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 APPOINTED PURSUANT TO SECTION 2 OF THE COMMISSION OF INQUIRY ORDINANCE (CHAPTER 86) ON 10 JULY 2018

WITNESS STATEMENT OF HO HON KIT

I, HO HON KIT, also known as Humphrey Ho, Assistant Director/New Buildings 2, Buildings Department, of 9/F Cityplaza Three, 14 Taikoo Wan Road, Taikoo Shing, Hong Kong, do say as follows:-

1. I am the Assistant Director/New Buildings 2 and in charge of the New Buildings Division 2 ("**NBD2**") of the Buildings Department ("**BD**"). NBD2 is responsible for processing structural proposals submitted under the Buildings Ordinance ("**BO**") for new building developments and monitoring construction sites. NBD2 also deals with the structural aspects of proposed alterations and additions works to existing buildings. My duties include, amongst other things, assisting the Director and the Deputy Director of Buildings in the setting of policy and strategies on building control and management of BD and managing the NBD2 to ensure optimum efficiency in discharging the duties of the Division.

2. I am a member of the Hong Kong Institution of Engineers and a member of the Institution of Structural Engineers of the United Kingdom. I am a Government Structural Engineer. I joined the then Buildings and Lands Department in 1990 and have taken up the office of Assistant Director/New Buildings 2 since 27 December 2017.

3. I make this Witness Statement pursuant to the request of the Commission of Inquiry (**"Commission"**) into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the Shatin to Central Link (**"SCL"**) Project, set out in a letter from Messrs. Lo & Lo to the Development Bureau and Director of Buildings dated 6 August 2018 ("**the 6 August Letter**"). Save where otherwise appears, the facts deposed hereto are within my personal knowledge or are derived from office files and records and sources to which I have access and are true to the best of my knowledge, information and belief. Save as otherwise specified, this

Statement adopts the same abbreviations and nomenclature as in the 6 August Letter.

4. The Witness Statement addresses Questions 1, 2, 5, 6, 7(a), 7(b), 9(b), 9(c), 9(f), 10(a) to (i), 10(k) to (o), 12, 13, 15 to 17 of the 6 August Letter. It is divided into the following parts:

(1) Part A explains the building control regime for the Hung Hom Station (**"HUH"**) Extension, in answer to Questions 1 and 2;

(2) Part B deals with the control measures and requirements for execution of steel bar fixing and coupler installation works in relation to the diaphragm walls and platform slabs, in answer to Questions 5, 6, 9(b), 9(c), 9(f), 10(d), 10 (g) and 10(m);

(3) Part C covers BD's investigation into the allegations of Defective Steel Works, in answer to Questions 7(a), 7(b), 10(a), (b), (c), 10(e) to (i), 10(k), 10(l), 10(n), 10(o), 12, 13 and 15 to 17.

A. The Building Control Regime for the HUH Extension

A1. The IoE

5. As explained in the Witness Statement of the Director of Buildings, some parts of the SCL Project are located at Government land and unleased land whereas some (including the HUH Extension) are on leased land. In respect of the latter parts, the Building Authority ("**BA**") has issued an Instrument of Exemption ("**IoE**") dated 5 December 2012. A copy of the IoE is at **Annex HHK-1**.

6. The IoE was accompanied with a Reference Schedule ("**Reference Schedule**") which set out the types of works which would be exempted with conditions stipulated. Normally, the exemption would be confined to those procedures and requirements relating to the appointment of Authorized Person ("**AP**") and Registered Structural Engineer ("**RSE**"), approval of plans, consent to commencement and resumption of works, and occupation of buildings provided for under sections 4, 14-17A, 19-21 of the BO. However, the design

and construction of the building works shall still comply with the standards of health and safety required under the BO.

7. Under the conditions imposed at paragraph 2 of the IoE, MTRCL is required to:

(1) submit such drawings, plans and calculations and other details as may be necessary to implement the consultation process detailed in the Reference Schedule and to comply with any reasonable request made during such consultation, including any requirement for modification or variation of designs and working procedures as may be reasonably necessary to maintain standards of health and safety (see paragraph 2(a));

(2) appoint a competent person ("**CP**"), who shall take up the responsibilities and duties of AP/RSE, to co-ordinate and supervise each area of the works in accordance with the agreed proposals[1], to certify the preparation of plans or documents and to certify to the relevant authorities upon completion of works. The appointment of the CP shall be subject to prior agreement of BD in regard to his/her qualifications and experience (see paragraph 2(b));

