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
("THE COMMISSION")

CLOSING ADDRESS BY COUNSEL FOR THE COMMISSION

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[**A1/10**] refers to Bundle A1 page 10

[**T1/10:1-11:3**] refers to Transcript Day 1 page 10 line 1 to page 11 line 3

I. Overview

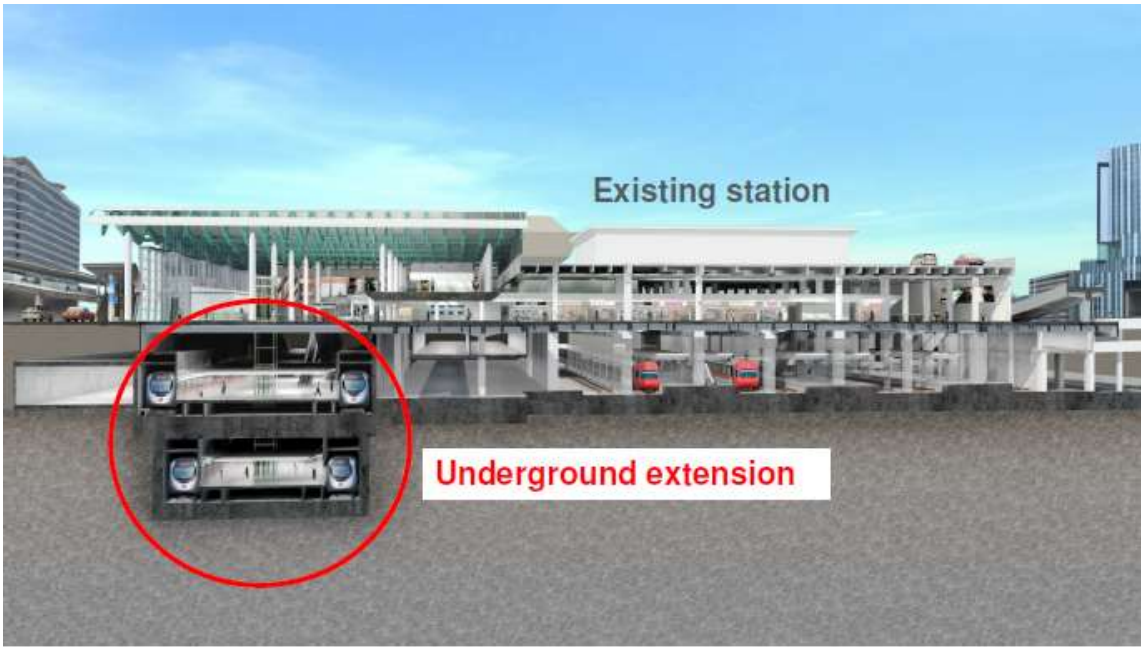
1. The Shatin to Central Link Project ("**the SCL Project**") was one of the railway projects recommended for implementation under the Railway Development Strategy 2000. The 17km long SCL Project is a territory-wide strategic railway project with ten stations, and it will be linked with a number of existing and future railway lines. Of the ten stations, six will be interchange stations, including Hung Hom Station. Including the cost of design and site investigation works, as at 1 August 2018, the approved project estimate for the entire SCL Project is approximately HK$83.1 billion.[1]

2. The focus of the Commission of Inquiry ("**the COI**") is Contract 1112 which was one of many civil engineering and other contracts entered into by MTRCL for the purpose of carrying out, completing and delivering the SCL Project.[2]

[1] See generally §§5-9 of the witness statement of Chung Kum-Wah, Director of Highways **[WS2/#82/G3/2059-2061]**

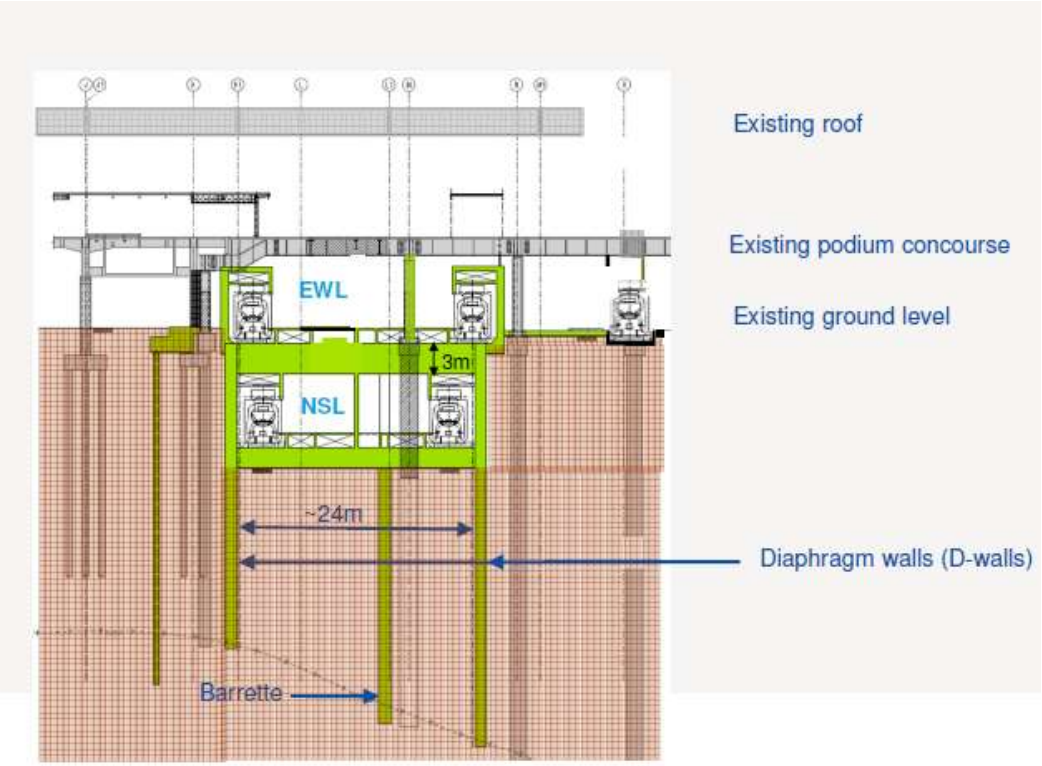
[2] MTRCL entered into approximately 49 civil construction contracts and 51 system-wide E & M contracts [**G9/7638 @7690-7693 and K1/197-200**]

3. Contract 1112 was entered into between MTRCL and Leighton Contractors (Asia) Limited ("**Leighton**") and dated 30 July 2013[3]. Contract 1112 required, amongst other things, the existing Hung Hom Station to be extended sideways (to the west) and, more importantly, underground to facilitate the inter-connection of the East-West Corridor ("**EWL**") and the North-South Corridor ("**NSL**") by forming two new platforms ("**the Project**"). The diagram below illustrates the new underground extension. The upper platform will be referred to as the "**EWL Slab**" and the lower platform as the "**NSL Slab**".



4. The diagram below, albeit still simplified, illustrates the underground works in more detail.

[3] See **[B2/846-848]**, although the Letter of Acceptance was issued on or about 7 March 2013 – see **[B2/846]**



5. For the purposes of the COI, the most important aspects of the underground construction works are (a) the East and West Diaphragm Walls ("**the D-Walls**") and, in particular, the East D-Wall and (b) the EWL Slab and the NSL Slab but, in particular, the EWL Slab. The OTE slab and wall connected to and above the East D-Wall is also of some relevance to certain issues.

6. On 10 July 2018, the COI was formally set up by the Chief Executive in Council against the backdrop of allegations, reported in the media, that there had been *systematic and widespread* cutting of threaded rebar and consequential improper connections made between threaded rebar and couplers, particularly at the connection between the EWL Slab and the East D-Wall. These allegations had previously been made by one Poon Chuk Hung Jason ("**Mr. Poon**") the managing director of China Technology Corporation Limited

("**China Technology**") a sub-contractor of Leighton under Contract 1112 in respect of formwork and placing of concrete at, amongst other areas, the EWL Slab and the NSL Slab.

7. Most public inquiries are set up to investigate the cause of an event which has demonstrably and unquestionably happened. Not this COI, however, which was set up merely on the basis of unproven allegations which, as stated above, had been made in certain sections of the media. As matters have transpired, on the basis of the evidence gathered by the COI, those basic allegations have proven to be generally unsubstantiated and false. Such evidence as exists on the topic of threaded rebar cutting is dealt with in **Section V** below.

8. Almost by default, and by virtue of the COI's dynamic process, emphasis has significantly shifted away from the allegations of cut rebar to focus more on the question as to whether the threaded rebar (procured by Leighton, threaded by BOSA and installed by Fang Sheung), has been properly screwed into the couplers at the connections between the D-Walls and the EWL and NSL Slabs. It is submitted that shift of such emphasis has not affected the ability of the COI to reach its conclusions and recommendations.

9. Thus, on the basis of the factual evidence, the available results of the "opening-up" and the independent structural engineering expert evidence, whilst isolated incidents of sub-standard workmanship have been established, it is submitted that the COI should be satisfied that the EWL Slab, the NSL Slab and the D-Walls are safe for their intended purpose and use. This is dealt with in **Section XII** below. Reports in the media that major repair works or even

demolition of the EWL and NSL Slabs is necessary are incorrect, and apparently not based on a full and proper consideration of the evidence.

10. In the course of the Inquiry, the COI also received evidence related to the compliance of a Quality Supervision Plan (see **Section VI** below), the changes of design/detail at the top of the East D-wall and the miscommunication problems among various parties (see **Section VII** below), the retrospective records prepared by MTRCL and Leighton (see **Section VIII** below) and the lack of as-built drawings (see **Section IX** below). These issues raise questions of contractual compliance and project management, the latter subject of which is dealt with in **Section XIII** below, and covered by paragraphs (b) and (c) of the COI's Terms of Reference ("**ToR**")[4].

11. The remaining or other issues of (1) honeycombing of concrete, (2) water seepage and (3) placement of lightweight concrete are dealt with in **Section X** below.

12. All of the matters touched on above have been dealt with to a greater or lesser extent by the involved parties in their written Closing Submissions and will no doubt be elucidated in the oral closing addresses. One matter raised by the Government, however, merits some brief observations. In paragraphs 7(1) and (2) of the Government's Closing Submissions, attention is fairly drawn to paragraph (a) (iii) of the ToR[5] of the COI. This requires the COI to "*ascertain whether the works in (i) and (ii) above were executed in accordance with the Contract. If not, the reasons therefor and*

[4] See [**A1/1**]
[5] **[A1/1]**

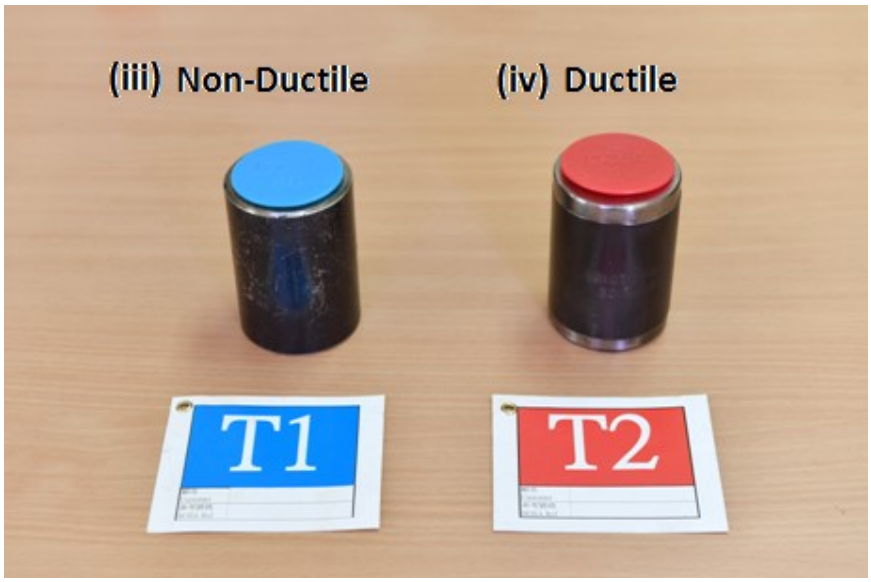
whether steps for rectification have been taken." The Contract referred to is, of course, Contract 1112 entered into between MTRCL and Leighton and to which the Government is not a party. Whilst fully cognizant of the requirement of paragraph (a)(iii), the COI is also mindful of the constraint imposed by paragraph (c) towards the end of the ToR which expressly precludes any determination of, inter alia, any criminal or **civil** liability. The Government asserts that "*structural safety has been examined as if it were an issue distinct from compliance of contractual or statutory requirement*." In a real sense, the two matters are distinct. Under the Contract, Leighton has obligations to provide (by way of example only) site supervision and as-built drawings.[6] A failure by Leighton to fulfill either of those obligations may lead to a conclusion that the works were not executed in accordance with the Contract but that does not necessarily mean that the works as executed are not structurally safe. The Government may rest assured that the COI has no intention of re-writing the Contract (as defined in the ToR) or any other contractual obligation of any involved party. Indeed, as the COI has indicated a number of times in another context, the COI is very reluctant to be pulled into complex questions of contractual interpretation. That said, the COI appreciates that it must make its determinations and recommendations against the backdrop of the contractual relationships between the involved parties.

II. The Threaded Rebar and Couplers

[6] MTRCL's obligations in these respects do not arise under the Contract but by a different route.

13. At this early juncture it might be helpful to summarise the construction processes under Contract 1112 which required the use of threaded rebar and couplers together with related matters, including the different types of threaded rebar and couplers.

14. For present purposes, there are two types of rebar and two types of coupler. As to the rebar, Type A rebar has approximately ten/eleven (10/11) threads, whilst Type B rebar has approximately twenty/twenty-one (20/21) threads, or almost twice as many threads as Type A. As to the couplers, both Type I and Type II can be ductile (a Seisplice coupler) or non-ductile (a Servisplice coupler) and they can be distinguished by their visual appearance, the ductile/Seisplice coupler having a distinct shiny ring at each end and the non-ductile/Servisplice coupler having a uniform dark appearance. As to functionality, Type I is referred to as a "standard" coupler and is used when threaded rebar is to be severed into the coupler (at both ends). Type II is referred to as a "positional" coupler and is used in situations where the individual steel bars of pre-fabricated rebar cannot be rotated (because, for example, it is L-shaped at one end). In this situation the coupler itself is rotated and subsequently counter-rotated. The four photographs below show (i) Type A rebar, (ii) Type B rebar, (iii) non-ductile coupler (T1) and (iv) ductile coupler (T2).



15. By a Sub-Contract dated in or about May 2013 between Leighton and BOSA Technology (Hong Kong) Limited ("**BOSA**")[7], BOSA agreed to (a) thread rebar supplied by Leighton and (b) supply couplers against orders placed by Leighton. From October 2013 onward, BOSA had a fabrication yard and storage facility on the Contract 1112 site.

[7] See **[C6/4842-4926]**

16. The first construction process which required the use of threaded rebar and couplers was the reinforcement for the D-Walls, as constructed by Intrafor. The D-Walls are 1.2m thick and are constructed in a series of panels which vary in width (from about 2.8m to 6.5m). The length (or depth) of the panels also varied since the D-Walls are formed of "hit" and "miss" (EM/WM) panels. The "hit" panels are required to be founded on bedrock and the depth of the bedrock is not uniform and will necessarily vary from location to location. The "miss" panels are, in effect, infills between certain "hit" panels, and are taken to a shallower depth.[8] The D-Walls are constructed of reinforced concrete. The reinforcement is provided by series of "cages". Depending upon the size and weight of the reinforcement cages required the individual cages would be fabricated at an on-site fabrication yard, transported to the D-Wall panel location and then lowered, cage by cage, into the excavated area. Each cage, however, must be connected to the next cage and this is achieved by the use of Type B couplers. The number of reinforcement cages per panel will necessarily vary, depending upon the length (depth) of the panel concerned.

17. During the course of the D-Wall construction works, BD/Pypun carried out one formal site audit in respect of Contract 1112 which was specifically in respect of the "*checking of sampling, assembling and testing of mechanical coupler works…by using BOSA-Type II mechanical couplers*". The audit took place between 22 and 24 January 2014 at BOSA's fabrication yard at the Hung Hom site. The test requirements were stated to be clause 3.2.8.2 of

[8] In Areas B and C, there are a total of 49 "hit" panels and a total of 24 "miss" panels

CoP 2004. Nine (9) rebar of sizes T32, T40 and T50 were tested. The grade of steel used was 460. Strength tests and elongation measurements were carried out. The 'Inspection Report with Photos' is at **H10/4797-4836**.

18. There has been no suggestion (let alone any evidence) that either the threaded rebar used to fabricate the reinforcement cages for the D-Walls was cut, or that the connections within the cages or the connections between the cages are in any way deficient. On the contrary, as discussed later, the records kept in respect of the D-Wall reinforcement cages, both in relation to fabrication and inspection/supervision are of a high quality[9].

19. It is perhaps appropriate to say at this juncture that so far as Intrafor is concerned, no issue is taken with the content of its clear and helpful Closing Submissions. In particular, it is submitted, in agreement with paragraph 6 thereof, that there is no evidential basis upon which to make any adverse findings with respect to the D-Walls as constructed by Intrafor (and ultimately approved by BD), or against Intrafor itself.

20. The next construction process (or processes) which required the use of threaded rebar and couplers was the formation of the reinforcement for the EWL Slab and the NSL Slab. The stages were, in general terms, as follows:

    (1) on the inside or inward facing elevation of the East D-Wall (also known as the excavation side) the reinforcement cages for the D-Wall panels incorporated horizontal rows of

[9] Report of Professor McQuillan at §§104-105 [**ER1/#3**]

couplers to allow for the threaded rebar for the EWL Slab and the NSL Slab to be connected thereto;

(2) so far as the 3m thick EWL Slab is concerned, there were two horizontal rows of couplers towards the top level of the slab (to form the top mat of rebar) and two further rows towards the bottom of the slab (to form the bottom mat of rebar);

(3) a similar arrangement was made in respect of the 2m thick NSL Slab on the side of the East D-Wall;

(4) the top of the West D-Wall was differently designed and vertical couplers were incorporated into the top reinforcement cage of the D-Wall panels and therefore the connection into the EWL Slab was entirely different[10];

(5) with regard to the NSL Slab the arrangement was similar to that used on the East D-Wall.

21. The next construction process which required the use of threaded rebar and couplers was the formation of the connection joints ("**the CJs**") between the "Bays" of poured concrete at the EWL Slab and NSL Slab. By way of further explanation and by reference to the drawings at **B17/24198** and **24199** (which relate to the EWL Slab only) the EWL Slab was, for design and construction purposes, divided as follows:

(1) Area A, Gridlines 0 – 7, Bays 1 – 7;

[10] For this reason there has been no opening-up or other investigations at the top of the West D-Wall.

