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

MTRCL'S CLOSING STATEMENT FOR THE EXTENDED INQUIRY

I. Introduction

1. In this Closing Statement MTRCL will focus in some detail upon what it considers to be the principal matters and issues which fall for the CoI's consideration and which, where necessary and appropriate, will be the subject of its findings in its Final Report[1].
2. Notwithstanding, MTRCL takes the opportunity to make at the very outset the following important points arising out of the evidence put before the CoI in the Extended CoI and which it is anxious that both the CoI and the Hong Kong public in general should bear in mind and take into account when assessing its performance as Project Manager on the Hung Hom Station Extension in general and, specifically, in respect of the construction works at the NAT, SAT and HHS:
   2.1 The construction works are safe, albeit to provide the public with an even greater degree of confidence in respect of the vitally important consideration MTRCL has agreed with Government to develop 'suitable measures' as defined in the VP Report which it is anticipated will be implemented in future to ensure all statutory requirements, including the requirements in the Buildings Ordinance (Cap. 123) are satisfied;
   2.2 MTRCL's personnel who gave evidence before the CoI were plainly honest witnesses who did their best to assist the CoI with its task and did not shirk from making a concession where one was genuinely

[1] Various abbreviations are adopted in this Closing Statement and the 'Key' thereto is set out in the table attached to Mayer Brown's letter to Lo & Lo dated 19 July 2019.

required, for example that there was room for improvement in the RISC forms procedure, and which served only to reinforce their credibility. It was also apparent from their evidence and demeanour that they carried out their tasks professionally and to the best of their ability and ensured the safe completion of the construction works at the NAT, SAT and HHS, in what were obviously challenging working conditions;

2.3 Insofar as defects were discovered at the 3 SJs, and whatever the prior situation might have been, MTRCL implemented a 'bespoke' quality assurance and control system for the remedial works, which works were carried out in accordance with the Method Statements and there was also a QSP and log book records for the same. Further, currently there are no water seepages at the SJs and the remedial proposal for the Shunt Neck CJ has been accepted by RDO subject to conditions;

2.4 Insofar as it has been established that there were project management issues in respect of the NAT, SAT and HHS, MTRCL has already taken significant steps and is in the process of taking yet further steps to enhance its project management systems and is confident that such measures will address the same;

2.5 MTRCL welcomes and will 'take on board' and comply with any recommendations that are made by the CoI in its Final Report.

II. <u>The construction works at the NAT, SAT and HHS</u>

(i) The construction of the NAT[2]

3. The NAT consists of three parts – the NSL tunnel, which is a twin-box underground tunnel; the EWL tunnel, which is an open trough above-ground tunnel; and, the Shunt Neck, which connects the EWL to the HHS[3]. The construction of these structures required collaboration between LCAL under Contract 1112 and the GKJV under Contract 1111.

4. The steps and procedures for constructing the NAT on the EWL and NSL track levels are set out in Method Statement no. 1112-CSF-LCA-CS-

[2] Paragraphs 1.7.1 to 1.7.3, 2.8.1 to 2.8.4, 2.14 to 2.16 of the NAT Letter **[BB1/4, 10-12]**.
[3] Paragraph 7 and Appendix A of the witness statement of Fu Yin Chit **[BB1/65-66]**.

000673A and ITP no. 1112-CSF-LCA-CS-003280[4].

5. The Particular Specification under Contract 1112 provided that LCAL had to '*complete the stitching joint, including omega seal, rebar, and infill, concrete, after tunnel backfilling and stabilization of tunnel settlement*' (Interface Item 1.4 of Table Z2.1.1)[5].

6. A total of three SJs in the NAT were constructed by LCAL and its sub-contractors, W&K (rebar cutting, bending and fixing) and Hills (formwork and concreting)[6]. MTRCL's Construction Manager for SCL, Michael Fu, explained that there were no Method Statements for the SJs (as there were for the SJs remedial works) but that they would have been helpful and beneficial for the SJs, which LCAL would have needed to prepare, as MTRCL's inspectors would have been able to understand and comment upon the method adopted to construct the SJs as well as ensuring that the quality of the works conformed to the requisite standards[7].

7. The design of the three SJs can be summarised as follows:

   7.1 The three SJs are located: (1) at the interface between EWL Bay 5 under Contract 1112 and the EWL tunnel structures under Contract 1111 ("**1111/1112 EWL SJ**")[8]; (2) at the interface between NSL Bay 6/7 under Contract 1112 and the NSL tunnel structures under Contract 1111 ("**1111/1112 NSL SJ**")[9]; and, (3) at the interface under Contract 1112 between NSL Bay 5 and NSL Bay 6/7 ("**1112/1112 NSL SJ**"[10])[11];

   7.2 In respect of the 1112/1112 NSL SJ, the NSL Bay 5 tunnel structures were supported by socket H-piles whereas the NSL Bay 6/7 tunnel structures were at grade. In respect of the 1111/1112 EWL SJ and the 1111/1112 NSL SJ, the interfacing tunnel structures were all built at grade, but the tunnel structures under Contract 1111 were constructed well ahead of the tunnel structures under Contract 1112[12];

[4] **[BB1/202-305]**, as cited in paragraph 6 of the witness statement of Fu Yin Chit **[BB1/65]**.
[5] Paragraph 12 of the witness statement of Fu Yin Chit **[BB1/69] & [BB1/424]**.
[6] Paragraph 24 of the witness statement of Fu Yin Chit **[BB1/77]**.
[7] [**T11/43/14-46/19**].
[8] This was sometimes referred to during the course of the hearing and thus in the Transcript as 'Joint 3' [**T1/6/15-17**].
[9] This was sometimes referred to during the course of the hearing and thus in the Transcript as 'Joint 1' **[T1/5/12-16**].
[10] This was sometimes referred to during the course of the hearing and thus in the Transcript as 'Joint 2' [**T1/6/6-7**].
[11] Paragraphs 9 to 10 and Appendices B and C of the witness statement of Fu Yin Chit **[BB1/67-68, 86 & 89]**.
[12] Paragraph 21 of the witness statement of Fu Yin Chit **[BB1/76]**.

7.3 Therefore, the purpose of the three SJs is to minimise potential stress/pressure at the joint due to different degrees of settlement or movement, given that the two placements of concrete being connected were built on different foundations (the 1112/1112 NSL SJ) or one of the two placements of concrete was constructed well in advance of the other (the 1111/1112 EWL SJ and 1111/1112 NSL SJ)[13];

7.4 The connection details and interface requirements specifications for the three SJs were set out in, *inter alia*, Appendix Z2 to the Particular Specification under Contract 1112[14] and a number of relevant working drawings[15]. MTRCL's Michael Fu told the CoI that Appendix Z2 to the Particular Specification which was similar, if not identical, to the Appendix in the Contract 1111 Particular Specification, identified the primary interfaces that were anticipated to arise and set out LCAL's and GKJV's respective responsibilities and obligations in relation to interface matters which included mutual co-ordination and co-operation in relation to interface matters[16];

7.5 For the Contract 1111 tunnel structures, GKJV used Lenton couplers which were based on a taper-threaded splicing system requiring taper-threaded rebars. For the Contract 1112 tunnel structures, LCAL used BOSA couplers (as in the construction of the Hung Hom Station box structure) which required the use of cylindrically-threaded rebars[17]. As such, the 1111/1112 SJs consisted of an interface between Lenton couplers/threaded rebars and BOSA couplers/threaded rebars;

7.6 It was clear from the oral evidence of Karl Speed, the General Manager for LCAL's Hong Kong business, that the brands of couplers to be used were discussed at Interface Meetings and that LCAL's representatives who attended such meetings knew that Lenton couplers were being used on Contract 1111, albeit he accepted that there appeared to be a

[13] Paragraph 19 of the witness statement of Fu Yin Chit **[BB1/75-76]**; Interface Item 1.4 (Purpose of Interface) of Table Z2.1.1 in Appendix Z2 to the Particular Specification under Contract 1112 **[BB1/424]**.
[14] **[BB1/420-432]**.
[15] Paragraphs 12 to 15 of the witness statement of Fu Yin Chit **[BB1/69-74]**.
[16] [**T10/93/18-94/18**].
[17] Paragraph 13 of the witness statement of Chan Chun Wai Chris **[BB1/111-113]**.

'communication breakdown' within LCAL so far as such requirement was concerned[18]. Previously, he had said that if Lenton couplers were used on the GKJV side of the SJ, it was LCAL's responsibility to ensure that the tapered threaded rebar which had to be used in conjunction with such couplers was ordered and supplied[19];

7.7 Regina Wong, LCAL's Sub-Agent and then Site Agent between October 2014 and February 2017 working mostly in the NFA, said that she attended Interface Meetings Nos. 9 – 22 and that in turn LCAL and GKJV drafted the Minutes and sent them to MTRCL for comment, whereupon they were circulated and remained on the INCITE system where they could be viewed by LCAL's management[20]. She also said that she appreciated then that there may be a compatibility issue which needed to be checked with regard to the mechanical splicing system, but presumed that Jim Wong, LCAL's Senior Site Agent responsible for the NAT between October 2014 to November 2016 and then promoted to Construction Manager, and his NAT team would take the initiative and deal with that[21], although she was unaware of any check that was undertaken by anybody at LCAL[22];

7.8 MTRCL attended the Interface Meetings in a monitoring role to manage the contractors and ensure that they were able to exchange enough materials and information for their own works, which would include materials, monitoring and design, and to resolve any difficulties arising[23];

7.9 Jim Wong candidly accepted that by at least January 2016 he knew that GKJV would use Lenton couplers and that somebody had to check the compatibility of those couplers with the materials that LCAL was using at the SJs, albeit that he could not remember telling anyone at LCAL that GKJV would use Lenton couplers[24];

[18] [**T8/51/1-53/8**].
[19] [**T8/13/1-14/23**].
[20] [**T7/107/6-114/1**].
[21] [**T7/121/13122/1**].
[22] [**T7/124/12-16 & T7/132/3-133/16**].
[23] See the evidence of MTRCL's Chris Chan [**T11/70/4-21**].
[24] [**T9/115/18-119/10**].