(3) appoint a Registered Geotechnical Engineer ("**RGE**") for building works with significant geotechnical content as described in Section 7 of the Code of Practice for Site Supervision 2009, to supervise each area of the works in accordance with the agreed proposals[2], to certify the preparation of plans or documents, and to certify to the relevant authorities upon completion of works (see paragraph 2(c));

(4) appoint registered general building contractors ("**RGBC**") and registered specialist contractors ("**RSC**"; collectively Registered Contractors, "**RC**"), as appropriate, to supervise and carry out each area of the works in accordance with the agreed proposals[3], and to certify to the relevant authorities upon completion of geotechnical works (see paragraph 2(d)); and

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[1] See paragraph 22 below.
[2] See paragraph 22 below.
[3] See paragraph 22 below.

(5) instigate an assurance system and control scheme to ensure that management of the construction of works are at a standard not inferior to that required under the BO and Regulations. All permanent construction and temporary works carried out by the person appointed in accordance with paragraph 2(d) and certified by the persons identified in paragraphs 2(b) and (c), or others acting on their behalf, shall not adversely affect the margin of safety or impair the stability of, or cause any danger to, any adjoining building, structure, land, street or services. Adequate and timely arrangements shall be made to facilitate relevant authorities in the inspection and testing of the works as may be required.

A2. The PMP

8. The IoE was issued by the BA having regard to the draft Project Management Plan ("**PMP**") of MTRCL dated 22 November 2012. Under the IoE, MTRCL was required to submit the formal PMP to BD. A copy of the PMP (versions D, E and F)[4] is at **Annex HHK-2**. Unless otherwise specified, references to the PMP in this Witness Statement are to version E, which was the applicable version at the material time of the construction of the diaphragm walls and platform slabs at the HUH Extension.

9. The PMP outlines the scope of the works for the SCL Project and provides details on how the project is to be managed by MTRCL in order to demonstrate that the proposed management process will meet the requirements set out in the IoE and the Entrustment Agreement between MTRCL and the Government. The PMP is to be reviewed and revised if necessary to reflect the changes that may occur during the project period.

10. Under the PMP, the responsibilities of MTRCL include:

(1) obtaining all necessary agreement, statutory approvals and consents from the relevant Government authorities regarding the design and construction of the SCL, and appointing RGBC and RSC, as appropriate,

[4] After the issue of the IoE, MTRCL has in total submitted 6 versions (versions A to F) of PMP to BD. PMP versions A to C were submitted to BD and RDO for comment, whereas PMP version D was accepted by BD on 17 March 2014. The PMP was revised to version E for appointing an additional CP and it was accepted by BD on 10 June 2015. The latest version is version F, which was accepted by BD on 26 July 2016. To avoid duplication, versions A to C will not be produced but will be made available upon the Commission's request.

to supervise and carry out each area of works in accordance with the agreed proposal[5], and to certify to the relevant authorities upon completion of works (see paragraphs 3.2 and 3.7 of the PMP);

(2) managing the SCL Project in accordance with MTRCL project management system for railway projects and major modification works (known as the "Project Integrated Management System"). MTRCL shall, among other things, ensure that there will not be any material deviation from the supervision plans without reasonable cause, and shall supervise the CP and to ensure the SCL Project is up to the required construction, safety, quality and environmental standards (see section 5 of the PMP);

(3) consulting the relevant Government departments on all deviations with reference to the relevant Government Standards during consultation submissions and fully documenting and maintaining all design records for future audits (see paragraphs 6.1.2 and 6.2.2 and the flow chart at Appendix 7 to the PMP);

(4) supervising all civil engineering works directly in accordance with the established procedures, keeping all site records, conducting safety audits and quality audits, and properly dealing with any non-conformity in accordance with the Code of Practice for Site Supervision as and when necessary (see section 7 of the PMP);

(5) consulting BD and/or the Railway Development Office ("**RDO**") of the Highways Department ("**HyD**") on the structural design and construction sequence of the SCL and related works that may affect existing or proposed nearby private buildings/structures, and making submissions to the various consultation committees (see section 9 of the PMP); and

(6) maintaining close communication with RDO and BD at working level, management level and senior management level (see section 10 of the PMP).

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[5] See paragraph 22 below.