(2) HKC, Gridlines 7 – 15, Bays 1 – 3;

(3) Area B, Gridlines 15 – 22, Bays 1 – 4;

(4) Area C1, Gridlines 22 – 31, Bays C1–1 to C1–5 and 1875;

(5) Area C2, Gridlines 31 – 40, Bays C2–1 to C2–6; and

(6) Area C3, Gridlines 40 – 49.5, Bays C3–1 to C3–6.

There were CJs formed by threaded rebar and couplers between each adjacent "Bay".

22. It is important to record at this early juncture certain critical facts and conclusions to be drawn from the structural engineering expert evidence namely:

(1) whilst the original design detail of the top mat of rebar connecting the EWL Slab to the East D-Wall contemplated the use of threaded rebar and couplers along, in effect, its entire length, in fact, save for a number of isolated areas[11] the design detail was changed from threaded rebar/couplers to "through bars";

(2) all structural engineering experts agree that the changed design detail creates a better detail (or at least no worse a detail) and provides more steel across the interface;[12]

(3) the bottom mat of rebar at the interface of the EWL Slab and East D-Wall is in "compression" and not relied upon for flexure and shear capacity, and based on the "redundancy" of the couplers at the bottom of the EWL Slab opening up of

[11] See the Holistic Proposal at **G17/12970**
[12] Experts' Joint Memorandum dated 18 December 2018 [**ER1/Tab 3/118**], §3

the underside of is unnecessary from the perspective of safety;[13]

(4) no evidence has been presented to the COI that, in terms of safety, justifies the invasive investigation of the D-Walls (East or West) or the NSL Slab and to the extent that such investigation is contained within the "Holistic Proposal"[14] [**G17/12970**] the structural engineering experts unanimously agreed that such invasive investigation should be reviewed.[15]

III. The Involved Parties

23. There are four Government departments or bureaux involved namely the (1) Transport and Housing Bureau ("**THB**"), (2) Highways Department ("**HyD**") including the Railway Development Office ("**RDO**"), (3) Development Bureau ("**DevB**") and (4) Buildings Department ("**BD**"). The first two entities performed a general monitoring role in the SCL Project and the latter two carried out their statutory duties and functions. The four entities are represented by the Department of Justice ("**DoJ**").

24. By an agreement dated 20 August 2012[16], PYPUN-KD & Associates Limited ("**Pypun**") was engaged by RDO on behalf of the Government as a Monitoring & Verification Consultant to, inter alia, monitor the performance of MTRCL under the Entrustment Agreement referred to below. For clarity, this engagement related

[13] Experts' Joint Memorandum dated 18 December 2018 [**ER1/Tab 3/118-119**], §§2 and 6
[14] See **[G17/12970]**
[15] Experts' Joint Memorandum dated 18 December 2018 [**ER1/Tab3/119**] §6
[16] See **[G9/7638]**

to the entirety of the SCL Project and not just Contract 1112 which, as stated above, was one amongst numerous individual contracts.

25. MTRCL was appointed by THB on behalf of the Government under an Entrustment Agreement dated 24 November 2008[17] to design and carry out site investigation works for the SCL Project, by a further Entrustment Agreement dated 17 May 2011[18] to carry out certain advance works as defined therein and by a further Entrustment Agreement dated 29 May 2012 ("**the Entrustment Agreement**") [19] to project manage the construction and commissioning of the SCL Project. The Government is the majority shareholder of MTRCL.

26. Pursuant to a Consultancy Agreement dated on or about 14 January 2010[20], Atkins China Limited ("**Atkins**") was engaged by MTRCL to be MTRCL's design consultant in respect of Contract 1112 [**J1/57/para. 6]]** ("**Atkins Team A**") and by a further and undated separate Consultancy Agreement, entered into sometime in April 2013, Atkins was engaged by Leighton as its temporary works design consultant in respect of Contract 1112[21] ("**Atkins Team B**").

27. Leighton was the main contractor engaged by MTRCL to construct, amongst many other things, the relevant D-walls and EWL/NSL Slab works under Contract 1112 dated 30 July 2013[22]. Contract 1112 was a target cost contract.

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[17] See **[G7/5466]**
[18] See **[G7/5521]**
[19] See **[G7/5595]**
[20] See **[B10/7652]**
[21] See **[J1/16]**
[22] See **[B2/846-848]**; **[C1/437 to C5/4353]**

28. Pursuant to a sub-contract dated 6 September 2013[23], Intrafor Hong Kong Limited ("**Intrafor"**) was Leighton's specialist contractor responsible for, amongst other things, the diaphragm wall construction works, including re-bar preparation, bending and coupler installation. In fact, Intrafor sub-sub-contracted the fabrication and fixing of the steel reinforcement cages for the D-Walls to Hung Choi Engineering Company Limited ("**Hung Choi**"). Although not an involved party, the Commission sought and obtained witness statements from two of Hung Choi's personnel who duly gave evidence before the Commission.[24]

29. Pursuant to a sub-contract dated 28 August 2015[25], Fang Sheung Construction Company ("**Fang Sheung**") was Leighton's sub-contractor responsible for carrying out the reinforcement bar cutting, bending and fixing works for the EWL/NSL Slabs and associated structures, as well as the South Approach Tunnel.

30. Pursuant to a sub-contract dated 28 May 2015[26], China Technology was engaged by Leighton to be its sub-contractor responsible for erecting formwork, including blinding concrete, soffit formwork and slab and side construction joint formwork, installation of electrical and cast-in items, carrying out cleaning prior to pouring concrete and pouring the concrete to form, amongst other things, the EWL Slab and the NSL Slab.

IV. <u>The Contractual and Regulatory Regimes</u>

[23] See **[C6/4665]**
[24] See **[I1/19 & 21 and I1/100 & 104, I1/111 & 117, I1/124 & 133]**. Furthermore, the role and involvement of BOSA both in relation to the D-Walls and EWL and NSL Slabs has been explained above.
[25] See **[E1/30]**
[26] See **[C6/4354 and D1/65]**

The contractual regime

31. **Section III** above sets out details of the contractual regime and relationships between the various parties. Further elaboration of certain of these matters is set out in the paragraphs below.

32. The RDO of HyD was the representative of the THB in executing the Entrustment Agreement[27]. Personnel from BD were seconded to RDO who, with the additional assistance of the M & V Consultant (Pypun), amongst other things, processed the various submissions made by and consulted with MTRCL.

33. Pursuant to the Entrustment Agreement, MTRCL was required to carry out the entrustment activities that related to the provision of project management services with the skill and care reasonably to be expected of a professional and competent project manager. In so acting, MTRCL was principally responsible for:-

    (1) the procurement, coordination, administration, management and supervision of the design and construction of works, the procurement of goods, and the enforcement of claims[28].

    (2) The safety aspects of the construction of the works carried out;

    (3) The progress of the works in accordance with the programme;

[27] See the witness statement of Frank Chan, at §17 **[WS2/#75/G3/1758]**. See also Clause 30.1 of the EA **[G7/5639-5640]**

[28] See the witness statement of Frank Chan, at §16 **[WS2/#75/G3/1758]**. See also Clause 5.1 of the EA **[G7/5615-16]**

(4) The quality of the works in accordance with the terms and specifications of Contract 1112; and

(5) The budget of the works[29].

34. As stated, on or about 7 March 2013[30], MTRCL and Leighton entered into a target cost contract, i.e. Contract 1112 [31] for the construction of the diaphragm walls, EWL Slab, NSL Slab and associated works.

35. Upon MTRCL's approval, Leighton, as main contractor, appointed the following sub-contractors for Contract 1112, details of which are given above:-

(1) BOSA for the provision of all necessary labour, supervision, plant, equipment and materials for the supply of couplers and the threading of reinforced steel rebars;

(2) Intrafor for the D-Walls and barrette construction and the associated works;

(3) China Technology for the provision of all necessary labour, supervision, plant, equipment and materials for formwork and concrete placing; and

[29] See the witness statement of Aidan Rooney, at §10 **[WS2/#59/B1/183]**
[30] By reference to the Letter of Acceptance. See **[B2/846]**
[31] See **[B2/846-960]**

(4) Fang Sheung for the provision of all necessary labour, supervision, plant, equipment and materials for reinforcement bar cutting, bending and fixing in respect of, among other things, the EWL Slab and NSL Slab. The history of Fang Sheung, the details of its long-standing relationship with Leighton, its contractual arrangements with Leighton under Contract 1112 and the gist of its contractual duties as helpfully set out in paragraphs 4 to 8 of Fang Sheung's Closing Submissions are accepted and agreed.

36. From April 2013, and with the consent of MTRC, Leighton appointed Atkins as their design consultant for the temporary works in Contract 1112[32]. There was overlap between the personnel in Atkins Team A and Atkins Team B. As time progressed, Atkins Team B also enlarged their scope of services to beyond temporary works[33]. The implications of this arrangement will be further discussed in **Section XIII** below.

The regulatory regime

37. Pursuant to section 54(2) of the Mass Transit Railway Ordinance (Cap 556) ("**MTRO**"), on or about 5 December 2012, having regard to the draft "Project Management Plan" ("**PMP**") dated 22 November 2012 submitted by MTRCL, the Building Authority ("**BA**"), who is the Director of Buildings and head of the BD[34], granted exemption from the Buildings Ordinance ("**BO**") in respect

[32] See the witness statement of John Blackwood, at §12 **[WS2/#108/J1/58-59]**
[33] See the witness statement of John Blackwood, at §12 **[WS2/#108/J1/58-59]**
[34] See the witness statement of TC Cheung, at §1 **[WS2/#94/H7/2107]**

of certain buildings and associated building works for the SCL Project[35], including works for Contract 1112[36].

38. The details of the said exemption are set out in the Instrument of Exemption ("**IoE**") [37], which explains that the exemption is confined to those procedures and requirements relating to the appointment of Authorized Person ("**AP**") and Registered Structural Engineer ("**RSE**") as appropriate, approval of plans, consent to commencement and resumption of works and occupation of buildings provided for in section 4, sections 14 to 17A and sections 19 to 21 of the BO, such that the BA's duties and sanctioning powers to ensure standards of health and safety are not undermined[38].

39. As conditions to be imposed under section 54(2) of the MTRO, the BA also requires MTRCL to, among other things:-

(1) implement a consultation process with the BD[39], which "*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 the BD or the various consultation committees in a timely manner and ahead of site construction, and shall include subsequent certification of satisfactory implementation of the agreed proposals prior to the operation of the railway*"[40];

[35] See **[H7/2220-21]**
[36] See **[H7/2226-27/Category 2]**
[37] See **[H7/2222-33]**
[38] See **[H7/2222/§1]**
[39] See **[H7/2222-23/§2(a)]**
[40] See **[H7/2229/§(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, to certify the preparation of plans or documents and to certify to the relevant authorities upon completion of works[41];

(3) appoint a Registered Geotechnical Engineer ("**RGE**") for building works with significant geotechnical content to supervise each area of the works in accordance with the agreed proposals, to certify the preparation of plans or documents, and to certify to the relevant authorities upon completion of works[42];

(4) appoint a Registered General Building Contractor ("**RGBC**") and Registered Specialist Contract ("**RSC**"), as appropriate, to supervise and carry out each area of the works in accordance with the agreed proposals, and to certify to the relevant authorities upon completion of geotechnical works[43];

(5) instigate an assurance system and control scheme[44] to ensure that management of the construction of the works is of a standard not inferior to that required under the BO and Buildings Regulations[45]; and

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[41] See **[H7/2223/§2(b)]**
[42] See **[H7/2223/§2(c)]**
[43] See **[H7/2223/§2(d)]**
[44] This assurance system came in the form of a PMP. See the witness statement of TC Cheung, at §15(3) **[WS2/#94/H7/2113]**
[45] See **[H7/2223/§2(e)].** In this regard, it is submitted that paragraph 28 of the Government's Closing Submissions is correct

(6) submit a site supervision plan ("**SSP**") to the BD before the commencement of the relevant construction works[46].

40. Pursuant to the IoE, during the construction works:-

(1) Drawings for the Contract were submitted to and accepted by the BD from about 25 February 2013[47];

(2) Aidan Rooney (from September 2013 until February 2015) and Jason Wong (from February 2015 until August 2018) of MTRCL were appointed as the CP [48];

(3) CK Chan of Atkins was appointed as the RGE[49];

(4) Leighton was appointed as the RGBC for the Contract as a whole from 29 April 2013[50] and Intrafor was appointed as the RSC for the D-Walls from 13 January 2014[51];

(5) 6 versions of formal PMPs were submitted to the BD from January 2013 to June 2016[52]; and

(6) Various SSPs were submitted to the BD[53].

41. Several points are noteworthy. More specifically:-

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[46] See **[H7/2230/§(l)]**
[47] See the witness statement of Andy Leung, at §30 **[WS2/65/B1/247]**
[48] See the witness statement of Aidan Rooney, at §22 **[WS2/#59/B1/188]**
[49] See the witness statement of CK Chan, at §3 **[WS2/#109.1/J6/4502]**
[50] **[H20/40121-23]**
[51] **[H7/2646-47]**
[52] **[B4/1825-2502]**
[53] Example can be found at **[H10/4281-4748]**

(1) Both Leighton (as the RGBC[54]) and Intrafor (as the RSC[55]) gave an undertaking to:-

"*carry out the works in strict compliance with standards in accordance with or equivalent to those required under the Buildings Ordinance and Regulations, recognizing the special requirements for railways, as stipulated in the exemption letter dated 5 December 2012*" (the "**Undertaking**");

(2) Pursuant to Appendix 9 to the PMP[56], if MTRCL wished to amend the *design* accepted by the BD, they needed to carry out a consultation process and obtain acceptance *before* the relevant construction work; and

(3) Pursuant to Appendix 9 to the PMP[57], MTRCL would need to submit the as-built record plans to the BD/RDO when their works were completed.

42. As explained above, to assist the HyD/RDO with monitoring and verification of certain aspects of the works of the SCL Project, on or about 20 August 2012, the Government also entered into an agreement [58] with Pypun appointing the latter as the M&V Consultant[59].

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[54] **[H20/40121-23]**
[55] **[H7/2646-47]**
[56] **[H7/2362]**
[57] **[H7/2362]**
[58] **[G9/7368+]**
[59] See the witness statement of YM Mak, at §8 **[WS2/#110/K1/12]**

43. A diagram illustrating the relationship between the aforesaid parties is annexed as **Annex I** hereto.

V. <u>The Rebar Thread-cutting Incidents</u>

44. As stated above, the COI was set up because of allegations of (a) widespread cutting of threaded steel rebar used as part of the concrete reinforcement and (b) the consequential improper/inadequate connection of the threaded rebar to the couplers (as described above).

45. This gives rise to the following questions in respect of the reinforcement steel for the EWL Slab and the NSL Slab:

(1) Did the aforesaid circumstances ever take place?

(2) If so, why did they happen?

(3) Were they isolated or *systematic and widespread* incidents?

(4) Assuming it happened, which party did the rebar cutting?

46. The above are matters of fact. It is important therefore to analyse the factual evidence from different parties in relation to the cutting or improper connection of rebar.

Fang Sheung's Evidence - Pun Wai Shan[60]

[60] Witness statement at **WS1/#31/E1/29.1-29.4** and Transcript at T12/1:5 to T13/89:11

47. Pun Wai Shan ("**Mr. Pun**") was the sole proprietor of Fang Sheung[61]. Mr Pun was, at times, somewhat vague and evasive with his answers in cross-examination and, whilst not dishonest, was not a particularly satisfactory witness. It is submitted that the Government's and China Technology's analyses of Mr. Pun's evidence (by reference to statements given at various times to MTRCL, the COI and the police) is unnecessarily harsh and largely unwarranted.[62]

48. In general, Mr. Pun mentioned that the difficulties in screwing rebar into couplers that Fang Sheung faced on site arose because of concrete residue inside couplers left in the D-Walls, deformed couplers and skewed couplers[63].

49. He also said, however, that there was a layer by layer inspection by Leighton and MTRCL in respect of Fang Sheung's rebar fixing works[64].

50. He accepted that the cutting machine appearing in the photo at **D1/228** was similar to the electric bandsaw provided by Fang Sheung and that the worker in that photo might be a worker from Fang Sheung[65].

51. In relation to NCR 157, he admitted that an NCR was issued to Fang Sheung by Leighton, but he claimed that he only saw the photos attached to the NCR on 13 June 2018 during MTRCL's

[61] **WS1/#31/E1/29.1**
[62] §§ 50 to 58 of the Government's Closing Submissions and §§77-93 of China Technology's Closing Submissions
[63] T12/32:4-33:13
[64] T12/34:14-34:20
[65] T12/54:5-55-18

interview[66]. After the issue of NCR 157, Mr. Cheung gave all workers a briefing and indicated that further rebar cutting would lead to the sack. Man Sze Ho of Leighton corroborated the fact of this briefing and indeed there is an attendance sheet in respect thereof.[67]

52. Initially, he denied there was any cutting of threaded rebar on site[68]. However, under cross-examination by Mr. Khaw (on behalf of the Government), he admitted that he was told by Mr. Joe Cheung (Fang Sheung's foreman) of a rebar cutting incident on site back in 2015 before NCR 157[69] was issued.

53. He also admitted that workers on site might have tried to cut corners when they faced difficulties on site[70].

54. He also agreed that he did not take any steps to look into the NCR and to find out what the problem really was[71].

Fang Sheung's Evidence - Cheung Chiu Fung[72]

55. Cheung Chiu Fung (also known as Joe Cheung) ("**Mr. Cheung**") was the site foreman and most senior person of Fang Sheung on site[73]. He was a qualified bar bender and fixer, had day to day site knowledge and, despite a number of inconsistencies in his evidence, was a generally reliable witness. Again, it is submitted that the

[66] T13/24:24-25:7; T13/29:1-29:21
[67] T22/18-19 and **C8/5552**
[68] T12/42:21-43:15, 105:2-105:9, 120:10-120:22
[69] **C12/8125**, T13/61:20-64:8
[70] T13/42:24-44:4
[71] T13/50:18-51:9
[72] Witness statement at **WS1/#35/E5/879.1-879.5** and Transcript at T13/91:23 – 132:23, T14/50:4-144:3, T15/60:13-130:17, T16/1:13-92:9
[73] **E5/879.1**

Government's and China Technology's analyses of Mr. Cheung's evidence (by reference to statements given at various times to MTRCL, the COI and the police) is largely unwarranted.