7.10 Chris Chan, MTRCL's ConE II and then ConE I, said that his understanding from attending the Interface Meetings was that everybody there knew that Lenton and BOSA couplers may not be compatible whereby it was agreed that LCAL would check on their compatibility, and that MTRCL was not obliged to check for compatibility but to ensure that the two contractors talked about the issue of brands, which objective it achieved[25]. Kappa Kang, MTRCL's ConE II, also attended the Interface Meetings, and gave evidence to identical effect as to who would check the compatibility of the couplers[26];

7.11 Remarkably, Henry Lai, LCAL's Engineer with personal responsibility for carrying out the rebar hold point inspections for the three SJs[27], said that nobody from LCAL who attended the Interface Meetings told him about the requirement for Lenton couplers nor did he receive any memorandum as to what happened at the Interface Meetings and that he only saw the Meeting Minutes at what he called 'the remedial stage'[28]. Even more remarkably it might be thought, Henry Lai was also unaware at the time of the Particular Specification for interfacing requirements between Contracts 1111 and 1112[29];

7.12 Unfortunately, *none* of the LCAL witnesses could offer a satisfactory explanation for not remembering and/or taking into account the need to order compatible rebar for use with the Lenton couplers at the interface between Contracts 1111/1112. In the event, this proved to be the material cause of many problems at the SJs and the Shunt Neck CJ which ultimately led to the need for remediation works, as further detailed below.

8. As to the construction sequence, and taking the 1111/1112 NSL SJ as an example, it was as follows:

8.1 GKJV first constructed the Contract 1111 NSL tunnel structures with

[25] [**T11/82/11-83/12**].
[26] [**T12/11/4-22**].
[27] [**T4/126/15-127/20**].
[28] [**T5/87/11-91/9**].
[29] [**T5/138/13-23**].

Lenton couplers fixed at the end of the structure, and then LCAL constructed the Contract 1112 NSL tunnel structures with BOSA couplers fixed at the end of the structure – both structures required a collar on the exterior with an external waterproof membrane and a water-stop, and an omega seal had to be installed at the collars' inner intersection. LCAL and its sub-contractors then constructed the SJ after the differential movements of the two connecting structures had stabilised[30], and hydrophilic strips would be installed on the structures' internal surface[31];

8.2 To construct the SJ, GKJV had to expose the Lenton couplers fixed at the end of the Contract 1111 NSL tunnel structures for W&K to install starter bars ("**1111 Rebars**"), and LCAL had to expose the BOSA couplers fixed at the end of the Contract 1112 NSL tunnel structures for W&K to install starter bars ("**1112 Rebars**"). Finally, the 1111 Rebars would be lapped with the 1112 Rebars to connect the base slabs, roof slabs, external walls and dividing walls, and LCAL/Hills then poured the concrete[32].

9. The above construction sequence applied *mutatis mutandis* to the 1111/1112 EWL SJ (save that there were no roof slabs or dividing walls to connect due to the open trough tunnel structure), and also to the 1112/1112 NSL SJ (save that LCAL was responsible for constructing both sides of the joint under Contract 1112 using BOSA couplers)[33].

10. In addition to the three SJs, there is one CJ at the Shunt Neck at the interface between Shunt Neck Bay 3 under Contract 1112 and the Shunt Neck structures under Contract 1111 ("**Shunt Neck CJ**"):

10.1 Although the joint was originally designed to be a SJ[34], this was not in fact necessary because the interfacing structures under Contract 1111 and Contract 1112 respectively were all founded on piles and were not

[30] See the notes in working drawing no. 1112/W/000/ATK/C11/101A **[BB1/433]**.
[31] Paragraphs 15(a)-(d) of the witness statement of Fu Yin Chit **[BB1/72]**.
[32] Paragraphs 15(e)-(g) of the witness statement of Fu Yin Chit **[BB1/73-74]** as corrected by Fu Yin Chit's Corrigendum [**BB84.1]**. The fact that GKJV exposed the Lenton couplers fixed at the end of the Contract 1111 NSL tunnel structures was also confirmed by LCAL's Henry Lai [**T4/113/10-114/18**] and Jacky Lee [**T13/97/19-98/17**].
[33] Paragraphs 16-17 of the witness statement of Fu Yin Chit **[BB1/74-75]**.
[34] Working drawing no. 1112/W/000/ATK/C11/246A **[BB1/435]**; Sections A and Section C in working drawing no. 1112/W/000/ATK/C11/247A **[BB1/436]**.

subject to any soil overburden pressure[35] – a CJ was sufficient;

10.2 Accordingly, MTRCL told GKJV that the joint would be constructed as a CJ[36]. This was reiterated when an email from MTRCL's Louis Lam, a SDME, dated 25 November 2015[37] was forwarded by GKJV to LCAL[38];

10.3 Further, as acknowledged in LCAL's evidence[39], in response to LCAL's Request for Information no. 1112-RFI-LCA-CS001510[40] in May 2016 concerning, *inter alia*, working drawing no. 1112/W/HUH/ATK/C10/E82[41] showing the 1111/1112 EWL SJ and the Shunt Neck, MTRCL made it abundantly clear that there would be *'no stitch joint at shunt neck except at interface with 1111'* i.e. a SJ was still required for the 1111/1112 EWL SJ but not for the Shunt Neck[42]. MTRCL's Chris Chan said that once the Request for Information had been answered and LCAL had DAmS 390 and assuming that no further questions arose, LCAL was simply expected to get on and build the SJ in accordance with DAmS 390[43];

10.4 As with the 1111/1112 SJs, GKJV used Lenton couplers for the Contract 1111 Shunt Neck structures[44]. As such, the Shunt Neck CJ also consisted of an interface at which LCAL was required to screw Lenton threaded rebars into the Lenton couplers fixed by GKJV at the Contract 1111 Shunt Neck structures.

11. In the event, the Shunt Neck CJ and the 1111/1112 EWL SJ were constructed from circa January to March 2017; the 1112/1112 NSL SJ was constructed from circa May to September 2017; and, the 1111/1112 NSL SJ was constructed from circa July to August 2017[45].

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[35] Paragraph 20 of the witness statement of Fu Yin Chit **[BB1/76]**.
[36] Paragraph 18 of the witness statement of Fu Yin Chit **[BB1/75]**; paragraph 3.6 of the 2nd Shunt Neck Report **[DD1/38.64-38.65]**.
[37] **[CC6/3355-3356]**.
[38] Paragraph 20 of the 3rd witness statement of Joe Tam **[CC1/85-86]**.
[39] *Ibid*; also paragraphs 61 to 62 of the 5th witness statement of Karl Speed **[CC1/66]** as well as his oral evidence when questioned by counsel for the CoI [**T8/37/2-6**].
[40] **[CC6/3333-3341]**.
[41] **[CC6/3339]**.
[42] Paragraphs 28-39 of the witness statement of Chan Chun Wai Chris **[BB1/118-120]**.
[43] [**T11/63/9-16**].
[44] Paragraph 13 of the witness statement of Chan Chun Wai Chris **[BB1/111-113]**.
[45] Paragraphs 7(a)-(d) of the witness statement of Fu Yin Chit **[BB1/65-66]**; paragraph 1.7 of the 2nd NAT Report **[AA1/57]**. A more detailed NAT pour summary has been provided to the CoI **[BB9/6363]**.

(ii) The construction of the SAT[46]

12. The construction of the SAT was carried out by LCAL and its sub-contractors, Fang Sheung Construction Company (rebar cutting, bending and fixing) and China Technology Corporation Ltd (formwork and concreting), from circa November 2015 to February 2017[47].
13. The SAT consists of the EWL which is an open trough structure; the L&R Tracks (which connect the EWL with the HHS); and, the NSL which is a box-section structure[48].
14. The steps and procedures for the construction of the SAT are set out in Method Statement No. 1112-CSF-LCA-CS-000542 and ITP no. 1112-CSF-LCA-CS-002819 for the EWL, and in Method Statement no. 1112-CSF-LCA-CS-000670 and ITP no. 1112-CSF-LCA-CS-003345 for the NSL[49].

(iii) The construction of the HHS[50]

15. The construction of the HHS structures was carried out by LCAL and its various sub-contractors from circa December 2014 to May 2017[51]. Due to the large geographical area of the HHS, MTRCL was unable to provide the HHS pour summary to the CoI until 14 June 2019[52]. Its key structures consisted of the underpinning works, the stabling siding tracks, the NFA (which connects the siding tracks with the EWL main line in the NAT), two L&R Tracks, eight accommodation blocks, two underpasses beneath the stabling sidings, and the emergency vehicular access[53].
16. The steps and procedures for the construction of the key structures within the HHS are set out in Method Statements and ITPs summarised in the witness statement of Kit Chan[54].