A3. The Roles, Duties and Responsibilities of Relevant Parties

The CP and RGE

11. As stated above, MTRCL shall appoint a CP and a RGE under paragraphs 2(b) and 2(c) of the IoE.

12. The CP co-ordinates and supervises each area of the works while the RGE is appointed for building works with significant geotechnical content and supervises such building works. In summary, the CP and RGE are each required to (among other things):

(1) prepare and certify plan submissions for consultation and obtain agreement by BD or the various consultation committees in a timely manner prior to the commencement of works (see item (a) of the General Notes and Conditions to the Reference Schedule);

(2) supervise the carrying out of the works according to the site supervision plans (for CP and RGE) and quality supervision plans (for CP) submitted to BD in accordance with BO, requirements specified in agreed proposal[6] and those stipulated in the PMP during construction. CP and RGE are required to certify completion of works and submit as-built records, certificates and test reports of the materials, etc. to BD upon completion of works (see paragraphs 2(b) and 2(c) of the IoE, items (b) and (l) of General Notes and Conditions to the Reference Schedule and Appendix 9 to the PMP); and

(3) notify BA of non-conformity which poses imminent danger to the public and/or damage to property and/or fatal accident (see paragraph 7.9.2 and the "Flow Chart for Construction Management and Assurance Procedure" at Appendix 7 to the PMP).

13. Section 4(3) of the BO also sets out certain duties of the RGE.

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[6] See paragraph 22 below.

The RGBC and RSC

14. Further, MTRCL is required to appoint RGBC and RSC to supervise and carry out the works in accordance with the agreed proposals[7] under paragraph 2(d) of the IoE. Insofar as Contract 1112 is concerned, Leighton Contractors (Asia) Limited ("**Leighton**") has been appointed as RGBC to carry out platform slabs and excavation & lateral support works, while Intrafor Hong Kong Limited ("**Intrafor**") being RSC in the "Foundation Works" category had been appointed to carry out diaphragm wall construction works. Copies of the Notices of Appointment of Leighton and Intrafor are at Item 2 and Item 1 of **Annex HHK-3** respectively.

15. As RGBC and RSC, Leighton and Intrafor are required to comply with sections 9(5) and 9(6) of the BO respectively.

16. Other than Leighton and Intrafor, I understand that BD has not received any notice of appointment of other RC under BO for the building works of the diaphragm walls and the platform slabs at the HUH Extension.

The BO Team and BSRC Team

17. Within the Government, there is a team known as the BO Team which is a team of professional staff seconded from BD to the RDO of HyD to handle matters relating to the IoE and the Instrument of Compliance ("**IoC**")[8] for the Express Rail Link ("**XRL**") Project and the SCL Project. It was formed in 2009 for handling the XRL Project and SCL Project. It comprises a Senior Building Surveyor (SBS/RD) together with a Building Surveyor (BS/RD, renamed as BS/RD1 in 2011) and a Senior Structural Engineer (SSE/RD) together with a Structural Engineer (SE/RD, renamed as SE/RD1 in 2011). Additional posts of 1 BS (BS/RD2) and 1 SE (SE/RD2) were created in 2011 for handling the SCL Project. SBS/RD and SSE/RD handle both the XRL Project and the SCL Project and consult the Chief Building Surveyor/NTE2&R and Chief Structural Engineer/K&R respectively in BD who are advisors on the building safety standards set out in the BO. The organisation charts of the BO Team and the RDO of HyD are at **Annex HHK-4**.

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[7] See paragraph 22 below.

[8] The Commission is referred to the Witness Statement of the Director of Buildings for details regarding the IoC.

18. The BO Team advises on the building safety standards, practices and procedures of BD which are to be adopted for the works on government land of the SCL Project as if they were controlled under the BO. Simultaneously, the BO Team is responsible for matters relating to the administration of building control on the leased land portion of the SCL Project.

19. The Building Surveyors (BS) grade officers of the BO Team mainly vet submissions relating to the fire safety, health standard and precautionary measures (including building layout plans, drainage plans, demolition plans and hoarding plans), while the Structural Engineers (SE) grade officers of the BO Team vet the structural plan submissions (including foundation plans, substructure/superstructure plans, site formation plans and excavation and lateral support works plans, etc.). The duties and responsibilities of each handling officer in the BO Team are summarised at **Annex HHK-5**.

20. The BO Team is assisted by the Building Submission Review & Compliance ("**BSRC**") Team of the Monitoring and Verification Consultant ("**M&V Consultant**").

