the rebars within the EWL slab as and when they were completed, while the IOWs would continue to conduct daily site surveillance in respect of the construction works generally, including the splicing of starter bars to the cast-in couplers at the wall-to-slab and slab-to-slab joints.

29. That said, it is important to note that there was collaboration and co-ordination between the IOW and ConE teams whenever appropriate, and we worked together generally on matters relating to site surveillance and inspections.

30. I refer to paragraphs 33 to 36 of the witness statement of Mr. Kobe Wong, which describe in some detail the use of the four-ply RISC form and the general administrative process relating to the submission, receipt and endorsement of RISC forms. I agree with what Mr. Wong has said.

31. I am aware that the RISC process (based on hold-points in the ITP) is outlined in broad terms in paragraphs 5.1.1 to 5.1.2 of the PIMS Practice Note on *'Monitoring of Site Works'* (PIMS/PN/11-4). However, neither the PIMS documentation nor the ITP specifies the standards or requirements which must be taken into account when carrying out the RISC inspections. As such, I think it would be helpful for me to explain in more detail the manner in which I carried out the RISC inspections, and I will do so in paragraphs 55 to 60 below in response to item 12(d) of the Letter.

(ii) *Non-Conformance Reports*

32. Whenever I observed any issues with the workmanship or quality of the works, I tried to resolve the issue on the spot by liaising with LCAL's representatives on site. A Non-Conformance Report ("**NCR**") would only be raised if there was a non-conformance in the final product, or if there was a recurrent non-conformance which could not be resolved. It should not be issued for minor defects reported in routine inspections.

33. To be clear, MTRCL's NCRs are internal and based on the guidance in the PIMS Procedure for *'Construction Management'*[4] and the Practice Note on *'Monitoring of Site Works'*[5]. This is distinct from the BD's Form B non-conformance and rectifications report referred to in paragraph 5.4 of the CoP, which is aimed at notifying the BD of any non-conformities that pose an imminent danger or cause a material concern for safety – such non-conformities have to be reported to a TCP of grade T5 and ultimately to the CP/CP representative. I have not issued any Form B report in respect of the EWL slab works.

34. If an issue was escalated to the SConE, Mr. James Ho, and he decided to issue a NCR, he often delegated the drafting of the NCR and the preparation of the attachments to the ConEs, and once reviewed and approved by Mr. Ho, the Construction Manager would issue the NCR to LCAL, and remedial proposals/responses were typically submitted through the ePMS.

35. Where there were serious non-conformances in the works, the construction management team identified those non-conformances and issued NCRs to LCAL pursuant to the PIMS guidelines, and the ConE team followed up on these NCRs to ensure that the issues were properly closed out. From a frontline perspective, there is a proper system in place to identify non-conformances, escalate matters when necessary, and to ensure the rectification of the non-conformances. As far as I am aware, MTRCL has not issued any NCRs relating to the cutting or shortening of rebars which forms the subject-matter of this Commission of Inquiry.

Item 8:

(a) Explain and confirm whether Your Company has any knowledge of the Defective Steel Works (whether undertaken by Leighton and/or its sub-contractors) and if so, identify and describe the relevant events and occasions.

(d) If the events and occasions were reported to you by your managers, supervisors, inspectors and/or other persons, identify the person(s) who made the reports to you.

(i) Provide Your Company's confirmation that, other than the events and occasions cited in Your Company's reply to this paragraph, Your Company is not aware of any other Defective Steel Works in the diaphragm walls and platform slabs.

36. I learned about the cutting of threaded ends of rebars for the first time from the email dated 15 December 2015 from Mr. Kobe Wong (SIOW II) to LCAL, as I was copied in to

[4] PIMS/P/11, paragraphs 10.3.1 to 10.3.5.
[5] PIMS/PN/11-4, paragraphs 5.1.2(g), 5.3.4, and Exhibit 7.9.

that email. In that email, Mr. Wong reported that *'our AIOW and under [his] routine inspection to threaded bars, at 3m thickness EWL slab at Area C3bay C3-2 / C3-3, was found 5 number of threaded steel bars heads'*, and that the *'remedial works was conducted immediately and witnessed by our AIOW at night time'*.