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[46] Paragraphs 1.2.1 to 1.2.2 of the SAT Letter **[BB1/24-25]**.
[47] Paragraphs 8 to 10 of the supplemental witness statement of Fu Yin Chit **[BB8/5215-5216]** and see the pour summary provided to the CoI **[BB13/8816]**.
[48] Paragraph 6 and Appendix E of the supplemental witness statement of Fu Yin Chit **[BB8/5214-5215, 5227-5231]**.
[49] Paragraph 7 of the supplemental witness statement of Fu Yin Chit **[BB8/5215]**.
[50] Paragraphs 1.2.1 to 1.2.2 of the HHS Letter **[BB1/35-36]**.
[51] Paragraphs 15, 20 and 21 of the witness statement of Chan Kit Lam **[BB8/5189-5190, 5192-5193]**.
[52] The pour summary was disclosed in three separate parts: (1) HHS Trackslab, Underpasses and 1875; (2) NFA; (3) Accommodation Blocks **[BB16/9780-9794]**. Since the date of disclosure of the pour summary it has been updated to incorporate Government's comments thereon and a revised pour summary was served upon the CoI on 14 June 2019.
[53] Paragraph 15 of the witness statement of Chan Kit Lam **[BB8/5189-5190]**.
[54] Paragraph 16 of the witness statement of Chan Kit Lam **[BB8/5190-5191**].

(iv) Safety of NAT, SAT and HHS

17. MTRCL's position is that the NAT (post the completion of the remedial works to the SJs and following the completion of the remedial works to the Shunt Neck CJ), SAT and HHS are already structurally safe, albeit to provide the public with an even greater degree of confidence in this respect, MTRCL has agreed with Government to develop 'suitable measures' as defined in the VP Report[55] which it is anticipated will be implemented in the future to ensure all statutory requirements, including the requirements in the Buildings Ordinance (Cap. 123) are satisfied.

III. <u>Adequacy of ground conditions for the construction of the SJs</u>

18. Paragraph 7 of the Opening Address by counsel for the CoI states the *'Commission's legal team observes […] that it remains unclear as to by whom, and upon what precise basis or criteria, a decision is taken that the ground conditions are such that the Stitch Joints can go ahead and be constructed'*.

19. MTRCL submits that the relevant contractual requirements are as follows:

    19.1 The Particular Specification under Contract 1112 provided that LCAL had to *'complete the stitching joint, including omega seal, rebar, and infill, concrete, after tunnel backfilling and stabilization of tunnel settlement'* (Interface Item 1.4 of Table Z2.1.1)[56];

    19.2 In a similar vein, working drawing no. 1112/W/000/ATK/C11/101A[57] provided in note 2 that the *'Stitch Joint shall be cast as late as possible in the construction sequence, and preferably after groundwater recharge, to minimise the amount of differential movement after casting. Casting shall not be carried out until after completion of backfilling'*;

    19.3 In terms of backfilling and groundwater recharge, BD accepted

[55] See Mayer Brown's letter to Lo & Lo dated 18 July 2019.
[56] See paragraph 7 of MTRCL's Opening Statement and **[BB1/424]**; see also paragraph 15(c) of the witness statement of Fu Yin Chit **[BB1/72]**.
[57] **[BB1/433]**; see also paragraph 15(c) of the witness statement of Fu Yin Chit **[BB1/72]**.

drawing no. 1112/B/352/ATK/C20/116E[58] provided, *inter alia*, as follows under *'Notes on Cut and Cover Tunnel'*:

'3. RECHARGE OF GROUNDWATER TO MIN. -0.5mPD SHOULD BE CARRIED OUT ONCE BACKFILL IS DONE TO +0.0mPD.';

19.4 As to the need to monitor differential settlement LCAL's William Holden said:

'[…] there's nothing within our contract that I can find where there's a quantity of "you are not allowed a certain amount of settlement beyond X millimetres over a period of time", and I wasn't there at the time, but we did monitor the structures throughout the period. So our only guide was that note on the drawing which has come up already, which is "as late as possible" and after completion of recharge. […] ***But I'm not aware of any monitoring or instrumentation or report that was required and approved by anyone – or it would have to be approved by the permanent works designer as their design requirement for stitching that structure together.***'[59] (Emphasis added).

20. The evidence before the CoI is that the construction of the SJs followed the sequence contemplated by the accepted design after backfilling and groundwater recharge (where applicable) had been completed:

20.1 In general terms, as explained by MTRCL's Michael Fu, LCAL had access to both sides of the interfacing structures at the SJs to monitor whether there were any differential movements[60]. Michael Fu further explained that:

'I believe our frontline colleagues would have very constant communication [with LCAL], and they would discuss the works progress, the works conditions, and whether there were anything abnormal that was spotted. I believe frontline colleagues would

[58] **[BB1/518]**.
[59] [**T8/72/11-73/1**].
[60] [**T10/98/6-19**].

discuss when the stitch joints should be built.'[61];

20.2 For the EWL tunnel, Michael Fu explained that no backfilling or groundwater recharge was required because:

'[…] Since it is a tunnel trough structure, ***it is on ground bearing, it did not have backfilling, it did not have ELS water discharge. In other words, when the main tunnel structures on the two sides were completed, there would not be any external additional loading on the EWL Tunnel structure****. So when the main tunnel structures on the two sides were completed, the stitch joint could be started.'*[62] (Emphasis added);

20.3 As for the NSL tunnels, Michael Fu explained that the structures had stabilised for a considerable period of time after the completion of backfilling and groundwater recharge:

'As for NSL Tunnel structure, since it is below ground level, it has ELS and water discharge. ELS is excavation and lateral support. When Leighton has completed the NSL Tunnel structure, it had to do backfilling up till a level, and then it could build the EWL Tunnel above it. ***In the series of backfilling and EWL Tunnel structure, when all these were completed, all the additional loading would have been in place. In the process of backfilling, water discharge would be stopped.*** *[…] When the tunnel structure on the two sides were completed, our contractor and our frontline staff would understand there would be one requirement, that the stitch joint should be constructed as late as possible.* ***So, when the NSL Tunnel structure was completed, we waited for over half a year, so the frontline staff could see that it had stabilised. Then they would think that the stitch joint could be constructed****.'*[63] (Emphasis added);

20.4 In the event, NSL Bays 5, 6 and 7 (i.e. including track slab, walls and roof) had all been completed by the end of November 2016, and the

[61] [**T10/99/9-14**].
[62] [**T10/100/14-23**].
[63] [**T10/100/24-101/18**].

SJs were constructed in July 2017[64]. As Michael Fu pointed out, any differential movements or other anomalies would have been visible to MTRCL and LCAL's frontline staff:

'I believe my frontline staff, they spent a lot of time on the site. Through visual inspection, they could see whether there was any obvious differential settlement of the two structures, and they could look at the peripheral settlement monitoring, which would provide good reference information.'[65]

21. MTRCL's and LCAL's factual evidence on this matter was not challenged during the hearing, and there is no evidence to suggest that there was any material differential settlement impacting on the safety or integrity of the SJs or the NAT structure as a whole or that the SJs were constructed on anything other than what should be regarded as 'adequate' ground conditions. As LCAL's William Holden pointed out:

'Q. […] it means it is also a possibility that the stitch joint was constructed too early, before the structure on both sides of the stitch joint had stabilised.

A. ***I would say that's unlikely, only because we did construct [the SJs on the NSL track level] at some time after, I think nine months after the original construction, which – the backfilling had been completed, including the groundwater recharge****. […]'*[66] (Emphasis added)

IV. MTRCL's material sampling and testing process[67]

22. According to LCAL's evidence in this CoI:

22.1 Approximately 7% (or 4,061.123 tonnes) of all the rebars (57,795.426 tonnes) delivered to the site have not been sampled and tested by a HOKLAS laboratory after delivery[68];

[64] See the relevant dates set out in the NAT Pour Summary **[BB9/6363]**.
[65] [**T11/19/3-8**].
[66] [**T8/115/13-18**].
[67] MTRCL's material sampling and testing process was summarised in paragraphs 24 to 29 of its Opening Statement **[OA1/5/9-10]**.
[68] Paragraph 60 of the 6th witness statement of Karl Speed **[CC6/3761]**; paragraph 7 of the 7th witness statement of Karl Speed **[CC11/7288]**; Table 1 in LCAL's letter to the BD dated 27 June 2019 **[DD12/13670]**. Currently, MTRCL is not in a position to agree with the figure of 4,061.123 tonnes (see paragraph 3.1.10 of the VP Report **[BB16/9965]**).

22.2 In other words, 92.97% of the rebars delivered to the site were sampled and tested, although for a very small number of batches (approximately 1.09% of all rebars sampled and tested), LCAL arranged for fewer samples to be tested than were required. On the whole, almost 93% of all rebars were tested by the manufacturer and also properly sampled and tested after delivery[69];

22.3 These figures are based on LCAL's review of its records, involving, *inter alia*, a comparison between rebar order/delivery records and records of rebars sampled and tested after delivery[70].