56. Paragraph 14 of Fang Sheung's Closing Submissions summarises the instructions and training received from BOSA by Mr. Cheung himself, Fang Sheung workers and foremen/inspectors of Leighton prior to the commencement of rebar fixing works.

57. Mr. Cheung identified the electric bandsaw as shown in the photo at **D1/228** as one similar to those owned by Fang Sheung[74]. He agreed that it appears to show a worker using the electric bandsaw to cut through the thread of a threaded rebar[75].

58. Mr. Cheung said that sometimes couplers were damaged and there was residue concrete and the protective cap missing[76]. He agreed that when couplers were damaged, the only way to remedy was to replace the coupler[77]. He also said that when couplers were tilted, workers would screw the rebar into the couplers first, and then use physical force to bend the rebar in order to remedy the situation[78].

59. Mr. Cheung also said that he had heard Fang Sheung workers talk about converting type B threaded rebar into type A threaded rebar by cutting (and thereby shortening) the threaded ends[79].

60. Mr. Cheung also said there might be a situation where Leighton could instruct Fang Sheung's workers to cut the threaded ends of

[74] T13/107:24-108:18
[75] T13/117:8-117:13
[76] T14/59:11-59:18
[77] T14/64:4-64:20
[78] T14/65:22-66:13; T14/67:22-68:7
[79] T14/101:15-102:15

rebar and insert the cut rebar back into damaged couplers cosmetically in light of the future dowel bar remedial works to be carried out by Leighton[80]. There is, however, no reliable evidence that Leighton did in fact instruct Fang Sheung workers to cut the threaded rebar.

61. He admitted that Mr. Edward Mok of Leighton had informed him about 3 incidents of cutting of threaded ends of rebar[81].

62. Mr. Cheung did not inform Mr. Pun about the 1st cutting incident, but did inform Mr. Pun about the 2nd cutting incident[82]. This is consistent with Mr. Pun's evidence. After the 2nd incident Mr. Cheung admonished Fang Sheung workers.

63. He admitted that he was not as honest and as frank as he should have been to the police and MTRC. He was worried that Fang Sheung would be blamed for the alleged large scale cutting of rebar[83].

64. He also said that workers may have tried to take short-cuts mistakenly[84]. He believed that the reason why workers may have cut the threaded ends of rebar was because the workers could not screw rebar into the couplers, and they made the decision on their own and for the sake of convenience[85].

China Technology's factual evidence

[80] T14/104:16-116:9
[81] T14/121:19-122:1
[82] T14/126:10-127:5
[83] T15/90:9-91:10, T16/14:2-15:16
[84] T15/97:21-98:17
[85] T16/18:8-18:22

65. Before considering the evidence of the particular individual witnesses, and leaving on one side Mr. Poon, as a general observation it is submitted that whilst at times their evidence was confusing and sometimes difficult to extract, broadly speaking China Technology witnesses were essentially truthful witnesses. It is undoubtedly the case that discrepancies emerged between the evidence of the employees of China Technology on the one hand and Mr. Poon on the other. In such instances, there is no doubt that reliance should be placed on the evidence of the employees and not that of Mr. Poon. This is essentially for two reasons. Firstly, being site-based and near the relevant work faces the employees had first-hand knowledge. Secondly, as analysed below, it is very difficult to believe anything Mr. Poon says.

China Technology - But Ho-Yin Ian[86]

66. Mr. But was the assistant foreman of China Technology from August 2015 to November 2017, and he rejoined China Technology in August 2018[87].

67. He started working at the Hung Hom site in mid-September 2015[88].

68. He said he saw the first cutting of threaded ends of rebar (involving 10 rebar near Area C1) in mid-September 2015, and the cut rebars were screwed into the couplers[89].

[86] 1st Witness Statement at **WS1/#16/D2/909-916**, 2nd Witness Statement at **WS1/#17/D2/945-950**, 3rd Witness Statement at **RWS/#CT2/D2/1005-1006** and T3/111:1 to T4/68:23
[87] Ian But's 1st Witness Statement, at §§1-2 [**WS1/#16/D2/909]**
[88] T3/122:5-122:8
[89] Ian But's 1st Witness Statement, at §9 **[WS1/#16/D2/912]**

69. He said the red cutting machine took about 1 minute to cut each rebar[90]. On the basis of recent trials, this is about right.

70. He considered the cutting was wrong using the analogy of assembling a wooden cupboard at home[91].

71. However, he did not recall whether the cut rebar were installed in the top or the bottom mat[92], and he did not recall the entire length of the cut rebar[93].

72. Apparently in relation to this incident, Mr. Poon says Mr. But attempted to stop the cutting of the rebar[94] but that evidence is contradicted by Mr. But himself who says he did not seek to stop the workers and he had no right to do so.[95]

73. He said he saw another rebar cutting incident on two separate days in early February 2016 in the EWL Slab[96]. On those two days, he saw 4 to 6 rebars being cut[97]. This evidence is difficult to reconcile with the fact that the last concrete pour on the EWL Slab was in January 2016.

74. This time, however, he did not see any workers attempting to screw the alleged cut rebar into the couplers[98].

75. On one of those two occasions, he also saw 20 rebars of 1.5m-2m in length lying on the floor with half of the threads cut[99]. The

[90] T3/126:1-126:6
[91] T3/129:8-129:18
[92] T3/123:20-124:6
[93] T3/124:17-124:21
[94] **WS1/#8/D1/20 at §35**
[95] **WS1/#16/D1/912 at §11** and T3/130:14
[96] Ian But's 1st Witness Statement, at §24 **[WS1/#16/D2/915]** & T3/132:22-134:5
[97] Ian But's 1st Witness Statement, at §24 **[WS1/#16/D2/915]** & T3/133:6-133:8
[98] T3/134:3-134:6

location was at western side of Area C1[100]. It is not clear when this occurred.

76. In mid-April 2016, he saw 30 threaded rebars of 2m in length with about 2-3cm threads left in HKC[101].

77. He said that on neither occasion did he see the rebar being screwed into the couplers in the D-wall[102].

China Technology - Ngai Lai Chi, Thomas[103]

78. Mr. Ngai was the superintendent of China Technology[104].

79. In December 2015 at or about 7pm in Area C, Mr. Ngai saw 2 workers cut about 2-3cm of the threaded end of rebar which was originally 7-8cm[105]. Mr. Ngai was clear that this was the one and only incident that he witnessed.

80. He said the machinery used to cut the threaded rebars was the same type as appeared in the photo at D1/228[106].

81. He did not see anybody attempting to screw the cut rebars into couplers[107].

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[99] Ian But's 1st Witness Statement, at §25 **[WS1/#16/D2/915]** & T3/135:5-20
[100] Ian But's 1st Witness Statement, at §25 **[WS1/#16/D2/915]** & T3/134:25-135:4
[101] Ian But's 1st Witness Statement, at §28 **[WS1/#16/D2/915]** & T3/137:1-137:4
[102] T3/137:16-137:20
[103] Witness statement at [**WS1/#19/D2/960-963**] and T4/69:11-117:18
[104] Thomas Ngai's Witness Statement, at §1 **[WS1/#19/D2/960]**
[105] Thomas Ngai's Witness Statement, at §9 **[WS1/#19/D2/962]**
[106] T4/75:11-75:22
[107] T4/77:16-77:19

82. In relation to Mr. Ngai, Mr. Poon altered his written evidence to the effect that Mr. Ngai had told him about the bar cutting incident in December 2015 rather than September 2015[108].

China Technology - Li Run Chao[109]

83. Li Run Chao stated in his witness statement that he joined China Technology as an assistant foreman on 11 January 2016[110], although China Technology's organization chart stated that Mr. Li's employment started on 13 January 2016[111].

84. Mr. Li said that on a night in January 2016, he saw 5-6 workers cut about 6 threaded rebars in Area B. It took about 1 minute to cut a rebar[112]. He said the threaded ends were about 10cm long, the workers cut about 6cm of them and allowed the remaining 4cm to drop to the floor[113]. (Whilst a matter of speculation, this could have been the reduction of a Type B rebar into a Type A rebar.)

85. He did not remember the exact location; he remembered it was at a welding area with the presence of an I-beam and it was during concrete pouring at Area B4/5[114].

86. In late January 2016 at night, he saw 5-6 workers cutting threaded rebars at the junction of Area HKC and Area A[115]. Unfortunately, Mr. Li's reference to "Area A" triggered a minor red-herring

[108] T7/132:1-19
[109] 1st Witness statement at **WS1/#22/D2/922-927**, 2nd Witness Statement at **WS1/#23/D2/951-952** and T4/117:21 to T6/40:13
[110] Li Run Chao's 1st Witness Statement, at §2 **[WS1/#22/D2/922] and D2/1065**
[111] **D1/224**
[112] Li Run Chao's 1st Witness Statement, at §§9-10 **[WS1/#22/D2/924]**
[113] Li Run Chao's 1st Witness Statement, at §11 **[WS1/#22/D2/925]**
[114] T5/8:12-8:14 & T5/12:6-12:11
[115] Li Run Chao's 1st Witness Statement, at §15 **[WS1/#22/D2/925]**

investigation into the location and relevance of "Area A2" (see Mr. Poon's 5th witness statement of 28 October 2018 as amended on 29 October 2018, produced when Mr. Li was in the witness box).[116] The upshot was that the excursion into Area A2 was irrelevant, it is doubtful that Area A2 fell within the ToR of the COI and there was no evidence from Mr. Li that he was anywhere near Area A2 at the material time.

China Technology - Chu Ka-Kam[117]

87. Chu Ka-Kam was a foreman of China Technology from late-June 2015[118].

88. On a day in or about late-October 2015 at around noon, Mr. Chu saw 2 workers at or about EWL Area C cutting threaded rebars. According to Mr. Chu, the thread were initially about 7cm long and 2 cm were trimmed down[119]. (If 5cm was left, this would be approximately equivalent to the length of the threads of a Type A threaded rebar.)

89. In an evening in about mid-June 2016, Mr. Chu saw 2 workers at or about NSL Area A cutting threaded rebars. The threads were initially about 7cm long and 2 cm were trimmed down[120]. (As to which, the comment above is repeated.)

[116] **WS1/#/9.1/D2/1082-1089 and WS1/#9.2/D2/1103-1110**
[117] Witness statement at **WS1/#25/D2/970-977** and T6/41:5-112:2
[118] Chu Ka-Kam's Witness Statement, at §2 **[WS1/#25/D2/970]**
[119] Chu Ka-Kam's Witness Statement, at §11 **[WS1/#25/D2/973]**
[120] Chu Ka-Kam's Witness Statement, at §18 **[WS1/#25/D2/975]**

China Technology - Poon Chuk-Hung, Jason[121]

90. As already stated, Mr. Poon is the managing director and principal shareholder of China Technology[122].

91. Mr. Poon's evidence was that in mid-August 2015 at Area C2/3, he saw 3 persons using a grinding machine to cut threaded rebars one after another[123].

92. Mr. Poon said that in mid-September 2015, he also saw workers cutting threaded rebars[124].

93. Mr. Poon said that between 15 and 20 September 2015, during a site inspection with Leighton's Gabriel So ("**Mr. So**") and Khyle Rodgers ("**Mr. Rodgers**"), they saw a worker cutting threaded rebars. Mr. Poon said that Mr. So asked that worker to continue with cutting the threaded rebars[125]. He described the cutter as a hydraulic disc cutter. However, under cross examination he corrected it as a red electric bandsaw cutter[126]. Mr. Rodgers denied having an inspection with Poon between 15 and 20 September 2015, and denied witnessing a worker cutting threaded rebars[127]. Mr. So also denied the same[128].

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[121] 1st Witness statement at **WS1/#8/D1/10-41**, 2nd Witness Statement at **WS1/#9/D1/889-890**, 3rd Witness Statement at **RWS/#CT1/D2/1001-1004**, 4th Witness Statement at **RWS/#CT1.1/D2/1058-1064**, 5th Witness Statement at **WS1/#9.1/D2/1082-1089** and T6/112:16 to T11/153:24
[122] Poon's 1st Witness Statement, at §1 **[WS1/#8/D1/10]**
[123] Poon's 1st Witness Statement, at §33 **[WS1/#8/D1/20]**
[124] Poon's 1st Witness Statement, at §38 **[WS1/#8/D1/21]**
[125] Poon's 1st Witness Statement, at §§39-40 **[WS1/#8/D1/21]**
[126] T10/49:10-52:3
[127] Khyle Rodgers' 2nd Witness Statement, at §§11-12 **[RWS/#L8/C32/24097]**
[128] Gabriel So's 2nd Witness Statement, at §7 **[RWS/#L5/C32/24103]**

94. Mr. Poon further said that on 22 September 2015, he saw workers cutting threaded rebars[129]. He took 7 photos which can be found in **D1/226** to **232.**[130] For the incidents in September 2015, Mr. Poon described the machinery used for cutting the threads as a hydraulic disc cutter. However, under cross-examination he accepted that it was a red electric bandsaw cutter[131].

95. Mr. Poon said it was Leighton's workers but not Fang Sheung's workers who cut the rebars[132]. However, he purely identified workers by their uniforms[133].

96. As an apparent final position, Mr. Poon roughly estimated that out of 30,000 rebars, 5% were cut i.e. about 1,000 cut rebar[134]. It is not really clear how this estimate is arrived at. It seems entirely arbitrary.

Leighton's Evidence - Edward Mok[135]

97. Edward Mok ("**Mr. Mok**") was a graduate engineer of Leighton. He was responsible for inspection of rebars in EWL and NSL Slabs from August 2015 to November 2016[136]. He had previously been responsible for the inspection of D-wall construction, including the fabrication and installation of D-Wall reinforcement cages, from

[129] Poon's 1st Witness Statement, at §41 **[WS1/#8/D1/21]**
[130] Save that Mr. Poon accepted that the photo at D1/227 was not taken on 22 September 2019. It is in fact dated 4 September 2015 and apparently included in error [T7/119:5-119:15]
[131] T10/49:10-52:3
[132] Poon's 1st Witness Statement, at §§73-74 **[WS1/#8/D1/33]**
[133] T10/18:1-18:10
[134] Poon's 1st Witness Statement, at §87 **[WS1/#8/D1/37]** & T8/58:25-59:8
[135] 1st Witness Statement at **WS1/#41/C12/8107-8119**, 2nd Witness Statement at **RWS/#L3/C32/24086-24095**, 3rd Witness Statement at **RWS/#L3.1/C35/26521-26524,** 4th Witness Statement at **WS1/#41.1/C35/26693-26694** and T21/2:2-140:8
[136] Edward Mok's 1st Witness Statement, at §§3-4 **[WS1/#41/C12/8108]**

August 2013 to August 2015[137]. Mr. Mok was an evidently intelligent and reliable witness.

98. Mr. Mok said he identified 3 occasions upon which the threaded ends of rebar had been cut off, and they were all in EWL Slab, Area C[138].

99. The **first** occasion was around September 2015. He identified the threaded end(s) of 1 or 2 rebars had been cut off. The rebar was not screwed into the coupler and there was a gap of 1-2 mm between the rebar and the coupler. There were still 1 or 2 threads remaining on the rebar[139].

100. This was the first time he had seen a cut rebar and he did not take any photographs[140]**.**

101. The **second** occasion was around October/November 2015. He and an MTRC engineer identified the threaded end of 1 or 2 rebars had been cut off. There was a gap between the rebar and the coupler[141].

102. He said it was likely that the photos showing two defective rebar in **C12/8123** and **C12/8125** were in relation to this second occasion, however, he was not sure[142].

103. The **third** occasion was NCR 157[143].

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[137] T21/6:13-19
[138] Edward Mok's 1st Witness Statement, at §28 **[WS1/#41/C12/8113]**
[139] Edward Mok's 1st Witness Statement, at §29 **[WS1/#41/C12/8114]** and T21/55:10-56:1
[140] T21/55:14-55:16 & 56:7-56:9
[141] Edward Mok's 1st Witness Statement, at §32 **[WS1/#41/C12/8114]**
[142] Edward Mok's 1st Witness Statement, at §36 **[WS1/#41/C12/8115]**
[143] Edward Mok's 1st Witness Statement, at §42 **[WS1/#41/C12/8127]** & C12/8127-8131

104. He considered the reason for the cutting of threaded rebars might have been because workers wanted to save time, without waiting for Leighton to replace faulty couplers[144]. However, he did not try to get to the bottom of the matter to find out the real cause[145].

MTRCL's Evidence - Wong Chi Chiu (Kobe Wong)[146]

105. Kobe Wong was MTRCL's Assistant Inspector of Works (Civil) from September 2010 to May 2013, Inspector of Works (Civil) from June 2013 to October 2015 and Senior Inspector of Works II (Civil) from November 2015 to March 2018[147].

106. Kobe Wong identified 5 incidents where threaded ends of rebars had been trimmed down. He did not take photographs except in relation to NCR 157[148]. He said all 5 incidents were in relation to the bottom mat of rebars at the EWL Slab[149].

107. The **first** incident was likely to be in Area C1-2 or C1-4 in or around August/September 2015. He noticed that 1 or 2 threaded ends of rebars had been cut short by a portable wire cutter by half[150]. (It seems not an unreasonable inference to draw that this was the same incident as Mr. Mok's first incident.)

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[144] T21/72:8-23
[145] T21/73:6-73:10
[146] 1st Witness Statement at **WS2/#70/B1/417-447**, Reply Witness Statement at **RWS/#M4/B16/13654-13671** and T29/116:22 to T30/117:6
[147] §2, [**WS2/#70/B1/417**]
[148] T29/140:18-22
[149] T29/154:6-10
[150] Kobe Wong's 1st Witness Statement, at §70 **[WS2/#70/B1/439]** and T29/141:1-3

108. The **second** incident was likely to have been in Area B in or around October/November 2015[151]. There were threaded ends of 1 or 2 threaded rebars being cut[152]. He was not sure if this was the second incident as described by Mr. Mok[153]. (It seems a reasonable inference to draw that it was the same incident.)

109. The **third** incident was NCR 157[154].

110. The **fourth** incident was in Area C1-5 and **fifth** incident was in Areas B-4/B-5[155]. Both incidents also involved in cutting of 1 or 2 threaded rebars[156].

111. He said he was the assigned T3 under the QSP to inspect D-wall couplers installation, but not for EWL Slab coupler installations. He expected the ConE team to carry out the formal inspections[157].

MTRCL's Evidence - Wong Kai Wing (Andy Wong)[158]

112. Andy Wong was MTRCL's Assistant Inspector of Works for the SCL Project from September 2015[159]. He was a straightforward, honest and reliable witness.

113. Andy Wong was the one who discovered the cut rebar as recorded in NCR 157 on 15 December 2015, and took the photographs[160].

