COMMISSION OF INQUIRY INTO THE CONSTRUCTION WORKS AT AND NEAR THE HUNG HOM STATION EXTENSION UNDER THE SHATIN TO CENTRAL LINK ("SCL") PROJECT ("THE COMMISSION")

CLOSING SUBMISSIONS OF THE GOVERNMENT

ON FACTUAL EVIDENCE FOR PART 2 OF THE INQUIRY

Table of Content

A. Overview

1. The Commission's legal team identified 3 issues in the Expanded Terms of Reference ("Expanded TOR") for this part of the Inquiry, namely:

   (1) The 3 original defective stitch joints at NAT (i.e. the Stitch Joints) ("Issue 1");

   (2) Non-compliance issues at the shunt neck connection at the interface between Contract 1111 and Contract 1112 at NAT (i.e. the Shunt Neck Joint) ("Issue 2");

   (3) Lack of inspection and supervisory records, including Request for Inspection, Survey and Check ("RISC") forms, unauthorized design changes and incomplete testing records of materials at NAT, SAT and HHS ("Issue 3").

2. The circumstances under which the aforesaid 3 issues came to the Government's knowledge and the steps taken by the Government in respect thereto after their discovery have already been set out in the Government's Opening Address **[OA1/6/1-25]**.

3. In Section B below, there will be a summary of the core evidence (adduced in Part 2 of the Inquiry) regarding the causes and extent of cracks and water seepage identified at the original Stitch Joints and Shunt Neck Joint at NAT.

4. The factual evidence also reveals various deficiencies and weaknesses in the project management system of both MTRCL and Leighton, which will be discussed in the following sections of these submissions:-

   (1) Section C: Unawareness of and apathy to the requirements under MTRCL's Project Integrated Management System ("PIMS").

   (2) Section D: Lack of or ineffective site supervision and inspection.

(3) Section E: Lack of RISC forms.

(4) Section F: Breakdown in communication.

(5) Section G: Failure to comply with material testing requirements.

(6) Section H: Unauthorized deviation.

5. In addition, Section I provides an analysis of Pypun's scope of work under the M&V Agreement, and Section J will include a brief outline of the potential expert evidence which may be adduced by the Government.

6. The aforesaid problems are highly unsatisfactory as they demonstrate the failure on the part of both MTRCL and Leighton to perform the obligations which they undertook for the SCL Project. In particular, MTRCL's obligations have been set out clearly under the relevant Entrustment Agreements ("EAs"), Instrument of Compliance ("IoC") and Instrument of Exemption ("IoE") and one of MTRCL's key commitments was to follow the requirements under PIMS. As stated in the Government's Closing Submissions for Part 1 of the Inquiry, MTRCL, who was entrusted by the Government as the project manager of the SCL Project and was paid project management fees in a total sum of approximately HK$8 billion, ought to have provided the requisite degree of skill and care reasonably expected of a professional and competent project manager.

B. Causes and extent of cracks and water seepage identified at the original Stitch Joints and Shunt Neck Joint

B1. Extent of defects

7. The circumstances leading to the discovery of the defects at the original Stitch Joints are not in dispute:

(1) In August 2017, water seepage was first observed at the newly constructed Joint 1 (i.e. the stitch joint of NSL at the interface between Contract 1111 and Contract 1112) during a routine inspection by MTRCL **[BB1/168/§2.1]**. Repeated grouting works carried out in an attempt to stop the seepage proved to be ineffective **[BB1/168/§2.2]**.

(2) Separation gaps of up to some 10mm were also observed where water seepage was identified **[CC1/75/§19]**. The extent of the cracks and water seepage is recorded in NCR 066 **[CC3/1310-1321]**.

(3) Between 6 and 8 February 2018, MTRCL instructed Leighton to chip off some parts of the concrete cover to expose the rebars at Joint 1. The inspection result *"revealed that the several exposed re-bars were not coupling to the couplers"* **[BB1/168/§2.4]**. Photographs annexed to NCR 095 indicate that there appeared to be a large scale problem of improper connection (or even non-connection) of the rebars to the couplers **[CC3/1324-1326]**.

(4) Between 9 and 12 February 2018, similar investigations were conducted in respect of Joint 2 (i.e. the internal stitch joint of NSL at about 20m away from Joint 1) and Joint 3 (i.e. the stitch joint of EWL at the interface between Contracts 1111 and 1112) respectively. The same condition, namely *"the several exposed re-bars were not coupling to the reserved couplers"*, was also observed **[BB1/168/§2.5]**.

8. These were the only contemporaneous reports on the defective coupler installation works at the original Stitch Joints. However, apart from providing a narrative as to how these problems came to be identified, as well as the proposed remedial works, the reports provide no details on the

nature and extent of the defects or any useful explanation as to how and why cracks and water seepage occurred in the first place.

9. William Holden, Engineering Manager of Leighton, had the opportunity to observe the condition of the defective rebar connections at the Stitch Joints before their demolition. His evidence is that:

(1) Insofar as the interface joints (i.e. Joints 1, Joint 3 and the Shunt Neck Joint) are concerned,

(a) on the side of Contract 1111, he observed instances of partial engagement and no engagement **[T8/76:4-12]**. For partially engaged couplers, only 2 to 3 threads were screwed in **[T8/76:17-21]**. That was due to the fact that someone had attempted to screw parallel-threaded rebars (which were for BOSA couplers) into Lenton couplers **[T8/75:19-24]**.

(b) on the side of Contract 1112, *"there was a combination of some of them were installed correctly, full engagement, and others weren't installed at all, they were put close to the coupler"* **[T8/75:24-76:3]**.

(2) At the internal stitch joint (i.e. Joint 2), there were instances of full engagement and non-engagements. Although *"the ones that were engaged were fairly well screwed in"*, *"there was quite a lot of threaded bar and coupler that wasn't engaged at all"* and they *"weren't lined up with couplers at all and were sitting adjacent to the couplers"* **[T8/77:20-78:9]**.

(3) These observations accord with the findings set out in the incident reports prepared by MTRCL as mentioned in paragraph 7 above.

10. The original Stitch Joints were demolished soon after the defects were revealed. Despite the extent and seriousness of the defects, neither

Leighton nor MTRCL saw fit to carry out a proper investigation as to how the issues came to arise in the first place.

11. Even up to now, MTRCL and Leighton are still unable to identify the exact cause of the defective coupler installation works at those locations, and no attempt had been made by either Leighton or MTRCL to do so. The existence of the defects strongly indicates that the hold point inspections have failed to prevent or detect improperly connected or unconnected couplers. This is a fundamental issue on project management.

B2. Potential contributing causes

12. William Holden postulated in evidence that the cracks and water seepage were caused by the improper engagement or non-engagement of the rebars with the couplers **[T8/77:15-78:20]**.

13. Based on the evidence given by witnesses from Leighton and Wing & Kwong (Leighton's sub-contractor for the steel fixing work), the following potential contributing causes of improper engagement or non-engagement have been identified:

(1) Mismatch of materials.

(2) Cast-in couplers not exposed sufficiently.

(3) Couplers were damaged.

(4) Defective work by Wing & Kwong coupled with lack of proper supervision and inspection of work on the part of MTRCL and Leighton.

Mismatch of materials

14. The main contractor for Contract 1111 is Gammon-Kaden SCL 1111 Joint Venture ("Gammon"). The problem of mismatch of materials arises out of the use of different types of couplers on the two sides of the interface Stitch Joints. Both Lenton and BOSA couplers were used on the Contract 1111 side of the interface Stitch Joints ("Gammon side"), whereas BOSA couplers were used on the Contract 1112 side ("Leighton side"). For BOSA couplers, the connecting rebars have to be parallel threaded ("BOSA rebar"), whereas the threaded part of the connecting rebar for Lenton coupler has to be tapered ("Lenton rebar").

15. For the construction of the interface Stitch Joints (i.e. Joints 1 and 3) **[BB1/84.1§15(e)]**:

    (1) Gammon had to expose the Lenton couplers (or both Lenton and BOSA couplers as the case may be) pre-installed on the Gammon side of the interface for Leighton's steel fixing sub-contractor, Wing & Kwong, to screw the appropriately threaded rebars into those couplers **[T4/113:24-114:2; T13/97:19-98:5]**;

    (2) Leighton had to expose the BOSA couplers fixed on the Leighton side of the interface for Wing & Kwong to screw BOSA rebars into those couplers; and

    (3) thereafter, Wing & Kwong had to lap the Gammon side rebars with the Leighton side rebars (i.e. BOSA rebars) at their intersections to form a stitch joint.

16. In order to achieve proper connection to the Lenton couplers installed on the Gammon side, it was incumbent upon Leighton to ensure that appropriately threaded rebars would be used so that they could fit into the Lenton couplers **[DD7/10281-10282§32(2)]**.

17. However, Leighton's engineer responsible for the Stitch Joints, Henry Lai, testified that he was not aware that Lenton couplers were used on the Gammon side and only ordered BOSA rebars for installation into Lenton couplers **[T5/2:20-4:17]**. Given the shape mismatch, the BOSA rebars (which as submitted above were parallel-threaded) could only be screwed in for 2 to 3 threads into the Lenton couplers (which were tapered-threaded) **[T3/68:19-23]**.

18. Further, pursuant to Interface Specification Item 1.7 of Appendix Z2 **[BB1/425]**, a joint site inspection shall be carried out by Gammon and Leighton on the waterproofing system, couplers and protection measures provided at the interface. Leighton was required to accept and maintain the waterproofing system, couplers and protection measures to coupler provided at the interface work. However, Henry Lai was not aware of this interface specification **[T5/138:18-23]**, and there is no record to show that such joint site inspection has ever taken place.

19. Whilst it should not be the task of the Commission to find fault of any particular individual involved in the operations of the project, the lack of awareness of Henry Lai of the need to use Lenton couplers on the Gammon side of the stitch joints reveals serious shortcomings in respect of MTRCL's and Leighton's project management systems:

    (1) Given the obvious difference in the type of couplers used on the two sides of the interface, one would have expected the difference in requirements to have been clearly documented and passed on to those who are responsible for the execution of the work, e.g. the frontline engineers.

    (2) As a matter of fact, MTRCL had passed on such information to Leighton, which detail was recorded in the minutes of the interface meetings between MTRCL, Leighton and Gammon **[BB3/1678-1795]**. It was – as Leighton acknowledged – due to an internal

"breakdown in communication" that the frontline engineer (here Henry Lai) was ignorant of such fact and ordered BOSA rebars to be connected to the Lenton couplers on the Gammon side.

(3) Quite how a mismatch in materials could have happened (and thereafter a failure of both MTRCL and Leighton to detect such error before concrete was poured) is of obvious concern to the Government. We will explore the systematic deficiency within MTRCL and Leighton for such failure in Section F below.

20. That said, while mismatch of materials is a cause giving rise to the defects identified on the Gammon side of Joints 1 and 3, it cannot explain the defects at Joint 2 (which was an internal stitch joint and hence the problem of shape mismatch never arose) and the Leighton side of Joints 1 and 3.

21. This suggests that there were other causes contributing to the improper or lack of connection discovered at the original Stitch Joints.

Concrete not exposed sufficiently and damaged couplers

22. The second and third potential causes, namely, embedded or cast-in couplers not exposed sufficiently and damaged couplers, were first identified by Wing & Kwong witnesses. Leung Chi Wah, steel fixer of Loyal Ease / Wing & Kwong said that:

(1) In respect of Joint 3, a handful of couplers were not exposed or not fully exposed on the Leighton side of Joint 3 **[T3/75:16-21]**. There were also damaged couplers, but they were relatively rare **[T3/77:11-23].**

(2) He encountered similar problems at Joint 1 **[T3/88:17-89:18]**.