23. According to LCAL's Incident Investigation Report for Quality Event dated 25 June 2019[71], LCAL has identified five root causes for the lapses in the testing and sampling of rebars delivered to site:

23.1 Lack of communication between LCAL frontline, Engineer and Quality controller for the arrangement of rebar delivery and immediate rebar sampling;

23.2 Lack of compliance with regard to inspection with MTRCL for the sampling of rebars for testing;

23.3 Lack of communication between LCAL frontline, Engineer and Quality controller for the material control and storage arrangement of rebar delivered to site that should be separated into 'not tested' and 'tested';

23.4 Lack of control of rebar release process; and

23.5 Lack of communication and training of staff and rebar-fixing sub-contractor with respect to rebar control system.

24. The causes identified by LCAL are broadly consistent with the evidence before the CoI, which suggests that the colour-coded rebars indicating their different statuses may not have been consistently understood or adhered to by all of LCAL's frontline staff and/or sub-contractors[72]. Moreover, the untested rebars were often placed close to the relevant work areas and could

[69] Paragraph 7 of the 7th witness statement of Karl Speed **[CC11/7288]**; LCAL's letter to the BD dated 27 June 2019 **[DD12/13670]**.
[70] See the oral evidence of LCAL's Henry Lai at **[T5/6/19-8/20]**.
[71] **[DD12/13673-13676]**.
[72] See e.g. the oral evidence of LCAL's Joe Tam at **[T9/28/5-29/7]**; Raymond Tsoi at **[T10/75/14-21]**; Alan Yeung at **[T10/55/11-57/25]**; and paragraph 16 of the witness statement of Henry Lai **[CC1/91]**.

have been used before the requisite sampling/testing was complete[73].

25. In order for the sampling/testing system to function properly, LCAL had to properly discharge its contractual obligations by notifying MTRCL's inspectors of the delivery of rebars to the site and the need for sampling and testing:
    25.1 As the Chairman of the CoI noted and MTRCL's Michael Fu confirmed during the hearing, it was an arrangement of trust and the primary burden was on LCAL to notify MTRCL of new materials which had to be sampled and tested[74];
    25.2 MTRCL's Chris Chan explained that it would be difficult to identify untested rebars during rebar-fixing hold point inspections, as the colour-coded sections of the rebars could have been cut off already or the paint would have fallen off in any event[75];
    25.3 Further, as MTRCL's Victor Tung[76] (former SIOW) and Tony Tang[77] (IOW) said it would be very difficult for the inspectorate team to know that certain batches of rebars were untested if LCAL omitted to notify MTRCL of the deliveries;
    25.4 None of their evidence was challenged or doubted.
26. In light of the evidence, MTRCL acknowledges that improvement measures are needed in order to minimise the risk of rebars being used in future works before they have been properly sampled and tested after delivery. For instance, untested rebars can be stored in a separate and clearly cordoned-off location[78], and the use of digitised platforms and tools would facilitate improved site communication. MTRCL's continuous efforts to enhance its project management system are addressed in Section IX herein.
27. Nevertheless, MTRCL notes that the CoI has received extensive evidence to the effect that the use of a small number of rebars which have not been tested by a HOKLAS accredited laboratory does not pose any material concerns as

[73] See e.g. the oral evidence of LCAL's Henry Lai at **[T5/127/14-128/14]**; Raymond Tsoi at **[T10/75/14-21]**.
[74] **[T10/124/14-23**].
[75] [**T11/116/13-117/15**].
[76] [**T13/37/18-38/6; 41/3-42/5**].
[77] [**T12/142/21-144/7**].
[78] See the oral evidence of LCAL's Joe Tam at **[T9/29/8-18]**.

to the safety and integrity of the structures:

27.1 LCAL's Karl Speed emphasised that all rebars delivered to site were tested by the manufacturer and supported by mill test certificates (which often suffice in other countries)[79], and he confirmed this during cross-examination:

'[…] we have 100 per cent of the testing from the manufacturers, which is often used in other countries, […] 7 per cent of it has not been HOKLAS tested. But all the testing carried out on the project has passed'[80];

27.2 It bears emphasis that according to CS2[81], the types of test and testing criteria for manufacturer's testing and HOKLAS testing respectively are essentially the same – see, for instance, the tensile, bend and re-bend test criteria for manufacturer's testing (paragraphs 3.1.4 to 3.1.7 and 6.2 to 6.4 of CS2[82]), and the tensile, bend and re-bend test criteria for HOKLAS testing (paragraph 5.1.2 of CS2, which cross-refers to paragraphs 1.9.1.2, 1.9.1.3 and 6.3 to 6.4[83]);

27.3 LCAL's witnesses' unchallenged evidence was that all rebars delivered to the site were tested by the manufacturer and supported by mill test certificates, and that all the tests carried out by the HOKLAS laboratory were satisfactory[84]. This evidence is also consistent with the results shown in the steel bar test summary retrieved from the MTS[85];

27.4 Further, the VP Report concludes that 'suitable measures' are not required[86].

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[79] Paragraphs 62 to 63 of the 6th witness statement of Karl Speed **[CC6/3762]**; paragraphs 7 and 8 of the 7th witness statement of Karl Speed **[CC11/7288]**.
[80] [**T8/62/21-63/1**].
[81] **[BB2/1178-1213]** - these standards were applicable to Contract 1112 pursuant to paragraph 1.1.4 of Appendix 1.1 to the Materials & Workmanship Specification for Civil Engineering Works **[C5/3575]**.
[82] **[BB5/1194-1195; 1207-1209]**.
[83] **[BB5/1204]**.
[84] See paragraph 17 of the 2nd witness statement of Henry Lai **[CC6/3789]**; paragraph 25 of the witness statement of Raymond Tsoi **[CC6/3797]**; paragraph 24 of the witness statement of Sean Wong **[CC6/3807]**; paragraph 29 of the witness statement of Alan Yeung **[CC6/3826]**; paragraph 27 of the witness statement of Ronald Leung **[CC6/3834]**; paragraph 24 of the witness statement of Saky Chan **[CC6/3845]**; paragraph 30 of the witness statement of Daniel Teoh **[CC10/6504]**.
[85] **[BB2/543-1040]**.
[86] Paragraph 5.3 of the VP Report **[BB16/9980]**.

V. MTRCL's site surveillance and inspection process

28. In respect of the construction works at the NAT, SAT and HHS described above, MTRCL's ConEs and IOWs carried out routine site surveillance (in accordance with paragraph 5.7.1 of PIMS/PN/11-4 on "Monitoring of Site Works"[87]) and hold point inspections (in accordance with paragraph 5.1 of PIMS/PN/11-4 on "Request for Inspection (on and off site)")[88]. In particular, paragraph 5.1.1 makes provision for the preparation of the ITPs referred to above and paragraph 5.1.2 makes provision for the use of a standardised RISC form. There are lists of current and former MTRCL officers who were involved in the checking, inspection and testing of rebars and couplers for NAT, SAT and HHS as well as for the three SJs and the Shunt Neck CJ[89].

29. Dealing first with routine site surveillance:

    29.1 The MTRCL IOW team was primarily responsible for conducting daily surveillance to monitor the day-to-day site works of LCAL and its sub-contractors, and such site surveillance typically covered: general works being constructed/installed; general progress of site works; general site management; and, safety[90];

    29.2 For instance, Tony Tang covered the entire NAT (including the SJs and the Shunt Neck CJ) during his 4 to 5 hours of site surveillance every day, and if he observed any issue relating to the spacing and size of rebars being fixed or the coupler splicing assemblies, he would raise it with the workers on site and report the matter to the SIOW and/or the ConEs[91]. Similarly, Victor Tung spent around 7 hours every day carrying out site surveillance and hold point inspections in the HHS/SAT, covering the majority of areas with structural significance[92];

    29.3 The ConE team also conducted site surveillance by means of regular

[87] See e.g. Version A5 **[B3/1633]** and Version A6 **[B3/1679]**.
[88] See e.g. Version A5 [**B3/1627-1628**] and Version A6 [**B3/1673-1674**].
[89] See **[BB3/1796]** for NAT, SAT and HHS and **[BB4/2237]** for the three SJs and **[BB8/5117]** the Shunt Neck CJ.
[90] Paragraphs 18(iii) and 27 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5191, 5194];** paragraph 13 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5218-5219]**.
[91] Paragraphs 8 to 13 of the witness statement of Tang Siu Hang, Tony **[BB1/123]** (NAT).
[92] Paragraphs 10, 15 and 42 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5250, 5251, 5259]**.

site walks[93]. For instance, Chris Chan was assigned to both NAT and SAT from mid-2015 onwards, and conducted site walks on Wednesdays (general inspection) and Thursdays (safety issues) covering all areas of the site for which he was responsible (including the SJs and the Shunt Neck CJ) – if he observed any issues e.g. with the installation of couplers, he would raise them with LCAL[94]. Sebastian Kong (MTRCL's Graduate Engineer) adopted a very similar approach[95]. As a further example, Kappa Kang said that she carried out such routine inspections regularly[96] and that a routine inspection for safety took place on Thursday afternoon, but if there were concerns about the progress of work they would do more site walks in a week, for instance two or three times at least[97]. She also explained that during her site walks for routine inspections, she looked at the general conditions on site including progress of work, safety, environmental compliance and whether the couplers were connected[98];