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[151] Kobe Wong's 1st Witness Statement, at §74 **[WS2/#70/B1/439]**
[152] T29/143:14 to 143:16 & 145:24-145:25
[153] T29/143:14-16 & 145:3-12
[154] Kobe Wong's 1st Witness Statement, at §§77-84 **[WS2/#70/B1/440-441]**
[155] Kobe Wong's 1st Witness Statement, at §85 **[WS2/#70/B1/441]**
[156] T29/156:3-6 & 156:20-22
[157] T30/9:12-10:18
[158] 1st Witness Statement at **WS2/#71/B1/448-463**, Reply Witness Statement at R**WS/#M5/B16/13672-13673** and T30/117:21 to 143:20
[159] Andy Wong's Witness Statement, at §2 **[WS2/#70/B1/448]**
[160] Andy Wong's Witness Statement, at §§17-18 **[WS2/#70/B1/452]**

114. The photo at **B10/7457** showed 2 rebars not properly connected at the slab to slab connection joint[161].

115. The photo at **B10/7459** showed 3 rebars cut short and not properly screwed into couplers at the connection between EWL Slab and the D-wall[162].

116. Later on, between 16 and 31 December 2015, in Area C1-5 or C3-3, he saw that 5 to 6 threaded rebars were not screwed into the couplers. These rebars were located at the slab-to-slab construction joint[163].

117. Defective rebars near the surface were rectified by replacing them with new threaded rebars. However, 3 defective rebars located in the lower part of the top reinforcement layer could not be rectified and concrete was poured as scheduled[164].

118. He indentified the 2 workers shown in Mr. Poon's photo taken on 22 September 2015 at 18:18[165] as Fang Sheung workers[166].

Escalation of Alleged Bar Cutting Incidents to Leighton and MTRCL

119. Mr. Poon alleged that MTRCL's Mr. Aidan Rooney ("**Mr. Rooney**") asked him on 3 occasions during Monday morning joint site inspections in September 2015 if he or China Technology's staff

[161] **B1/453/para. 25(1)** and T30/127:15-127:17
[162] Andy Wong's Witness Statement, at §25(4) **[WS2/#70/B1/453]** and T30/127:6-127:14
[163] Andy Wong's Witness Statement, at §30 [**WS2/#70/B1/454]**
[164] Andy Wong's Witness Statement, at §34 [**WS2/#70/B1/454]**
[165] **[D1/228]**
[166] T30/134:13-135:2, 136:3-136:6

had witnessed the practice of cutting of threaded rebars[167]. However, Mr. Rooney (who on the basis of his general demeanour and clear answers was an obviously honest and reliable witness) said he did not hear of the cutting of threaded rebars until he received an email from Michael Fu on 6 January 2017 at 11:28am[168]. If these conversations had taken place then Mr. Rooney would surely have remembered them, and presumably would have done something by way of follow up.

120. Mr. Poon alleged that between September 2016 and January 2017, Leighton's Anthony Zervaas ("**Mr. Zervaas**") and himself discussed possible solutions to rectify the defective rebars[169]. Mr. Zervaas denied having such a discussion with Mr. Poon since he joined the SCL Project on 11 October 2016[170].

121. Mr. Poon alleged that in late November 2016, Mr. Zervaas orally admitted to him that there were practices of cutting of threaded rebars and agreed to find a solution to settle the issue of defective rebars[171]. Mr. Zervaas denied having such a conversation with Mr. Poon[172].

122. Mr. Poon further alleged that Mr. Zervaas, in or about December 2016, started to deny the occurrence of the cutting of the threaded rebars[173]. Mr. Zervaas denied having any conversation with Mr.

[167] Poon's 1st witness statement, at §44 **[WS1/#8/D1/22]**
[168] Aidan Rooney's witness statement, at §70 **[WS2/#59/B1/204]**
[169] Poon's 1st witness statement, at §45 **[WS1/#8/D1/23]**
[170] Anthony Zervaas' 2nd witness statement, at §6 **[RWS/#L2/C32/24657],** Anthony Zervaas' 3rd Witness Statement, at §5 **[RWS/#L2.1/C35/26496]**
[171] Poon's 1st witness statement, at §46 **[WS1/#8/D1/23]**
[172] Anthony Zervaas' 2nd witness statement, at §7(a) **[RWS/#L2/C32/24657],** Anthony Zervaas' 3rd Witness Statement, at §6 **[RWS/#L2.1/C35/26497]**
[173] Poon's 1st witness statement, at §47 **[WS1/#8/D1/23]**

Poon to that effect[174]. (There is no reason to doubt the veracity of Mr. Zervass' evidence in relation to the above matters, which is supported by Mr. Zervaas' email of 6 January 2017 referred to below.)

123. Mr. Poon alleged that on or about 9 December 2016, he reported the incidents in August 2015 to MTRCL's Project Director, Dr. Philco Wong ("**Dr. Wong**"). He alleged that Dr. Wong told him not to be outspoken on the matter, that he would handle the matter and asked Mr. Poon to keep him informed through Raymond Au[175]. Dr. Wong admitted that he had a telephone conversation with Mr. Poon about payment issues between China Technology and Leighton, and he asked Raymond Au to follow up the matter. However, Dr. Wong denied that Mr. Poon raised any allegations of cutting of threaded rebars, and that he had told Mr. Poon not to be outspoken[176]. (There is no reason to doubt the truth and accuracy of Dr. Wong's version of events particularly against the backdrop of the general unreliability of Mr. Poon.)

124. On 6 January 2017 at 0944 hours, Mr. Poon sent an email[177] to Mr. Zervaas attaching 2 photos taken on 22 September 2015[178]. This was the first time Mr. Poon had raised the issue of rebar cutting in writing. Mr. Zervaas said this was the first time he had been told about any rebar cutting[179].

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[174] Anthony Zervaas' 2nd witness statement, at §7(a) **[RWS/#L2/C32/24657]**
[175] Poon's 1st witness statement, at §48 **[WS1/#8/D1/23]**
[176] Philco Wong's 1st Witness Statement, at §§42-45 **[WS2/#56/B1/150-151]**, Philco Wong's Reply Witness Statement, at §§4-10 **[RWS/#M1/B16/13617-13618]**
[177] **D1/234-235**
[178] **D1/228 & 232, C32/24664-24665**
[179] Anthony Zervaas' 1st Witness Statement, at §7(a) **[WS1/#40/C12/7675]**

125. Mr. Zervaas forwarded Mr. Poon's email to Michael Fu of MTRCL, copying to his superiors at the time, Paul Freeman (Operations Manager of Leighton at that time) and Stephen Lumb ("**Mr. Lumb**") (Heading of Engineering of Leighton). As a consequence, Leighton mobilised Mr. Lumb and his team (principally, Guntung) to attend site to conduct an internal investigation into Mr. Poon's allegations[180].

126. Mr. Poon alleged that MTRCL's Raymond Au contacted him by telephone and asked him to stop pushing Leighton[181]. Mr. Au denied this allegation[182].

127. Mr. Rooney in his email dated 6 January 2017 to TM Lee[183] stated that Mr. Poon's email was an attempt by China Technology to exert commercial pressure upon Leighton. He said so because Mr. Zervaas had told him as much[184].

128. Mr. Zervaas replied to Mr. Poon on 6 January 2017 by email, telling him that it was quite alarming that he had not brought the issue to Leighton's attention earlier, particularly when the alleged malpractice occurred in September 2015. He informed Mr. Poon that an investigation had been commenced to review the allegations in his email[185].

129. Mr. Poon replied to Mr. Zervaas on 7 January 2017, alleging that Mr. Rodgers was well aware of the bar cutting and was directing

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[180] **[C12/7929-7932]**
[181] Poon's 1st Witness Statement, at §50 **[WS1/#8/D1/25]**
[182] Raymond Au's Reply Witness Statement, at §8 **[RWS/#M6/B16/13675]**, Raymond Au's 2nd Witness Statement, at §9 **[RWS/#M6.1/B19/235744]**
[183] **[B10/7523]**
[184] T28/55:24-35
[185] **[C12/7937]**

activities[186]. Mr. Zervaas did not apparently forward this reply to anyone[187], and certainly not to Mr. Rodgers who denied ever having seen it[188].

130. It is noted that there is ample evidence to support the fact that there was a concurrent commercial dispute between China Technology and Leighton in around December 2016/January 2017[189]. That dispute, at least temporarily, was resolved following the email exchanges referred to above.

131. Following a hiatus from January 2017, on 15 September 2017 at 0853 hours, 8 months after the 6 January 2017 email, Mr. Poon sent another email to Mr. Zervaas about the issue of cutting of rebars[190].

132. Mr. Poon alleged that on 15 September 2017 at 0900 hours, he contacted Mr. Zervaas by phone and Mr. Zervaas indicated to him that Leighton was of the view that the cutting of threaded rebars was never an issue[191]. Mr. Zervaas accepted that there was a telephone conversation with Mr. Poon in which he told Mr. Poon that (as was the case) the matter had been reported to MTRCL, Leighton had conducted an investigation and no evidence of the alleged cutting of threaded ends of rebars had been found[192].

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[186] **[C12/7940]**
[187] T17/96:23-26
[188] T15/8:13-9:17
[189] Anthony Zervaas' 1st Witness Statement, at §§8-11 **[WS1/#40/C12/7674-7676]**; Jason Poon's 4th Witness Statement , at §§5-8 **[RWS/#CT1.1/D2/1059-1063]**
[190] **[D1/237**]
[191] Poon's 1st Witness Statement, at §§53-54 **[WS1/#8/D1/26]**
[192] Anthony Zervaas' 2nd Witness Statement, at §9(b) **[RWS/#L2/C32/24658]**

133. On 15 September 2017 at 1106 hours, Mr. Poon sent an email to the Secretary for Transport and Housing, Mr. Frank Chan[193], inviting him to a "joint interview" to review and discuss "an important issue" on the execution of the Contract 1112 works "which is much related to the interest of the Public".

134. On 15 September 2017 at 1300 hours, an Assistant Secretary of the THB, Leung Sai Ho, called Mr. Poon. Mr. Leung told Mr. Poon that a Senior Engineer of HyD would contact him shortly[194].

135. On 15 September 2017 at 1608 hours, Mr. Leung formally replied to Mr. Poon's email[195].

136. Mr. Poon stated that on 15 September 2017 in the afternoon, Mr. Zervaas asked him to attend a meeting at Leighton's Wan Chai office, and he agreed to do that[196].

137. At or about 1700 hours on 15 September 2017, Mr. Poon alleged that he attended a meeting with Mr. Zervaas and Mr. Karl Speed (Leighton's General Manager) at Leighton's Wan Chai office. According to Mr. Poon, Mr. Speed threatened him and they had a quarrel. He showed Mr. Speed photographs and a video clip on his mobile phone which depicted the cutting of threaded rebars[197]. Mr. Zervaas agreed that he and Mr. Speed had a meeting with Mr. Poon on 15 September 2017. However, he disagreed with Mr. Poon about the general tenor and contents of the meeting. He said the

[193] **[D1/239]**
[194] Poon's 1st Witness Statement, at §56 **[WS1/#8/D1/27]**
[195] **[D1/241-242]**
[196] Poon's 1st Witness Statement, at §58 **[WS1/#8/D1/28]**
[197] Poon's 1st witness Statement, at §59 **[WS1/#8/D1/28]**

meeting was confined to commercial issues[198]. Mr. Speed also agreed that he had a meeting with Mr. Poon on 15 September 2017, but he also disputed Mr. Poon's evidence concerning the tone and contents of the meeting. Mr. Speed said Mr. Poon did not mention the issue of the cutting of rebars during the meeting[199].

138. On 16 September 2017, Mr. Poon alleged that during a joint site inspection between himself and Mr. Zervaas, Mr. Zervaas told him that he would try to convince Mr. Speed to be cooperative and therefore he (Mr. Poon) agreed not to disclose the details to the public and/or the government before the next meeting on 18 September 2017[200]. Mr. Zervaas denied having such a joint site inspection and conversation with Mr. Poon[201].

139. On 18 September 2017 at or about 1500 hours, Mr. Poon says he attended another meeting with Mr. Zervaas and Mr. Speed in Leighton's Wan Chan office. According to Mr. Poon, Mr. Speed agreed that Leighton would be responsible for working with MTRCL directly to drill and plant steel dowels to stabilize the structure. Mr. Poon said in light of Mr. Speed's promise, he agreed not to disclose the matter to the Government[202]. Mr. Zervaas admitted he had a meeting with Mr. Poon and Leighton's Mark Manning at 5:15pm on 18 September 2017 in Wan Chai and that a 'Confidentiality Agreement' was signed at that meeting.[203] However, Mr. Zervass gave evidence that Mr. Speed was not at the

[198] Anthony Zervaas' 2nd Witness Statement, at §10 **[RWS/#L2/C32/24659]**; Anthony Zervaas' 3rd Witness Statement, at §17 **[RWS/#L2.1/C35/26502]**; Anthony Zervaas' 1st Witness Statement, at §25 **[WS1/#40/C12/7678]**
[199] Karl Speed's 2nd Witness Statement, at §§10-11 **[WS1/#39/C12/8092]**; Karl Speed's 3rd Witness Statement, at §§9-10 **[RWS/#L1/C32/24114]**
[200] Poon's 1st Witness Statement, at §62 **[WS1/#8/D1/29]**
[201] Anthony Zervaas's 2nd Witness Statement, at §11 **[RWS/#L2/C32/24659]**
[202] Poon's 1st Witness Statement, at §63 **[WS1/#8/D1/29]**
[203] **[C12/8095]**

meeting, and there are discrepancies between Mr. Poon and Mr. Zervass in relation to what actually happened at the meeting[204]. Mr. Speed also denied having attended a meeting with Mr. Poon on 18 September 2017[205].

140. On 18 September 2017, Mr. Poon on behalf of China Technology and Mr. Speed on behalf of Leighton signed a 'Confidentiality Agreement[206]. Mr. Speed said the 'Confidentiality Agreement' was entered into with China Technology together with a Final Account Agreement[207] since he did not want other subcontractors to know about the terms of mutual termination between Leighton and China Technology[208]. Under cross-examination, Mr. Speed added that the 'Confidentiality Agreement' was needed due to China Technology's false allegations and lies[209]. It is submitted that this addition is more likely to be closer to the truth than the prior explanation.

141. Further, it is noted that under cross-examination, Mr. Speed admitted that China Technology was the only sub-contractor that Leighton required to sign a Confidentiality Agreement[210], and this was Mr. Zervaas' first experience of a 'Confidentiality Agreement'[211].

142. On 18 September 2017 at 1922 hours, Mr. Poon sent an email to Leung Sai Ho and copied to Mr. Frank Chan, Vincent Chu and Mr.

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[204] Anthony Zervaas's 4th Witness Statement, at §6 **[WS1/#40.1/C35/26575]**
[205] Karl Speed's 3rd Witness Statement, at §11 **[RWS/#L1/C32/24115]**
[206] **[D1/244-248**; **C12/8095-8106]**
[207] **[C12/7992-7998, D1/584]**
[208] Karl Speed's 2nd Witness Statement, at §12 **[WS1/#39/C12/8093]**; Karl Speed's 4th Witness Statement, at §10 **[RWS/#L1.1/C35/26570]**
[209] T16/110:3-16 & 101:21-102:1
[210] T16/102:16-103:4
[211] T17/108:1-109:8

Zervaas notifying that matters had been resolved with Leighton and that was the end of the issue[212].

143. There is also ample evidence that in September 2017 Mr. Poon's raising of the rebar cutting issue was once more against the backdrop of an on-going commercial dispute with Leighton. Indeed, that was a dispute that Mr. Rooney of MTRCL, who had been kept informed of matters by Mr. Zervaas, encouraged Leighton to resolve by terminating its relationship with China Technology.[213]

Follow Up actions of Leighton and MTRCL in 2017 in Response to the Alleged Rebar Cutting

Leighton's Lumb Report

144. As mentioned above, after Mr. Zervaas had received Mr. Poon's email of 6 January 2017, he forwarded the email to Leighton's Head of Engineering, Mr. Lumb and his team to conduct an internal investigation[214].

145. Mr. Lumb sent Design Manager Guntung to the site to head up and effectively conduct the investigation, with Mr. Lumb fulfilling a more supervisory role[215].

[212] **[D1/250]**
[213] **WS2/#/59/B1/207** and T28/63:9-15
[214] Anthony Zervaas's 1st Witness Statement, at §13 **[WS1/#40/C12/7675]**; Stephen Lumb's 4th Witness Statement, at §4 **[WS1/#44.2/C35/26680]**
[215] Stephen Lumb's 4th Witness Statement, at §6 **[WS1/#44.2/C35/26681]**

146. According to Mr. Lumb, Guntung discussed the bar cutting allegations with the following persons:-

(1) Kevin Harman
(2) Betty Ng
(3) Kian Law
(4) William Holden
(5) Joe Tam
(6) Andy Ip
(7) Man Sze Ho

147. Of those listed above, the only individuals that had any relevant knowledge of the matters under investigation were Andy Ip and Man Sze Ho.

148. Guntung conducted the investigation from 6 January 2017 to 11 January 2017 and Mr. Lumb himself attended the site on 9, 10 and 11 January 2017[216].

149. According to Mr. Lumb, in the review process, they (a) obtained and reviewed relevant documentation (drawings, details, the method statement, the ITP and the QA/QC records), (b) understood the site supervision and inspection regime and compared that to what was set out in the ITP, (c) reviewed the non-conformance list and assessed the close out procedures for those items and (d) spoke to engineers that remained on site[217].

[216] Stephen Lumb's 4th Witness Statement, at §§6 & 8 **[WS1/#44.2/C35/26681]**
[217] Stephen Lumb's 1st Witness Statement, at §19 **[WS1/#44/C27/20113]**

150. A first draft report was prepared on 17 January 2017[218] and a final report on 17 February 2017[219] (the "**Lumb Report**").

151. The Lumb Report concluded that coupler installation and manufacture complied with the BD's conditions[220].

152. The Lumb Report also considered NCR 157 and confirmed that the issue had been rectified by the sub-contractor and the NCR had been closed out in accordance with the appropriate procedure[221]. However, in fact, the investigation had identified that NCR 157 had not been formally closed out as at the date of the review process in January 2017 and this prompted Leighton's Quality Control Manager, Kevin Harman to collate relevant records and close out NCR 157[222] at that juncture.

153. What is manifest is that the Lumb report did not find out the reason(s) or cause(s) of the cutting of rebars in relation to NCR 157[223].

154. Further, it is noted that the Lumb Report was based on the erroneous assumption that the original connection details between EWL Slab and East D-wall had been adopted throughout [224]. It was not brought to Mr. Lumb's attention that there had been changes in respect of the connection details[225].