23. Given the lack of proper contemporaneous records detailing the condition of and cause of defects of the original Stitch Joints, it is difficult to form

any definitive views on whether these causes had any contribution to the cracks and water seepage discovered at the original Stitch Joints.

24. Nonetheless, what can be seen from the evidence is that the problems of couplers not exposed sufficiently and damaged couplers were relatively rare. Hence, it is likely that these problems were not the major causes of the defective works.

25. The actual cause(s) of the cracks and water seepage originated from defective works (i.e. improper connection or non-connection of the rebars with the couplers), coupled with a systematic failure on the part of MTRCL and Leighton to (a) properly supervise and inspect the steel-fixing works during execution and (b) spot those defects at hold point inspections before concrete was poured.

B3. Poor workmanship, coupled with lack of proper supervision, appears to be the main cause

26. As mentioned above, William Holden observed that there were instances of partial engagement and no engagement on the Gammon side of the interface joints **[T8/77:15-78:20]**. He also observed instances of no engagement at the internal joint (i.e. Joint 2) **[T8/77:20-78:9]**.

27. The question is, firstly, why there were partial engagements or non-engagements of the couplers. Partial engagement at the Gammon side of Joints 1 and 3 may be explained by the fact that there was a shape mismatch between the BOSA rebars ordered and the Lenton couplers installed. But that does not explain the problem of non-connection on the Leighton side of Joints 1 and 3 and that at Joint 2. In view of William Holden's evidence that some rebars were not *"lined up with couplers at all and were sitting adjacent to the couplers"* **[T8/78:7-9]**), the most

probable cause would be poor workmanship on the part of Wing & Kwong and lack of supervision by Leighton and MTRCL.

28. The next question, perhaps more fundamental to project management, is why MTRCL and Leighton failed to spot the improper connections (or worse still, non-connection) of the couplers during the various routine and hold point inspections before concrete was poured. The fact that such improper connections went unnoticed evidences the failure of both MTRCL and Leighton to supervise the construction works (in particular, how they conducted routine and hold point inspections). Further, this also relates to the lack of supervisory records or RISC forms which will be detailed in Section E below.

B4. The dispute between Wing & Kwong and Leighton

29. One particular factual dispute which gave rise to the main battle between Leighton and Wing & Kwong is whether the defective rebar fixing works (arising from the mismatch of materials) were carried out under the express instruction of Leighton (in particular its engineer Henry Lai).

30. Conflicting evidence has been provided by Wing & Kwong and Leighton respectively. In gist:

(1) Ng Man Chun (of Loyal Ease / Wing & Kwong) was adamant that he informed Henry Lai of the mismatch problem as soon as he discovered the same, and Henry Lai instructed him to *"screw in as much as [he] could"* **[EE1/371.19-371.21§§42-49]**.

(2) On the other hand, Henry Lai said that he could not recall such conversation having taken place and would not have given such instructions anyway **[CC10/6507§8]**. He only learned about the mismatch during the execution of the remedial works **[T5/33:23-34:3]**.

31. The Government observes that:

(1) The issue of shape mismatch must have been picked up by the rebar fixing workers during the execution of the steel fixing works as Wing & Kwong would have encountered difficulty in screwing the BOSA rebars into Lenton couplers.

(2) In all likelihood the rebar fixing workers would have brought this problem to the attention of Leighton. It is unlikely that the workers would have decided on their own frolic to proceed with the works despite their knowledge that the rebars provided could not fit into the couplers. No incentive for so doing on the part of the rebar fixing workers (or Wing & Kwong) has been identified, as the Chairman pertinently observed in the course of the proceedings **[T5/34:23-35:4]**.

(3) It follows that it is highly improbable that there would have been no discussion whatsoever between Wing & Kwong and Leighton on the problem of mismatch.

(4) On the other hand, it is also unlikely that a junior engineer of Leighton (in the position of Henry Lai) would have taken it upon himself to direct Wing & Kwong or the rebar fixing workers to continue to work on the wrong materials without consulting any of his superiors, as this course of action would inevitably run the risk of causing further costs of replacement and/or repair, as well as delay to the project, in the event that such defective works were discovered and rejected by MTRCL at the hold point inspections.

(5) It would only make sense for Henry Lai to have done so if he had obtained the approval of his superior and been fairly confident that such defective works would not be discovered or rejected by MTRCL eventually. Coincidentally or otherwise, such defective

works did (puzzlingly) go wholly unnoticed at all of the routine or hold point inspections.

32. That said, whether Ng Man Chun (of Loyal Ease / Wing & Kwong) or Henry Lai (of Leighton) is telling the truth is (we respectfully submit) not particularly important for the purposes of this Inquiry. What appears more relevant to the Expanded TOR of the Inquiry is that:

(1) The information regarding the use of Lenton couplers, which was communicated to Leighton at the interface meetings, was not passed on to the frontline engineer (i.e. Henry Lai);

(2) Henry Lai did not take any initiative to check the couplers used on the Gammon side which, if done, would have enabled him to discover the issue of incompatibility of materials;

(3) Henry Lai did not know there was interfacing requirement under Contract 1112 **[T5/138:18-23]**;

(4) As mentioned above, there is no record showing that a joint site inspection required under the interface requirements of Contract 1112 had taken place. Even if such inspection had taken place, mismatch of materials at the interface was not spotted;

(5) The defects (i.e. improper or lack of connection of the rebars) were not picked up by MTRCL and Leighton during the routine or hold point inspections.

33. In the circumstances, even if Wing & Kwong had made its own decision to cut corners, Leighton's and MTRCL's supervision and inspection system ought to have prevented the events from happening. The incident reveals a systematic failure on the part of both MTRCL and Leighton in their respective supervision and inspection works, which is probably what this Commission is more concerned with.

C. <u>Unawareness of or apathy to the requirements under MTRCL's PIMS</u>

34. Pursuant to the EAs, MTRCL is contractually obliged to follow PIMS in implementing the SCL Project (see §7 of the Government's Opening Address **[OA1/6/4§7]**; see also MTRCL's Project Management Plan ("PMP"), Section 5.1 **[H7/2381]**, where MTRCL confirmed that PIMS would be adopted as its project management system for the SCL Project).

35. Under the requirement of the Practice Note PN11-4 of MTRCL's PIMS (entitled "Monitoring of Site Works"):

(1) request for inspection, test or survey check of site works shall be made by means of a standardised RISC form[1]. If possible the project specific Electronic Project Management System ("ePMS") should be used to administer the RISC form process, otherwise the Senior Inspector of Works ("SIOW") of MTRCL should set up an independent register[2] to control and monitor the RISC form process **[B3/1628§5.1.2(a)&(c)]**.

(2) the Senior Construction Engineer ("SConE") of MTRCL is required to retain RISC records related to on and off site inspection and testing **[B3/1635§6.1(a)]**.

(3) Further, SConE is responsible for keeping contemporaneous records of inspection results **[Exhibit 7.15 – Schedule of Regular Constructional Records at B3/1670]**.

[1] See sample at **[B6/3650]**.

[2] See sample at **[B6/3651]**.

36. However, it transpires that the staff of MTRCL were either not familiar with the record keeping requirements or did not consider it necessary to strictly comply with such requirements:

(1) It is perplexing that even up to this date, MTRCL witnesses are not able to give a clear and coherent answer as to the person responsible for filling in the MTRCL's RISC register.

(2) MTRCL's Inspector of Works ("IOW"), Tony Tang, gave evidence that it is his understanding that whoever is responsible for carrying out the inspection is responsible for also updating the RISC register **[T12/76:1-21]**. Kappa Kang, a Construction Engineer ("ConE") II of MTRCL at the material time who conducted many hold point inspections, however, disagreed with such a suggestion and maintained that it was not part of her job to update MTRCL's RISC register **[T12/17:21-18:7]**.

(3) The confusion amongst MTRCL's staff on something as basic as who is required to maintain the RISC register (i.e. a requirement in PIMS) is unfortunate yet perhaps not surprising: frontline MTRCL engineers, such as Kappa Kang, only received minimal training (if at all) on PIMS requirements. Kappa Kang herself testified that she at most received a one-hour training on PIMS when she was a graduate engineer, and no more thereafter **[T12/65:16-66:3]**. This was so despite the fact that PIMS documents stretch over 700 pages **[B3/1058-1824]**.

(4) In fact, the general attitude of MTRCL's staff was that they did not treat the RISC form requirements seriously:

(a) Kappa Kang openly acknowledged that both MTRCL's ConE team and inspectorate teams were well aware of Leighton's failure to submit RISC forms on time; however despite

reporting the issue to her superiors Chris Chan and Joe Tsang, her superiors did not ask her to suspend the rebar inspection **[T12/21:20-22:11]**.

(b) Kit Chan, MTRCL's then construction manager, after mentioning that "*the contractor normally do not pay high attention to the RISC form requirements*" **[T13/131:1-9]**, went as far as saying that for minor pours the RISC procedure need not be strictly complied with **[T13/139:14-20; T14/15:18-16:8]**. It should however be noted that it is also Kit Chan's own evidence that the pours for the Stitch Joints would not be minor pours **[T14/18:17-22]**; thus suggesting that the RISC form procedure for such works ought to have been complied with by Leighton's and MTRCL's site staff.

(c) However, Kit Chan failed to convey clearly to his staff what constituted major pours and what constituted minor pours, and left it to his frontline engineers and inspectors, some of whom were clearly inexperienced, to decide for themselves **[T14/19:1-18]**.

(5) The issue of lack of RISC forms was also not timely escalated to the senior management of MTRCL. Michael Fu, who replaced Kit Chan as the Construction Manager of the SCL Project at the time when the original Stitch Joints and Shunt Neck Joint were built, was not even aware of the problem of missing RISC forms until March 2018 **[T10/105:3-25; T14/54:24-55:3]**.

37. The above attitude towards PIMS requirements (both in relation to ensuring that RISC forms were issued, and that the results were clearly recorded in the RISC register) adopted by MTRCL staff, from the level of ConE up to Construction Manager, was unacceptable.

38. This rather lax approach taken by MTRCL obviously caused Leighton to pay insufficient attention to the significance of complying with the RISC requirements. Under cross examination, Leighton's Project Director Jonathan Kitching frankly acknowledged that had MTRCL insisted that no inspections would be carried out unless RISC forms were duly submitted, Leighton would have put in more resources to ensure that the RISC form requirements were properly complied with **[T6/155:24-156:3]**. This is indeed a matter of common sense: the significance attached to the RISC procedure from the perspective of the contractor (i.e. Leighton) would no doubt be highly dependent on how strictly the employer (i.e. MTRCL) enforces those rules. Kit Chan himself also believes that Leighton would have been more co-operative had MTRCL insisted on the RISC procedure, yet unfortunately he took no action **[T14/31:21-32:8]**.

D. <u>Lack of or ineffective site supervision and inspection</u>

39. The failure of MTRCL to ensure that the RISC forms requirement under the PIMS is properly complied with is not merely a technical contractual breach. Rather, it directly relates to the quality of its overall supervisory and control mechanism. The Chairman aptly observed the following when Chris Chan was giving evidence **[T11/110:21-111:11]**:-

> *"CHAIRMAN: You see, what I suppose is potentially troubling is that if the only record is the RISC form, and if a habit developed in terms of which RISC forms were received late or not at all, you could well have a situation where, without any bad faith intended, six months after the event, you might be able to go around and say, "Who attended this particular hold-point inspection?", and nobody would be able to remember because the RISC forms had not been submitted?*

A. Yes, that's a possibility. Yes.

CHAIRMAN: And the possibility then leads to another possibility, which is if nobody from MTR has any memory of attending, and there are no paper records, then the question may be raised of whether in fact the inspection took place at all.