21. As explained in the Witness Statement of my colleague Mr Lok Pui Fai, BD is involved in the HUH Extension of the SCL Project, including the design stage (when consultation submissions are submitted to and acceptance letters are issued by BD), construction stage and the completion stage. I shall in the following focus on BD's role in the consultation process, and defer to Mr Lok Pui Fai to elaborate on BD's role in the other stages in his Witness Statement.

A4. The Consultation Process and Acceptance Letters

22. Under the IoE regime, consultation shall mean the submission of drawings, plans, calculations and other details together with any necessary supporting documentation for the proposed works, for vetting and agreement by BD or the various consultation committees in a timely manner and ahead of site construction, and shall include certification of satisfactory implementation of the agreed proposals prior to the operation of the railway (see Items (a) of General Notes and Conditions to the Reference Schedule). The types of structure that are subject to consultation and the actions required are set out in

the Reference Schedule. I should mention at this juncture that, while the IoE, PMP and other documents contain various references to "accepted" or "agreed" plans/proposals (see, for example, paragraphs 7(2) and 10(1) herein), the terms are used interchangeably to refer to plans/proposals submitted for consultation with BD under the IoE scheme.

23. According to the administrative procedure for consultation submission (at Appendix 9 of PMP, see p.264 at **Annex HHK-2**), consultation submissions including amendment submissions should be accepted by BD prior to the commencement of works.

24. The consultation submissions by the CP shall be accompanied by the "Certification of preparation of plans or documents" (see paragraph 5.2.3 of PMP) to certify that the plans or documents comply in all respects with standards in accordance with or equivalent to those required under the BO and regulations.

25. As explained above, consultation submissions are processed by the BO Team with the assistance of the BSRC Team of the M&V Consultant. The submission would be checked on a curtailed basis[9]. It is the responsibility of the CP, RGE and RC to ensure that the works fully comply with the BO, its subsidiary legislation and any other relevant laws, codes of practice and practice notes.

26. For the HUH Extension, building layout plans shall be submitted to various committees for consultation. These consultation committees are the Safety and Security Coordinating Committee, Trackside Safety and Security Committee and Station and Transport Integration Committee. However, the scope of work of these consultation committees does not relate to the investigation under the terms of reference of the Commission. Hence, I shall not elaborate on the consultation process with these committees in this Witness Statement.

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[9] Pursuant to Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineer ADM-19 issued by BD, a curtailed check system has been adopted to check on fundamental issues only in processing plan submissions, whilst non-fundamental issues will not be checked and will not be raised as disapproval items. After commencement of works, any contravention of the BO and its subsidiary regulations should be rectified as and when they are discovered and in any event, before certification of completion of works.

27. Structural submissions for consultation with BD would only be accepted upon satisfactory demonstration of compliance with the safety standards not inferior to those required under the BO as if approval is granted for plans submissions under full application of the BO. The construction works should be carried out in accordance with the accepted plans.

28. Upon acceptance of the plans submitted for consultation, BD would issue an acceptance letter specifying requirements pursuant to paragraph 2(a) of IoE. These requirements include the submission of certain documents/information, such as Quality Supervision Plan ("**QSP**"), Quality Assurance Scheme ("**QAS**") and Site Supervision Plan ("**SSP**"), prior to the commencement of works. I understand that Mr Lok Pui Fai will provide details of the QSP, QAS and SSP in respect of the SCL Project in his Witness Statement.

B. Control Measures and Requirements for Execution of Steel Bar Fixing and Coupler Installation Works

29. I turn now to the questions about the execution of steel bar fixing and coupler installation works for the HUH in the SCL Project (see Questions 5, 6, 9(b), 9(c), 9(f), 10(d), 10 (g) and 10(m) of the 6 August Letter).

30. While BD is not directly involved in the supervision of the actual execution of steel bar fixing and coupler installation works, it has specified requirements in the acceptance letters requiring the CP and the Authorized Signatory ("**AS**") of the RC (i.e. Leighton and Intrafor) to ensure that measures in respect of the quality assurance and control of such works are in place for proper execution of the works on site. As I will explain in paragraphs 34 and 41 below, the RC is required to have full time site supervision during site working hours.

31. Broadly speaking, the relevant control measures are contained in:

(1) the BO and Building (Administration) Regulations ("**B(A)R**");

(2) the applicable Code of Practice for Site Supervision and Technical Memorandum for Supervision Plans; and

(3) the relevant QSP, QAS and SSP.