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[218] **[C27/20118-20240]**
[219] **[C27/20242-20610]**
[220] Stephen Lumb's 1st Witness Statement, at §26 **[WS1/#44/C27/20114]**; **[C27/20265]**
[221] Stephen Lumb's 1st Witness Statement, at §25 **[WS1/#44/C27/20114]**; **[C27/20265]**
[222] Stephen Lumb's 5th Witness Statement, at §6 **[WS1/#44.3/C35/26707]**; Kevin Harman's Witness Statement, at §§18-19 **[C35/26716]**
[223] T25/43:16-47:3
[224] **[C24/20247]**
[225] T24/134:1-11

155. It is noted that the complainant, Mr. Poon and the person Mr. Poon mentioned in his 7 January 2017 email[226] i.e. Mr. Rodgers, were not interviewed. It also seems incredible that the key person of Leighton who would have first-hand knowledge in assisting in the investigation, Mr. Mok, was neither listed nor spoken to by Mr. Lumb or Guntung. Mr. Zervaas also did not inform Mr. Poon of the Lumb Report[227] after it had been prepared. It is also noteworthy that the email and its attached 2 photos sent by Mr. Poon on 6 January 2017 were not attached to the Lumb Report, and Mr. Lumb confirmed he did not even know the location where the photos were taken[228]or whose workers appeared in the photo[229].

156. The Lumb Report was hardly an exercise in investigative rigour. It was evidently carried out (needlessly) in something of a hurry and the appropriate people were not interviewed. As a result, it was superficial and its conclusions were inconsistent with the limited evidence that was unearthed.

MTRCL's Internal Review Report dated 8 February 2017

157. Mr. Rooney contacted Carl Wu ("**Mr. Wu**"), the Coordination Manager of the SCL Project of MTRCL, with regard to the carrying out of a review of the inspection records for the coupler installation in Contract 1112. The scope of the review was to examine the construction records in order to confirm whether the steel reinforcement and couplers for the EWL Slab had been

[226] **[C12/7940]**
[227] T17/105:12-15
[228] T25/11:6-13:7
[229] T25/13:8-14:13

installed according to the requirements of the relevant quality assurance and quality control regimes[230].

158. This lead to the production of MTRCL's internal review report dated 8 February 2017 entitled "Review of quality assurance & quality control of steel reinforcement and coupler installation for the East West Line (EWL) track slab of Contract 1112 for the Shtain to Central Link (SCL) Project"[231]. The review report concluded that steel reinforcement and couplers for the track slab had been installed in accordance with QA/QC regimes as stipulated under the PIMS and Leighton's method statement and QSP[232].

159. However, Mr. Wu was not specifically told that there were allegations of threaded rebars having been cut[233]. He was only aware of cutting of rebars by looking at NCR 157 during the internal review[234].

160. The actual field work of the review took 2-3 days and it took another 2-3 days for report drafting[235].

161. The internal review report recommended 5 follow up actions at paragraph 5.1. This included confirming that Leighton's and MTRCL's supervision was in compliance with the QSP and was recorded on the Appendix C of QSP[236]. Mr. Wu said at the time of

[230] Aidan Rooney's 1st Witness Statement, at §74 **[WS2/#59/B1/205]**; Carl Wu's Witness Statement, at §42 **[WS2/#73/B1/480]**
[231] **[B7/4516-4520]**
[232] Carl Wu's Witness Statement, at §43 **[WS2/#73/B1/480]**
[233] T31/56:21-23
[234] T31/82:8-18
[235] T31/61:5-22
[236] **[B7/4519]**

preparing this report, he acknowledged that the records were incomplete, but he did not follow up about the extent or type of documents which were missing[237].

162. Frankly, Mr. Wu's report was even more superficial and unsatisfactory than the Lumb Report. The lack of any follow up action seems inexplicable.

Analysis of Cutting of Rebars

163. Prior to this Inquiry, the allegation that there existed a systematic and widespread practice of cutting the threads of rebar emanated from China Technology and, in particular, Mr. Poon.

164. However, despite his arbitrary estimate that about 1,000 rebars were cut, the evidence produced by China Technology's employees generally and Mr. Poon in particular is extremely limited. The 7 photos taken by Mr. Poon manifestly do not support the alleged systematic and widespread practice.

165. In overall terms, Mr. Poon's evidence is inconsistent with the evidence of many other witnesses including some of his own employees, together with Mr. So, Mr. Rodgers, Mr. Rooney, Mr. Zervaas, Dr. Wong, Mr. Au and Mr. Speed. Further, if Mr. Poon's allegations were true, it begs the questions (a) why is there no written record whatsoever of any complaint until 6 January 2017? and (b) why did China Technology proceed to pour concrete knowing of such systematic and widespread practice?

[237] T31/64:21-67:2

166. It is submitted that Mr. Poon has simply invented a good deal of his evidence and cannot, on any objective basis, be regarded as a credible or reliable witness. Unfortunately, this conclusion has the inevitable consequence of tainting such parts of Mr. Poon's evidence as might otherwise have had some value. Any independent tribunal would struggle to give credence to what Mr. Poon has said. The media may have been inadvertently drawn in by him, but the COI will not be so easily misled.

167. While it is clear that there were isolated incidents of rebar cutting, which is accepted and shown by Leighton's and MTRCL's own evidence, there is no good explanation as to why Leighton, as a corporation, would adopt such a practice let alone MTRCL condone such a practice.

168. Moreover, although MTRCL's site supervision might have had its own deficiencies, it would be highly surprising that such systematic and widespread practice could have escaped their attention.

169. To the extent, however, that rebar cutting occurred, the overwhelming conclusion is that it was carried out by the workers of Fang Sheung and, realistically and quite properly, the Closing Submissions of Fang Sheung do not seek to contend to the contrary

170. The recent "opening-up" (see **Section XI** below) does not support such a practice. The results do not support systematic and widespread cutting of rebar threads[238]. On the contrary, they are

[238] See **[OU1/240]**

consistent with the conclusion that the rebar cutting incidents are isolated events[239].

171. Therefore, to answer the questions posed at the beginning of this Section:

(1) Yes. The cutting of the threads of rebar did take place in Contract 1112 and, of the five incidents of which evidence has been provided, only in respect of part of one were remedial measures not taken immediately.

(2) The possible reasons for such incidents included that the relevant workers tried to avoid construction difficulties, they tried to avoid further questioning by MTRCL and/or they did it for the sake of convenience.

(3) The incidents were isolated rather than systematic and widespread, and this is conclusion is amply supported by the recent opening up of areas of the EWL and NSL Slabs.

(4) The party most likely to have cut the threaded rebar is Fang Sheung.

VI. <u>The QSP</u>

172. The BD issued 2 acceptance letters dated 25 February 2013 and 1 acceptance letter dated 25 June 2014 in respect of the works for the

[239] See the table compiled by Professor McQuillan for tests up to 14 January 2019 **[ER1/#3.2]**. Subsequent tests show similar results **[OU1/471]**

EWL Slab at gridlines between 0-15[240], 22-49[241] and 15-22[242] respectively.

173. According to the imposed conditions contained in the aforesaid acceptance letters, a quality supervision plan ("**QSP**") of the CP and the RGBC/RSC was required to be submitted to the BD prior to the commencement of the mechanical coupler works. The QSP was required to include, among other things, the following details:

(1) Assignments of quality control supervisor of the CP and quality control co-ordinator of the RGBC/RSC to supervise the installation of steel reinforcing bars to the couplers.

(2) Frequency of quality supervision, which should be at least 20% of the splicing assemblies by the quality control supervisor of the CP and "*full time continuous*" supervision by the quality control co-ordinator of the RGBC/RSC of the mechanical couplers work.

(3) For couplers to be used at the top of a pile cap and transfer plate, the frequency of quality supervision should be at least 50% of the splicing assemblies by the quality control supervisor of the CO and "*full time continuous*" supervision by the quality control co-ordinator of the RGBC/RSC[243].

174. The meaning of "*full time continuous*" supervision has caused some difficulties in this Inquiry. Although there is no dispute that

[240] See **[H9/3873-3907]**
[241] See **[H9/3908-34]**
[242] See **[H9/4029-46]**
[243] See **[H9/3903; 3930; 4041]**

the phrase does not mean one-on-one "man-marking" of each worker who is screwing in rebar[244], different persons have put forward different interpretations of the phrase, which can be summarised as follows:

(1) According to the Commission's project management expert, Mr. Steve Rowsell:

> *"I consider that the interpretation of this requirement is very simple and requires the need for the coupler works to have continuous supervision. That means, in my opinion, that a Contractor's supervisor needs to be present at all times where mechanical coupler works are underway. The objective being to ensure that the work is done properly in accordance with the specifications and any problems are resolved without delay. It does not have to be the same supervisor for the whole of a working day but continuous supervision has to be provided for the full time that work is underway ... In my opinion, the obligation requires a supervisor to be present at the site of work activity rather than for example, being present elsewhere on site or in the site office carrying out other tasks. The General Specification requires that the Works shall be arranged so that the Works are supervised at a minimum ratio of 1 supervisor to no more than 10 workers* ***[para G3.9.1,C3/2040]****. Therefore, if the number of workers*

[244] See the oral evidence of Stephen Lumb at **[T25/57:3-58:13]**; the oral evidence of Ho Hon Kit at **[T37/87:25-89:1]**

involved in the coupler works is greater than 10 then there should be more than one supervisor in attendance."[245]

(2) Ho Hon Kit of the BD appears to interpret the phrase along similar lines[246].

(3) Raymond Brewster[247] and Stephen Lumb[248] of Leighton appear to consider that the phrase just means "*the normal daily supervision and inspection*" which is carried out by someone who works full time on site.

(4) The evidence of MTRCL's project management expert, Mr. Steve Huyghe is, with respect, a little unclear, although he agrees in the Joint Statement of Project Management Experts that:

"*We agree that "full-time and continuous supervision" does not mean "man-marking". The requirements for supervision by the Contractor are set out in the General Specification and require a minimum ratio of 1 supervisor to no more than 10 workers.*"[249].

175. It is submitted that Mr. Rowsell's view is correct. Firstly, the "*full time continuous*" supervision requirement imposed by the QSP should be something on top of and more stringent than the normal daily supervision and inspection requirement. It was introduced to

[245] See **[ER1/#1/§78]**
[246] See the oral evidence of Ho Hon Kit at **[T37/87:1-89:1]**
[247] See the oral evidence of Raymond Brewster at **[T23/29:23-30:7]**
[248] See the oral evidence of Stephen Lumb at **[T25/57:3-58:13]**
[249] See **[ER1/#9/§26]**

provide an enhancement to the standard supervision that would otherwise have been provided. Otherwise, there would have been no need to specify the particular requirements in the QSP.

176. Secondly, if there is no quality control co-ordinator of the RGBC/RSC who is present at all times where mechanical coupler works are underway, the workers can, for example, cut short the threads and screw in the remaining threads. When the quality control co-ordinator comes back to inspect the completed connection, he will only find that no thread is exposed and assume that the connection has been properly made. He will not be able to detect that the bar has been cut short.

177. Thirdly, the ratio of 1 quality control co-ordinator to 10 workers appears to be reasonable and should not cause practical difficulties to Leighton or other main contractors in a similar situation.

178. On or about 12 August 2013, MTRCL submitted the QSP to the BD[250]. In particular, it additionally provided that:

(1) The minimum qualification and experience of the quality control supervisors/co-ordinators were to be the same as grade T3 (TCP) as stipulated in the Code of Practice for Site Supervision ("**CoP**")[251];

[250] See **[H9/4263+]**
[251] See **[H9/4267]**

(2) The results of the supervision and inspection should be recorded in the Record Sheet attached to appendix B to the QSP[252] and incorporated into the inspection logbook[253].

179. In respect of the (vertical) couplers within the diaphragm walls, there is no dispute that MTRCL and Intrafor had complied with the relevant requirements.

180. The controversy lies in the couplers connecting the diaphragm walls and the EWL Slab. In this regard, so far as MTRCL is concerned:

(1) Louis Kwan ("**Mr. Kwan**"), a construction engineer of MTRCL, gave evidence that as far as he was concerned, he was only responsible for the inspection of the reinforcement bars in the EWL Slab and not the coupler connections although he might look at them. He considered that it was the Inspector of Works ("**IOW**") team which should conduct inspection of the coupler connections[254].

(2) Although Kobe Wong, a Senior IOW, confirmed that he "*had conducted routine site surveillance in respect of more than 50% of the couplers in the EWL slab*"[255], the non-compliance rate as shown in the opening up exercise (see **Section XI** below) whilst not a threat to safety, raises a doubt as to the comprehensiveness of his inspection.

[252] See **[H9/4277]**
[253] See **[H9/4269]**
[254] See his oral evidence at **[T29/16:7-24:19; 46:11-21; 58:20-60:6]**. See also his witness statement, at §58 **[WS2/#69/B1/396]**
[255] See his 1st witness statement, at §54 **[WS2/#70/B1/434]**

(3) In any event, there is no dispute that MTRCL (and Leighton) did not prepare the Record Sheet contemporaneously in accordance with the QSP[256].

181. It is therefore quite clear that MTRCL failed to fully comply with the QSP. Whilst Kobe Wong may be correct, the absence of verifying contemporaneous documents casts a serious shadow of doubt on his evidence and, in this regard, it is submitted that the Government's Closing Submissions at paragraphs 67 to 72 are correct.

182. So far as Leighton is concerned:-

(1) Most of their witnesses (e.g. Anthony Zervaas[257], Gabriel So[258], Chan Chi-ip[259], Joe Tam[260], Gary Chow[261], Joe Leung[262], Andy Ip[263], Edward Mok[264], Man Sze-ho[265]) were unaware of the requirements of the QSP.

(2) Edward Mok gave evidence that while he would on and off walk past the location where couplers were being connected, there was no one assigned or stationed at that location to watch every coupler being connected[266]. In other words,

[256] See his 1st witness statement, at §46 **[WS2/#70/B1/432]**
[257] See his oral evidence at **[T17/150:13-17]**
[258] See his oral evidence at **[T18/113:25-117:4]**
[259] See his oral evidence at **[T19/67:25-68:8]**
[260] See his oral evidence at **[T19/103:4-25]**
[261] See his oral evidence at **[T19/125:10-15]**
[262] See his oral evidence at **[T20/6:8:-7:15]**
[263] See his oral evidence at **[T20/29:18-22]**
[264] See his oral evidence at **[T21/13:14-18]**
[265] See his oral evidence at **[T22/24:10-25:2]**
[266] See his oral evidence at **[T21/p30:7-13]**

there was evidently no "*full time and continuous*" supervision.

(3) None of the Leighton engineers involved in the inspection was a grade T3 TCP[267].

(4) As submitted above, the results of the supervision and inspection were in any event not recorded in the Record Sheet in accordance with the QSP.

183. If, at paragraph 112 of Leighton's Closing Submissions, it is being suggested that the QSP did not apply to the EWL Slab and the NSL Slab, this is unsustainable. The version of the QSP prepared by and bearing Leighton's logo, and submitted to BD on 12 August 2013[268] was in no way qualified or restricted in its application to the rebar cages for the D-Walls. Indeed, the MTRCL's submission letter stated "Quality Supervision Plan Submission of the Proposed Ductility Coupler for Diaphragm Wall Reinforcement Cage *and Slab Construction* at Hung Hom Station-1 set"[269].

184. Paragraphs 115, 120 and 130 to 131, in particular, advance an entirely new point with regard to the non-applicability of the QSP. It is self-evidently an *ex post facto* argument conceived by Leighton's legal team. It is submitted that the contention is likely to be incorrect. In a nutshell, Leighton seeks to argue that, aside from the D-Walls, the QSP only applies to coupler assemblies with a "*ductility requirement*" and, in that regard, point to (a) Appendix

[267] See **[T20/13:13-14:5;32:3-12][H10/4727]**
[268] **[H9/4265]**
[269] **[H9/4263]**

VIII of BD's conditional acceptance letter[270] which refers to "*ductility requirement*" and (b) certain drawings which contain the annotation "*ductility zone*". Such drawings only apply to the intersection of the D-Wall and the NSL Slab at Area A. So, it is reasoned, the QSP only applies to that particular area. Whilst the Government's and MTRC's response to this new contention is awaited, it is pointed out that the QSP itself provides, inter alia, "*For the purpose of this document…SEISPLICE-TYPE II (DUCTILITY COUPLER-**Use in Any Location***)." In other words, the QSP applies to all ductile couplers and not just ductile couplers within a ductility zone.

185. Further with regard to Leighton's contentions considered in paragraphs 183 and 184 above, and as referenced in a different context below, when, on 13 June 2018 Leighton submitted a "Certification of Completion of Works' for, inter alia, the **EWL Slab** Areas A, B and C, it was accompanied by a series of 'Compliance Statements' in respect of 'Quality Supervision Report'.[271] Leighton's Authorised Signatory clearly thought that the QSP applied to the EWL Slab.

186. It is therefore submitted that Leighton also failed to fully comply with the QSP.

VII. The changes of design/detail

[270] **[H9/3908 @ 3928]**
[271] **[G2/1280, 1290-1292]**

187. The changes of design/detail at the top of the East D-wall between gridlines 15 and 50 of the site (i.e. at Areas B and C) is another topic which has received a lot of attention in this Inquiry. The relevant D-wall panels range from EH40 to EH115[272], in other words 76 panels.

188. From the evidence adduced during the Inquiry, it is submitted that what happened can be summarised as follows.

The 1st Change

189. According to the BD's originally accepted drawings back in early 2013, the typical design/detail[273] at the top of the relevant diaphragm walls comprised the following:

(1) On the excavation side of the diaphragm wall, there were 2 horizontal rows of rebar at the top mat of the EWL Slab. Such rebar was connected to the diaphragm wall by couplers. Through the couplers, they extended their length into the diaphragm wall and bent downwards to provide anchorage;

(2) On the other side of the diaphragm wall, there was 1 horizontal row of rebar at the top mat of the OTE Slab. Such rebar was also connected to the diaphragm wall by couplers and continued to go inside the diaphragm wall and bent downwards to provide anchorage;

(3) A "U-bar" was provided at the top; and

[272] See the overall location plan **[A1/250]**.
[273] i.e. Detail E, see **[B5/2847]**. See also **[H14/32920]**

(4) All of the rows of rebar and "U-bars" were designed to be spaced out uniformly[274].

190. In around early July 2013 when the construction of the diaphragm wall began, however, Leighton and Intrafor proposed to change the layout of the rebar and leave out the U-bar due to the need to accommodate the tremie pipe (for the pumping of concrete to form the diaphragm wall) and a reservation pipe (hereinafter referred to as the "**1st Change**")[275].