37. I do not have any first-hand knowledge of or involvement in the incident, as the incident had already been resolved by the time of Mr. Wong's email, and I was not responsible for inspecting the rebar fixing works in bays C3-2 to C3-3. In any event, I understand that the incident is explained in full in paragraphs 77 of 84 of the witness statement of Mr. Kobe Wong. Other than the incident referred to in Mr. Wong's email (which I was copied into), I am not aware of any other incidents in which the threaded ends of rebars have been cut.

38. I do know as a fact that Mr. Jason Poon of China Technology attended some of our Weekly Works Meetings – these were typically attended by MTRCL's ConEs, LCAL's representatives and subcontractors' representatives. Mr. Kit Chan (Construction Manager) chaired those meeting until he left the SCL Project, when Mr. James Ho (SConE) took over Mr. Chan's role. Based on the meeting minutes which I have managed to review in the limited time available to date, Mr. Poon attended a weekly works meeting for the first time on 3 March 2016, and continued to attend those meetings until at least the end of November 2016, but as far as I can recall (and the minutes of those works meetings confirm) Mr. Poon did not mention any issues regarding the rebar fixing works or coupler connections in any of those meetings.

Item 11(d): Confirm whether Your Company has any additional information and materials to supplement the MTRCL Report and if so, please adduce such additional information and materials by way of a supplemental report.

39. During my routine site surveillance activities, I have personally observed the top of the east diaphragm wall panels being hacked off, followed by the replacement of the coupler connections therein with through-bars. Based on the site photos of the east diaphragm wall which I have managed to review to this date within the limited time available, this change has been implemented in the majority of panels in the east diaphragm wall, except for a limited number of panel where the top of the panel was not trimmed and the coupler connections were retained:

39.1. Underpinning in Area B: panels EH 44 (3 layers of coupler connections) and EH 45, 48, 50, 51 and 57 (3 to 4 layers of coupler connections).

39.2. Capping beam in Area B: panel EH 40 (coupler connections on excavation side only).

39.3. Area C1-1, consisting of two panels in the initial bay of the EWL slab works constructed according to coupler connection details: panels EH 73 and 75.

39.4. Areas C1-1 and C1-2, constructed according to the LCAL's remedial proposal (sketch SK-0034-001) for Technical Query 34, on which Atkins Team B had no adverse comment: panels EH 69, EM 70, EH 71, EM 72 and EH 74 (through-bars in row T1 from the EWL slab up to the soil side of the diaphragm wall; all coupler connections were kept in the other layers).

40. I was aware of the agreement within the construction management team that the change in construction detail was considered acceptable at that time. In particular, upon reviewing my own records within the limited time available, I recall that I was forwarded at least three relevant emails by Mr. James Ho (SConE) in July 2015:

40.1. An email dated 8 July 2015 (timed at 20:51) to MTRCL's Mr. Kenneth Tan (Design Management Engineer I) from LCAL's Mr. Johnson Luk (Risk Manager), who attached (amongst other things) a *'Design Report for HUH Station Primary Structure'* (Deliverable No. TWD-004B3) prepared by Atkins' Team B for LCAL (and which was ultimately submitted by MTRCL's Design Manager, Mr. Andy Leung, to the BD on 29 July 2015). Mr Ho forwarded this email chain to myself and Mr. Derek Ma (ConE I) on 9 July 2015 at 08:09. I note in particular that section 6.2 of the attached design report included the following statements:

> *'The top of diaphragm wall panel will be trimmed to the lowest level of top rebar for the EWL slab (min 420mm below the top level of EWL slab).*
>
> *The top rebar of EWL slab at the diaphragm wall panel will then fix to the top rebar of OTE [i.e. Over Track Exhaust] slab to achieve full tension laps.*

The EWL slab and OTE slab will be casted concurrently with temporary openings around the existing columns and pile caps.'

40.2. An email dated 24 July 2015 (timed at 16:20) to LCAL from Mr. Wan Cheung Lee of Atkins' Team B, who *'reminded that in order to comply with the design assumption, the OTE wall must be concrete/pour together at the same time (monolithically) with the 3m EWL slab'*. Mr Ho forwarded this email chain to myself and Mr. Derek Ma (ConE I) on 25 July 2015 at 09:43.

40.3. An email dated 25 July 2015 (timed at 14:05) from Mr. Rob McCrae of Atkins' Team A to MTRCL's Mr. Brandon Reilly, which stated that the OTE slab could only be cast after the EWL slab if that was done before future activities would further load the structure. Mr Ho forwarded this email chain to myself, Mr. Derek Ma (ConE I), Mr. Wing Chen (ConE I), Mr. Kingsley Lam (ConE II), Mr. C.K. Cheung (ConE II), and Mr. Dick Kung (SIOW) on 27 July 2015 at 08:46.