B1. General requirements for Steel Bar Fixing and Coupler Installation Works

32. In respect of steel bar fixing and coupler installation works, the CP and the AS of the RC (i.e. Leighton and Intrafor) are required to undertake the management and execution of both site safety and quality supervision of the works covered by the SSP to be carried out in the manner prescribed by the provisions of the BO and its regulations, the SSP, the Code of Practice for Site Supervision 2009 ("**Supervision Code**") and the Technical Memorandum for Supervision Plans 2009 ("**Technical Memorandum**"). Copies of the Supervision Code and the Technical Memorandum are respectively at Items 1 and 2 of **Annex HHK-6**. Further details of the SSP for the diaphragm walls and platform slabs will be given by Mr Lok Pui Fai in his Witness Statement.

33. In addition, the CP and AS are required to provide qualified supervision[10]. The CP, who shall take up the responsibilities and duties of AP/RSE, should give periodic supervision in accordance with the B(A)R regulation 37(1) and paragraph 6.3 of the Supervision Code. The RC, represented by the AS, should give continuous supervision in accordance with the BO sections 9(5), 9(6), B(A)R regulation 41(1) and paragraph 6.5 of the Supervision Code.

34. With reference to Questions 9(b) and 9(c) of the 6 August Letter, I would like to further elaborate on the RC's duty to provide continuous supervision. As mentioned above, the RC is required to carry out continuous supervision to ensure that works are carried out in accordance with the SSP and to ensure that the works are carried out in accordance with the provisions of the BO and regulations and with the plans accepted and requirements specified. Under the Supervision Code and the SSP, the CP, RGE and AS should have their own supervision team comprising Technically Competent Persons ("**TCPs**") with the required qualifications and experiences. For the purpose of meeting the supervision requirements, the RC has to allocate sufficient

[10] Qualified supervision means supervision by experienced and competent persons to ensure that the works are carried out in accordance with the agreed proposal and that the required standards are complied with (see, for example, paragraph 2 of Appendix II to the acceptance letter issued by BD to MTRCL dated 25 February 2013 at item 1 of **Annex LPF-1** of Lok Pui Fai's Witness Statement).

manpower depending on the type and scale of the works. Circumstances may require the RC to provide full time inspection during site working hours. Specifically:

(1) The grades, numbers and frequency levels of inspection of the TCPs to be provided should be calculated in accordance with the guidelines given in paragraphs 8 and 9 of the Supervision Code and Section 6 of the Technical Memorandum;

(2) Paragraph 5.1 of the Supervision Code requires the AS of the RC to devise check lists for its TCPs for the typical items and other particular items considered appropriate and necessary for their projects and surrounding conditions;

(3) Paragraph 5.2 of the Supervision Code requires the TCPs shall carry out their duties as per the check lists devised by their own heads of stream and all the check lists and inspection records shall be kept on site for the inspection of the BA;

(4) Section 5.1.1 of the Technical Memorandum states that the safety management functions of the RC is, among others, to exercise all reasonable skill, care and diligence in following the part of the supervision plan prepared by the AS and to carry out measures and actions during the course of works to meet the objectives in Section 4.3 of the Technical Memorandum;

(5) Paragraph 6.5 of the Supervision Code further stipulates that even if some of the building works are carried out by their sub-contractors, it remains the responsibility of the RC to ensure that the building works and continuous supervision in accordance with B(A)R regulation 41(1) are properly done in accordance with the provisions of the BO and the supervision system as specified in the Supervision Code;

(6) Under paragraph 6.1 of the Technical Memorandum, the minimum requirements on the grades of TCP and frequency level of inspection are set out in Table 1. Under Table 1, the RC should provide T1 TCPs for all types of building works except minor work with the frequency level of inspection of 5, i.e. full-time inspection during site working hours;

and

(7) Table 8.2 of the Supervision Code specifies full time site supervision to be Level 5 frequency level of site inspection. The Notes to Table 1 of the Technical Memorandum further defines Level 5 frequency level of site inspection as full time inspection during site working hours.

35. In respect of any non-conformity detected in the steel fixing works or coupler installation works, the CP should notify BD immediately if the non-conformity poses an imminent danger. All non-conformities detected during the checking of typical items for specific tasks by the TCPs must be properly recorded in the Non-Conformity and Rectification Reports [11]. Detailed procedures for dealing with non-conformities are specified in paragraph 7.9 of the PMP and paragraph 10.3 of the Supervision Code.