191. MTRCL's Construction Management Team had knowledge and agreed with the change[276]. Atkins Team A and Team B also considered the change acceptable.[277] The 1st Change was therefore implemented on the site.

192. The problem, however, was that due to miscommunication, MTRCL's Design Management Team did not know about the change[278]. Consequently, there was no consultation submission made by MTRCL to the BD[279].

193. In or about January 2015, MTRCL began to make the "BA14 submission", eventually in 6 batches, for the acceptance of the Certificate of Completion of Works as regards the diaphragm walls.

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[274] As confirmed by Buckland, see **[T23/83:18-84:10]**

[275] See Buckland's 1st witness statement, at §§23-24 **[WS1/#53.1/C27/20806]**; MTRCL's Report to the BD dated 27 July 2015, at §§2.1-2.3 **[H11/5542-43]**

[276] See Leighton's Contractor's Submission Form dated 23 August 2013 **[C29/21522-757]**, which attached the first batch of Intrafor's shop drawings showing the 1st Change; MTRCL's Report to the BD dated 27 July 2015, at §2.2 **[H11/5543]**

[277] See MTRCL's Report to the BD dated 27 July 2015, at §2.3 **[H11/5543]**

[278] See Andy Leung's 1st witness statement, at §§34-35 **[WS2/#65/B1/248]**; MTRCL's Report to the BD dated 27 July 2015, at §2.4 **[H11/5543]**; Andy Leung's oral evidence at **[T25/109:14-112:11]**

[279] See Andy Leung's oral evidence at **[T25/115:14-116:4]**

It was only then that MTRCL's Design Management Team came to realise the existence of the 1st Change[280].

194. As for the BD and the Government in general, their knowledge came even later. On or about 14 April 2015, there was a meeting between (1) MTRCL's Design Management Team and Atkins Team A[281], and (2) the BO Team/BD and the RDO Project Team[282]. The summary note of meeting recorded that the BO Team was only notified of the 1st Change on that day.[283] In particular, it was stated that:

*"**Dwall construction deviated from accepted proposal without prior design acceptance***

Notified BO Team on 14 April 2015

- ***Critical moment connection** for 27m span new roof slab* [i.e. the EWL Slab[284]] *supporting existing/future station structure*
- ***Covered up** the major revision of ongoing foundation works for 2 years (since August 2013* [i.e. around the time when the 1st Change was implemented[285]]*)*
- ***Structural Safety and serviceability concern** to existing station structures and future station*
- ***Potential programme impact** if remedial works required"*

[280] See Andy Leung's 1st witness statement, at §§34-35 **[WS2/#65/B1/248]**; MTRCL's Report to the BD dated 27 July 2015, at §2.4 **[H11/5543]**
[281] It is noted that although David Wilson, a member of Atkins (Team B), attended the meeting, he was treated as a member of the "DDC", i.e. Atkins (Team A). See **[H11/5517]**
[282] See **[H11/5517]**
[283] See **[H11/5520]**
[284] Buckland's oral evidence **[T23/94:4-18]**
[285] Buckland's oral evidence **[T23/95:2-4]**

195. On or about 21 May 2015, the BD rejected MTRCL's batch 1 and batch 3 BA14 submissions[286]. One of the key reasons was the discovery of the 1st Change. In particular, the BD stated that:

> *"3. In the meeting with your representative on 14 April 2015, it is noted that the reinforcement details at the top of some Eastern diaphragm walls (along Grid line M) have been constructed not in accordance with the accepted proposal. In this connection, you are required to review and clarify if any of the said modified diaphragm walls are included in the captioned batch of as-built diaphragm wall submission.*
>
> *4. The selection of diaphragm walls/barrette for proof tests cannot be made until the above have been clarified/rectified to the satisfaction of the Building Authority."*

196. As a result, MTRCL, together with Atkins and Leighton, needed to justify the 1st Change and, if necessary, provide a remedial proposal[287].

The 2nd Change

197. The BD's reaction appears to have been anticipated by MTRCL, Atkins and Leighton. After MTRCL's Design Management Team came to know about the existence of the 1st Change in around January 2015, Atkins, through Team A and/or Team B, had already started to consider various proposals to deal with the 1st Change.

[286] See **[H10/5130-5133]**
[287] As agreed by Buckland, see **[T23/97:3-10]**

198. On or about 25 February 2015, Atkins Team B[288] produced a remedial proposal as regards EH105 and EH107[289]. In particular, it included the remedial work of: (1) demolishing the top portion of those particular diaphragm wall panels and (2) adding the required number and diameter of rebar as per the accepted design drawings[290].

199. On or about 14 May 2015[291], Atkins Team B produced a draft temporary work design report TWD-004B2[292] in support of the strutting work at Area C1 and C2 at gridlines between 22 and 40[293]. In the said draft report, Atkins Team B suggested another remedial proposal for the 1st Change, which included[294]:-

(1) trimming the top portion of the relevant diaphragm walls;

(2) using through-bars to replace the couplers; and

(3) concreting the EWL Slab, the diaphragm wall and the OTE Slab concurrently, meaning in one piece[295].

200. By late May or early June 2015, however, it appears that Atkins (through both Teams A and B) had come up with another and different remedial proposal. In particular, according to WC Lee[296], at a meeting at around the time between (1) MTRCL's Design

[288] See McCrae's oral evidence at **[T36/130:21-131:5]**
[289] See **[F34/23946-84]**
[290] See **[F34/23948]**
[291] See McCrae's 1st witness statement, at §51 **[WS2/#109/J4/3351]**
[292] See **[J1/92+]**
[293] See such reference at **[B10/7256-58]**
[294] See §1.3.5 and fig. 1.4 **[J1/106-7]**; §6.2 **[J1/142]**
[295] See McCrae's oral evidence at **[T36/139:9-23]**
[296] See Lee's oral evidence at **[T34/38:20-40:14; 54:16-55:18]**; Lee's 1st witness statement, at §21 **[J6/4526]**

Management Team and Atkins (both Teams A and B), and (2) the BD and Pypun, the BD was told that:-

(1) there would be *no* trimming of the relevant diaphragm walls or replacement of couplers by through-bars;

(2) the EWL Slab and the OTE Slab would be cast at the same time to ensure "monolithic behaviour", while the diaphragm wall in-between would be left intact.

201. Further, according to Andy Leung[297], WC Lee[298] and Dr. McCrae[299], it was the aforesaid remedial proposal which was finally put into the permanent design report PWD-059A3 dated 9 July 2015[300] and which was meant to be considered by the BD[301].

202. Unfortunately, when Atkins Team B produced the final temporary work design report (i.e. TWD-004B3[302]) on or about 17 June 2015, while they referred to a draft permanent work design report PWD-059A1 for the remedial work proposal for the 1st Change,[303] the reference to the trimming of the top portion of the relevant diaphragm walls was retained[304]. As accepted by Dr. McCrae[305], this was irreconcilable with Atkins' intention to change the proposal.

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[297] See Andy Leung 1st witness statement, at §§36-38 **[WS2/#65/B1/248-49]**
[298] See Lee's oral evidence at **[T34/29:15-30:18]**
[299] See McCrae's oral evidence at **[T36/154:19-155:25]**
[300] See **[B10/7322-7358]**
[301] See McCrae's oral evidence at **[T36/157:13-15]**
[302] See **[B10/7256-7321]**
[303] See §1.3.5 **[B10/7277]**
[304] See §6.2 **[B10/7312]**
[305] See McCrae's oral evidence at **[T36/156:2-157:15]**

203. Further confusion also arose from the use of the word "monolithic" in PWD-059A3[306], TQ 33[307] and in subsequent emails[308], which caused MTRCL's Construction Management Team [309] and Leighton[310] to believe, inconsistent with the intention of MTRCL's Design Management Team and Atkins Teams A and B, that the remedial proposal approved by MTRCL's Construction Design Team and Atkins was the one similar to that set out in TWD-004B2.

204. Such belief/misbelief was further reinforced by Atkins Team A's response to TQ 34[311] on 29 July 2015, which suggested that as regards EH74, similar to what was set out in TWD-004B2, Leighton should:-

(1) hack off concrete at the diaphragm wall;

(2) extend T1 rebar to the far side of the diaphragm wall by a through bar; and

(3) cast the hacked-off portion and EWL Slab and OTE Slab in one go.

205. In addition, at around the same time, there were various other construction difficulties as regards couplers[312]. As a result:

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[306] See **[B10/7333-34]**
[307] See **[B5/2997]**
[308] See the email correspondence among MTRCL, Atkins and Leighton from 21 to 25 July 2015 **[B10/7249-53]**
[309] See Kit Chan's 1st witness statement, at §51**[WS2/#66/B1/280-81]**
[310] See Taylor's oral evidence at **[T24/74:17-76:6]**
[311] See **[B16/12527-28]**
[312] See Kit Chan's 1st witness statement, at §47 **[WS2/#66/B1/279]**

(1) MTRCL's Construction Management Team and Leighton agreed that the whole of Area C1-2, which had the same difficulty as EH74, would adopt the remedial proposal as set out in TQ 34[313]; and

(2) They further agreed that, subject to Area C1-2 and certain other exceptions, the panels in Areas B and C would adopt the following remedial proposal:-

(a) First, save in respect of certain limited 'special' areas, Leighton would trim down the top 450 mm of the East D-wall;

(b) Second, Leighton would use 1 through bar to replace 3 segments of rebar;

(c) Finally, Leighton would complete the concrete pour over the structure in one go[314].

206. Both remedial proposals, together with the certain other exceptional changes (hereinafter referred to as the "**2nd Change**"), were subsequently carried out on the site. MTRCL's Construction Management Team was "*under the impression*" that the Design Management Team would update the working drawings of the EWL Slab reinforcement and thereafter obtain approval from the

[313] See Kit Chan's 1st witness statement, at §41**[WS2/#66/B1/277]**
[314] See Kit Chan's 1st witness statement, at §49**[WS2/#66/B1/279-80]**

BD[315]. MTRCL's Design Management Team, however, did not know about the 2nd Change until around July 2018[316].

207. The BD received TWD-004B3[317] (which was, as explained above, prepared in support of the strutting work at Area C1 and C2 at gridlines between 22 and 40[318]) on or about 29 July 2015. Further, it received another submission in support of excavation and lateral support work at Area C3 between gridlines 40 and 49 on or about 23 March 2016[319]. They are referred to by Leighton as the "**First Submission**" and "**Second Submission**" respectively[320].

208. From the perspective of the BD, those 2 Submissions were made by MTRCL for the design of temporary work at Areas C1 to C3 only. They did not constitute any consultation submissions for the change of permanent work. Therefore, even though Section 6.2 of TWD-004B3 stated that the top of the diaphragm wall would be trimmed down, the BD did not see that statement as any proper notice that such work would actually be carried out, still less consider any acceptance had been given by BD[321]. In particular, the BD:-

(1) replied to the First Submission on or about 8 December 2015[322] stating that:-

[315] See Kit Chan's 1st witness statement, at §51**[WS2/#66/B1/280-81]**
[316] See Andy Leung's oral evidence at **[T25/122:7-123:5]**
[317] See **[B10/7256-7321]**
[318] See such reference at **[B10/7256-58]**
[319] See **[C26/19996-20001]**
[320] See **[C27/20854]**
[321] See Humphrey Ho's 2nd witness statement, at §§22-28 **[RWS1/#D1/H20/40061-63]**
[322] See **[H14/35344-35351]**

"*It is noted that reinforcement details of permanent slab of the station have been included in this temporary works design submission. In order to avoid ambiguity, it is recorded that the said reinforcement details were submitted for information only and you are required to ensure the corresponding permanent station structure submission are fully compatible with this ELS submission.*" [323]

(2) replied to the Second Submission on or about 28 April 2016[324] stating that:-

"*It is noted that steel rebar details of permanent station structure has been included in this temporary works design submission. In order to avoid ambiguity, the steel rebar details is treated as providing information to justify that the ELS effects has been considered in the permanent works design. You are required to submit all change in the permanent station structure in the appropriate design package for consultation agreement.*" [325]

209. In terms of permanent work, the BD also received from MTRCL the 7th Amendment Submission[326] attaching PWD-059A3[327] on or about 30 July 2015, the 8th Amendment Submission on or about 4 November 2015[328] and the 9th Amendment Submission on or about 14 January 2016[329]. It eventually accepted the 9th Amendment

[323] See **[H14/35348]**
[324] See **[H14/35372-35374]**
[325] See **[H14/35374]**
[326] See **[C17/12101-325]**
[327] See **[B10/7322-7358]**
[328] See **[C29/21804-13]**
[329] See **[H11/5721-23]**

Submission on or about 2 March 2016[330] and acknowledged the Certificate of Completion of Works for the diaphragm walls on or about 5 May 2017[331]. In all those submissions, however, the drawings submitted and retrospectively approved did *not* show any trimming of diaphragm walls or replacement of couplers by through-bars[332].

210. Therefore, the BD, like MTRCL's Design Management Team, had no knowledge of the 2nd Change until the recent events leading to this Inquiry[333].

Whether the 2nd Change required prior acceptance of the BD

211. This issue has attracted some controversy. In particular:

(1) BD's position is that prior acceptance ought to have been sought from the BD[334];

(2) MTRCL's Design Management Team appear to agree with BD's position[335];

(3) MTRCL's Construction Management Team[336] and Leighton[337] however take the position that the 2nd Change is a minor change and no prior acceptance from the BD was necessary.

[330] See **[H11/5724-27]**
[331] See **[H10/5157]**
[332] See, e.g. **[B10/7357]**
[333] See Humphrey Ho's 2nd witness statement, at §29 **[RWS1/#D1/H20/40063]**
[334] See Humphrey Ho's 2nd witness statement, at §§13-21 **[RWS1/#D1/H20/40059-61]**
[335] See Andy Leung's oral evidence at **[T26/3:11-23]**
[336] See Kit Chan's 1st Witness Statement, at §57**[WS2/#66/B1/282]**
[337] See Buckland's 1st Witness Statement, at §9(b) **[WS1/#53.1/C27/20802]**

212. It is submitted that this public inquiry is not the proper forum to resolve the issue as between BD, MTRCL's DM and CM Teams, and Leighton. What the COI should focus on is the miscommunication among the various parties and what should be done to prevent such miscommunication from happening again. It is not the function or purpose of the COI to resolve the dispute for BD, MTRCL and Leighton in this Inquiry. Any finding, if made, would not, in any event, be binding on any of the parties involved.

213. As to the project management consideration arising out of the miscommunication issue, this will be dealt with in **Section XIII** below.

VIII. Retrospective Records

MTRCL's Retrospective Records signed by Kobe Wong [B7/4537-4598]

214. As discussed above, in January/February 2017, an internal review was carried out by MTRCL after Mr. Poon's 6 January 2017 email. At the time of MTRCL's internal review, it was found that in respect of the EWL Slab and the NSL Slab there were no record sheets as required by the QSP which were supposed to be prepared by Leighton and countersigned by MTRCL[338]. There remained no such records until mid-2018.

215. After the first media report in late May 2018 regarding allegations of defective steel works, MTRCL's James Ho, Derek Ma, Louis

[338] Kobe Wong's Witness Statement, §§46-48 [**WS2/#70/B1/432**]

Kwan and Arthur Wang began to gather evidence in response to these allegations[339].

216. James Ho told Kobe Wong that Leighton had prepared a set of record sheets for the EWL Slab and asked if Kobe Wong was willing to countersign them. Kobe Wong refused to sign Leighton's retrospective records. This appears to have led to MTRCL compiling their own sets of records[340].

217. It was Derek Ma who prepared MTRCL's retrospective records based on the softcopy received from Leighton[341]. This set of MTRCL's retrospective records was based on as-built drawings of Intrafor[342].

218. Kobe Wong did not check the details and relied on Derek Ma. He confirmed he did carry out inspection of couplers for more than 50%. The checklists were back dated to "*10 February 2017*" because these checklists were prepared in response to the follow-up actions recommended in the internal review in January/February 2017[343].

219. As to the purpose of their production, MTRCL alleged that their retrospective records are internal records and not form part of the BD submission[344].

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[339]Kobe Wong's Witness Statement, §50 [**WS2/#70/B1/433**]
[340] Kobe Wong's Witness Statement, §§53 - 56 [**WS2/#70/B1/433**]
[341] T27/75:3-15
[342] Derek Ma's Witness Statement, §42 [**WS2/#68/B1/368**]
[343] Kobe Wong's Witness Statement, §§57 & 59 [**WS2/#70/B1/434-435]**
[344] Kobe Wong's Witness Statement, §61 [**WS2/#70/B1/435**]; Derek Ma's Witness Statement, §39 [**WS2/#68/B1/367**]

220. However, Kobe Wong also agreed that he attempted to make the records look as if they were compiled in or about February 2017[345].

221. BD said during a document inspection in June 2018 that they were not told by anyone from MTRCL that these coupler check lists were actually retrospective and back dated records[346]. HyD/RDO also said these records did not appear to be retrospective records[347].

222. It is noted that as appeared on the face of these MTRCL retrospective records, nowhere stated that they were for "internal use".

Unsigned Leighton's Retrospective Records

223. It is noted that there is another set of retrospective records prepared by Leighton. The information in the form was prepared by Edward Mok in June 2018[348]. However, Edward Mok and Man Sze Ho who did the actual inspection also said they were not the one who circled the "S/NS" on the retrospective records[349].

224. They were attached to RISC Forms and produced to BD/RDO/PyPun for inspection[350]. They were submitted by Leighton to MTRC on 13 June 2018[351].

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[345] T30/31:3-7
[346] Fan Tak Pun's Reply Witness Statement, §10 [**RWS/#D2/H20/40110**]; Wong Wing Wah's Reply Witness Statement, §15 [**RWS/#D3/H20/40115**]
[347] James Fung's Reply Witness Statement, §9 [**RWS/#TH1/G13/10875**]
[348] Kobe Wong's Witness Statement, §50 [**WS2/#70/B1/433**]
[349] T21/104:9-105:13; T22/35:18-25
[350] Derek Ma's Witness Statement, §29 [**WS2/#68/B1/365**]
[351] Derek Ma's Witness Statement, §30 [**WS2/#68/B1/365**]

225. MTRCL provided other Leighton's inspection records of mechanical coupler installation (i.e. coupler checklists) for BD's viewing on 6 June 2018[352].

226. In fact, there are 2 sets of Leighton's retrospective records. The original sets can be found in **B5/TS44251-44339** and **G12/9591-9707**. They are also scattered in Bundles 13 to 15. They wrongly state that top bars in Area B and C were couplers. It is noted that there are similar records with slightly different descriptions as observed by the Government during June 2018 inspection[353].