A. Yes, there is this possibility. Yes."

40. In this Section, we will address the deficiencies in relation to Leighton's and MTRCL's site supervision and inspection system, which failures are significantly exacerbated by the lack of RISC forms or supervisory records over the works.

D1. Lack of training / failure to carry out supervision and inspection properly

41. It appears from what is referred to above that obvious defects at the original Stitch Joints and Shunt Neck Joint were not discovered by MTRCL's site inspectors and engineers during the many routine and hold point inspections. This is alarming.

42. The evidence of both Leighton's and MTRCL's staff suggests that they did conduct inspections regularly and spend a lot of time on site:

(1) Leighton's engineers spent the best part of their day on site, and during each of their "rounds" (which was about 2 to 3 times per day) they would conduct routine inspections in order to check that *"the work was being carried out in accordance with Leighton's safety standards, approved or agreed drawings, the required workflow process and the ITP"* **[CC6/3791-3792§§9-10]** (Raymond Tsoi), **[CC6/3800-3801§§8-9]** (Sean Wong), **[CC6/3810§§10-11]** (Jeff Lii), **[CC6/3819-3820§§10-11]** (Alan

Yeung), **[CC6/3839-3840§§8-9]** (Saky Chan); see also **[CC1/89§§9-10]** (Henry Lai).

(2) Each of the routine inspections took place for anywhere between 5-30 minutes, and that Leighton's engineers responsible would, among other matters, observe how the rebar fixers screw the threaded rebars into the couplers **[T5/42:3-43:16; T7/44:15-18]**.

(3) When it comes to hold point inspections, both Leighton's and MTRCL's staff would conduct the same together. These hold point inspections typically lasted for 15 to 30 minutes **[T4/136:7-25]**.

(4) Insofar as the original Stitch Joints are concerned, there ought to have more than 20 hold point inspections (for rebar fixing and pre-pour check). The fact that concrete was nonetheless poured meant that for all those 20 plus occasions, no one from Leighton (in particular Henry Lai) and his accompanying ConE or inspector from MTRCL was able to spot the defects **[T6/139:18-140:19]**.

43. The improper connection (or non-connection) of the rebars to the couplers would have been easy to spot as there were only 2 layers of rebars for the top mat and bottom mat respectively **[T4/134:19-20]**. As can be seen in the photographs, improper connections would have been apparent on visual inspection **[CC3/1324-1326]**. Michael Fu of MTRCL also agreed so **[T11/6:15-7:16]**.

44. The defective steel fixing works at the original Stitch Joints and Shunt Neck Joint that went undetected are clear demonstrations of a serious breakdown of the inspection system as a safeguard for the quality of work.

45. At this juncture it may be convenient to review the training provided by MTRCL and Leighton to its frontline staff, which may explain the lax manner in which the inspections were conducted.

46. For Leighton:

(1) Leighton frontline engineers (including Henry Lai who was responsible for the supervision and inspection of the construction of the original Stitch Joints and Shunt Neck Joint) were not told or trained how to conduct routine and hold point inspections. They were never given any checklists or written instructions on what they should be looking for and/or the areas they should focus on for the purpose of those inspections.

(2) Henry Lai, having observed that no one within Leighton had instructed him how to conduct routine inspections, was asked on what basis he conducted the routine inspections. His answer, tellingly, was that **[T5/126:24-25]**:

> *"From the basis from my experience gathered from previous sites."*

(3) This is obviously unsatisfactory, bearing in mind that, as mentioned above, many of the frontline engineers (including Henry Lai) were relatively inexperienced and may not be able to tell what exactly it is that they need to inspect during routine inspections.

47. As for MTRCL:

(1) There is similarly no system in place to inform the frontline construction engineers / inspector of works as to what to check or look for at hold point inspections.

(2) Kappa Kang, who was responsible for most of the rebar inspections at NAT and SAT, gave evidence that she had not received training from BOSA, and did not know how to determine what constitutes a proper splicing assembly **[T12/53:17-54:3]**.

(3) When Kappa Kang carried out rebar fixing hold-point inspection, she would only look at the splicing assemblies generally and would not focus particularly on the connection between a rebar and a coupler **[T12:54:4-22]**.

(4) MTRCL's IOW, Tony Tang, gave evidence that, in carrying out pre-pour inspection, he would not pay attention to the rebars **[T12/109:13-19]**. But the Inspection and Test Plan ("ITP") specifically requires the inspector to check reinforcement fixing during pre-pour check **[BB1/294].**

48. Even though specific requirements on supervision were specified by BO Team on the use of couplers (see the Government's Opening Address **[OA1/6/10-13§§24-27]**), it appears that **none** of Leighton's or MTRCL's staff were given specific instructions or training thereon. In particular:

(1) None of the frontline engineers and inspectors said that they received any form of training by BOSA or Leighton (see evidence of Jeff Lii **[T7/43:16-44:5]**; Saky Chan **[T9/72:2-11];** Sebastian Kong **[T9/93:5-8]**; Alan Yeung **[T10/49:10-13]**; Tony Tang **[T12/139:19-141:13]**; Kappa Kang **[T12/53:17-54:3]**).

(2) In a similar vein, none of them were aware of the requirement that details of the supervision and inspection conducted have to be recorded in an inspection logbook (see evidence of Henry Lai **[T5/5:14-6:18]**, Victor Tung **[T13/35:8-21]**).

D2. The hold point inspection system put in place was ineffective

49. Lest it be thought that the failures identified in the aforesaid section are merely "procedural" or "administrative" in character (as suggested by some Leighton staff such as Jeff Lii **[T7/11:20-18:17]**, who went as far as opining that the non-submission of RISC forms would not be a

substantive problem *"as long as the MTRCL didn't think that it would affect progress"* **[T7/18:4-5]**), it has been shown that serious consequences have arisen from the systematic failure in the way hold point inspections were conducted by MTRCL and Leighton.

50. As recorded in an email from MTRCL to Leighton dated 30 June 2017 **[BB8/5789-5793]**:

> *"Please note that the rebar inspection was rejected this pm for the remaining footing at VRV Unit*[3]*, due to incomplete fixing of the coupler, refer to the attached photos.* ***More than half of the coupler at the B1 rebar were not properly fixed. Your engineer did not rectify the defects and decided to cast concrete anyway****. It is also note that* ***general cleaning inspection was not arranged with our IOW before pouring concrete****. This is unacceptable.*
>
> *Please follow up and advise your remedial action.*
>
> *Please also be reminded to submit RISC form for all the required inspection in advance, as RISC forms are outstanding for recent inspections."* (emphasis added)

51. The photographs attached to the email clearly show the rebars not having been properly screwed into the couplers **[BB8/5793]**.

52. The Leighton engineer responsible for this incident, WC Lam, is not a witness in this Inquiry. Ronald Leung from Leighton gave evidence that he asked WC Lam about the incident and the latter explained that there may have been miscommunication with the subcontractors **[T10/24:3-25:1]**.

[3] The VRV Unit can broadly be understood as the air-conditioning unit.

53. Putting aside the mistake on the part of Leighton, it is submitted the manner in which this incident was handled by MTRCL clearly fell short of a professional and competent project manager:

(1) There were obvious defects with the rebar fixing works for the VRV Unit. However, despite noticing the issue, MTRCL did not issue any non-conformance report ("NCR") to Leighton and did not follow up on the incident until very recently after the conclusion of the factual evidence in the Extended Inquiry[4] **[T10/26:9-27:1]**. As a result, the defective works have still not yet been remedied and Leighton faced **no** consequence for the aforesaid incident up till now. This casts doubt on MTRCL's supervision and management of the construction work on site and its ability to ensure that the as-built works comply with the accepted design and the requirement of the Contract.

(2) This matter, which shows serious non-compliance with PIMS, was not brought to the attention of Michael Fu, the then Construction Manager who would have been responsible for issuing the NCR **[T11/37:10-38:8]**.

(3) After the incident, MTRCL recorded its rejection on the retrospectively submitted RISC forms **[BB8/5794-5799]** and requested Leighton to review its ITP and inform MTRCL as to what measures have been implemented to prevent the problem from occurring again **[BB8/5796]**. However, it appears that this matter was also not followed up by MTRCL and Leighton **[T10/28:25-29:13]**.

54. More fundamentally, this incident demonstrates that the system in place was not effective in preventing Leighton or its subcontractor from

[4] According to the NCR Register submitted by MTRCL [**DD12/13952-13966]**, an NCR for "defective rebars connections at HHS VRV unit base slab" was only signed on 28 June 2019 [**DD12/13964**].

proceeding with the concrete pour in the absence of approval from MTRCL (or in the event of an express refusal as in this incident). In fact, Victor Tung from MTRCL confirmed that there was no mechanism to stop a Leighton engineer from instructing the concreting company to do concreting work even if the hold point inspection had not been passed **[T13/48:16-20]**.

55. As project manager, MTRCL has not only failed to ensure that Leighton fulfilled its duties in relation to issuance of RISC forms under PIMS, but has also failed to prevent Leighton from proceeding to the next stage of work without obtaining MTRCL's approval at hold point inspections **[T10/26:18-29:1; T11/37:16-23]**.

56. These problems indicate a broader unawareness of the importance of hold point inspections on the part of Leighton engineers, as well as the MTRCL hold point inspectors in ensuring that the hold point inspections are properly conducted and their results properly enforced.

57. This incident also reinforces (a) the proposition that RISC forms perform the important function of recording what has or has not been approved at the hold point inspections, and (b) the importance of keeping a complete supervision record.

D3. Failure to comply with supervision and inspection requirements in relation to coupler installation

58. As with Part 1 of the Inquiry, the evidence reveals Leighton's and MTRCL's failure to comply with the supervision and inspection requirements in relation to coupler installation.

Ductility couplers

59. The requirements under the Quality Supervision Plan ("QSP") apply to the ductility couplers used in the connection between slab and diaphragm walls at SAT **[DD9/12283§§20-21]**. Specifically [5]:

(1) Leighton (Registered Contractor ("RC")) is required to appoint a quality control supervisor who will be responsible to carry out full time and continuous supervision of the splicing assemblies on site. Details of the supervision and inspection conducted have to be recorded in coupler inspection record sheets and written into the inspection log book by the said quality control supervisor.

(2) MTRCL (Competent Person ("CP")) is required to appoint its own quality control supervisor to provide supervision for ≥ 20% of the splicing assemblies, and shall record the inspection by countersigning the inspection record sheet and placing it in an inspection log book.

(3) The minimum qualifications and experience of the said quality control supervisors is to be the same as that of a Technically Competent Person ("TCP") grade T3 stipulated in the Code of Practice for Site Supervision 2009 ("CoP") **[H8/2664-2783]**.

60. According to the evidence of Pun Wai Shan of Fang Sheung, only the same level of supervision as for the station box structure was provided by Leighton **[T2/114:14-20]**. According to the evidence received under Part 1 of this Inquiry, Leighton did not provide the required full time and continuous supervision for the splicing assemblies on site, and the requirements set out in the QSP for the supervision of ductility coupler installation works have not been fully complied with (see Interim Report §§170, 287, 291-300).