41. Atkins was included in the email chains referred to above, as were MTRCL's senior supervisors/managers e.g. Mr. Brendan Reilly (Project Manager), Mr. Jason Wong (General Manager/Competent Person for Contract 1112), Mr. Andy Leung (Design Manager) and Mr. James Ho (SConE). As I was only a ConE II and not responsible for any design matters, I implemented what Atkins proposed and what the more senior members of the construction management team had discussed and agreed.

42. In any event, from an engineering point of view, it made perfect sense to me that if the *'design assumption'* was for the EWL and OTE slabs to be cast monolithically – and at the same time, through-bars should be used instead of several bars connected by couplers – this would reduce the number of splicing assemblies and thus the risk of non-conformances in the construction process.

43. For my part, I carried out the RISC inspections by checking the rebar fixing works against the working drawings for the EWL slab issued to LCAL for construction in August and September 2015 respectively (as detailed in paragraph 53 below), and that exercise was not affected by the change in construction detail because:

43.1. The working drawings issued by Atkins' Team A for the construction of the EWL slab only showed the rebars within the slab, which were not subject to any changes. The connection details had to be ascertained from a separate coupler schedule, which indicated two layers (T1 and T3) of top rebars connecting the EWL slab to the top of panels EH 40 to EH 115 in the east diaphragm wall: see working drawing no. 1112/W/HUH/ATK/C12/607 Rev A.

43.2. Accordingly, for the panels in which coupler connections were replaced with through-bars, I inspected the connection details based on the working drawings issued for construction, and I checked the through-bars extending from the EWL slab across the east diaphragm wall based on the same spacing and T1/T3 layers as specified in the original coupler schedule. I will illustrate this in more detail by reference to a few concrete examples in paragraph 56 below.

43.3. Since July 2018, MTRCL's construction management team has been checking the drawings against the site records to double check the full extent of the change in construction detail. I have assisted in collating and compiling the relevant site photos (from MTRCL's project server) showing the top-layer slab-to-wall connection details in Areas B to C. Examples of these photos are shown in paragraphs 56.1 to 56.3 below.

44. By the time the MTRCL Report of 15 June 2018 was being prepared, the construction management team had to provide an estimate of the total number of couplers, while we were all collating a large amount of information and documents at the same time. The estimate was provided based on the BA-14 as-built drawings for the diaphragm walls within a very tight timeframe, such that we were not aware of the discrepancies in those as-built drawings at the time. I refer to the witness statements of Mr James Ho (paragraphs 72 to 78) and Mr Derek Ma (paragraphs 42 to 43), which also explain the circumstances at the time.

Item 11(p): Explain whether it is common in the construction of diaphragm walls and platform slabs for steel bars to be shortened and cut and confirm whether such shortening and cutting of steel bars within the diaphragm walls and platform slabs is acceptable and in compliance with Requirements, Standards and Practice.

45. To the best of my knowledge, other than the cutting of the 12-metre rebars (as delivered) to the correct length for the rebar fixing works using a bar bending machine, there should

be no need to cut the rebars or the threaded ends in the work areas, whether with wire cutters or otherwise.

Item 12:

(a) Describe at which stage the steel fixing works would be inspected by Your Company and Leighton.

(b) State how frequently Your Company and Leighton would carry out the inspections.

(d) Describe and explain how the inspections would be carried out, whether they were visual inspections only or equipment was used or both.

(e) Confirm whether reports or records were kept following the inspections and if so, please produce such reports and records.

(i) Stage and frequency at which rebar fixing works were inspected

46. As a TCP of grade T3, the frequency of my routine site surveillance activities is 4 times (i.e. 4 days) a week under the SSPs submitted by MTRCL to the BD. However, the frequency of the RISC inspections (i.e. at the hold-points for the rebar fixing works in each bay) depended on the progress and date of completion of the rebar fixing works in each bay.

47. I was initially responsible for inspecting the rebar fixing works in Areas B to C1 of the EWL slab, but I also ended up inspecting Areas C2 and C3 to step in for Mr. Kingsley Lam, as he was busy with the preparation of the BA-14 as-built submissions for the diaphragm walls at that time. I was therefore the person signing off the RISC forms for all the bays in Areas B and C (except bays C3-2 and C3-3, which were inspected and signed off by another ConE I, Mr. Jeff Cheung).