227. The other set is a revised version apparently made in July 2018 and can be found in Bundles C13 to C15[354].

228. It is noted that there was no mention of "*retrospective*" in these two versions of Leighton's retrospective records.

229. The revised Leighton's retrospective records show drilled-in bars marked in red. The drilled-in bars were located at the position suggested by TQ-12 and TQ-13.[355] They can only be found in Bundles C13 to C15. They were revised after Leighton was aware that most of the top bars were changed to through bars[356].

230. It is submitted that the preparation of such retrospective records by MTRCL and Leighton, whatever their genuine intention was, is

[352] Fan Tak Pun's Reply Witness Statement, §8 [**RWS/#D2/H20/40109**]**[H14/35136, H14/35137, H14/35141, H14/35142, H/1435148, H/1435149]**
[353] **H14/35083, H14/35164, H14/35082, H14/35163, H14/35067, H14/35148, H14/35068, H14/35149**
[354] **C13/8650, C13/8651, C13/8840, C13/8841, C13/8956, C13/8957, C14/9056, C14/9057, C14/9172, C14/9173, C14/9278, C14/9279, C14/9403, C14/9404, C14/9532, C14/9533, C14/9627, C14/9628, C14/9744, C14/9745, C15/9829, C15/9830, C15/10101, C15/10102, C15/10250, C15/10251, C15/10427, C15/10428, C15/10537, C15/10538, C15/10630, C15/10631**
[355] **[B5/2906-2919]** & James Ho's 1st Witness Statement, §60 [**WS2/#67/B1/338**]; T21/80:16-25
[356] T21/79:23-80:10

unfortunate. Such records served no useful purpose and confused others, including the BD. Such practice should not be encouraged and should be deplored.

IX. As-built drawings

231. The project management experts, Mr. Rowsell and Mr. Huyghe, both agree[357] that:

(1) It is Leighton's scope of work to produce the as-built drawings and submit the same to MTRCL. The General Specification to the Contract sets out that the as-built records and drawings shall be produced on a progressive basis. The as-built records comprise a wide spectrum of records including material submissions, test certificates, construction records (such as TQs, RFIs, photographs) and as-built drawings.

(2) MTRCL is obliged to submit as-built records and drawings to the Government.

232. The problem in the present case is that the working drawings were not properly updated contemporaneously. In particular, the 2nd Change was not reflected in the working drawings. As a result, Leighton and MTRCL have had to re-construct, the best they can, the as-built details based on site photos and other available materials[358].

[357] See the Joint Statement of Project Management Experts, at §§23-24 **[ER1/#9]**
[358] **[B19/25480-689]**

233. John Blackwood of Atkins states that the provision of updated working drawings incorporating most site changes would make the as-built drawing production process much easier[359]. Wilson Sung of Atkins explains that the normal practice is that site changes should be updated contemporaneously rather than retrospectively[360]. MTRCL's TM Lee also admits that there is a shortfall in relying on photographs, and perhaps memories of staff, to ascertain the as-built condition[361]. As a matter of commonsense, this must be correct.

234. It is submitted that both Leighton and MTRCL are responsible for such shortfall. While Leighton has the primary duty of preparing the as-built drawings and there was clearly a deficiency in its process of discharging that duty, MTRCL ought to have picked up such deficiency and corrected it. Its failure to do so shows that there was also a problem in its management of as-built records, including as-built drawings.

X. Other issues

235. In the requests for information sent to a number of the involved parties, they were asked to confirm whether, apart from the steel reinforcement issues, they had any knowledge of any other works forming part of Contract 1112 which raised concerns about public safety. A few matters have been raised in response to the Commission's request namely:

[359] **[T33/77:16-25]**
[360] **[T33/139:7-140/16]**
[361] **[T32/42:10-22]**

(1) Honeycombing of concrete.

(2) Water seepage.

(3) Placement of lightweight concrete.

Honeycombing of Concrete

236. MTRCL has reported to the RDO at Project Supervision Committee Meeting held on 28 August 2018 that honeycomb concrete was observed at the EWL Slab, and RDO informed BD on the same day by email.

237. On 29 and 31 August 2018, BD and Pypun's BRSC Team carried out site inspections which revealed that some loose concrete/concrete spalling and a void could be observed at the soffit of the EWL Slab between grid lines 21-33, 39-43 at Areas B, C1 and C2[362].

238. MTRCL has submitted non-conformance reports to RDO and copied to BD [363] and also submitted a method statement for concrete repair works to BD[364].

239. BD has requested the Competent Person of MTRCL to carry out investigation and submit its investigation report and remedial proposal for comment by BD[365]. In response to BD's comments, MTRCL submitted another remedial proposal on 12 November 2018 to BD[366].

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[362] Lok Pui Fai's 1st Witness Statement, at §72 **[WS2/#96/H7/2207]**
[363] **[H13/7495-7516]**
[364] **[H13/7519-7675]**
[365] **[H13/7490-7494; H13/7517-7518]**
[366] **[H20/40467-40533]**

240. NCR No. 258[367], NCR No. 259[368], NCR No. 260[369] and NCR No. 264[370] are the NCRs concerning honeycombing of concrete.

241. On 10 September 2018, MTRCL submitted the interim findings of the inspection and investigation to BD and advised that the investigation is in progress[371].

242. There are also NCRs 255 and 256 relating to shear links allegedly not complying with construction drawings [372] . These non-conformances were discovered during breaking up of the honeycomb part of the soffit and it was discovered that the installation method for shear links at the time was not in compliance with MTRCL's drawings[373].

243. Michael Fu of MTRC said that the poor concrete quality observed by MTRLC does not pose any material safety or structural risks[374]

244. There is no evidence suggesting the issue of honeycombing of concrete is serious. It is also clear that different parties are looking into the matters and remedying the defects. The structural engineering experts agree that these are not safety issues.

Waterseepage

[367] **[H13/7499]**
[368] **[H13/7505]**
[369] **[H13/7509]**
[370] **[B20/26052]**
[371] **[H13/7676-7703]**
[372] **[H19/39691-39707]**
[373] T22/41:17-43:11
[374] Michael Fu's Reply Witness Statement, at §28 **[RWS/#M7/B16/13685]**

245. HyD requested MTRCL to provide bi-weekly reports starting from 20 August 2018 until further notice detailing the defects of cracks and water seepage found on Contract 1112, and MTRCL's follow-up actions to be taken[375].

246. As revealed in Pypun's site visit monitoring report dated 13 November 2018, water seepage was recorded in NCR No. 263[376].

247. Intrafor's Mr. Gillard explained that some cracks may appear in D-wall as with any another concrete structure. This is expressly recognized by the Sub-Contract which set out tolerances for cracks and water seepage[377].

248. He also said that Intrafor had attended site since the completion of D-wall to address NCRs, including cracks and water seepage. He said nothing caused concern[378].

249. Kit Chan also said water seepage in D-wall was not uncommon[379].

250. MTRCL recorded 4 NCRs in relation to water seepage. MTRCL confirmed that they do not pose any safety hazard[380].

Placement of Lightweight Concrete

251. This is another red-herring raised by Mr. Poon. He alleged in the special meeting of LegCo subcommittee on 13 July 2018 that

[375] G8/6951-6952; Ralph Li's 1st Witness Statement, at §21 **[WS2/#84/G3/2094]**
[376] **[G20/15072]**
[377] Gillard's 1st Witness Statement, at §201 **[WS1/#1/F1/80];** §72(iii) **[WS1/#1/F1/46]**
[378] Gillard's 1st Witness Statement, at §72(v) **[WS1/#1/F1/46]**
[379] Kit Chan's 1st Witness Statement, at §59 **[WS2/#66/B1/283]**
[380] **[G20/15177-15179]**

China Technology refused to pour lightweight mass concrete at Area A due to substandard site preparation[381].

252. MTRCL's James Ho clarified that he was aware of the use of mass concrete for backfilling in Area A in the space between the in-situ wall and the D-wall on NSL level. He said that this was Leighton's initiative and MTRCL agreed to reduce the costs of the works as a value engineering exercise and to be environmentally friendly. The type of concrete used to backfill the area is mass concrete and not lightweight concrete as alleged by Mr. Poon in LegCo subcommittee meeting on 13 July 2018[382].

253. MTRCL also clarified that a PCG paper was approved on cost saving for the use of broken concrete in RDO-MTRCL Coordination Meeting on 23 August 2018[383].

254. Further evidence can be found in correspondence between MTRCL and RDO[384]. It is submitted that Mr. Poon's allegation cannot be substantiated and can be safely ignored.

XI. <u>Opening up</u>

255. On or about 6 December 2018, MTRCL submitted the "Holistic Proposal to Verify and Assure As-Constructed Conditions &

[381] RDO's letter dated 24 July 2018 **[G6/4697-4698]**
[382] James Ho's Witness Statement, at §§98-99 **[WS2/#67/B1/353]**
[383] Para 6.1(vi) at **G13/10331**
[384] MTRCL's letter to RDO dated 1 Aug 2018 **[G6/4985-4986]**; RDO's letter dated 8 Aug 2018 **[G6/5157-5158**]; 1st MTRC's letter to RDO dated 30 Aug 2018 at **[G6/5418-5419]**; MTRC's 2nd letter to RDO enclosing Leighton replied by way of letter to MTRCL about the use of lightweight concrete **[G14/11332-11334]**

Workmanship Quality of the Hung Hom Station Extension, Rev. B" ("**the Holistic Proposal**") to HyD.[385]

256. The Holistic Proposal involves physical investigation of the structure of the Project as follows:

(1) Opening up a minimum of 24 locations at the EWL Slab for the purpose of verifying the as-constructed details, namely purpose (i).

(2) Opening up a minimum of 28 nos. random locations at the EWL and NSL Slabs each for the purpose of verifying the workmanship quality, namely purpose (ii).

257. The results of the opening up are updated regularly. As of **23 January 2019** (leaving aside a limited number of untested samples), out of 115 samples:

(1) 112 have greater than 26.4mm embedment;

(2) 107 have greater than 32mm embedment;

(3) 77 have greater than 37mm embedment; and

(4) 48 have greater than 40mm embedment[386].

Please refer to **Annex II**.

[385] **[B20/26190-236]**
[386] **[OU1/490]**

XII. Structural safety

258. As already submitted, on the basis of the evidence gathered by the COI, the allegations relating to widespread and systematic cutting of the threads of rebar have proven to be generally unsubstantiated and unfounded.

259. On the other hand, undisputedly, it has been discovered that:

(1) There were changes to the design/detail at the top of the East D-wall and EWL Slab (i.e. the 1st and 2nd Change) from the BD's originally approved drawings; and

(2) Some of the coupler assemblies are not fully engaged as shown by the recent opening up.

260. The question before the COI is whether the new Hung Hom station structure is safe in the light of these discoveries.

261. There were in total 5 structural engineering experts called to give evidence in the Inquiry. They are (in the order in which they were called):

(1) Professor Francis Au on behalf of the Government;
(2) Professor Albert Yeung on behalf of China Technology;
(3) Mr. Nicholas Southward on behalf of Leighton;
(4) Dr. Mike Glover on behalf of MTRCL; and
(5) Professor Don McQuillan on behalf of the COI.

262. Further, Leighton also instructed COWI UK Limited ("**COWI**") to produce a report on the utilisation of the station structure[387].

263. It is submitted that all the experts met the criteria of independence and necessary expertise, although it is observed that Professor Yeung is primarily a geo-technical expert rather than a structural expert.

The changes of design/detail

264. Mr. Southward considers that the changes are safe and the final as-built detail is actually an improvement to the BD's originally approved detail because:

(1) The as-built detail increases the amount of reinforcement that connects the EWL Slab to the D-wall, so the structure has an increased amount of strength and hence robustness and redundancy.

(2) The as-built detail eliminates the vertical construction joints between (a) the EWL Slab and D-wall, and (b) the D-wall and the OTE.[388]

265. Dr. Glover agrees and states that "*the Contractor's Alternative Detail for EWL slab to the east Diaphragm Wall connection is a superior detail to the accepted connection detail described by the consultation drawings, both in terms of performance and constructability*".[389]

[387] See COWI's report **[ER1/#4]**
[388] See Mr. Southward's report, at §9.5 **[ER1/#5/26]**
[389] See Mr. Glover's report, at §8,7 **[ER1/#6/11]**

266. Professor McQuillan also shares a similar view and states that "*In my opinion the amended detail, as represented by the "first change" and as subsequently developed to represent the "second change", is superior to the original fully coupled joint from both a structural and buildability perspective. More steel is provided across the top of the D-wall tan originally intended.*"[390]

267. In contrast, Professor Au's stance is that:

(1) The 2nd Change creates a new construction joint at the connection between the EWL Slab and D-wall;

(2) This will require a calculation of the horizontal shear force at the new construction joint and the internal stresses within the Slab-Wall Joint.[391]

268. Professor Yeung agrees with Professor Au[392].

269. In reply:

(1) Mr. Southward considers the shear capacity of the vertical rebar in dowel action can provide resistance to the shear forces in the new construction joint, so that the block above the new additional joint will not move[393].

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[390] See Mr. Glover's report, at §8,7 **[ER1/#3/41]**
[391] See Mr. Au's report, at §§6.3-6.4 **[ER1/#3/41]**; List of Structural Checks on the Connection between the East Diaphragm Wall and EWL Platform Slab (the Slab-Wall Joint), including checking on internal stressed within the Slab-Wall Joint and the Additional Construction Joints ("**List of Structural Checks**") **[H27/45878-79]**
[392] See **[T42/54:1-25]**
[393] See **[T42/120:24-121:6]**; **[ER1/#5.1/21]**

(2) Further, he believes that once a construction joint is properly prepared, there is no longer a construction joint but a monolithic piece of concrete[394].

(3) Dr. Glover[395] and Professor McQuiillan[396] generally agree with that view.

(4) Professor McQuillan also states that there is a "clamping" action above the D-wall, such that there will be no shear stress at the additional construction joint at the top of the D-wall[397]. He considers that horizontal dowel action prevents the concrete block above the D-wall top from sliding sideways and that one needs to take into account the dowel action if calculations are to be done[398].

270. It is submitted that there is no suggestion that the structure's safety is in any way compromised because of the 1st and 2nd Change. The views of Professor Au and Professor Yeung, even put at their highest, merely suggest that the changes require further numerical checking and verification. It is not clear whether Professor Au in particular is saying that BD should not have approved the 1st Change.

271. It is noted that both Professor Au and Professor Yeung previously agreed that such further numerical checking and verification would

[394] See **[T43/10:20-25]**
[395] See **[T43/117:9-16]**
[396] See **[T44/167:11-171:12; 174:11-176:5]**
[397] See **[ER1/#3/§§99-100]**
[398] See **[ER1/#3.1/12]**. The dowel action is derived from the rebar.

not show the new construction joint to be problematic[399], although they now appear to have reservations as to that agreement[400].

272. To date, neither of them has provided any calculations of their own.

273. While it is understood, as a matter of caution, that the Government would like to carry out further numerical checking and verification, the COI must decide the matter and make its determinations on the available evidence before it. On that basis, it is submitted that the explanation given by Mr. Southward, Dr. Glover and Professor McQuillan is in accordance with sound and highly experienced engineering judgment and common sense and there is no good reason to doubt the structure's safety and integrity because of the 1st and 2nd Change. Thus, in the context of the COI, the contents of paragraph 7(3) of the Government's Closing Submissions are not accepted.

Partial engagement of coupler assemblies

274. Mr. Southward, Dr. Glover and Professor McQuillan again share the same view that the partial engagement of coupler assemblies as shown in the opening up will not affect the structure's safety and integrity. Their views may be summarised as follows.

275. First of all, according to the Joint Statement of MTRCL and Leighton[401], a substantial part of the top of East D-wall is subject to the 2nd Change from coupler assemblies to through bars. The opening up for purpose (i) shows that the Joint Statement of

[399] See the Agreed Expert Memorandum signed on 18 December 2018, at §3 **[ER1/#3/118]**
[400] See Mr. Au's oral evidence **[T40/61:3-62:4]**; Mr. Yeung's report, at §44 **[ER1/#8/10]**
[401] See **[B19/25485-88]**

MTRCL and Leighton is generally correct[402]. In other words, a substantial part of the connection of the top of the EWL Slab with the East D-wall is not subject to any concern of partial engagement at all.

276. Secondly, according to BOSA's own calculation [403] and test conducted on 21 November 2018[404], a minimum of engagement of 6 threads or 60% (i.e. about 26.4 mm) will be sufficient to provide the required strength. Those tests were not testing the couplers but rather the coupler assembly and, in circumstances where, under load, the rebar broke (and not the coupler), the tests may be regarded as satisfactory. China Technology's criticism of the conclusions to be reached (and, in fact reached) by the majority of the structural engineering experts is misplaced.[405] The better view is set out in the Closing Submissions of MTRCL [406] and Leighton.[407]

277. With regard to the latterly introduced arguments about "butt-to-butt", this is all inextricably linked to the engagement/embedment length of the thread issues. On the evidence, it is submitted that the analysis set out at paragraphs 91 and 92 of the MTRCL's Closing Submissions is correct. In particular, from the perspective of safety and integrity of the structure, it is submitted that Professor McQuillan's proposed criteria of 32 mm engagement is sensible.

[402] See **[OU1/473-474]**
[403] See **[ER1/#3/§66][H25/44527.1]**
[404] See **[ER1/#3/§67][H25/44485-526]**
[405] §§16-25 of China Technology's Closing Submissions
[406] §§78-82 of MTRCL's Closing Submissions
[407] §§69-92 of Leighton's Closing Submissions

As a matter of fact, very few test results of partial engagement fall below 32 mm[408].

278. As of 22 January 2019, the opening up shows that apart from a few cases (e.g. 1 at the East D-wall connection with the top of the EWL Slab[409], 1 at the East D-wall connection with soffit of the EWL Slab[410] and 1 at West D-wall connection with the soffit of the EWL Slab[411]), all the other coupler assemblies have more than 26.4 mm engagement[412].

279. In summary, the extent of partial engagement problem is very limited indeed and certainly not sufficient to question the safety and integrity of the structure.