5 **[H9/4267-4270]**

Non-ductility couplers

61. Non-ductility couplers are subject to the requirements set forth in Appendix V of Railway Development Office ("RDO")'s acceptance letter dated 5 November 2014 **[DD7/10339-10341]** (see the Government's Opening Address **[OA1/6/11-12§26]**). The requirements are:

(1) MTRCL (CP) should assign a quality control supervisor to supervise the works, determine the necessary frequency of inspection by the said quality control supervisor, which should not be less than once a week, and devise inspection check lists. The minimum qualifications and experience of the said quality control supervisor is to be the same as a TCP grade T3, as stipulated in the CoP.

(2) Leighton (RC) should assign a quality control co-ordinator to provide full time on site supervision of the works and devise inspection check lists. The minimum qualifications and experience of the quality control co-ordinator is to be the same as a TCP grade T1, as stipulated in the CoP.

(3) The names and qualifications of the supervisory personnel representing the CP and RC respectively should be recorded in an inspection log book. The date, time, items inspected and inspection results should be clearly recorded in the log book. The log book should be kept at the site office and, when required, produced to the Government for inspection.

(4) After delivery of the mechanical splices to site, strength tests on a representative number of the mechanical splices, as directed by the CP, are required to be carried out and a report is required to be submitted to BO Team upon completion of the mechanical splice works.

No proper supervision and inspection for the additional coupler assemblies used by Leighton (the unauthorized deviation referred to in Issue 3)

62. In relation to the unauthorized deviation referred to in Issue 3, Leighton accepted that, as a result of the change from lapped bar to couplers, it ought to provide the same level of supervision for the installation of the additional couples used on site **[T8/129:7-131:5]**.

63. However, it transpired from the evidence that the same level of supervision and inspection required under Appendix V of RDO's acceptance letter (as described above) has not been provided by MTRCL and Leighton in respect of these additional coupler connections. Henry Lai from Leighton, the engineer responsible for NAT, was not given any information about the level of supervision that would be required for rebar fixing works **[T5/5:4-22]**. He is also not aware of any log book being kept **[T5/6:8-18]**. Other Leighton witnesses also gave evidence to similar effect (see evidence of William Holden **[T8/131:6-11]**, Saky Chan **[T9/72:25-73:9]** and Alan Yeung **[T10/50:4-52:10]**). Regarding the required inspection by MTRCL, it has plainly not been fully complied with as MTRCL does not even have proper record of where the said unauthorized deviation occurred.

64. As explained by Andrew Lok of BO Team, the Government accepts that, from a technical point of view, coupler is an alternative splicing method to the lapping of rebars **[DD7/10284§40]**. While the deviation, in and of itself, may be acceptable subject to prior consultation submission, the Government's primary concern is on the **quality** of the splicing assembly works. As submitted above, according to the evidence of various factual witnesses, the same level of supervision required for the installation of non-ductility couplers specified in the accepted design drawings (for other parts of the works) has **not** been provided by MTRCL and/or Leighton for these undocumented additional couplers used by Leighton.

Doubtful supervision and inspection for the coupler connections at the original Stitch Joints and Shunt Neck Joint

65. MTRCL's and Leighton's witnesses agree that the defects in the original Stitch Joints and Shunt Neck Joint were serious. However, no formal investigation was carried out to ascertain the cause of the cracks and water seepage **[T6/81:2-20]**, in particular whether hold point inspections had been carried out as per the requirement of ITP, and if so, who carried out the inspections **[T10/91:2-6]**.

66. Although the defects cast doubt on the reliability of the hold point inspections and implementation of PIMS, MTRCL did not find it necessary to carry out any official investigation (see Michael Fu's evidence **[T10/90:11-93:17]**). This is so even though, as of now, MTRCL is still unable to confirm whether hold point inspections had in fact been conducted for the original Stitch Joints and Shunt Neck Joint (see Michael Fu's evidence **[T11/4:23-5:3]**).

67. Neither did Leighton carry out (or was interested in carrying out) any thorough investigation into the cause of the defective works despite the fact that in the end HK$50M was allegedly incurred in the rectification works **[T6/80:22-82:7; T6/159:22]**.

E. Lack of RISC Forms

68. The problem of late submission or, worse still, non-submission of RISC forms was serious:

    (1) This can be seen from the summary tables prepared by Leighton for the purpose of the Extended Inquiry, which shows that the majority of RISC forms were not submitted: **[CC6/3864]** (NAT), **[CC8/4397]** (SAT), **[CC9/5642]** (HHS). It is noteworthy that for

the construction of the original Stitch Joints, no RISC forms whatsoever were submitted at all: **[CC1/280]**.

(2) The findings of Pypun's on-site checking exercise show that the completeness of the RISC form was very low except for the North Fan Area ("NFA") of HHS **[GG3/1025§3]** (see also the Final Verification Study Report on As-constructed Conditions of the NAT, SAT and HHS ("Final Report") at **[BB16/9963]**).

(3) Further, the RISC forms (that were issued by Leighton) contained various irregularities. As Pypun observed **[GG3/1025§4]**:

"About 61% (176 out of 287 inspected RISC Form for "rebar fixing") and 66% (228 out of 342 inspected RISC Form for "pre-pour check") were late submission, and the percentages was quite high."

(4) There is contemporaneous evidence showing that at least on one occasion, a Leighton engineer (Jeff Lii) had submitted a whole pile of RISC forms to MTRCL's IOW (Victor Tung) covering a 4-month period in one go **[BB14/9437-9438]**.

69. As a result of the missing RISC forms, it is now impossible to ascertain whether hold point inspections had in fact been conducted for the rebar fixing works at the original Stitch Joints and the Shunt Neck Joint and if so, who conducted those inspections. Michael Fu (of MTRCL) gave evidence that he attempted to identify the engineer who conducted the inspections at the original Stitch Joints (if any) in February or March 2018, but to no avail in the absence of RISC forms or written records **[T10/90:11-92:18]**.

70. There was a factual dispute between MTRCL and Leighton as to the identity of the MTRCL staff who has allegedly conducted the hold point

inspections (if at all) of the original Stitch Joints with Henry Lai (of Leighton):

(1) Henry Lai's evidence is that he positively recalled that he conducted the rebar hold point inspections with Chris Chan of MTRCL **[T4/127:18-130:11]**.

(2) However, Chris Chan was adamant that he did not conduct any of the rebar hold point inspections with Henry Lai **[BB1/117§25]**. Instead, Chris Chan believed that it is likely that it was either Tony Tang or Kappa Kang who conducted such inspections on behalf of MTRCL **[T11/98:13-99:6]**.

(3) Tony Tang said that he did not conduct rebar fixing checks other than in NFA **[T12/72:23-73:25]**.

(4) Kappa Kang, on the other hand, gave the repeated answer that she has no recollection of conducting the rebar inspections **[T12/31:8-34:8]**.

71. This lacuna in information could easily have been avoided if MTRCL and Leighton had put in more effort in complying with their obligations to maintain a complete set of RISC forms or that MTRCL had properly updated the RISC form register and/or kept records of inspection results as required under PIMS. As mentioned above, Leighton's Project Director Jonathan Kitching frankly acknowledged that Leighton would have devoted more resources to ensuring that the RISC form requirements were properly complied with if the requirement was taken seriously by MTRCL **[T6/155:24-156:3]**. It is baffling as to why MTRCL failed to enforce such requirement.

72. MTRCL seeks to contend that the missing RISC forms *"is an administrative/procedural issue, given that RISC forms do not constitute a statutory or regulatory requirement"* **[OA1/5/17§49]**. However, failure

to keep RISC forms is *prima facie* a breach of the EAs (see paragraph 34 above).

73. It is important to remember that during Part 1 of the Inquiry, while dealing with the lack of record sheets for the inspection of the coupler installations in the EWL and NSL slabs, it was Leighton's and MTRCL's position (and also their evidence) that RISC forms actually constituted sufficient evidence to show that the works had been properly carried out. See Interim Report §301, where the Commission recorded Leighton's and MTRCL's then submission to the following effect:-

> *"On behalf of MTRCL and Leighton, it was submitted that the well-tried RISC forms and pre-pour checklists were in fact sufficient evidence that coupler installation works had been fully supervised and inspected. In the course of his evidence, Aidan Rooney, at the time MTRCL's General Manager, said that his company's engineers and inspectors "checked 100% and verified that through signing off of the RISC forms". While individuals may not have checked more than 40% or 50%, he was confident that the team as a whole would always manage a 100% check. Aidan Rooney had great confidence in his team of engineers and inspectors."*

74. It is therefore not open to MTRCL to undermine the significance of RISC forms by asserting that they are merely procedural and administrative in nature.

75. RISC form system serves to ensure quality of the construction works under PIMS. As the Chairman has observed, PIMS *"has a position of central importance because, among other things, it guarantees the right for government and/or the MTR to ensure due quality"* and *"[o]ne of the instruments by which it ensures due quality is to look at written records, which have long-time been preserved in PIMS, namely the RISC forms"* **[T7/68:18-25]**.

76. On a practical level, the RISC forms enhance accountability by recording who conducted the relevant hold point inspections. This provides an incentive for engineers and inspectors to carry out their work properly. On the other hand, it provides an assurance to the contractor, project manager and the client that inspections had in fact been conducted in accordance with the ITP.

77. As a matter of fact, if proper supervision records, in particular the RISC forms, had been kept by MTRCL and Leighton, it is likely that incidents like the defective steel fixing work, the unauthorized concreting of VRV Unit and the defective original Stitch Joints and Shunt Neck Joint would not have occurred. In fact, in giving evidence in Part 1 of this Inquiry, Aiden Rooney's heavy reliance on the RISC forms suggests that for the works of the station box structure, both MTRCL and Leighton had no problem in complying with the RISC form system.

78. Further, during the cross-examination of Ralph Li from the Highways Department ("HyD"), counsel for Leighton suggested that the Government should just do away with the RISC forms because (a) there were other sources of information (such as photos and WhatsApp messages) showing inspection had taken place **[T15/72:18-21]** and (b) compilation of RISC forms was time consuming and not user-friendly **[T15/77:17-78:2]**.

79. It may be the case that different individuals working on the site might have resorted to other ways of recording the inspections (e.g. by way of photos/WhatsApp messages). However, one of the main functions of having a sound system in place is that it would serve the purpose of ensuring certainty and consistency. If it was simply left to site staff to decide how the inspection should be recorded, as the Chairman further observed, such improvised record system adopted by individual MTRCL and Leighton staff would lead to the creation of a *"very uncertain causal*

system", which may in the end cost the inspectorate personnel more time and resources to trace the details of the inspections conducted **[T13/133:11-22]**.

80. Further, the other sources of record as alleged by Leighton may not be reliable or comprehensive. As Mr Steve Rowsell, the Commission's expert on project management issues, has pointed out in Part 1 of the Inquiry, "*[a] photo reflects a specific moment in time and can be difficult to interpret"* **[ER1/1/42§52]**. It would be difficult to retrieve all relevant WhatsApp messages for the purpose of verifying the relevant information regarding inspections. For example, Kappa Kang was only able to locate about 11 messages relating to rebar fixing hold point inspections **[BB14/9468-9473]**) and it would be sometimes even more time consuming for one to put together and interpret the relevant messages between different parties. Further, without a reliable system in place, there is always a risk that information stored in the individual employees' mobile phones may not be traceable or retrievable. For example, Tony Tang told the Commission that as his phone had malfunctioned, he has lost all his WhatsApp records **[T12/92:10-14]**. Kappa Kang also said she lost two mobile phones in the past few years **[BB14/9466§15]** and she could only retrieve a few of her own messages relating to rebar fixing hold point inspections with the assistance of her colleagues or the colleagues' phone **[BB14/9466-9467§15 & T12/38:7-13]**. Michael Fu said that because the relevant engineers (Chris Chan and Joe Tsang) had left MTRCL, he could not ask from them information relating to hold point inspections **[T11/8:18-25]**. All these show that the other causal or improvised forms of records suggested by Leighton are not reliable.