29.4 Kappa Kang also elaborated upon her evidence concerning site surveillance and site inspections as follows: she took photos during the course of the routine inspections[99]; if there were any problems, she would send the photos to the WhatsApp groups[100]; if she did not send the photos to the WhatsApp group, she would keep them for her own record[101]; she knew that the MTRCL inspectors would take a lot of progress photos on site and they put them on a server called *"Site photos"* and that every day in different areas there were a lot of photos that would be stored there, albeit that she did not put her photos on that server[102];

29.5 In addition to routine site surveillance, MTRCL's staff also made *ad*

[93] Paragraph 18(iii) of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5191]**; paragraph 13 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5218-5219]**.
[94] Paragraphs 21 to 22 of the witness statement of Chan Chun Wai Chris **[BB1/116]** (NAT and SAT).
[95] Paragraphs 9 to 11 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5244-5246]**.
[96] **[T12/12/11-13]**.
[97] **[T12/11/23-12/21]**.
[98] [**T12/12/22-13/12**].
[99] **[T12/13/13-16]**.
[100] **[T12/13/17-14/5]**.
[101] **[T12/14/6-9]**.
[102] **[T12/14/10-21]**.

hoc visits upon LCAL's request to resolve specific site issues (e.g. safety, utilities or operations), and such visits would be for a specific purpose and at a specific location as per the request[103];

29.6 Importantly, it was not MTRCL's staff's responsibility to conduct any *'man-marking'* or continuous supervision over the rebar fixers when they were conducting their works[104]. To that end, the PMEs' opinion that MTRCL was not expected to conduct any *'man-marking'* during the EWL/NSL slab works[105] applies to the NAT, SAT and HHS works;

29.7 MTRCL's evidence on site surveillance: (a) is corroborated by the evidence of LEEL's Ng Man Chun who said that MTRCL's inspectors would conduct routine inspections around 5 to 7 times a day[106]; (b) is consistent with the evidence of LCAL's inspectorate team[107]; and, (c) was not challenged at the hearing;

29.8 Whilst it is undisputed that MTRCL's inspectorate team had conducted regular site surveillance, at the hearing the focus was on the quality of such site surveillance and, specifically, on the quality of the inspection of the coupler connections;

29.9 The general tenor of MTRCL's inspectorate team's evidence is that they either were not involved with couplers (in the case of Sebastian Kong during his short involvement at the HHS[108]), or did not receive any formal training by BOSA (in the case of Tony Tang who said that he only received training prior to the construction of the new SJs)[109]. However, despite his lack of formal training, the evidence that Tony Tang gave in respect of his inspection standard[110] was consistent with the tolerance level prescribed by BOSA[111], namely that one or two

[103] Paragraphs 21 and 23 of the witness statement of Chan Chun Wai Chris **[BB1/116]** (NAT and SAT)**.**
[104] Paragraph 36 of the witness statement of Tang Siu Hang, Tony **[BB1/129-130]** (NAT).
[105] Paragraphs 26 to 27 of the Joint Statement of the PMEs **[ER1/9/T-4]**.
[106] [**T3/53/17-54/5**].
[107] Paragraph 27 of witness statement of Henry Lai [**CC1/93**] (**NAT**), paragraph 13 of witness statement of Raymond Tsoi [**CC6/3792**] (SAT), paragraph 12 of witness statement of Sean Wong [**CC6/3801**] (SAT), paragraph 14 of witness statement of Jeff Lii [**CC6/3811**] (HHS), paragraph 14 of witness statement of Alan Yeung [**CC6/3820**] (SAT), paragraph 12 of witness statement of Saky Chan [**CC6/3840**] (SAT), paragraph 12 of witness statement of Ronald Leung [**CC6/3830**]
[108] [**T9/100/14-22**].
[109] [**T11/79/8-24**] (in respect of Chris Chan); [**T12/53/23-54/22**] (in respect of Kappa Kang) and [**T12/140/13-144/4**] (in respect of Tony Tang).
[110] Only Tony Tang was asked questions on the specifics of the extent of exposed threads.
[111] [**DD1/106**].

exposed threads were considered acceptable. In any event, the consistent evidence before the CoI is that the coupler splicing assemblies were checked by qualified professionals and in accordance with manufacturer's recommendations[112];

29.10 Further, LEEL (who was responsible for rebar-fixing at the NAT and HHS) also confirmed that the lack of proper coupler connections only took place at the original SJs[113].

30. Secondly, in relation to hold point inspections:

30.1 When LCAL's works reached a hold point, the expected normal practice was for LCAL to submit a RISC form to MTRCL's AA. The RISC form would then be passed on to the SIOW for him to distribute to the relevant IOWs or ConEs to conduct an inspection for their respective areas[114];

30.2 The process by which MTRCL's AAs and IOW team dealt with incoming RISC forms has been neatly summarised in the witness statement of Tony Tang[115]. In essence, the RISC forms were in four layers of white, pink, yellow and blue respectively – LCAL would keep the blue carbon copy of the RISC form before submitting it to MTRCL, and once MTRCL's IOW/ConE had completed the inspection and filled in Parts B and C of the form, the SIOW would endorse the RISC form and return it to LCAL. Lastly, LCAL would sign off the *'Contractor's Confirmation of receipt'* at the bottom of the RISC form and return the pink and yellow carbon copies to MTRCL. The foregoing summary is supplemented by the evidence of the Police Statements of LCAL's Wong Ho Lam[116] and MTRCL's Audrey Fung[117], which together describe a cumbersome procedure whereby multiple copies of a RISC form were handled by different personnel from LCAL and MTRCL. The significance of the foregoing

[112] See Kit Chan's evidence that proper inspections of the coupler connections were carried out despite the lack of formal record-keeping (i.e. in a log book as required for non-ductile couplers) [**T14/40/6-41/10**].
[113] [**T4/40/20-25**].
[114] Paragraph 18 of the witness statement of Chan Chun Wai Chris **[BB1/115]**.
[115] Paragraph 15 of the witness statement of Tang Siu Hang, Tony **[BB1/123-125]**; see also paragraphs 30 to 32 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5195-5196]**.
[116] [**CC10/6212-6217**].
[117] [**BB13/8805-8815**].

is further dealt with in Section VI herein;

30.3 The ConEs were typically responsible for inspecting the rebar fixing works as they had the most up-to-date working drawings and the relevant DAmS and RFI responses, against which the diameter, spacing, layering and lap length of the rebars and the arrangement of starter bars (if any) and shear links (if any) would be checked[118]. The inspections were, in relative terms, a simple and straightforward matter;

30.4 For the NAT and SAT, the rebar fixing inspections were in fact delegated by MTRCL's Chris Chan to the ConE II and IOWs in his team in or around mid/late 2017, when he became pre-occupied with a number of significant interfacing issues involving various designated contractors[119]. For the HHS, Ben Chan (ConE I) similarly delegated some of the rebar fixing inspections to other members of his team e.g. Sebastian Kong and Victor Tung[120];

30.5 In addition to assisting with some of the rebar fixing inspections, upon the ConEs' request the IOWs routinely carried out other hold point inspections at a number of stages including concrete blinding, waterproofing, cathodic protection, formwork, and the pre-pour check[121], and kept record photos thereof. In particular, the IOWs' pre-pour checks focussed on checking for cleanliness and debris[122].

31. LCAL was persistently behind in terms of paperwork and often failed to submit RISC forms timeously or at all for the relevant hold point inspections, contrary to the expected normal practice[123]. Nevertheless, MTRCL's inspectorate staff maintains that the requisite hold point inspections were in fact carried out based on LCAL's verbal notifications (in person or by

[118] Paragraph 24 of the witness statement of Chan Chun Wai Chris **[BB1/116-117]** (NAT and SAT); paragraph 9 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5244-5245].**
[119] Paragraph 24 of the witness statement of Chan Chun Wai Chris **[BB1/116-117]** (NAT and SAT)**.**
[120] Paragraphs 9 to 11 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5244-5246]**; paragraphs 16 to 17 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5252]**.
[121] Paragraph 11 of the witness statement of Tang Siu Hang, Tony **[BB1/123]** (NAT); paragraphs 15, 18 and 41 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5251-5252, 5258]**; paragraph 18 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5191-5192]**; paragraph 13 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5218-5219]**.
[122] Paragraphs 29 to 34, 49 to 51 of the witness statement of Tang Siu Hang, Tony **[BB1/127-129, 133]** (NAT); paragraph 18 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5252]**; paragraph 18(v) of the witness statement of Chan Kit Lam (NAT, SAT, HHS) **[BB8/5192]**; paragraph 13 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/ 5218-5219]**.
[123] See further Section VII below.

phone)[124], a contention that LCAL's witnesses corroborate[125], and permission to proceed was mostly given verbally to LCAL.