36. For completeness, I should mention that upon completion of the works, the CP and AS have to certify that the construction works have been carried out in accordance with the agreed proposal and comply with standards required in accordance with, or equivalent to, BO and the regulations. The CP and AS also have to submit and certify the material certificates and testing reports as required in the acceptance letters.

B2. Specific requirements for Use of Mechanical Couplers

37. Before elaborating on the requirements for installation of couplers, I shall first give a brief explanation on the use of couplers in construction works. In accordance with the Code of Practice for Structural Use of Concrete 2004 (**"Concrete Code 2004"**, at **Annex HHK-7)**, forces could be transmitted from one steel bar to another steel bar by the lapping of steel bars, welding or mechanical device such as couplers. Mechanical coupler is an alternative splicing method to the lapping of steel bars, and both methods are stipulated in the Concrete Code 2004 as acceptable methods subject to their respective requirements. Under Contract 1112 for the SCL Project, mechanical couplers have been adopted as one of the methods for connection of the steel bars in the diaphragm walls, platform slabs and at the junctions between platform slabs and diaphragm walls.

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[11] See Form B at Appendix III to the Supervision Code at Item 1 of **HHK-6**.

38. Coupler is a proprietary product. Its method of production, threading process and installation vary among different manufacturers. The requirements and method of how the threaded steel bars should be connected to the couplers should follow the manufacturer's specifications.

39. The Concrete Code 2004 requires structural detailing for ductility[12]. Ductility is characterized by significant plastic deformation of material (steel bars in reinforced concrete structures). Structures designed to satisfy the ductility requirements would only deform significantly without collapse immediately under extreme loading condition (e.g. earthquake load). Couplers used for splicing steel bars at critical regions requiring ductility (e.g. joints between columns and beams) should satisfy the quality control, quality assurance and testing requirements as specified in the acceptance letters (collectively called as 'ductility couplers'). Quality supervision requirements for splicing assemblies of ductility couplers are also specifically specified in the acceptance letters. On the other hand, couplers without ductility characteristics (collectively called as 'non-ductility couplers') can be used in areas other than the critical regions (e.g. floor slabs and secondary beams).

40. Hence, there are specific requirements on the submission of quality assurance and quality control documents and provision of qualified site supervision for ductility couplers. In summary:

(1) As regards the quality supervision of ductility coupler works, the QSP specifies the frequency of quality supervision of at least 20% of the splicing assemblies by the quality control supervisor of the CP. For the more critical zones of columns above pile caps or transfer plates where plastic hinges may be formed, more stringent frequency of quality supervision of at least 50% of the splicing assemblies by the quality control supervisor of the CP is specified; and

(2) Under the QSP, the RC should assign a quality control co-ordinator to provide full time continuous supervision on the manufacturing process of the connecting ends of the steel reinforcing bars, installation of steel

[12] Ductility refers to the ability of a structure to undergo "plastic deformation" (i.e. permanent and irrecoverable deformation before rupture). Such ability is desirable in structure as it gives adequate warning to the user for repair or escape before failure.

reinforcing bars to the couplers and quality supervision of the splicing assemblies. The CP is required to submit a quality supervision report signed by him/her to confirm that the quality supervision has been adequately provided with, the inspection log book of the quality control supervisors representing the CP and the RC for the mechanical couplers works.

(See, for example, Appendix IX to the acceptance letter issued by BD to MTRCL dated 25 February 2013 at item 1 of **Annex LPF-1**).

41. The full time continuous supervision should be 100% of the splicing assemblies in accordance with the QSP submitted by the CP, which requires that 100% inspection check should be carried out on site by the quality control co-ordinator of the RC. It is therefore incumbent upon the RC to exercise good judgment and determine the actual degree of supervision during the course of works for the purpose of ensuring the building works are carried out in accordance with the accepted plans.

42. Having set out the requirements above, I should address the specific matters raised at Questions 9(b), 9(c), 9(f), 10(d), 10 (g) and 10(m) of the 6 August Letter:

(1) The requirements on quality supervision, including full time continuous supervision by the quality control co-ordinator of the RC, are and have been made clear to all the parties involved. As explained above, the requirements are set out in the acceptance letters and contained in the QSP and/or SSP submitted by the CP.

(2) As far as I am aware, BD has not received any enquiries or feedback from practitioners of the construction industry expressing difficulties in fixing the steel bars into the couplers.

(3) To the best of my knowledge, BD has not heard anything from the construction industry which suggests that it is common for steel bars to be shortened and cut and not properly inserted into the couplers in the construction of diaphragm walls and platform slabs. BD was also not aware of any evidence indicating that it is common practice in the construction industry to use a hydraulic cutter or other equipment to

shorten or cut steel bars.