48. The RISC form in relation to each bay of the EWL slab covered the inspection of the rebars in both the top layers and the bottom layers. However, I should stress that the inspection of each bay was not done on a single occasion – as a matter of common sense, if the top layers had already been completed, it would be difficult to visually inspect the bottom layers. Therefore, I typically inspected the bottom layers of rebars once they had been completed (and prior to the commencement of the fixing of the top layers of rebars), and then returned for a second inspection once the fixing of the top layers of rebars had also been completed.

49. In practice, LCAL's representative (e.g. Mr. Edward Mok and Mr. Man Sze Ho, who were LCAL's graduate engineers) usually contacted me when the fixing of the bottom layers of rebars had started in order to request an inspection of those bottom layers. There were also occasions when I personally observed the commencement of the fixing of the bottom layers during my regular site surveillance activities and inspected those layers whilst on site. In any event, it was not difficult to know the location and status of the rebars being fixed at any given point in time, as the rebar fixing works were not carried out in many different bays at the same time, and we knew by and large the relevant bays and layers which were going to be ready for inspection.

50. The RISC forms were meant to be submitted by LCAL to MTRCL in advance of the intended date of the hold point inspection, but LCAL was often late with its paperwork and submitted the RISC forms after the relevant works had already been completed (hence many RISC forms were marked as *'late submission'* in the notes/comments section), even though I verbally reminded LCAL on multiple occasions to submit RISC forms in advance of the intended hold point inspections. In practice, an arrangement was in place on site such that I was requested by LCAL to inspect the top and bottom layers of rebars in each bay on separate occasions. For the bays which I have inspected, I am confident that the top and bottom layers of rebars have both been inspected on a spot-checking basis, in order to ensure that they had been properly fixed before I signed each RISC form and gave permission for LCAL to proceed to the next stage of the works.

51. I should point out that my involvement in the RISC process was largely confined to carrying out the hold-point inspections on site. After giving permission for the works to proceed to the next stage and completing Part C of the RISC form, I had no involvement in the subsequent endorsement by the SIOW of the form or the filing of the completed form in the ePMS (which is explained in paragraphs 33 to 36 of the witness statement of Mr Kobe Wong), the latter of which was LCAL's responsibility as far as I recall.

(ii) *Working drawings used for RISC inspections of rebar fixing works*

52. When carrying out RISC inspections for the rebar fixing works in the EWL slab, I did so largely by reference to the working drawings (as already mentioned in paragraph 17

above), and also taking into account my own engineering experience and professional judgment.

53. The rebar fixing works in the EWL slab began with the 1875 box culverts and bay C1-1. In respect of these areas, I carried out the RISC inspections for the relevant rebar fixing works by reference to:

53.1. For the area known as the '1875' box culverts (Gridlines 30 to 31), the rebar fixing works were carried out from 10 March to 27 May 2015. I referred to working drawing no. 1112/W/HUH/ATK/C12/181 Rev. B which was issued on 25 October 2013 and was current at the time – this drawing indicated two rows of top layer rebars (T1 and T3) from the EWL slab across the diaphragm wall, which matched the number of rows and spacing as constructed. I should add that at this location, the cut-off level of the east diaphragm wall (panels EH 75 and EM 76) is lower than at other locations to cater for the box culvert construction, such that through-bars were adopted from the EWL slab across the diaphragm wall up to the OTE/soil side.

53.2. For bay C1-1 (Gridline 28.5 to 30), the rebar fixing works were carried out from 13 July to 25 July 2015. Apart from panel EH 74 (which was constructed as per the remedial proposal in response to TQ 34 with the first row in the top layer replaced with a through-bar), the slab-to-wall connections followed the coupler connections and number of layers in the diaphragm wall as reflected in the BA-14 as-built submissions for the diaphragm walls.