32. In relation to QSP for coupler splicing assemblies, MTRCL's position is as follows[126]:

32.1 For the HHS, the relevant acceptance letters[127] did not contain any specific requirements for couplers or require any QSP. This is in line with Government's position[128];

32.2 For the SAT, paragraph 3 of Appendix IX to the acceptance letter dated 25 February 2013[129] required a QSP for Type II couplers (i.e. couplers for rebars with ductility requirement). There is no such requirement under Appendix X[130] for Type I couplers (i.e. couplers for rebars without ductility requirement). MTRCL accepts that the QSP applied to the ductility requirements in the diaphragm wall as shown in the accepted drawings;

32.3 For the NAT, the acceptance letter dated 5 November 2014[131] for the Contract 1112 works contained requirements for Type I couplers in Appendix V, which did not require any QSP. This is in line with Government's position[132]. Appendix XI of the acceptance letter dated 11 July 2013[133] for the Contract 1111 side of the SJ/Shunt Neck Joint works required a QSP for Type II couplers.

VI. Lack of inspection and supervisory records

33. MTRCL acknowledges that there are gaps in the RISC form records in

[124] Paragraph 19 to 20 of the witness statement of Chan Chun Wai Chris **[BB1/115]** (NAT and SAT)**;** paragraphs 9 and 14 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB5244-5245, 5246-5247]**; paragraphs 27 to 30 of the witness statement of Tang Siu Hang, Tony **[BB1/127-128]** (NAT); paragraph 13 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5251]**.
[125] Paragraphs 16, 34 and 52 of the 6th witness statement of Karl Speed **[CC6/3754, 3757, 3760]** (NAT, SAT and HHS); paragraphs 7 to 11 of the 2nd witness statement of Henry Lai **[CC6/3787-3788]** (NAT); paragraphs 21 to 23 of the witness statement of Raymond Tsoi **[CC6/3795-3796]** (SAT); paragraphs 20 to 22 of the witness statement of Sean Wong **[CC6/3805-3806]** (SAT); paragraphs 22 to 25 of the witness statement of Jeff Lii **[CC6/3814-3815]** (HHS); paragraphs 23 to 26 of the witness statement of Alan Yeung **[CC6/3824-3825]** (SAT); paragraphs 20 to 22 of the witness statement of Saky Chan **[CC6/3844-3845]** (SAT); paragraphs 21 to 24 of the witness statement of Ronald Leung **[CC6/3833-3834]** (HHS).
[126] [**T2/65/3-68/15**].
[127] **[DD8/11433-11646]**; paragraph 11 of the 4th witness statement of Lok Pui Fai **[DD7/10294-10295]**.
[128] Paragraph 26 of Government's Opening Statement **[OA1/6/11-12]**.
[129] **[DD8/10938]**; paragraph 13 of the 3rd witness statement of Lok Pui Fai **[DD7/10289]**.
[130] **[DD8/10940-10942]**; paragraph 13 of the 3rd witness statement of Lok Pui Fai **[DD7/10289]**.
[131] **[DD7/10327-10344]**; paragraph 8 of the 2nd witness statement of Lok Pui Fai **[DD7/10273]**.
[132] Paragraph 26 of Government's Opening Statement **[OA1/6/11-12]**.
[133] **[CC1/307-310]**; contrary to paragraph 29 of the 2nd witness statement of Lok Pui Fai **[DD7/10280]**.

respect of the hold point inspections carried out at the NAT, SAT and HHS[134]. This is an administrative/procedural issue, given that RISC forms do not constitute a statutory or regulatory requirement[135]. The requirement for RISC forms stems from paragraph 5.1 of PIMS/PN/11-4 and is contractual in nature (as part of quality assurance)[136].

34. As to the RISC forms' (limited) contractual significance:

    34.1 The Government did not regard the RISC forms as important enough to expressly mandate in its contract with Pypun that the RISC forms formed part of Pypun's audit[137]; and

    34.2 The CoI will recall that MTRCL's Kit Chan gave evidence to the effect that there was no requirement to keep the RISC forms after project completion[138]. At the request of the CoI, on 19 June 2019[139], MTRCL provided PIMS/PN/02-4/A1[140] to the CoI;

    34.3 Part A of paragraph 7.3 of PIMS/PN/02-4/A1 summarises the Project Records into 22 categories and states that those that needed to be handed over in hard copies are earmarked and elaborated in Part B Retention Schedule[141]. For concrete structures, RISC forms are assigned category 11.47.1[142]. As category 11.47.1 is not asterisked[143], hard copies of RISC forms are destroyed after project completion. Consistent with the foregoing, under Part B of paragraph 7.3, documents falling within category 11.47.1 are not required to be handed over following project completion[144].

35. There was a consensus amongst MTRCL's and LCAL's senior personnel that there was room for improvement in respect of the RISC forms procedure which was in place for Contract 1112 at the material time. For example:

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[134] Kit Chan proffered 5 reasons behind the non-submission of RISC forms namely: (1) individual performance; (2) importance or otherwise of the pours; (3) non-user-friendly nature of the RISC forms in today's construction environment; (4) potential delay which might be occasioned to the works if the RISC form procedure was strictly adhered to; and, (5) RISC form not a statutory requirement. [**T14/1/20-2/22**].
[135] Paragraph 22 (footnote 1) of the 2nd witness statement of Lok Pui Fai **[DD7/10277]**; paragraph 11 of the 3rd witness statement of Lok Pui Fai **[DD7/10288-10289]**; paragraph 9 of the 4th witness statement of Lok Pui Fai **[DD7/10294]**.
[136] See the exchanges between Professor Hansford and the Chairman and counsel for the Government and for the CoI [**T7/59/13-64/23**].
[137] See Ralph Li's evidence [**T15/53/2-15**].
[138] [**T14/9/13-10/22]**.
[139] [**BB16/9837**].
[140] [**BB16/9838-9865**].
[141] **[BB16/9849**].
[142] [**BB16/9854**].
[143] [**BB16/9850**].
[144] [**BB16/9858**].

35.1 LCAL's Project Director, Jon Kitching, described the RISC form process as antiquated and said that there was a *"big reliance"* on WhatsApps and emails which were not as regulated as a more formal system would be. For a fast-track and highly complex job, Jon Kitching was of the view that the RISC forms were cumbersome and complicated as the RISC forms were expected to be submitted days in advance[145] when the works might not have finished days in advance as LCAL tended to work almost to 'just-in-time' delivery[146];

35.2 LCAL's General Manager, Karl Speed, described the RISC form process as cumbersome and the frontline staff *"found some technology to work around"* but acknowledged that the alternative was not a structured process[147]. He further referred to *"Construction 2.0 Time to Change"* [148] to make the points that the construction industry as a whole was looking at ways to improve cost, time and quality and that such initiatives are being pursued by LCAL to simplify and speed up the RISC form process[149];

35.3 MTRCL's Construction Manager, Kit Chan, commented that the RISC form process was time-consuming and labour-intensive and had originated some 40 years ago when the construction industry was different, as the structures that were being built were simpler and there were fewer stakeholders to deal with. He further suggested that the RISC form process was not practical and the industry should devise methods to simplify the process with new technology[150].

36. It is submitted that Kit Chan's comment that the RISC form process was time-consuming and labour-intensive is justified. As demonstrated by the evidence contained in the Police Statements of LCAL's Wong Ho Lam and MTRCL's Audrey Fung:

36.1 On LCAL's side, Wong Ho Lam said the RISC Form had to be

[145] Under GS 12.4.1 and 12.4.3 [**C3/2118**] cited in the NCRs issued for lack of RISC Forms (see e.g. [**BB9/6349]**), RISC forms should be submitted not less than 3 days of normal working time before the work was ready for final inspection.
[146] [**T6/120/1-11**].
[147] [**T8/33/4-7**].
[148] Published by the Development Bureau of the Hong Kong Government, dated September 2018, https://www.hkc2.hk/en/.
[149] [**T8/12/5-24**].
[150] [**T13/130/10-25**].

generated in draft by an engineer using a proprietary system (INCITE), which draft would then be issued separately by LCAL's Document Control Team and then distributed by yet another team, namely LCAL's administrative staff[151]. LCAL's Jeff Lii complained about the INCITE system being non user-friendly and difficult to edit documents[152], to the extent that he filled out a particular RISC form involving many locations (specifically columns) by hand[153];

36.2 On MTRCL's side, Audrey Fung said that upon receipt of RISC forms from LCAL she would input the RISC forms into the RISC Forms Register and then place the RISC forms on the desk of the responsible SIOW or SIOW II who would then further distribute the same to the relevant ConE or IOW. Audrey Fung's understanding was that her colleagues with access rights could access the RISC Forms Register for updating purposes[154].

37. Those facts and matters set out in paragraphs 33 and 34 above contributed to the relaxation of the RISC form requirements and, no doubt, the existence of some of the anomalous records which the CoI explored with various witnesses. As the Chairman noted[155], the relaxation of the RISC form requirements allowed an unstructured and casual system to evolve which created uncertainties, one being that there was no formal record of re-bar fixing having been satisfactorily completed and further progress to concreting relying on informal checks carried out between MTRCL's ConEs and the IOWs. Such uncertainties are precisely those which the current project management initiatives (see Section IX herein) are directed to cure. As the Chairman observed, the CoI has been aware of a number of sources advocating the need for technology and simplification of the process[156].