(4) As to Question 10(g) of the 6 August Letter, shortening or cutting of threaded ends of steel bars for the purpose of misleading people to believe that the steel bars have been screwed fully into the couplers pre-installed in diaphragm walls would not be acceptable and such act also demonstrates that the accepted plans have not been complied with.

(5) In relation to Question 9(f) of the 6 August Letter, please refer to paragraphs 32 to 34 and 40 to 41 above.

C. Investigation into the Allegations of Defective Steel Works

C1. BD's Investigations

43. Prior to the media reports in May 2018, BD had no knowledge regarding irregularities in the connection of couplers between the diaphragm walls and the EWL slab of HUH Extension. In answer to Questions 7(a) and 10(1) of the 6 August Letter, BD, according to my understanding, was first aware of the report of the suspected Defective Steel Works in HUH Extension from the report of Apple Daily on 30 May 2018.

44. Since then, BD has taken various steps to investigate the matter, including requesting information from MTRCL and Leighton for further review to decide on the necessary follow up actions. BD's investigation is ongoing and at the fact-finding stage, and is not confined to the steel fixing works for the EWL platform slab only. For details of the steps taken by BD to investigate the matter, please refer to paragraph 79 of Mr Lok Pui Fai's Witness Statement. In passing, I would like to mention that there were media reports in relation to improper coupler connections at the stitch joint of the North Approach Tunnel and BD has taken steps to investigate the matter. However, the said incident is not relevant to the diaphragm wall and platform slab construction works under Contract 1112 and I shall not elaborate on the same.

45. With reference to Question 10(c) of the 6 August Letter, BD has not received any report on the existence of cracks or water leakage at the

diaphragm walls so far. Pending investigation, BD is not in a position to state the reason(s) of any such cracks or water leakage (if they exist).

46. Under Question 10(i) of the 6 August Letter, BD was asked to explain whether it would be apparent on visual inspect that the steel bars were shortened, cut or not properly installed. Since, as explained above, the quality control supervisor of the CP and quality control co-ordinator of the RC are required to supervise the manufacturing process of the connecting ends of the steel reinforcing bars and the installation of steel reinforcing bars to the couplers, it would be apparent on a visual inspection if the steel bars were shortened, cut or not properly inserted into the couplers during the process of installation of the steel bars into the couplers.

47. After the steel bars have been inserted into the coupler, whether they had been shortened, cut or not properly inserted into the couplers can be detected and identified would depend on the particular circumstances. Examples of apparent signs of irregularities would be any gap between coupler and steel bar, misalignment of steel bar, or any unreasonably excessive length of exposed thread of steel bar after installation.

48. Turning to Question 10(f) of the 6 August Letter, if there is evidence to prove that the steel bars were shortened, cut, or improperly inserted into the couplers, the BA may issue statutory order(s) to require the works to be ceased under section 23 of the BO. If the works have been or are being carried out in such a manner as, in the opinion of the BA, will cause or will be likely to cause a risk of injury to any person or damage to any property, the BA may, under section 24A of the BO, require such works to be carried out to ensure that the works will cease to constitute a risk. If a person fails to comply with an order under section 24A, the BA may, without any further notice, carry out, or cause to be carried out, such work as may be necessary to ensure that the order will be complied with and recover the cost from the person concerned.

49. Under paragraph 4 of the IoE, the BA may take any action including requiring the suspension of any works and the preventive or remedial action in the event of any works materially deviating from the accepted plans or working procedure or in the event of any works causing or being likely to cause damage to or a collapse of, whether total or partial, any adjoining or other building,

street or natural, formed or man-made land. Under paragraph 6 of the IoE, the BA may withdraw the exemption if any of the conditions in the IoE are not observed or in other circumstances necessitating such withdrawal.

50. Further, without the confirmation from all relevant government departments, including BD, that the railway works have been completed up to their satisfaction, the Railways Branch of Electrical and Mechanical Services Department will not issue a letter to MTRCL to confirm the completed works are safe and sound, and thus the railway in question cannot come into operation.

51. As BD's investigation is still at the fact-finding stage, it is not yet in a position to form a concluded view on the quality, safety and integrity of the HUH Extension. Whether the suspected Defective Steel Works, if they do exist, would compromise the quality, safety or integrity of the diaphragm walls and platform slabs would depend on the type, location and extent of the irregularities. In any event, the quality, safety and integrity of the structures must be assessed by the CP to the satisfaction of BD. The above answers Questions 10(e), 10(h), 10(i) of the 6 August Letter.