81. Various excuses have been proffered by MTRCL's and Leighton's witnesses as to why they have failed to ensure the timely submission of RISC forms.

82. The primary reason given by most Leighton engineers for not submitting RISC forms was due to their heavy workload. It is, however, questionable whether such excuse withstands scrutiny.

(1) Henry Lai indicated that it would only take 5 to 10 minutes to fill in a RISC form **[T5/56:20-23]** and Victor Tung indicated that Leighton engineers could have planned ahead for timely submission and delivery of RISC forms **[T13/16:9-12]**.

(2) According to Victor Tung, it took about 1 day for Leighton's engineers to generate the RISC forms until they were received by the MTRCL's engineers **[T13/13:22-15:15]**.

(3) As a matter of fact, one of Leighton's engineers, Alan Yeung, performed pretty well in his submission of RISC forms at the SAT **[CC6/3823§§20-21]**. This shows that compliance with the RISC form requirement is more or less an individual choice on the part of the engineers.

83. Leighton's witnesses have also criticized the RISC form process for being not user-friendly, and that there should be modernization of the system in place. Jeff Lii, in particular, made the following criticism of the RISC form system **[T7/15:7-21]**:

> *"That's a problem with the system, because they used something called INCITE to generate the form. Compared to my previous experience, using a Word file would enable the form to be generated for signature and submission. Using the INCITE system, you would have to use a tri-colour photocopier to print the document.*
>
> *There might be errors and should that happen it's difficult to correct them. Sometimes, for the same item, you would have to input the information again.*

It's rather time-consuming. Compared to previous times when a Word file was used, I could just copy and paste the activity; I only changed the location, and put my signature there. That's it. That's my opinion."

84. Such sentiment appears to be shared by senior MTRCL staff. Kit Chan (the then Construction Manager of MTRCL) made the following observation **[T13/130:9-25]**:

"…as I mentioned to you, the RISC forms are very time-consuming and labour intensive, and it was there some 40 years ago when the industry was totally different from now, and the construction work was a lot simpler at that time and now the construction is so complicated, and the expectations from society are so high. 40 years ago, I never had to deal with the Labour Department or Environmental Department. No stakeholder issues. I just concentrate on prepare the RISC form and get the job done.

But the system is still there. Four parts. If you look, every RISC form has four parts, have to sign off by four different people. It takes a long, long time.

It's not practical. I think the industry got to start thinking to revise the system to more user-friendly, with the help of new technology."

85. The Government adopts an open-minded approach to modernization of the RISC form system. The Government would not dispute that there is always room for improvement of the RISC form system which was proposed by MTRCL. No doubt, the system could be made more user-friendly or effective by, for instance, greater use of information technology. In fact, digitized RISC forms are used on a trial basis in some Government projects.

86. Yet, any change of such system (which MTRCL and Leighton are contractually obliged to follow) should not be initiated by any individual(s) unilaterally in a cavalier manner without any comprehensive discussions with all relevant parties. MTRCL is contractually bound under EA3 to act in accordance with its PIMS and that the Government relies on MTRCL to manage the SCL Project strictly in accordance with its PIMS in order to ensure its progress, costs, safety and quality. In the absence of a satisfactory replacement system being devised and agreed by the Government to be deployed in the SCL Project, MTRCL was not entitled to ruthlessly or arbitrarily relax its requirements relating to RISC forms, as suggested by Kit Chan or MTRCL's engineers.

87. It is also disappointing that, despite the extent of missing RISC forms, MTRCL failed to fully inform the Government of the real nature, extent and seriousness of the problem of the missing RISC forms until December 2018 / January 2019. As mentioned in Section C of the Government's Opening Address, at the meeting on 23 January 2019, MTRCL advised the Government for the first time that there were also missing RISC forms for the works of HHS and that the missing RISC forms have impacted on the production of the as-built records of all three areas **[OA1/6/18§45]**. This demonstrates either MTRCL's failure to realize the significance of such missing documents or its failure to report to the Government on its failure to comply with the requirement under PIMS, or both. In addition, site audits carried out by BO Team on 13 and 20 March 2019 revealed certain supervision records of the TCPs that ought to exist under the Site Supervision Plan for the CP stream and RC stream were not available for inspection. BO Team issued a letter to MTRCL on 10 July 21019 for seeking further information / clarification **[DD12/13969-13973]**. This demonstrates that MTRCL and Leighton may also fail to comply with the contractual requirements under EA3 and the requirements specified by BO Team.

F. Breakdown in communication within MTRCL and Leighton

88. The factual evidence also reveals fundamental problems and deficiencies in MTRCL's and Leighton's communication, including:

(1) The lack of a mechanism to ensure that important matters are communicated to frontline staff (see Section F1);

(2) The lack of a mechanism to ensure that problems happened on site were brought to the attention of the senior management in a timely manner (see Section F2); and

(3) Insufficient communication between MTRCL and Leighton (see Section F3).

F1. Important matters not communicated to frontline staff

89. From 2014 to early 2017, a total of 22 interface meetings were held between MTRCL, Gammon and Leighton (as the contractor of Contract 1112) to *"co-ordinate, discuss and agree actions for the implementation of the interface between Contractor 1111 and Contractor 1112 in supporting their respective scope of work"* **[CC2/740]**.

90. The issue of compatibility of materials used at the interface was first discussed in November 2014 and was recorded as an outstanding item on the minutes until January 2017:

(1) At the 7th interface meeting held on 8 November 2014, Gammon tabled three proposed material submissions, including submissions for mechanical splicing system of rebar, which would be used at the interfaced location for Leighton's review. At the meeting, Leighton's representatives indicated that *"LCAL will review and*

provide relevant method statements to cope with these interfacing works" **[CC2/752§7.4.2]**.

(2) At the 8th meeting held on 5 December 2014, Leighton's representative indicated that Leighton *"[had] no comment on those submissions and will check with their supplier regarding compatibility in later stage"* **[CC2/757§8.4.2]**. The cover page of the material submissions for mechanical splicing system of rebar, which shows that Lenton couplers would be used, was attached to the minutes of the 8th meeting **[CC2/763]**. A copy of the minutes was sent to TC Kan, Jimmy Wong and Joe Tam of Leighton **[CC2/755]**.

(3) At the 19th meeting held on 18 January 2016, the item was revised as *"Mechanical Splicing System of rebar (ref. 1111-MSF-GKJ-CS-000832). T40 coupler is BOSA; others are Lenton – Approved"* **[CC2/849§19.3.3]**.

(4) The item had remained in substantially the same form until the last interface meeting, which was held on 6 January 2017 shortly before the construction of the Shunt Neck Joint and original Stitch Joints.[6] Notably, the rebar fixing works for the Shunt Neck began on 4 January 2017 **[BB1/66§7(d)]**. But the minutes for the 6 January 2017 meeting still recorded that *"LCAL will check with their supplier regarding compatibility in later stage"* **[BB3/1792§19.3.3]**.

91. Despite its promise to check the compatibility issue, and the fact that such issue had been recorded on the interface minutes as an outstanding item for a period of over 2 years, Leighton did not take any steps to follow up on the same. Nor was the Leighton engineer responsible for the interface Stitch Joints (i.e. Henry Lai) informed that for reinforcing bars of a

[6] Michael Fu §7(a) to (d) at **[BB1/65-66]**

diameter less than 40mm, Lenton couplers would be used by Gammon at the interface.

92. In this regard, Leighton's witnesses gave evidence as follows:

(1) Regina Wong (Sub-Agent responsible for NFA) attended most if not all of the interface meetings since January 2015. However, she did not pay attention to the compatibility issue because the interface was not an area she was responsible for. She expected Jim Wong to handle such matter **[T7/132:17-133:4]**.

(2) Jim Wong (Senior Site Agent responsible for NAT area) became aware that Lenton couplers were to be used back in January 2016 **[T9/115:18-116:6]**, but did not follow up on this issue before he left NAT in November 2016 because *"there was still no need"* to check the compatibility of the materials at that time **[T9/117:7-118:25]** even though the construction of the Shunt Neck Joint was about to commence in January 2017.

(3) Joe Tam (Construction Manager of Leighton responsible for NAT area) confirmed that he was aware that Lenton couplers would be used **[T8/157:10-158:3]**. However, he did not take any steps to ensure that Henry Lai was made aware of such requirement. He expected Henry Lai to draw from the minutes, but agreed that junior engineers were not told that they should go back to the relevant minutes for interface works **[T8/164:5-167:13]**.

(4) Henry Lai did not receive minutes of the interface meetings. In fact, he was not even aware that there were interface meetings between Leighton, MTRCL and Gammon **[T5/1:16-22]**. No one ever told him about the details of the interfacing work on the Gammon side. As a result he worked under the assumption that BOSA couplers were used at the Gammon side of the interface **[T5/2:20-4:17]**.

93. It also transpired from the evidence of MTRCL's witnesses that the frontline staff responsible for the supervision and inspection of interface works were not familiar with the materials used at the interface:

(1) Kappa Kang (ConE II responsible for NAT) attended most if not all of the interface meetings between January 2015 and January 2017 together with Chris Chan **[BB3/1694-1795]**. Chris Chan explained that he invited her to attend the interface meetings because they were both responsible for NAT and he considered that she needed to know the same information that was available to him **[T11/76:3-13]**. It is therefore surprising that Kappa Kang, having attended many interface meetings, had no knowledge of the differences between BOSA and Lenton couplers **[T12/9:24-10:4]**. This is highly unsatisfactory as Ms Kang was one of the two engineers responsible for rebar inspections at NAT **[T11/94:24-95:12; T12/15:17-23]**.

(2) Tony Tang (IOW responsible for NAT) was entirely unaware that Lenton couplers were used during the construction of the original Stitch Joints **[T12/139:7-14]**.

94. Leighton's witnesses admitted that there had been a breakdown of communication in respect of the materials used at the interface **[T8/53:4-8; T8/167:9-13]**. It is submitted that the above is **not** an isolated incident of breakdown in communication. It reveals a more fundamental problem in Leighton's and MTRCL's management systems, that is, the absence of a mechanism to ensure that important matters are communicated to the relevant frontline staff in time.

95. Henry Lai was *"effectively the hands-on Leighton engineer responsible for the stitch joints and the shunt neck joint"* **[T5/3:5-9]**. It is surprising that he knew nothing about the details discussed at the interface meetings. In fact, there is no reason why he, being the sole person in Leighton responsible for ordering the required threaded bars, as well as the

supervision and inspection of the interfacing works, was not invited to attend the interface meetings.

96. Similarly, it is unsatisfactory that Kappa Kang and Tony Tang being the frontline staff responsible for the rebar and pre-pour hold point inspections respectively, were not familiar with the details of the couplers used on the Contract 1111 side of the interface.

97. In a large scale project like the present one involving a considerable number of site staff, it is necessary to have a mechanism in place to ensure that information is passed on to the relevant frontline staff in time. It is unhelpful to simply upload all documents to MTRCL's or Leighton's system and expect the frontline staff to study and understand the information without any proper instructions being provided.

F2. Problems on site not escalated to senior management in a timely manner

98. Another aspect of breakdown in communication relates to the failure to escalate problems on site (such as missing RISC forms, insufficient manpower and the VRV Unit incident) to the senior management.