280. Thirdly, the structure's design has a very low utilisation rate. Atkins, Arups and COWI all agree that there is at least 40% spare capacity at the top mat of the EWL Slab connection[413]. The experts also agree[414] that the structure's design provides 50% more steel at the bottom mat than that is required by the Code of Practice for Structural Use of Concrete 2004[415]. Thus, the limited problem of partial engagement will not affect the structure's overall safety and integrity. As an adjunct to this point, Professor McQuillan pointed out there will not be "*slow fatigue*" of the coupler connections.[416]

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[408] Professor McQuillan's powerpoint **[ER1/Tab 3.1/3-4]**. See also **[OU1/490]**
[409] See **[OU1/454/Item 5]**
[410] See **[OU1/454/Item 22]**
[411] See **[OU1/240]**
[412] See **[OU1/454]**
[413] See Mr. Southward's oral evidence **[T42/114:2-11]**
[414] See **[ER1/#3/117]**; Mr. Au's oral evidence at **[T40/69:3-18]**
[415] See **[H8/2818-3015]**
[416] T44/157:4-163:14

281. In contrast, Professor Au and Professor Yeung question the reliability of BOSA's calculation and test. In particular, Professor Au suggests more tests should be carried out, which include:

(1) A more comprehensive strength test – Professor Au considers it "strange" that in BOSA's test, the strength peaks at 60% engagement[417];

(2) A cyclic tension and compression test; and

(3) An elongation test[418].

282. In reply:

(1) Mr. Southward explains that the strength peaking at 60% in BOSA's test actually proves that more than 60% engagement has no effect on the strength of the coupler assembly. Once that level of engagement is reached, the rebar, rather than the coupler, breaks first. This shows that 60% engagement fulfills the design safety requirement[419].

(2) Mr. Southward also explains that the cyclic tension and compression test and the elongation test are neither here nor there because according to the calculation carried out by COWI, the variation in stress when trains go on the platform slab is only 15 to 20MPa, which is insignificant and cannot affect the structure's integrity[420].

[417] See Mr. Au's oral evidence **[T40/43:18-44:5]**
[418] See List of Tests on the Partially Engaged Couplers ("**List of Tests**") **[H27/45880-81]**
[419] See Mr. Southward's oral evidence **[T42/110:21-111:12]**
[420] See Mr. Southward's oral evidence **[T42/112:18-114:1]**

(3) Professor McQuillan agrees. He states that because of the structure's low utilisation values, the rebar will, in reality, never be subjected to that level of stress which is required to be tested under the elongation test[421].

(4) He also similarly states that the rebar will in reality never be subjected to a stress reversal situation which is required to be tested under the cyclic tension and compression test[422].

283. It is submitted, similarly to the issue in respect of the 1st and 2nd Change, both Professor Au and Professor Yeung are not positively asserting that the structure is unsafe as shown by the evidence in this Inquiry. What they appear to be saying is that they cannot make any conclusion until further tests are conducted.

284. Again, whilst it is understood that, as a matter of caution, the Government would like to carry out more tests, the COI must decide the matter and make its determinations on the available evidence before it. And on that basis, it is submitted that the COI should be satisfied by the explanations given by Mr. Southward, Dr. Glover and Professor McQuillan, which, it is submitted, provide an entirely realistic (as opposed to a theoretical) assessment of the current situation.

285. A good reality check is provided by the fact that the EWL Slab and NSL Slab have been completed for a considerable time and MTRCL has in the meantime carried out train tests at the platform. Nothing out of the normal has been detected[423]. The Slabs are, and

[421] See Professor McQuillan's oral evidence **[T44/105:19-107:1]**
[422] See Professor McQuillan's oral evidence **[T44/107:21-109:5]**
[423] See **[B1/41]**

have been for some time, bearing 90% of the load (dead load) and the additional live load is unlikely to make any material difference.

Other issues

286. All experts, except Mr. Southward (not part of his brief) agree that miscellaneous workmanship issues such as spalling, voiding, gaps etc. are all repairable[424]. They also agree that mis-aligned shear links have no structural significance in the context of the slab rebar.

Next course of action

287. All experts agree that load test is unnecessary and long term monitoring would be a better approach to allay public safety concern[425].

288. Both Professor Au[426] and Professor McQuillan[427] agree that fibre optic sensors can be used for the structure's long term health monitoring. It is submitted that this is the next course of action to be recommended.

XIII. <u>Project management</u>

289. Sub-paragraphs (b) and (c) of the ToR [**A1/1**] provide as follows:

> *"(b) to review, in the light of (a) above,*
>
> *(i) the adequacy of the relevant aspects of **MTRCL**'s*

[424] See the Agreed Expert Memorandum signed on 18 December 2018, at §4 **[ER1/#3/118]**
[425] See the Agreed Expert Memorandum signed on 18 December 2018, at §5 **[ER1/#3/118]**
[426] See Mr. Au's oral evidence **[T40/99:16-100:13]**
[427] See Professor McQuillan's report, at §113 **[ER1/#3/45]**

- *project management and supervision system*
- *quality assurance and quality control system*
- *risk management system*
- *site supervision and control system and process*
- *system on reporting to Government*
- *system and processes for communication [a] internally and [b] with various stakeholders*
- *and any other related systems, processes and practices and the implementation thereof; and*

*(ii) the extent and adequacy of the monitoring and control mechanisms of **the Government**, and the implementation thereof; and*

(c) in the light of (b) above, to make recommendations on suitable measures with a view to promoting public safety and assurances on quality of work."

290. To assist it in its consideration of sub-paragraphs (b) and (c) of the ToR, the Commission appointed Mr. Steve Rowsell ("**Mr. Rowsell**") as its project management expert.[428] Mr. Rowsell's CV is attached as Appendix 1 to his Expert Report and his considerable experience described at the beginning of the oral synopsis of his expert evidence at **T39/106-108**.

[428] Mr. Rowsell's expert report dated 20 December 2018 is at **ER1/Tab 1**. He gave oral evidence to the Commission on 10 January 2019 [**T39/104-197]**. He was questioned by the Government, Atkins and MTRCL.

291. MTRCL also appointed an independent project management expert namely Mr. Steve Huyghe ("**Mr. Huyghe**").[429] Mr. Huyghe's CV is attached at Appendix A to his Expert Report and his extensive experience described at the beginning of the oral synopsis of his expert evidence **T39/9-13**.

292. As reflected in the "Joint Statement of Project Management Expert" dated 9 January 2019 [**ER1/Tab 9**] ("**the Joint Statement**") there is a considerable degree of common ground or consensus between Mr. Rowsell and Mr. Huyghe in respect of the principal project management issues.[430] The Joint Statement was produced, following the exchange of expert reports, at an experts' meeting held in Hong Kong on 9 January 2019.[431]

293. Given the measure of agreement between the project management experts ("**the PM experts**"), a detailed analysis of their respective reports is neither necessary nor appropriate. Rather, the observations and submissions made below focus on the Joint Statement as supplemented by the experts' oral evidence.

294. The effective starting point of the PM experts analysis is to correctly recognise that the MTRCL's overall project management obligations are defined by and set out in a variety of documents namely the Entrustment Agreement [**G7/5595–5714**], MTRCL's Project Management Plan ("**the PMP**") [**B4/1825–2502**] [432] ,

[429] Mr. Huyghe's expert report dated 4 January 2019 is at **ER1/Tab 2**. He also gave oral evidence to the Commission on 10 January 2019 [**T39/6-103]**. He was questioned by the Commission, the Government and Atkins.
[430] Mr. Huyghe was not, however, (and quite understandably) instructed to comment on sub-paragraph (b)(ii) of the ToR, namely the monitoring and control mechanisms of the Government. The Government chose not to appoint an independent project management expert.
[431] As explained by the Chairman at **T39/1-2**
[432] Versions A to F issued between 30 January 2013 and June 2016

MTRCL's Project Integrated Management System ("**PIMS**") [**B3/1058–1824**], the IoE [**H7/2220-2233**], Code of Practice for Site Supervision 2009 [**B5/2676-2795**] [433], the contract documents between MTRCL and Leighton and the Quality Supervision Plan ("**QSP**") for coupler installation [**B6/4096 –4114**]. It is apparent that certain of the project management issues have arisen because the relevant obligations are to be found in a variety of disparate documents, and the basic recommendation of the PM experts is that there should be a process of rationalization of such documentation. Moreover, and more specifically, the PM experts agree that the PMP and PIMS should be made more contract/project specific.

295. The PM experts recommended improvements to the **PIMS** and **PMP** are set out in the Joint Statement at paragraphs 10 and 11 respectively [**ER1/Tab 9/T-2**].

296. With regard to the inspection of threaded rebar/coupler connection at the EWL Slab[434] the PM experts agree that:

(1) separate inspection forms (one for the top mat and one for the bottom mat of rebar) should have been prepared for signing off the rebar inspections (paragraph 17 of the Joint Statement) [**ER1/Tab 9/T-3**] and, in other words, an additional hold point should have been provided for in respect of the bottom mat of rebar [**T39/22**]; and

[433] Which must include the associated Site Supervision Technical Memorandum [**B5/2796-2829**]
[434] And by necessary inference or deduction, it is submitted, the NSL Slab also.

(2) although ultimately a matter of contractual interpretation, Leighton and MTRCL should have followed the QSP requirements regarding "*the logging, execution and filing of the Record Sheets for coupler inspection*" (paragraph 18 of the Joint Statement) [**ER1/Tab 9/T-3**]. (In other words, it is submitted, the records in respect of the coupler connections at the EWL Slab (and NSL Slab) and the D-Walls should have been in the same or similar format and detail as produced in respect of the cage reinforcement within the D-Walls.)

297. Essentially against the backdrop of the detailed evidence concerning NCR No. 157 (discussed above) the PM experts considered the process of non-conformance reporting. Agreement was reached that

(1) The inconsistency between PIMS [435] which provides for an NCR to be issued if a defect is "*significant*" and the PMP and CoP which state that if any non-conformity arises it should be the subject of an NCR, should be clarified (paragraph 20 of the Joint Statement) [**ER1/Tab 9/T-3**].

(2) NCRs should be re-categorized to capture lower less 'significant' defect.

(3) An NCR need not necessarily be issued if an item of defective work is identified, corrected and immediately signed off on the same day but (a) all site supervision and

[435] PIMS Practice Note, PIMS/PN/11-4/A4, Monitoring of Site Works, Exhibit 7.9 Guidelines for Raising Contract Level Works NCR **[B3/3656-3657]**

construction engineering teams [436] should be put on notice of the defective work concerned and (b) if such defective work occurs again, an NCR should be issued by the contractor and possibly also by MTRCL (paragraph 22 of the Joint Statement) [**ER1/Tab 9/T-4]** [**T39/32**].

(4) All NCRs should be entered into a single database, logged and tracked and should be subjected to proper investigation and implementation of corrective measures (paragraph 21 of the Joint Statement) [**ER1/Tab 9/T-4**].

298. The threaded rebar cutting incidents and the lack of records in respect of the rebar/coupler inspections have necessarily highlighted the "supervision" obligations of both Leighton and MTRCL and, to a lesser extent, the role of Pypun, the Government's M+V Consultant.

299. So far as Leighton is concerned, the obligation to provide "*full time and continuous supervision*" does not mean "*man-marking*" but the General Specification requirement of a minimum ratio of 1 supervisor to no more than 10 workers means, it is submitted, a full time and continuous obligation to provide 1 supervisor on site at the location of relevant work at all times when the relevant work is being carried out.[437]

300. As to MTRCL, the PM experts agree that:

[436] Of both MTRCL and the main contractor.
[437] At times, Mr. Huyghe was a little ambivalent about this but his evidence at **T39/50** appears reasonably clear.

(1) there was an obligation to supervise at least 20% of the splicing assemblies;

(2) a supervision team did have a continuous presence on site to undertake the supervision duties; and

(3) there was a lack of clarity in respect of the designated responsibility of formal inspections and for maintaining records[438].

301. Generally with regard to site supervision and the keeping of records in respect thereof, as set out in paragraphs 61 to 74 of Mr. Rowsell's Expert Report and summarised in paragraph 294 above, the parties' supervisory obligations are defined by the use of inconsistent terminology and to be found in numerous documents. Two key agreements (and recommendations) of the PM experts are that (a) an all-inclusive "Supervision Manual" should be produced in multi-languages as required[439] and (b) the introduction of the use of technology to support efficiency and effectiveness in undertaking site supervision and record-keeping duties.[440] With regard to the latter point, the increased use of tablets, smartphones etc. and the applications that go with them are encouraged.

302. The PM experts gave consideration to the change in connection detail at the top of the East D-Wall and, in particular, the "second change".

[438] §27 of the Joint Statement **[ER1/Tab 9/T-4]**
[439] Paragraph 28(b) of the Joint Statement [**ER1/Tab 9/T-5**]
[440] Paragraph 28(c) of the Joint Statement [**ER1/Tab 9/T-5**]

303. At paragraph 13 of the Joint Statement [**ER1/Tab 9/T-2**] the PM experts agreed that the modification works at the top of the East D-Wall should have not proceeded without approved working drawings. It is submitted that this conclusion was probably reached not as a matter of statutory or contractual interpretation or obligation, but rather as a matter of good practice.

304. Whilst essentially a factual matter, the PM experts agreed (as was the case) that there was a lack of meaningful communications between MTRCL's DM and CM teams, Leighton, and Atkins (Team A and B). The PM experts' suggestions/recommendations for improving communications between MTRCL's DM and CM teams are set out at paragraph 14 of the Joint Statement [**ER1/Tab 9/T-2**] and include the development and implementation of the use of BIM (building information modeling) as a collaboration tool.[441]

305. Against the background of the following facts and matters:

(1) as-built records comprise a wide spectrum of records including as-built drawings;

(2) Leighton had an obligation to produce as-built drawings and submit the same to MTRCL;

(3) MTRCL had an obligation to submit as-built drawings to the Government (BD)

the PM experts agreed and recommended that the various documentation setting out as-built records requirements should be

[441] See Mr. Rowsell's oral explanation of the use and advantages of BIM at **T39/114-118**

reviewed for consistency and clarity of responsibilities, and future arrangements should ensure that as-built records are prepared and submitted progressively and promptly.[442] Putting Pypun's site visits and inspections in their proper context, it is submitted that the contents of paragraph 169(iii) of MTRCL's Closing Submissions are somewhat unrealistic. Even if, which seems doubtful, Pypun did observe the trimming down of the East D-Wall, its seems rather unlikely that they would (or should) have concluded that there was something amiss.

306. The final subject matter dealt with by the PM experts in the Joint Statement is the dual role of Atkins in 'supporting' MTRCL and Leighton. The PM experts agreed that it is not good practice for the same design firm to provide services to the Employer (MTRCL) and the Contractor (Leighton) particularly in the context of making design revisions or modifications, because it poses a real or perceived conflict of interest. The PM experts further agreed (and recommended) that MTRCL should develop a conflict of interest policy and a procedure for conflict of interest checks on all design related services[443].

307. It is acknowledged that MTRCL has commenced the implementation of many of the recommendations of the PM experts in the light of the Turner & Townsend Interim Report dated October 2018 [**B17/24421-24476**] (see Mr. Huyghe's Report, Appendix D [**ER1/Tab 2**] and Mr. Rowsell's Report at paragraph 200 [**ER1/Tab 1/86**].)

308. With regard to the Government, Mr. Rowsell's recommendations fall essentially into two categories namely (a) the Government

[442] See paragraphs 23 to 25 of the Joint Statement **[ER1/Tab 9/T-4]**
[443] §§15-16, Joint Statement **[ER1/Tab 9/T-3]**

itself and (b) the Government's arrangements with its M+V Consultant (in this instance, Pypun).[444]

309. Prior to dealing with the recommendations, it is submitted that paragraph 58 of the clear and helpful Closing Submissions of Pypun is correct and that on the basis of the evidence whilst it may be possible through recommendations to improve arrangements for the future, there is nothing in Pypun's performance of the M & V Agreement which would justify any criticism against Pypun.

310. As to the Government itself, the recommendations may be summarised as follows:

(1) Rationalise the number of Government departments with which MTRCL is to consult/deal with.

(2) Rationalise and clarify the documentation concerning consultation with BD and make the same more project/contract specific.

(3) Consider options for working arrangements whereby Government staff would be integrated within MTRCL teams on a regular basis.

(4) Review the attendees at the PSC or create a higher level committee to ensure that such a high level committee is focusing on strategic issues and performances.

(5) Review the CoP on Site Supervision 2009 [**B5/2676+**] and related documents to give clarity on the definition of

[444] See in particular paragraphs 156-166 of Mr. Rowsell's Report [**ER1/Tab 1/80-81**]

supervision, record keeping requirements and non-conformance reporting. [It is submitted that this could be carried out in conjunction with MTRCL's production of an all-embracing Supervision Manual.]

(6) Develop a conflict of interest policy appropriate and applicable to each project, allocating responsibility for administering the policy to the PCM or other committee as appropriate.

311. As to the M+V Consultant, the recommendations of Mr. Rowsell may be summarised as follows:

(1) Consider extending the role of the M+V Consultant to (a) provide high level monitoring of the operation of the project quality assurance systems and (b) develop into a Government's Project Representative role (who would work closely with MTRCL).

(2) Review the lump sum contractual arrangement and consider options which may provide a more effective incentive to be proactive in the execution of its duties.

(3) Clarify requirements in relation to site audits and "surprise checks".

(4) Ensure that the M+V Consultant has access to the necessary level of resources.

(5) Consider options of recovering M+V Consultant audit costs if poor performance by the contracting parties results in additional audits being required above the norm.

XIV. Burden of Proof

312. Paragraph 119 of China Technology's Closing Submission makes mention of the "onus of proof" and refers to the decision in *HKSAR v Lee Ming Tee* (2003) 6 HKCFAR 336. The recent Court of Appeal decision in *Securities and Futures Commission v Cheng Chak Ngok* [2018] 4 HKLRD 612 confirms that the orthodox approach is that in an inquisitorial inquiry by a tribunal there was no place for the requirement of burden of proof. In other words, no one or particular party takes on the burden of proving a fact or series of facts. As to the standard of proof, the Commissions of Inquiry Ordinance CAP.86 ("**the Ordinance**"), whilst providing that a Commission of Inquiry is a "*judicial proceeding*", makes no mention of the standard of proof to be applied. *Public Inquiries* by Jason Beer QC (at paragraph 9.72) states that public inquiries "*have consistently reserved to themselves the flexibility to determine what standard of proof they require in order to make their findings*" and the lack of any stipulation or guidance in the Ordinance tends to support the principle of flexibility. Having said that, however, the COI is at least in the very broad nature of civil proceedings and there appears to be no compelling reason why the balance of probabilities standard should be departed from. It is against such standard, therefore, that the Commission should weigh and evaluate the evidence. As an adjunct to this point, certain involved parties take the point that another involved party did not

"put its case" to a particular witness or witnesses. Again, in an inquisitorial process there is no duty or obligation as such to "put a case." In the nature of things, however, if an involved party has made serious allegations against another involved party or, indeed, an individual employed by another involved party, if those allegations are not "put" when the opportunity arises to do so, the COI may and is entitled to take such matters into account when evaluating the evidence.

24th January 2019

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