52. Given that the extent of the suspected Defective Steel Works (if any) cannot be ascertained at this stage, the consequences, in the event that the suspected Defective Steel Works remain unrectified, cannot be determined at present. It is difficult to comment on whether and how an effective and viable structural scheme can be devised to strengthen the structure of the diaphragm walls and platforms slabs until sufficient information is available. BD will nevertheless continue its investigative efforts with a view to ascertaining all necessary information for the formulation of proper rectification/remedial measures. The above answers Questions 10(k) and (o) of the 6 August Letter.

C2. Preliminary Load Test Proposal submitted by MTRCL and BD's response

53. In response to HyD's letter dated 31 May 2018 (see Item 1 of **Annex HHK-8**), MTRCL has engaged C M Wong & Associates Ltd ("**CMWA**") to act as an independent expert for conducting an independent safety checking of the EWL slab of HUH Extension. On 22 June 2018, MTRCL submitted a Safety Test Outline Proposal prepared by CMWA (see Item 2 of **Annex HHK-8**).

54. HyD collated the comments by BD and its appointed overseas expert and provided consolidated comments to MTRCL on 11 July 2018 (see Item 3 of **Annex HHK-8**).

55. On 20 July 2018, MTRCL provided CMWA's response to HyD's letter dated 11 July 2018 (see Item 4 of **Annex HHK-8**). According to CMWA, it received new information from MTRCL on 16 July 2018, which indicated that only Bays C1-1 and 1875 of the EWL slab had couplers at the top reinforcement. As such, CMWA would revise the said Safety Test Outline Proposal to focus on the two bays only because its proposed load test could only test the couplers at the top reinforcement.

56. The expert engaged by BD to comment on the said Safety Test Outline Proposal in terms of the methodology and acceptance criteria is Professor David A Nethercott. Up to now, Professor Nethercott had studied and commented on CMWA's Safety Test Outline Proposal dated 22 June 2018 and provided his response to CMWA's comments dated 20 July 2018. He came to Hong Kong on 12 July 2018 to meet with BD, the design consultant of the station (i.e. Atkins China Limited) and MTRCL. He also made a site visit to the HUH Extension on 13 July 2018 to see the diaphragm walls and EWL slab. The relevant email correspondence, review report and site inspection report from Professor Nethercott are at **Annex HHK-9**.

57. On 20 August 2018, CMWA presented a Loading Test Proposal in a meeting with MTRCL, HyD and BD. MTRCL submitted the Loading Test Proposal on 30 August 2018 (see Item 5 of **Annex HHK-8**). The Loading Test Proposal includes a drawing[13] showing 11 types of as-built connection details between the EWL slab and diaphragm walls based on the latest information from MTRCL, which are different from the details as shown in MTRCL's report and letter dated 15 June 2018 and 13 July 2018 respectively. A copy of the said report and letter are at Item 1 and Item 3 of **Annex LPF-12** respectively. BD has been following up the matter by demanding MTRCL to explain the discrepancy between the connection details.

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[13] See page 802 of **Annex HHK-8**.

C3. Option of opening up the Diaphragm Wall and Platform Slab for investigation

58. The Government is still in the course of gathering further evidence on the construction details of Defective Steel Works at the HUH Extension works at present. For example, the Government has requested MTRCL to examine and verify all construction records comprehensively and to provide the records to HyD and BD for consideration. In parallel, BD will continue to consult expert opinion on structural safety. The Government would not rule out the option of opening up part of the connection between platform slabs and diaphragm walls for examination. It is essential to gather all relevant information before any conclusion can be made.

C4. Way Forward

59. BD is still at the fact-finding stage of its investigation. It is believed that any aspects of non-compliance, inadequacies and deficiencies in respect of sub-paragraphs (i) and (ii) of paragraph (b) of the Commission's Terms of Reference would be identified in the course of and/or upon completion of the investigation.

60. BD, as the regulator under the BO, will carefully examine and follow up any recommendations from the Commission in respect of suitable measures that could be taken to promote public safety and the quality of works.

61. I confirm that the contents of this Witness Statement are true to the best of my knowledge, information and belief.

Dated this 13th day of September 2018

(HO HON KIT)
Assistant Director/New Buildings 2
Buildings Department