54. After the completion of the rebar fixing works in bay C1-1 and the 1875 box culverts, further working drawings were provided by Atkins' Team A to MTRCL's design management team ("**DM Team**"), who in turn issued the working drawings to LCAL and the ConE team for construction. Having looked back at my own records and correspondence within the limited time available to date, I have identified the sets of working drawings issued for the construction of the EWL slab in Areas B and C, which can be summarised as follows:

Date of email	Description	Key working drawings	Bays covered	Concrete casting

		attached		date
19/06/2015	Atkins' Team A uploaded working drawing C12/607 Rev. B dated 15 June 2015 (Coupler Schedule for Areas B to C) onto ePMS.	C12/607 Rev. B	B to C	-
11/08/2015 at 16:36	Mr Edward Tse (Atkins Team A) sent Mr. Kevin Yip (DM Team) the *'updated working drawings with DIL for Area C1 and C2 for your advance information'*. These were *'advance check prints'*, and were issued to LCAL in order to avoid holding up the construction works on site.	C12/180 Rev. D1 C12/181 Rev. C1 C12/182 Rev. C2 C12/605 Rev. B1 C12/606 Rev. C1 C12/017 Rev. A2 C12/018 Rev. A1	C1-2 C1-3 C2-5	22/08/2015 07/09/2015 14/09/2015
11/08/2015 at 19:28	Mr. Andy Leung (DM Team) sent Mr. Justin Taylor and LCAL's Mr. Philip Daynes an *'advance set of updated EWL slab Working Drawings of Area C1&C2 for your construction'*. Mr. James Ho (SConE) and Mr. Kit Chan (Construction Manager), amongst others, were copied into this email.			
12/08/2015 at 08:17	Mr. James Ho (SConE) forwarded the working drawings to (amongst others) myself and Mr. Derek Ma.			
22/09/2015 at 13:47	Mr. Kenneth Tan (DM Team) sent to LCAL's Mr. Justin Taylor *'the latest EWL slab in formal revision for your advance information and site construction'*. Mr. James Ho (SConE) and Mr. Kit Chan (Construction Manager), amongst others, were copied into this email.	C12/179 Rev. D C12/180 Rev. D C12/181 Rev. C C12/182 Rev. C C12/183 Rev. C C12/184 Rev. B C12/605 Rev. B C12/606 Rev. C C12/017 Rev. A C12/018 Rev. A	C1-4 C2-6 C2-3 C3-5 C2-4 C3-6 C3-1 C2-1 B-2 C3-4	29/09/2015 07/10/2015 08/10/2015 24/10/2015 29/10/2015 07/11/2015 10/11/2015 23/11/2015 25/11/2015 30/11/2015

22/09/2015 at 13:49	Mr. Kenneth Tan (DM Team) issued the *'EWL slab layout and rebar detail for construction'* to MTRCL's Mr. CK Cheung, copying in myself, Mr. Derek Ma, and Mr. Wing Chen.		B-3 B-1 C1-5 C3-2 C3-3 B-4 B-5	09/12/2015 15/12/2015 23/12/2015 28/12/2015 28/12/2015 12/01/2016 12/01/2016

(iii) *Manner of carrying out RISC inspections of rebar fixing works*

55. The RISC inspections for the rebar fixing works were conducted visually on the basis of the working drawings. I would typically check the spacing of the rebars with a tape measure, the number of rows/layers of rebars, the lap length of the lapped rebars, and the diameter of the rebars used.

56. In order to illustrate how I checked the rebar fixing works against the working drawings during RISC inspections, I set out three random examples below. For convenience, all three examples relate to the slab-to-wall rebar connection details on the east diaphragm wall, in order to demonstrate how I was able to inspect the rebar connections based on the working drawings after the change in construction detail discussed above:

56.1. **Example 1 – Panel EH 42 (Area B1, Gridline 16):**

56.1.1. Working drawing no. 1112/W/HUH/ATK/C12/179 Rev. D dated 21 September 2015 (**Image 1**) referred to the coupler schedule in working drawing no. 1112/W/HUH/ATK/C12/607 Rev. B dated 16 June 2015 **(Image 2)** (both of which were current at the time), which indicated two rows (T1 and T3) of T40 top layer rebars connecting the top of the east diaphragm wall to the EWL slab, with a spacing of 150 mm centre-to-centre.