38. However, the absence of RISC forms does not mean no inspections were carried out or that LCAL's non-conformances went by unchecked:

[151] Paragraphs 6-7 of the Police Statement of Wong Ho Lam [**CC10/6214-6215**].
[152] [**T7/15/9-21**].
[153] [**T7/27/18-28/13**].
[154] There is a lack of clarity as to who was responsible for updating the RISC Forms Register following completion of an inspection. MTRCL's Kappa Kang gave evidence that she was not so responsible [**T12/18/3-7**]. It appears that MTRCL's Tony Tang may have retracted from his original position that whoever carried out the inspection would be responsible for updating the RISC Forms Register [**T12/79/9-13**].
[155] [**T13/133/11-22**].
[156] [**T13/135/12-16**].

38.1 The general tenor of MTRCL's evidence is that the ConEs/IOWs did carry out the requisite hold point inspections and give permission to LCAL before the works proceeded to the next stage[157], which is consistent with the evidence of LCAL and W&K's sub-sub-contractor, LEEL[158];

38.2 It is important to note that the RISC forms were by no means the only source of contemporaneous records of the construction works and the inspections carried out by MTRCL. MTRCL's IOW team has kept daily photographic records of its daily site surveillance and formal hold point inspections[159];

38.3 In addition, MTRCL's IOW team created WhatsApp groups which recorded the *modus operandi* of the hold point inspection process. A number of examples were given by MTRCL's Victor Tung in respect of the works carried out at the Northern Underpass[160]. Indeed, the CoI heard evidence that the *modus operandi* adopted by Victor Tung enabled him to fill out a substantial number of RISC forms despite their late submission by LCAL[161];

39. In order to provide further confidence of the fact that hold point inspections did take place irrespective of gaps in the RISC form records, MTRCL has engaged WSP as an independent audit consultant to verify that works in the NAT (including the re-construction of the SJs in 2018, but excluding the original construction of the SJs), SAT and HHS were properly inspected[162]:

39.1 WSP reviewed the RISC forms provided by MTRCL for any inconsistencies and/or irregularities. Further, where RISC forms are

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[157] Paragraph 20 of the witness statement of Chan Chun Wai Chris **[BB1/115]** (NAT and SAT); paragraphs 16 and 28 of the witness statement of Tang Siu Hang, Tony **[BB1/125, 127]** (NAT); paragraphs 13 to 15 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5246-5247]**; paragraphs 32, 35 and 36 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5254-5257]**.

[158] Paragraphs 16, 34 and 52 of the 6th witness statement of Karl Speed **[CC6/3754, 3757, 3760]** (NAT, SAT and HHS); paragraphs 7 to 11 of the 2nd witness statement of Henry Lai **[CC6/3787-3788]** (NAT); paragraphs 21 to 23 of the witness statement of Raymond Tsoi **[CC6/3795-3796]** (SAT); paragraphs 20 to 22 of the witness statement of Sean Wong **[CC6/3805-3806]** (SAT); paragraphs 22 to 25 of the witness statement of Jeff Lii **[CC6/3814-3815]** (HHS); paragraphs 23 to 26 of the witness statement of Alan Yeung **[CC6/3824-3825]** (SAT); paragraphs 20 to 22 of the witness statement of Saky Chan **[CC6/3844-3845]** (SAT); paragraphs 21 to 24 of the witness statement of Ronald Leung **[CC6/3833-3834]** (HHS); paragraphs 15(12) and 34 of the witness statement of Ng Man Chun **[EE1/348, 354]**; **[EE1/371.9, 371.17]** (NAT and HHS).

[159] Paragraph 12 of the witness statement of Tang Siu Hang, Tony **[BB1/123]** (NAT); paragraphs 10, 14, 25, 32 and 36 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5250-5251, 5253-5255, 5257]**.

[160] Paragraph 33 of the witness statement of Tung Hiu Yeung **[BB8/5255]** and paragraph 4 of the 2nd witness statement of Tung Hiu Yeung **[BB14/9497.2-9497.3]**.

[161] **[T13/20/18-22/17]**.

[162] Paragraphs 11 to 18 of the witness statement of Peter Ewen **[BB8/5155-5157]**.

not available for audit at this time, WSP evaluated the supplementary documentation and information available (e.g. photos and site diaries) to determine whether there was sufficient evidence of the hold point inspections in question, with the audit outcome signified by "red" (no supporting materials), "yellow" (insufficient supporting materials) or "green" (sufficient supporting materials);

39.2 The said exercise has culminated in two reports on the NAT[163] and the SAT[164] respectively dated 15 May 2019, while the report for the HHS will shortly be provided to the CoI and in relation to which MTRCL reserves the right to make further submissions as and when it has had an opportunity to consider and digest contents of the same;

39.3 The latest findings of WSP's reports demonstrate that for the essential hold point inspections on key structural elements of the NAT and SAT works, WSP has assigned "green" audit results for most essential inspections for the NAT and all of the essential inspections for the SAT – consistent with MTRCL's evidence.

40. The consistent evidence of MTRCL's ConE and IOW teams is that the gaps in the RISC form records were occasioned by LCAL's omissions during the construction works, despite MTRCL's repeated complaints to LCAL[165]. For example, LCAL's engineer, Henry Lai told the CoI that: as regards the failure to submit RISC forms, his intention was to issue them on the same day, but he failed to do so[166]; he accepted that he ought to issue them one to two days afterwards, but then he forgot to do it[167]; he understood that MTRCL expected him to issue those RISC forms, albeit late[168], but he did not issue those RISC forms because he was too caught up with the work and he just forgot to do it[169]; he went to his superiors and said he forgot to do the

[163] **[BB11/7625-7646].**
[164] **[BB13/9199-9218].**
[165] Paragraphs 19 to 20 of the witness statement of Chan Chun Wai Chris **[BB1/115]** (NAT and SAT); paragraphs 16 to 22 of the witness statement of Tang Siu Hang, Tony **[BB1/125-126]** (NAT); paragraphs 12 to 15 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5246-5247]**; paragraphs 20 to 32, 36, 39 and 40 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5252-5255, 5257-5258]**; paragraphs 19 to 30 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5223-5225]**; paragraphs 36 to 41 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5197-5198]**.
[166] **[T5/10/3-4]**.
[167] **[T5/10/5-9]**.
[168] **[T5/10/22-11/1]**
[169] **[T5/11/5-6]**.

RISC forms as he was just too busy[170]. As to further evidence relating to this aspect of the matter:

40.1 As already described above, the expected normal practice was for LCAL to submit a RISC form in good time before the intended date of the hold point inspection – it would not suffice to issue the RISC form within hours of the intended inspection. In the event, LCAL's paperwork was persistently behind the actual progress of the works and the RISC forms were not submitted timeously;

40.2 At times, LCAL submitted the RISC forms after the hold point inspection, but as time went by LCAL progressively failed to do so (e.g. due to the lack of resources[171]). Where RISC forms were only received after the relevant hold point inspections, the ConEs/IOWs often marked those forms as *'late submissions'* and recorded the date/time of the inspections by reference to the record photos they had taken;

40.3 The WhatsApp groups created by MTRCL's IOW team illustrated the above issues. For instance, in the *'HHS Inspection Group'* (which was later superseded by the *'Inspection Group'*), LCAL often requested hold point inspections by promising that the RISC form would follow later or by sending through a photograph of a proposed RISC form, and on one occasion in December 2015, LCAL sent through four months' worth of RISC forms in one go[172];

40.4 The reality in the field was that had MTRCL insisted on receiving each and every RISC form before the works were allowed to proceed, there would have been significant and unacceptable delays to all of the works. For this reason, MTRCL's ConEs/IOWs adopted a collaborative approach and acceded to LCAL's verbal requests for hold point inspections, relying in good faith on LCAL's assurance that

[170] **[T5/12/11-17]**.
[171] Paragraph 6 of the 2nd witness statement of Henry Lai **[CC6/3787]** (NAT); paragraph 20 of the witness statement of Raymond Tsoi **[CC6/3795]** (SAT); paragraph 19 of the witness statement of Sean Wong **[CC6/3804-3805]** (SAT); paragraph 22 of the witness statement of Alan Yeung **[CC6/3824]** (SAT); paragraph 19 of the witness statement of Saky Chan **[CC6/3843]** (SAT); paragraph 21 of the witness statement of Jeff Lii **[CC6/3814]** (HHS); paragraphs 19 to 20 of the witness statement of Ronald Leung **[CC6/3832-3833]** (HHS).
[172] Paragraph 32(5) of the witness statement of Tung Hiu Yeung **[BB8/5255]**.

the requisite paperwork had been submitted or would be made good subsequently (which often turned out not to be the case).