99. It is clear from the evidence that members of MTRCL and Leighton's senior management were not informed of the problem until a very late stage:

(1) Michael Fu, Construction Manager of MTRCL, was unaware of the problem throughout the period from May 2016 to February/March 2018 **[T10/105:17-106:8]**. This is astonishing.

(2) Joe Tam, Construction Manager of Leighton, said that he only became aware of the serious lack of RISC forms in March 2017 as a result of MTRCL's complaint email to Leighton **[T8/145:8-146:6]**.

100. It is highly unsatisfactory that a matter which merited a discussion between highest level of management of MTRCL and Leighton **[T10/106:9-24]** was not brought to the attention of the Construction Managers.

101. As discussed above, a number of Leighton engineers had complained that their heavy workload prevented them from submitting the RISC forms (see evidence of Henry Lai **[T5/119:15-120:5]**, Jeff Lii **[T7/47:24-48:15]**). It is appreciated that the frontline staff might not find it appropriate to tell their superiors that they could not cope with the workload. However, had proper communications been maintained, the management level should at least been alerted to the lack of RISC forms first, which would then have prompted them to conduct investigation and find out the reason for such a serious non-compliance.

102. Another example is the VRV Unit incident, which according to Kit Chan is a very serious matter that should be *"reported effectively right to the top"*. He would expect his inspectors or engineers to inform him immediately, in the event of which he would immediately speak to his counterpart in Leighton and go to site to find out what happened **[T13/117:18-118:4]**.

103. Unfortunately, it appears that the matter was not reported upwards. Michael Fu, the then Construction Manager, was not informed of the incident **[T11/37:10-38:8]**.

F3. Insufficient communication between MTRCL and Leighton

104. The evidence reveals deficiencies not only in internal communication within MTRCL and Leighton respectively, but also in communication between MTRCL and Leighton.

105. Several Leighton's witnesses gave evidence on a colour paint system which, according to some of the Leighton's witnesses, was used on site to distinguish rebars which have passed the HOKLAS test from untested rebars. Joe Tam explained that rebars would be sprayed with white paint when they were delivered on site. When they passed the HOKLAS test, they would be sprayed with a different colour **[T9/28:19-29:3]**.

106. However, MTRCL's frontline engineers and inspectors were not familiar with the colour paint system (see evidence of Victor Tung **[T13/38:7-16]** and Chris Chan **[T11/116:18-20]**). Hence, they were unable to spot untested rebars being used by Leighton in construction works **[T13/38:17-25 & T11/116:21-117:15]**.

107. The above demonstrates that Leighton's site management and quality control systems were not properly communicated to MTRCL's engineers and inspectors. As a result of the poor communication, MTRCL's site staff were unable to fully discharge their duties of ensuring that Leighton complies with the quality assurance and control requirements, in particular only successfully tested rebars are being used in the works.

G. <u>Failure to comply with material testing requirements (Issue 3)</u>

108. CP for Contract 1112 proposed to comply with CS2:1995 in the design drawings submitted to BO Team (e.g. clause R1 in drawing no. 1112/B/000/ATK/C01/007 for NAT **[DD7/10390]** and clause R1 in drawing no. 1112/B/HHS/ACM/C01/501 for HHS **[DD8/11223]**). BO Team accepted such proposal and duly specified in the acceptance letter that all rebars delivered on site have to be tested as per the requirements of CS2:1995 **[H10/4751-4786]** and PNAP APP-45 **[H10/4787-4789]**.

109. For example, Appendix II to the acceptance letter dated 5 November 2014 for NAT provides that **[DD7/10332]**[7]:

> *"(a) Sampling and testing of steel reinforcing bars should be carried out in accordance with Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) APP-45 for compliance with CS2:1995. Testing should be carried out by a laboratory accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for the particular test concerned. Test results should be submitted within 60 days of the delivery of the steel reinforcing bars to the site. The test reports should be appended with a statement signed by the Competent Person to confirm the following:*
>
> *(i)* ***All steel reinforcing bars used for the construction and the test specimens covered by the test reports are in accordance with the types and grades of steel shown in the agreed proposal****.*
>
> *(ii) Sampling and testing of steel reinforcing bars used have been carried out in accordance with PNAP APP-45 for compliance with CS2:1995.*
>
> *(iii) The acceptance criteria appropriate to each type and grade of steel reinforcing bars used have been complied with.*
>
> *(iv) All steel reinforcing bars tests have been carried out by a laboratory accredited under the HOKLAS."* (emphasis added)

[7] For HHS, see **[DD8/11571]**; for SAT see **[H9/3883]**.

110. Leighton is also required under Contract 1112 (with MTRCL) to conduct material tests:

(1) Section 10.14 of the Materials and Workmanship Specification for Civil Engineering Work provides, amongst other things **[C5/3754]**[8]:

> *"(1) Samples of bar reinforcement, epoxy coated reinforcement, fabric reinforcement and reinforcement connectors for tension joints shall be provided by the Contractor in accordance with the procedures detailed in Appendix 10.1. Samples shall be provided from each batch of the material delivered to the Site and at least 28 days before fixing of the reinforcement starts. The number of samples to be provided from each batch shall be as stated in CS2 Table 9."*

(2) Section 10.15 further provides that **[C5/3755]**:

> *"(1) Each sample of bar reinforcement shall be tested to determine the yield stress, elongation, tensile strength, bending and re-bending properties and unit mass. Additionally each sample of epoxy coated reinforcement shall be tested to determine the thickness, adhesion and continuity of the coating.*
>
> *…*
>
> *(4) The number of tests on each sample shall be as stated in CS2 Table 9 and Table 10.1 of this Section."*

111. However, according to Leighton, some of the rebars delivered on site were not tested by a HOKLAS certified laboratory. Specifically, Leighton ordered approximately 57,000 tonnes of rebars for the works under Contract 1112, amongst which approximately 53,000 tonnes of rebar were tested. Approximately 4,000 tonnes (representing

[8] See also Appendix 10.1.4 **[C5/3770]** for Sampling Bar Reinforcement.

approximately 7%) of rebars delivered on site were not arranged for sampling and testing. Moreover, Leighton did not arrange for testing of sufficient samples for a further (around) 580 tonnes of rebars (representing approximately 1%) as required under Leighton's contract **[CC11/7287-7288§§5-6]**. The number of untested rebars amounted to about 100 lorry loads of reinforcing bars **[T11/27:11-15]**.

112. In relation to the untested rebars, Leighton admitted in the letter dated 27 June 2019 **[DD12/13666-13676]** that the use of untested rebars did not fully meet the requirements on material testing in CS2. The Government's position is that Leighton's failure to comply with the requirement of sampling for testing as stipulated under CS2 in accordance with acceptance letters and the quantity of untested rebars raised concerns.

113. The failure to test approximately 4,000 tonnes of rebars exposed deficiencies in MTRCL's and Leighton's site management and quality control system.

114. No evidence has been adduced by MTRCL showing that there is any mechanism under PIMS to ensure that all rebars delivered on site are tested before the same could be used by steel fixers in the permanent works.

115. The procedures for rebar testing can be summarized as follows:

(1) Leighton engineer would place order for reinforcing bars. When the rebars are delivered on site, Leighton engineer would inform MTRCL's IOWs accordingly;

(2) MTRCL's IOWs would then select samples from the newly arrived batches of rebars to be cut and labelled for testing;

(3) Thereafter, MTRCL's IOWs would inspect the samples again to ensure that they were accurately labelled and everything was in order;

(4) The samples were then sent to MTRCL's testing laboratory for testing;

(5) Leighton's Quality Assurance team would inform Leighton engineer of the test results.

(See §24 of Raymond Tsoi's witness statement **[CC6/3797§§24-25]** and the evidence of Michael Fu **[T10/120:13-121:12])**.

116. Under these procedures, MTRCL had to rely on Leighton to inform them when rebars have been delivered. In this regard, MTRCL's inspectors said that it would be difficult for them to ascertain the details of delivery without having been informed by Leighton (see evidence of Tony Tang **[T12/143:15–144:7]** and Victor Tung **[T13/37:18-38:6]**).

117. On the part of Leighton, while certain measures were in place to differentiate successfully tested rebars from untested rebars, such measures were however not properly implemented and supervised by its site staff.

118. As mentioned above, there was a colour paint system on site to differentiate tested rebars from untested rebars. However, Leighton engineers were not familiar with such system. For example, Alan Yeung of Leighton was not aware of the existence of such system **[T10/55:11-57:15]**. Further, such system was not properly communicated to MTRCL frontline staff. As a result, inspectors and engineers could not effectively spot and prevent the use of untested rebars on site.

119. On the issue of whether on-site sampling and testing of rebars (currently required under CS2:1995 and Leighton's contract) is necessary, Leighton indicates in paragraph 27 of its Opening **[OA1/4/9§27]** that it intends to adduce evidence from an expert with experience of the ISO standards for the testing of materials. The Government reserves its right to adduce expert evidence in response.

120. The Government however emphasizes that, according to the Expanded TOR, one of the issues for the Commission to consider is whether the relevant works were executed in accordance with Contract 1112 (paragraph (a)(2)(iii) of the Expanded TOR). As pointed out above, Contract 1112 expressly stipulates that the requirements of CS2:1995, which include on-site sampling and testing of rebars, be followed. There was *prima facie* a breach of Contract 1112 here (in addition to a breach of the conditions under BO Team's acceptance letters), and thus any expert evidence on ISO standard will not exonerate Leighton from its contractual obligations.

H. Unauthorized deviation (Issue 3)

121. A number of MTRCL's and Leighton's witnesses gave evidence that, during the construction of NAT, SAT and HHS, the lapping of rebars at a number of slab-to-wall joints were changed to coupler connections. One reason for the change was to form an opening at a permanent structure to create internal access routes within the site **[BB8/5238§§7-8; CC6/3777-3778§27]**.

122. The said deviation had not been submitted to BO Team for consultation before it was implemented. As will be explained in Section H1 below, this is a clear breach of the IoE **[H7/2220-2233]**, IoC **[H7/2418-2431]** and PMP **[H7/2371-2504]**.

123. Putting aside the issue of whether prior consultation is required, there is a genuine concern that the requisite level of supervision and inspection had not been provided and thus the workmanship of the splicing assemblies installed was put in question (see Section H2 below). Further, proper records had not been kept in respect of the locations where the change was applied (see Section H3 below).

H1. Prior consultation and acceptance is required

124. Pursuant to clause 2(a) of the IoE and IoC, MTRCL is required to *"submit such drawings, plans and calculations and other details as may be necessary to implement the consultation process detailed in the Reference Schedule and to comply with any reasonable request made during such consultation…"* **[H7/2222-2223; 2418]**.

125. The consultation process is set out in Section 9.1 of the PMP **[H7/2391]** and Appendix 9 thereto **[H7/2498]**. Appendix 9 specifically deals with the consultation process under the PMP and makes it clear that all designs of permanent works (including new proposals or amendments to accepted proposals) have to go through the consultation process under the IoE or IoC, and acceptance by BO Team ought to be obtained prior to the commencement of the works **[DD9/12277§7]**.

126. The relevant accepted drawings of Contract 1112 show the rebar splicing methods. For example, the 'R.C. DETAILS FOR 200 THK. (CLEAR SPAN LARGER THEAN [*sic*] 2600mm) TROUGH WALL' in drawing no. 1112/B/HHS/ACM/Cl2/702 **[DD8/11311]** and the 'WALL BASE DETAIL' at drawing no. 1112/B/HHS/ACM/Cl1/501 **[DD8/11305]** show that the connection between the base slab and kicker walls at HHS is by lapping of rebars. A change from rebar lapping to coupler splicing would involve a change of the rebar splicing methods as shown in the accepted drawings. Accordingly, consultation submission should be made in accordance with the procedures set out in Appendix 9 of the PMP prior to the commencement of the splicing work so as to allow BO Team to vet the adequacy of the design changes and specify requirements on supervision and documentation in relation to the scope and nature of the proposed changes. MTRCL's failure to follow the procedures in Appendix 9 constituted a clear breach of the IoE / IoC and PMP.