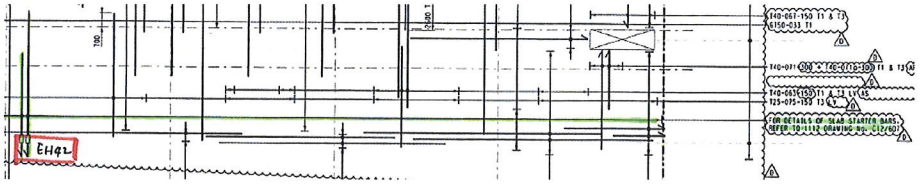

Image 1: drawing no. 179 Rev. D – annotation referring to drawing no. 607 Rev. B

AREA B & C (GRID 15-50)	ROOF SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	TRACK SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	OHL FIXINGS	WH39	WH137	T16-150 T1	T16-150 T1	EH40	EH115	T16-150 T1	T16-150 T1
	ROOF SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-
	TRACK SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-

Image 2: drawing no. 607 Rev. D – top rows (T1 and T3) at the top of EWL slab

56.1.2. I have checked that the number of rows/layers, spacing and diameter of the rebar connections observed on site were consistent with the working drawings, and this is confirmed by the relevant site photo **(Image 3)**, which show two as-built rows of top layer through-bars connecting the EWL slab and the east diaphragm wall.[6] The relevant drawings are contained in **Appendix 1** hereto.

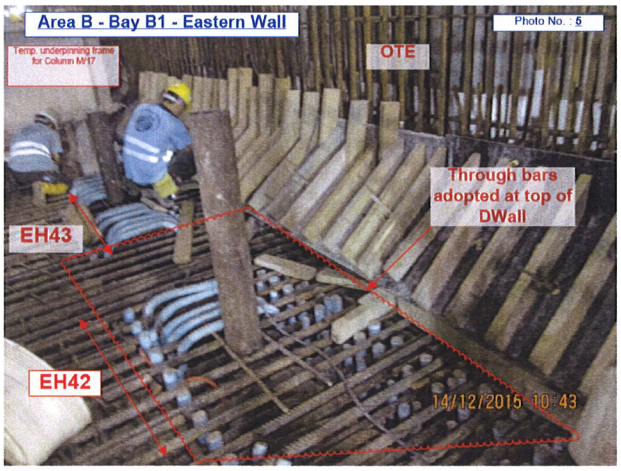

Image 3: site photo showing through-bars in the top layer of panel EH 42

56.2. **Example 2 – Panel EH 47 (Area B2, Gridline 18):**

56.2.1. Working drawing no. 1112/W/HUH/ATK/C12/179 Rev. D dated 21 September 2015 **(Image 4)** referred to the coupler schedule in working drawing no. 1112/W/HUH/ATK/C12/607 Rev. B dated 16 June 2015 **(Image 5)** (both of which were current at the time), which indicated two rows (T1 and T3) of top layer rebars connecting the top of the east diaphragm wall to the EWL slab, with a spacing of 150 mm centre-to-centre.

[6] Thus superseding the details in BA-14 as-built diaphragm wall drawing no. 1112/Z/HUH/LCA/C12/820 Rev. A (Developed Front Elevation of Permanent D-Wall Panel EH42 – Section A) and 1112/Z/HUH/LCA/C12/607 Rev. A (Coupler Schedule for Area B), which showed four top layers of slab-to-wall coupler connections.

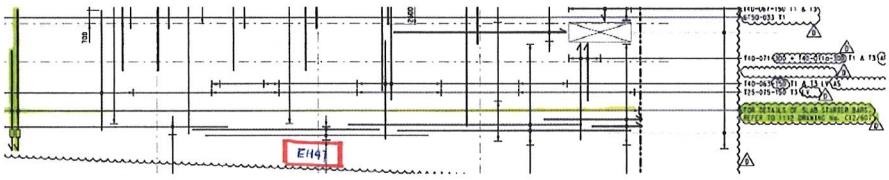

Image 4: drawing no. 179 Rev. D – annotation referring to drawing no. 607 Rev. B

AREA B & C (GRID 15-50)	ROOF SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	TRACK SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	OHL FIXINGS	WH39	WH137	T16-150 T1	T16-150 T1	EH40	EH115	T16-150 T1	T16-150 T1
	ROOF SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-
	TRACK SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-

Image 5: drawing no. 607 Rev. D – top rows (T1 and T3) at the top of EWL slab

56.2.2. I have again checked that the number of rows/layers, spacing and diameter of the rebar connections observed on site were consistent with the working drawings, and this is confirmed by the relevant site photo (**Image 6**), which show two as-built rows of top layer through-bars connecting the EWL slab and the east diaphragm wall.[7] The relevant drawings are contained in **Appendix 2** hereto.

Image 6: site photo showing through-bars in the top layer of panel EH 47

[7] Thus superseding the details in the BA-14 as-built diaphragm wall drawings no. 1112/Z/HUH/LCA/C12/679 Rev. A (Developed Front Elevation of Permanent D-Wall Panel EH49 – Section A) and 1112/Z/HUH/LCA/C12/607 Rev. A (Coupler Schedule for Area B), which showed three top layers of slab-to-wall coupler connections.