127. MTRCL and Leighton suggested that the change from lapping to splicing assembly is a "minor change" or change in construction detail which is not subject to prior consultation **[BB8/5204§54; BB8/5238§6; CC6/3779§28]**. Such proposition is unsustainable:

(1) Under Appendix 9 of the PMP **[H7/2498]**, all amendments to the design of permanent works are subject to prior consultation and acceptance. No exception is provided for the so-called "minor changes in construction details" as alleged by MTRCL and Leighton.

(2) Although lapping of rebars and couplers are both accepted method of splicing, the use of coupler is subject to additional quality assurance, quality control and testing requirements (such as those set out in Appendix V of the acceptance letter). Should the change of lapped rebar to coupler connections be included in an amendment submission for prior consultation, relevant requirements for supervision and inspection of the coupler installation works would have been imposed in the acceptance letter. In the absence of prior consultation, BO Team would not be able to impose the relevant conditions for use of couplers as only lapped rebars were shown on the accepted drawings **[DD12/13939]**.

(3) Insofar as MTRCL or Leighton relies on Appendix 7 of the PMP **[H7/2492]**, the Government reiterates that Appendix 7 is irrelevant in that it sets out MTRCL's own design management and assurance process. In determining whether consultation submission to BO Team is required, one should refer to Appendix 9, which specifically sets out the administrative procedures of consultation submissions under the IoE / IoC **[DD9/12277-12278§8]**. In fact, Section 9.1.5 of the PMP expressly refers to Appendix 9 as "*the flow chart for the administrative procedures of the consultation submissions under the IoE / IoC*" **[H7/2391]**.

H2. Failure to conduct proper supervision and inspection

128. Putting aside the issue of whether prior consultation and acceptance is required, it is not in dispute that the integrity of the structures depends on whether couplers are properly connected. This has been expressly confirmed by Kit Chan from MTRCL **[T14/36:9-38:7]**. It is therefore crucial to ensure that the proper supervision and inspection are provided for the coupler installation works.

129. However, the evidence set out in Section D above gave rise to a genuine concern in respect of the level and quality of supervision and inspection provided:

(1) Leighton's and MTRCL's frontline staff were apparently unaware of the supervision and inspection requirements regarding coupler installation works (see evidence of Henry Lai **[T5/5:14-6:18]**, Victor Tung **[T13/35:8-21]**).

(2) According to the evidence of Pun Wai Shan of Fang Sheung, the same level of supervision as for the station box structure was provided by Leighton **[T2/114:14-19]**. This means the requirement of *"full time on site supervision"* **[DD7/10339]** was not provided by Leighton (see §293 of the Interim Report).

(3) Further, most if not all of them did not receive training from BOSA on how to conduct inspection for coupler installation works (see evidence of Jeff Lii **[T7/43:16-44:5]**; Saky Chan **[T9/72:2-11];** Sebastian Kong **[T9/93:5-8]**; Alan Yeung **[T10/49:10-13]**; Tony Tang **[T12/140:13-141:13]**; Kappa Kang **[T12/53:15-54:3]**).

(4) The ITP requires inspection to be conducted by reference to working drawings **[BB1/294 items 4&5]**. On the evidence, there were no working drawings showing the location where the changes

were to be implemented (elaborated in Section H3 below). Therefore, it appears that the inspections were not conducted in accordance with the ITP.

(5) There exists no log book containing any inspection records for the additional coupler connections in question.

H3. Failure to maintain proper record

130. MTRCL staff gave evidence that the change was effected *orally* on site **[BB8/5204§54; BB8/5238§10]**. There existed no proper working drawings or records at the time showing where the changes were to be implemented **[T14/34:4-36:3]**. As a result of the lack of proper record, MTRCL had to conduct an investigation into the locations of the deviations. Such investigation has recently been completed pursuant to MTRCL's Verification Proposal, and the Final Report was submitted to the Commission on 18 July 2019 **[BB16/9952-10000]**.

131. The problems exposed by the lack of proper records are manifold.

132. First, it shows that MTRCL has failed to hold Leighton to its contractual obligations. Pursuant to clauses 9.10 and 58.1 of the Conditions of Contract for Civil Engineering and Building Works Construction of Contract 1112 between MTRCL and Leighton, Leighton shall *"during the progress of works prepare drawings showing those parts of the Works which have been designed by the Contractor as built".* It shall also *"keep records of levels and dimensions during the course of the Execution of the Works in an Approved form and shall submit records as and when required by the Engineer"* **[C3/1838, 1885]**.

133. Secondly, the failure to keep proper records is a breach of MTRCL's own obligations under the PIMS and the PMP:

(1) Insofar as drawing management is concerned, clause 5.4.6 of PIMS/PN/11-4 **[B3/1631-1632]** requires that:

> *"**All drawings and drawing amendments must be formally issued to the Contractor**. For co-ordination and monitoring purposes, drawings must be registered and maintained in a controlled manner. **Drawings and drawing amendments must be provided in a timely manner to all relevant parties for their use**. Obsolete drawings and information shall be removed or positively identified as being superseded."* (emphasis added)

(2) As to site record keeping, clause 5.8.2 of PIMS/PN/11-4 **[B3/1634]** provides that:

> *"CM/SConE/ConE/SIOW/IOW/AIOW shall keep regular constructional records, or review the preparation of such records, a typical schedule of the records required to be kept is provided in Exhibit 7.15. This will vary between projects and the SConE/SIOW should continually review the records kept as the works progresses. Wherever possible the site specific ePMS system should be used for this."* (see also **[B6/3630§5.8.2]**)

(3) Exhibit 7.15 referred to above requires the ConE and SIOW to ensure that as-built records are prepared *"as a continuous operation as construction proceeds, and that **brand-names of actual materials used, instructed and proposed changes, actual details of works determined on site are recorded**."* (emphasis added) **[B6/3665]**. This includes the keeping of proper records showing how and where the changes have been implemented.

(4) Further, section 6.2.2 of the PMP provides that:

> *"All design records, **<u>including design changes</u>** and waivers, will be fully documented and maintained in the Project Records for future audits."* **[H7/2252§6.2.2]** (emphasis added)

134. In this regard, the General Specification of Contract 1112 sets out a timeframe for conducting as-built survey and submitting the relevant records. Clause G1.10.1 requires Leighton to ensure that the as-built surveys are undertaken within 2 days of the completion of the Permanent Works and the survey record submitted for review within 7 days. Leighton shall prepare and maintain a set of drawings of the permanent works showing the as-built survey records and identifying all deviations with respect to the design. It shall also ensure that the data from the as-built surveys are incorporated into the as-built survey record drawings and submitted for review within 14 days of the date of the as-built survey **[C3/2019]**. However, although MTRCL has requested Leighton to provide the details and locations of the deviations for months, Leighton has yet to formally submit the required information to MTRCL **[BB8/5202§49]**.

135. <u>Thirdly</u>, the absence of revised working drawings also reveals MTRCL's and Leighton's failure to learn from their own mistakes made in a previous incident in 2015 and implement the improvement measures they promised at the time. This incident has been picked up by Mr Steve Rowsell. In Mr Rowsell's expert report, he observed that:

> *"…an Incident Report was issued two years ago, on 27 July 2015, by the MTRCL investigating the cause of non-conformity to the original design accepted by BD which was not identified by the MTRCL until the preparation of the Certificate of completion of works (BA14) to BD in January 2015… Steps purportedly taken by MTRCL and Leighton at the*

time (ie. 2015) to avoid future recurrence were stated in the conclusion of the Incident Report (paragraphs 4.4, 4.5 and 4.7) ***[H11/5546]****):*

> *"4.4 In addition to the procedures (PIMS/PN/11-4/ A4, refer to Appendix B) stipulated for reviewing contractor's submissions in MTRCL's Project Integrated Management System (PIMS) which is included in the PMP of SCL,* ***TCPs shall not allow changes to be made to the permanent works in contractor's shop drawing submissions. TCPs in the CP stream shall supervise the works to ensure they are executed in accordance with the Working Drawings/Accepted Plans. They should bring CP's attention to any deviations in a timely manner****;*
>
> *…*
>
> *4.7 In addition to the original procedures for design and drawing management in the 1112 Quality Management System, the Contractor has implemented a robust control system to track the progress of all proposed changes to the permanent works until they are approved and incorporated into the Working Drawings."* **[ER1/1/39§46]** (emphasis added)

136. While MTRCL repeatedly emphasizes that it is a learning organization, the unauthorized deviation reveals that MTRCL failed to learn from its previous mistake.

I. M&V Agreement with Pypun

137. Pypun contends that the scope of its work under the M&V Agreement does not cover the quality of the construction works and the keeping of construction records. Consequently, the RISC forms were not documents that Pypun would have been required to look at. This is not accepted by

the Government. Yueng Wai Hung, Director of Pypun, gives evidence that Pypun only conducted checking of RISC forms and QSP checklists for couplers under supplementary engagements of the Government (See Yueng Wai Hung's 2nd witness statement **[GG1/27, 28, 29, 31, 33, 46 §§6, 12, 20, 30, 44, 103]**). The Government's position, which will be elaborated below, is that the checking exercise falls within the scope of the M&V Agreement and no supplementary engagement is required.

138. Clause 3.1 of the M&V Agreement **[G9/7653]** sets out the overall objective of the M&V Agreement:

> *"The overall objective of the Assignment is to provide monitoring and verification services in relation to the work undertaken by the MTRCL (including submissions by its consultants, contractors or agent to MTRCL) during the construction, testing and commissioning phase of the Project* ***so as to provide assurance that the MTRCL's obligations stated in the EAs for the SCL advance works and construction phases have been properly fulfilled****. The monitoring and verification shall focus on cost, programme and public safety of the Project."* (emphasis added)

139. Since MTRCL's work and obligations under the EAs cover all aspects of works, including construction quality, it must follow that the M&V Consultant's assignment on monitoring and verification work should have the same coverage. It is therefore plain that construction quality forms part and parcel of Pypun's monitoring and verification work in respect of cost, programme and public safety. As Yueng Wai Hung has accepted, poor construction quality will lead to remedial works, which will have an impact on costs and programme **[T15/13:7-14:4]**. This is in line with the evidence of Jonathan Leung of HyD that issues relating to costs, programme and public safety would from time to time involve matters concerning quality of the works **[T15/89:19-90:15]**. It is therefore not

open to Pypun to argue that construction quality does not fall within its scope of service under the M&V Agreement.

140. Clause 4.1 of the M&V Agreement contains a description of Pypun's work, which includes but is not limited to the following **[G9/7654]**:

(1) reviewing key documents relating to the SCL Project including construction programmes, contractors' method statements and other key documents relating to the SCL works etc.;

(2) carrying out monitoring on MTRCL's works through review of project documents and necessary site inspection, identification of and providing advice on key issues of the SCL Project on cost, programme and public safety;

(3) carrying out verification by conducting audits to the activities / processes undertaken by MTRCL, reporting and the necessary follow-up work; and

(4) provision of professional services in respect of the assessment of building submissions for compliance with the BO and other relevant ordinances, regulations and standards (i.e. works to be performed by the BSRC team).