56.3. **Example 3 – Panel EM 96 (Area C2-6/C3-1, Gridline 40):**

56.4. Working drawing no. 1112/W/HUH/ATK/C12/182 Rev. C dated 21 September 2015 (**Image 7**) clearly indicated two rows (T1 and T3) of T40 top layer rebars connecting the top of the east diaphragm wall to the EWL slab, with a spacing of 150 mm centre-to-centre. The coupler schedule in working drawing no. 1112/W/HUH/ATK/C12/607 Rev. B dated 16 June 2015 (**Image 8**) indicated the same detail.

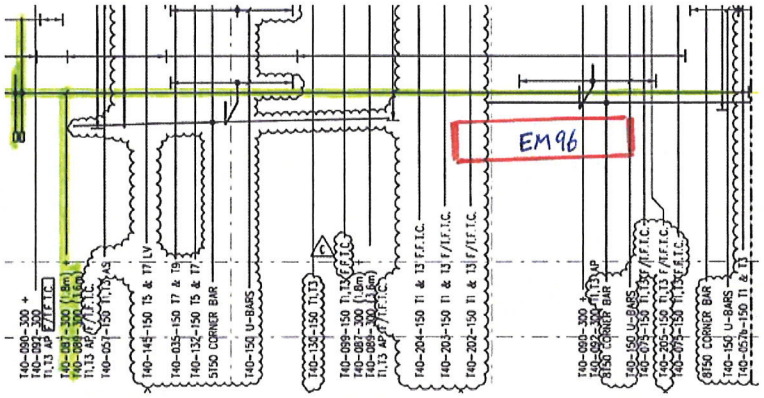

Image 7: drawing no. 182 Rev. C – annotation referring to top rows (T1 and T3)

AREA B & C (GRID 15-50)	ROOF SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	TRACK SLAB	WH39	WH137	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	EH40	EH115	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3
	OHL FIXINGS	WH39	WH137	T16-150 T1	T16-150 T1	EH40	EH115	T16-150 T1	T16-150 T1
	ROOF SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-
	TRACK SLAB	NH1	NH2	T40-150 T1 T40-150 T3	T40-150 B1 T40-150-B3	-	-	-	-

Image 8: drawing no. 607 Rev. D – top rows (T1 and T3) at the top of EWL slab

56.5. Yet again, I have checked that the number of rows/layers, spacing and diameter of the rebar connections observed on site were consistent with the working drawings, and this is confirmed by the relevant site photo (**Image 9**), which show two as-built rows of top layer through-bars connecting the EWL slab and the east diaphragm wall.[8] The relevant drawings are contained in **Appendix 3** hereto.

[8] Thus superseding the details in BA-14 as-built diaphragm wall drawings no. 1112/Z/HUH/LCA/C12/611 Rev. B (Developed Front Elevation of Permanent D-Wall Panel Type 1 – Section A) and 1112/Z/HUH/LCA/C12/834 Rev. C (Coupler Schedule for Area C), which were applicable to panel EH 91 and showed three top layers of slab-to-wall coupler connections.

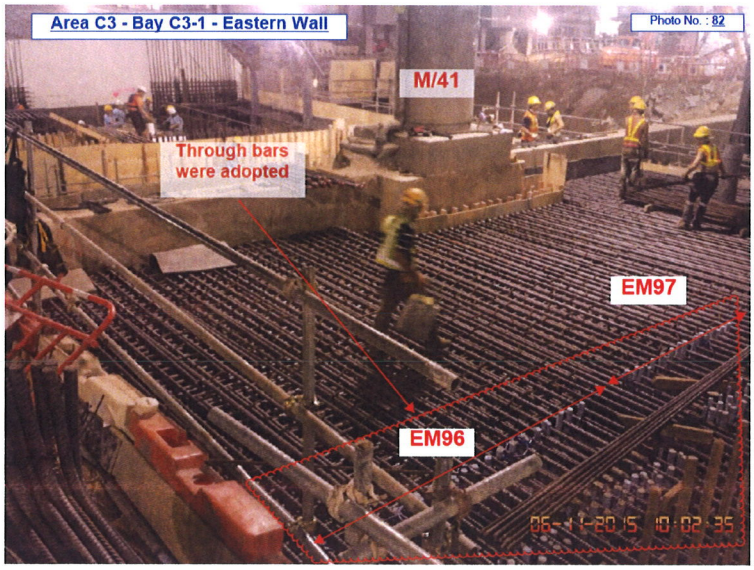

Image 9: site photo showing through-bars in the top layer of panel EM 96

57. There were also areas where the rebar connection details were subject to revisions by Atkins (Team A) as a result of RFIs from LCAL to MTRCL. For example, in panels EH 85 to EH 89 in Area C2-4, the top of the diaphragm wall was trimmed off and converted into a three-metre capping beam on those panels, based on the drawings attached to the response of Atkins to LCAL's RFI 001250 dated 16 October 2015 (see **Appendix 4**). Through-bars were used given that the cast-in couplers had been hacked off.

58. Although my understanding at the time of the EWL slab works was that the IOWs were responsible for conducting site surveillance in respect of the coupler splicing assemblies, I nonetheless observed the conditions of the coupler connections generally when inspecting the top and bottom layers of the rebars.

59. As part of my inspections, there were occasions when I spot-checked the splicing assemblies by asking LCAL's representatives (e.g. Mr. Edward Mok) to instruct the workers on site to unscrew certain starter bars from the couplers and expose the threaded end of those rebars, and then screw the bars back into the couplers. To be clear, and in line with general industry practice, I never bypassed LCAL to deal with the subcontractor's workers directly.

60. Based on the inspections described above which I conducted on a spot-checking basis, I signed off on the RISC forms for rebar fixing works in Areas B and C (except bays C3-2

and C3-3), as I was satisfied with the safety and integrity of the rebar structures from an engineering perspective and the compliance of the rebar fixing works with the working drawings issued in August/September 2015 (as outlined in paragraph 53 above).

61. I can confirm that the rebar fixing works under my watch were always inspected on site before LCAL was permitted to progress beyond the hold-point to the next stage of the works. Indeed, by the time of the pre-pour check, if there were any doubts as to the existence/endorsement of a RISC form for the rebar fixing works in any given bays, the IOWs would ask us to check if we had inspected the rebar fixing works before conducting the pre-pour check and granting permission to proceed. I do not recall this happening in relation to the areas/bays which I have inspected.

(iv) List of RISC forms for rebar fixing works in Areas B and C

62. I understand that the RISC forms which I have signed off will be disclosed to the Commission of Inquiry together with all other relevant materials. These RISC forms can be chronologically summarised as follows:

Area/Bay	**RISC Form No.**	**Date of Receipt of RISC Form by MTRCL**
C1-1	8092	27/07/2015 (late submission)
C1-2	8258	13/08/2015 (late submission)
C1-3	8424	07/09/2015 (late submission)
C2-5	8425	07/09/2015
C1-4	8563	29/09/2015 (late submission)
C2-6	8595	05/10/2015 (late submission)
C2-3	8596	05/10/2015 (late submission)
C3-5	8702	26/10/2015
C2-4	8728	28/10/2015
C3-6	8802	05/11/2015
C3-1	8845	10/11/2015
C2-1	8953	19/11/2015
B-2	8985	23/11/2015
C3-4	9013	25/11/2015 (late submission)
B-3	9138	05/12/2015
B-1	9217	11/12/2015
C1-5	9243	15/12/2015
B-4	9500	08/01/2016
B-5		

Item 13(c): Confirm whether workers engaged by Leighton and/or its subcontractors had used hydraulic cutters to shorten and cut the steel bars embedded or to be embedded within the diaphragm walls and platform slabs and if so, please identify the workers and/or entities who carried out such shortening or cutting work by hydraulic cutters, and the persons and/or entities who gave instructions (i) for such work to be carried out and (ii) for hydraulic cutters to be acquired.

63. I have not seen any hydraulic cutters on site, whether during my RISC inspections or routine site surveillance activities. I am not aware of any other work activities in Contract 1112 on the SCL Project which required a hydraulic cutter. As far as I am concerned, I am not aware of and have never seen any cutting or shortening of rebars or threaded ends of rebars by LCAL and/or its sub-contractors using hydraulic cutters.

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

64.1. The events in question and which form the subject matter of the Commission of Inquiry took place several years ago and my recollection of every detail is not therefore perfect.

64.2. 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, meeting minutes and 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 13th September 2018

KWAN Pak Hei Louis