Clearly, the RISC forms record the joint inspections at the critical hold points, which signify completion of different parts of the works, and hence reflect the progress and quality of the construction works which have an implication on the programme and costs of the project and they should be within the ambit of Pypun's monitoring and verification work.

141. Clause 6.1.7 of the M&V Agreement further provides that **[G9/7658-7659]**:

> *"**The main roles of the Consultants is to appraise, monitor and audit the activities/processes of the MTRCL, and verify that these***

activities/processes are carried out in accordance with the MTRCL's management and control procedures and in compliance with the 3 EAs *for the SCL design and site investigation, advance works or construction phases,* ***and that value for money is achieved through procedures that are complied with*** *and to recommend improvement measures whenever appropriate. Hence,* ***the Consultants shall be proactive****, working closely with the Director's Representative and the MTRCL and timely adjust its work plan to* ***suit*** *the progress and programme of the SCL works."* (emphasis added)

142. And, under Clause 6.1.9 of the M&V Agreement **[G9/7659]**:

> *"For the avoidance of doubt,* ***the Consultants' monitoring and verification shall cover all the work carried out by the MTRCL during the construction, testing and commissioning phase****, including the E&M systems, unless otherwise stipulated in this Brief."* (emphasis added)

143. Clause 6.6.4 of the M&V Agreement **[G9/7665]** deals with the scope of services on checking compliance with building safety standards. They include, *inter alia*, *"(f) conduct audit and surprise checks to construction sites on* ***aspects of the structural safety and integrity of foundation, tunnel, superstructure and etc. for safety assurance and for compliance with the building safety standards****, and examine the remedial proposals submitted by MTRCL if contravention is detected."* (emphasis added)

144. In performing its services under the M&V Agreement, Pypun is required to be *"proactive throughout the course of the Assignment"* and *"shall identify, where necessary, any additional information/documents from the MTRCL or other related parties through the Director's Representative to facilitate their work in this Assignment"* **[G9/7660§6.2.4]**.

145. Hence, the monitoring and verification of whether the RISC form requirements (which relate to quality assurance and form part of MTRCL's management and control procedures) have been complied with necessarily fall within the scope of the M&V Agreement.

146. Having said the above, Pypun is entitled to adopt a risk-based approach in the performance of its services under the M&V Agreement. For example:

(1) In relation to monitoring, Pypun is responsible for devising the monitoring plan and determine, on a risk-based approach with focus on cost, programme and public safety aspects, what items to look at **[G9/7660-7661§6.3.1, 6.3.4]**.

(2) Similarly, for verification, Pypun *"may use a risk based approach to identify high risk areas for forward planning of audits"* **[G9/7662§6.4.1]**.

147. At the time, both MTRCL and Pypun did not consider the possible non-compliance with the RISC form system as a high risk item to be closely monitored and followed up, with which the Government, not in hindsight, had no reason to disagree. Of course, Pypun could have been more proactive during the course of their work in performing its duties to, amongst others, identify the documents which should be subject to monitoring and verification. However, it is noted that had Pypun carried out an audit on the RISC form system at the time, it would have been by way of sample check on the basis of the documents made available to it by MTRCL. It may still have been difficult for Pypun to discover the non-compliance in the circumstances.

148. Regarding Pypun's argument based on additional services engaged by the Government for checking of RISC forms, Jonathan Leung of HyD has explained that Pypun was asked to check the RISC forms and other site

records as an additional service, but not a supplementary agreement **[T15/91:6-22]**:

> *"I want to explain two things. What we have signed is not a supplementary agreement. It's an agreement for additional services. We engaged additional services for M&V.* ***When some works or processes were <u>not anticipated or impossible to anticipate</u> at the time of signing the contract****, even if we are talking about very experienced contractor, for example it was not every stage that there would be such major problems with Hung Hom Station, then we have looked at whether we are asking them to do very simple auditing or we are asking them to retrieve each and every RISC form to look at the form.* ***It's not something very simple, a sampling check under the check the checker approach. So we must regard this exercise as <u>additional services</u>. Then we also look into <u>whether they need to deploy additional resources and whether it would be envisaged by the original contractor in the original contract</u>****."* (emphasis added)

149. The gist of Jonathan Leung's evidence is that additional services would be issued if the work (or the extent thereof) was not anticipated at the formation of the original M&V Agreement. But the issuing of additional services does not mean the nature of the task does not fall within the scope of work under the M&V Agreement. As Jonathan Leung has explained, if the service required only involves a sample check and no additional resources are required from Pypun, it may not be necessary to order for additional services.

150. Hence, where the Government requires extra work to be carried out within the original scope of the M&V Agreement, it would consider placing order for "additional services" with Pypun. But if the additional work required to be carried out is outside the original scope of work of the

M&V Agreement, HyD would have entered into a supplementary agreement with Pypun.

151. The Government's position is that the task of checking site records for SAT, NAT and HHS falls within the scope of the M&V Agreement, it is incumbent upon Pypun to demonstrate that the checking has involved manpower in addition to those engaged under the original M&V consultancy.

152. In the premises, Pypun's argument that the awarding of additional services means the checking of RISC form is not within the scope of the M&V Agreement is misconceived and must be rejected.

153. In Part 1 of the Inquiry, Mr Rowsell has recommended the Government to consider extending the role of the M&V Consultant and to review the requirements in relation to site audits and surprise checks, the level of monitoring by the M&V Consultant and the corresponding level of resources required in the discharge of its duties **[ER1/1/80-81§158, 165]**.

154. The Government has taken on board the suggestion of extending the role of the M&V Consultant and has since mid-2018 implemented measures which sought to encourage more proactive involvement of Pypun, for example, by including Pypun in all 3-tiered meetings and increasing the frequency of site visits and regular audits by Pypun. The Government will also consider how to further utilize e-platforms (which have already been set up) to facilitate the sharing of relevant site and project records of MTRCL with Pypun so as to ensure that Pypun has ready access to relevant and timely information. The Government has embarked upon further review on how best to further define and potentially enlarge the role of the M&V Consultant in future railway projects.

155. Regarding site audits and surprise checks, the M&V Consultant had carried out on-site checks to verify the extent of missing RISC forms in

relation to the construction of NAT, SAT and HHS in April 2019 and a Document Review Report was submitted to the Commission in May 2019 **[GG3/1011-1856]**. The BSRC Team also conducted several site audits and surprise checks since mid-2018 in addition to regular site safety inspection to the completed structural works of SAT and NAT of NSL and EWL and HHS of Contract 1112 (see for example, item 165 of the Chronology **[DD12/13773]** and **[DD5/5480]**).

156. The number of site walks conducted by the M&V Consultant has also been increased since August 2018. Between 8 August 2018 and 16 July 2019, a total number of 102 site walks have been conducted.

157. Meanwhile, the M&V Consultant has continued to conduct public safety, programme and financial audits. As at end June 2019, a total of 5 public safety audits, 11 programme audits and 12 financial audits had been completed for Contract No. 1112.

158. Apart from the work by Pypun, HyD has also mobilized in-house staff to conduct site surprise checks. Since September 2018, a total of 97 site surprise checks have been carried out up to 16 July 2019. HyD has also mobilized its in-house inspectorate staff to be stationed full-time on site at MTRCL's site office (EWL) of the SCL for closer monitoring.

159. The Government will work together with Pypun in order to identify the areas in which more frequent audits or audits of a wider scope should be carried out. The Government will also take steps to ensure that Pypun is capable of providing the necessary resources and manpower when they are required to do so.

160. In addition, HyD has taken actions on improvement measures in various aspects in response to the recommendations made by the Commission in its Interim Report:

(1) HyD and MTRCL have established a high-level Steering Group on Communications ("SGC"), with a small membership size of senior management of both parties, to provide directions on enhancing communications between the Government and MTRCL (in response to recommendation in §§130-131 of Mr Rowsell's report **[ER1/1/72]**).

(2) Director of Highways and senior officials of RDO/HyD also continue to visit the construction sites on a regular basis. Apart from MTRCL's construction team and the M&V Consultant, representatives from MTRCL's contractors, sub-contractors and suppliers of construction materials as well as other working teams of MTRCL, such as its design team and the detailed design consultants, etc., will be invited to join the visits. These regular site visits will serve as a direct communication channel with the workforce, contractors and consultants.

(3) The Government will further consider how to make the work at the PSC level more efficacious. The coming SGC working group meetings will review the membership of the PSC meetings and review how the 3-tiered PSC, PCM and PPM meetings could be streamlined to enhance the effectiveness of the discussions at these meetings (in response to recommendation in §160 of Mr Rowsell's report **[ER1/1/80-81]**).

(4) The Government has advocated the use of NEC form in public works contracts. Early contractor involvement ("ECI") is one of the new features in NEC4. For future railway projects to be delivered under the concession approach, HyD would review if the ECI principle would be applied in future entrusted works to be taken up by MTRCL (§§136 and 195) **[ER1/1/73-74, 85]**).

(5) HyD will make the voluntary training courses in railway engineering and project management mandatory to all professionals in RDO, including continue to sponsor RDO staff to pursue master degree in railway engineering.

161. Last but not the least, the Government is fully aware of the importance of reviewing and evaluating its monitoring and control mechanisms in order to further strengthen and improve the same. In this regard, the Government is grateful for the helpful and constructive recommendations made by Mr Rowsell in Part 1 of the Inquiry. Mr Rowsell has also expressed that he is glad to see that the Government has already put in place some of the initiatives for improvement **[T39/113:22-25]**. In light of the inadequacies of both MTRCL and Leighton in the performance of the works in NAT, SAT and HHS, the Government welcomes further suggestions from the Commission on possible improvement measures in respect of the overall project management and site supervision systems of the MTRCL.

J. Expert Evidence

162. The scope of expert evidence for Part 2 of the Inquiry will need to be defined in due course. The Government will need to continue to liaise with the Commission's legal team for the purpose of deciding whether the Government will adduce expert evidence and (if necessary) what particular areas warrant such evidence. MTRCL has reserved its right to adduce expert evidence on various areas including the structural integrity of the Stitch Joints **[OA1/5/14§39]** and Shunt Neck Joints **[OA1/5/15§43]**, applicability of the Code of Practice for Structural Use of Concrete 2004 regarding the change of lapped bars to couplers in NAT, SAT and HHS **[OA1/5/23§60]** and the issue of the change from lapped bars to couplers in NAT, SAT and HHS in the context of Appendix 9 of PMP **[OA1/5/24-**

25§§62-64]. Leighton has also indicated that it would adduce evidence from an expert with experience of ISO standards to comment on the adequacy of the tests performed on the rebars **[OA1/4/9§27 & CC6/3762]**. Without prejudice to our submissions relating to the aforesaid ISO standards at paragraph 120 above, these are the areas that the Government may consider adducing evidence in response to the expert evidence (if any) which may be put in by MTRCL and Leighton. However, in order to avoid unnecessary resources being incurred on expert evidence, it is hoped that directions would be given by the Commission which would enable the parties (including the Commission's legal team) to come up with a list of issues for expert evidence. To say the least, if MTRCL and Leighton at the end of the day are not minded to adduce expert evidence on the areas they have outlined, it may not be necessary for the Government to engage its own experts on such areas.

163. In relation to project management, the Government will consider if it is necessary to adduce expert evidence after it has had an opportunity of considering such evidence which is likely to be produced for and on behalf of the Commission.

Dated 19 July 2019.

Richard Khaw SC
Anthony Chow
Martin Ho
Ellen Pang
Counsel for the Government

Department of Justice
for the Government