41. Importantly, various members of MTRCL's CM team have, on numerous occasions, made complaints and requests to LCAL for the late/missing RISC forms, in an attempt to address LCAL's persistently poor performance in respect of RISC form submissions:

    41.1 As early as 2014, MTRCL's SIOW at the time, Dick Kung complained to LCAL's Kevin Harman about deficiencies in RISC form submissions[173], which prompted LCAL to consider possible avenues for improvement[174];

    41.2 Kit Chan, MTRCL's Construction Manager for Contract 1112 from November 2014 to May 2016, first raised the issue with LCAL in or around May 2015, and LCAL's Kevin Harman conducted investigations and identified in a series of documents titled *'MTR Outstanding Submission Responses 5-Week Rolling View'* that LCAL was making *'late RISC submissions'* (Item 36A) and *'not submitting RISC records inspection requests'* (Item 36B). LCAL did not have any immediate solution to resolve the problem, and the planned dates for resolution were continuously deferred[175];

    41.3 CK Cheung, a MTRCL's ConE II, issued an email dated 15 May 2015[176] to LCAL's Roger Lai about late submissions of RISC forms for the works at 1875 MH035-034, pointing out that a one-month delay in submitting RISC forms was unacceptable[177];

    41.4 Sebastian Kong, MTRCL's Graduate Engineer at the time with responsibility for the HHS area, said that on a number of occasions he reminded LCAL's Matthew Tse and Jeff Lii to submit the relevant RISC forms for sign-off when he met them on site or spoke to them over the phone, but LCAL failed to follow-up on those reminders[178];

[173] **[BB8/5787-5788]**.
[174] Paragraph 21 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5252-5253]**.
[175] Paragraphs 36 to 41 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5197-5198]**.
[176] **[BB8/5690-5691]**.
[177] Paragraph 22 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5253]**.
[178] Paragraph 15 of the witness statement of Kong Sebastian Sai Kit (HHS) **[BB8/5247]**.

41.5 Tony Tang, MTRCL's IOW who was responsible for the NAT area, made repeated oral complaints between 2016 and 2017 to LCAL's Henry Lai, Chan Hon Sun and Joe Tam. He also raised the issue with Kenneth Kong (MTRCL's SIOW at the time), who issued an email to LCAL's representatives dated 24 March 2017[179] complaining about LCAL's failure to submit RISC forms for hold point inspections at the NAT, SAT and HHS, and requested LCAL *'to take immediately [sic] follow up action for this issue'*[180];

41.6 Victor Tung, MTRCL's SIOW II at the time who was responsible for the SAT and the HHS areas, created a number of WhatsApp groups to keep records and facilitate communication. For example, on 30 June 2015, MTRCL attempted to chase LCAL for *'hardcopy of inspection form'* in the *'HHs1875 MH34-36'* and *'New underpass'* groups, and similar complaints were made in the *'HHS Inspection Group'*/*'Inspection Group'*[181];

41.7 The CoI will no doubt recall that LCAL's witnesses' evidence given in cross-examination readily acknowledged the fact that complaints were in fact made by MTRCL[182], or that such complaints were made substantially earlier than LCAL's original position[183].

42. To this date, MTRCL has conducted a number of searches to identify the RISC forms which appear to be missing, and there are currently 138 outstanding NCRs in relation to missing RISC forms for the NAT, SAT and HHS (the position of which is under on-going review):

42.1 On 17 April 2018, MTRCL issued 69 NCRs for the NAT and 31 NCRs for the SAT to record the RISC forms which were considered to be missing. 12 of those NCRs were closed out in June/July 2018 upon LCAL's clarification that the relevant RISC forms had been submitted, and a further 11 NCRs were identified as double-counted[184];

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[179] **[BB4/2245-2247]**.
[180] Paragraphs 25 to 28 of the witness statement of Tang Siu Hang, Tony **[BB1/126-127]** (NAT); also paragraphs 4 to 5 of the 4th witness statement of Joe Tam **[CC6/3784-3785]**.
[181] Paragraphs 26 to 32 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5253-5255]**.
[182] See Henry Lai's evidence [**T5/103/9-108/14**].
[183] See Joe Tam's evidence [**T8/177/8-184/13**].
[184] Paragraphs 19 to 23 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5223-5224]**.

42.2 On 10 July 2018, MTRCL issued 47 NCRs for the NAT and 9 NCRs for the SAT to record the RISC forms which were also considered to be missing after further investigations[185];

42.3 On 7 March 2019, MTRCL issued one NCR to record all the RISC forms which were considered to be missing for the HHS after an extended investigation[186];

42.4 On 15 March 2019, MTRCL issued 4 more NCRs for the NSL structure in the SAT to record the RISC forms which were also considered to be missing after further investigations[187];

42.5 On 25 April 2019, MTRCL issued three letters (in respect of the NAT, SAT and HHS respectively) [188], requesting LCAL to provide information regarding, *inter alia*, the missing RISC forms, records of continuous supervision of works, relevant reports produced or investigations undertaken by LCAL, evidence to demonstrate that any irregularities found had been fully rectified, assurance as to the safety and integrity of the works, and proposals on how to close out the NCRs and to demonstrate and provide confidence in the safety and structural integrity of the works[189].

42.6 NCRs nos. 204 to 217 and 246 to 247 related to the missing RISC forms for the three SJs. It is expected that these NCRs will be closed out upon the completion of all the remedial works[190].

VII. <u>Defective SJs and Shunt Neck CJ at the NAT</u>

(i) Discovery and remediation of defective SJs in 2018[191]

43. As set out in section 2 of the 2nd NAT Report[192]:

43.1 MTRCL observed water seepage at the newly completed NSL SJs during routine site surveillance. Cement and PU grouting works were carried out by LCAL from October 2017 onwards but did not

[185] Paragraphs 24 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5224]**.
[186] Paragraph 25 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5224]**.
[187] Paragraph 25 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5224]**.
[188] **[BB13/8788-8789, BB14/9414-9415, BB9/6361-6362]**.
[189] Paragraph 29 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5225]**.
[190] Paragraph 28 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5225]**.
[191] Paragraphs 1.18, 1.23 to 1.27 of the NAT Letter **[BB1/6-8]**.
[192] **[AA1/58]**.

effectively resolve the water seepage;

43.2 From 6 to 8 February 2018, MTRCL instructed LCAL to chip off the concrete at three locations to expose the rebars at the 1111/1112 NSL SJ for investigation, which revealed that some rebars at the SJ were not properly spliced, only being slotted into the couplers[193]. Further investigations at the 1112/1112 NSL SJ and the 1111/1112 EWL SJ from 9 to 12 February 2018 revealed similar defects in the coupler splicing assemblies.

44. As a result, MTRCL issued three NCR to LCAL in 2018 to record LCAL's defective workmanship[194]:

44.1 NCR 066 (22 December 2017 - water seepage and cracks identified at the 1111/1112 NSL SJ)[195];

44.2 NCR 095 (9 February 2018 - water seepage, cracks, defective coupler splicing assemblies identified at the 1111/1112 NSL SJ and 1111/1112 EWL SJ)[196];

44.3 NCR 096 (14 March 2018 - water seepage, cracks and defective coupler splicing assemblies identified at the 1112/1112 NSL SJ)[197].

45. MTRCL understands from LCAL that following the receipt of NCRs 095 and 096, LCAL issued an internal NCR to W&K on 19 March 2018, and it was decided after a meeting that W&K would not be carrying out the remedial works[198].

46. The remedial works on the defective SJs were carried out by LCAL from March to July 2018[199]. In summary:

46.1 The remedial works were governed by Method Statements no. 1112-CSF-LCA-CS-000922 (EWL), 1112-CSF-LCA-CS-000921 (NSL), and 1112-CSF-LCA-CS-000940A (NSL) respectively[200]. MTRCL's

[193] Paragraph 29 of the witness statement of Fu Yin Chit **[BB1/80]**; see also William Holden's observation during his inspection of the rebar and coupler connections at the time: paragraphs 20 and 21 witness statement of William Holden **[CC1/75]**; **[T8/73/9-76/23]**.
[194] Paragraph 35 of the witness statement of Fu Yin Chit **[BB1/83]**; see also William Holden's observation during his inspection of the rebar and coupler connections at the time: paragraphs 22 and 23 witness statement of William Holden **[CC1/75]**; **[T8/77/11-78/20]**.
[195] **[BB7/5087-5098]**.
[196] **[BB7/5099-5111]**.
[197] **[BB7/5112-5115]**.
[198] See paragraph 4 of LCAL's letter to MTRCL dated 4 October 2018 **[BB7/5083]**.
[199] Paragraph 36 of the witness statement of Fu Yin Chit **[BB1/83]**; paragraphs 20 to 29 of the witness statement of Lee Chiu Yee, Jacky **[BB1/98-102]**.
[200] **[BB7/4717-4737]**, **[CC3/1914-1972]** and **[BB7/4778-4843]** respectively.

Construction Manager, Michael Fu, confirmed that the remedial works were carried out in accordance with the Method Statements, that there was also a QSP for such remedial works and that there were also log book records for the same[201];

46.2 If the existing couplers were damaged and/or could not be re-used, post-drilled rebars with couplers would be installed using Hilti HIT-HY 200 Injectable Mortar. Otherwise, if the existing couplers could be re-used, appropriate lapping rebars would be screwed into the couplers;

46.3 MTRCL implemented a quality assurance and control system for the remedial works. The final updated versions of the QSP for BOSA Type II couplers and Lenton couplers were submitted by MTRCL to RDO by letter dated 26 March 2018[202]. The Quality Assurance Scheme was submitted to the RDO by letter dated 27 July 2018[203];

46.4 As per the BOSA and Lenton QSPs, the TCP stated in the SSP were also responsible for the quality control of the remedial works. However, MTRCL was responsible only for inspecting 20% of the splicing assemblies, whereas LCAL was responsible for providing full-time and continuous supervision;

46.5 By letter dated 22 March 2018, MTRCL submitted the updated SSPs to the RDO[204] with the relevant TCPs for the supervision and inspection of the remedial works (these SSPs were further updated by MTRCL's letters dated 14 June 2018[205] and 21 August 2018[206] respectively);

46.6 LCAL has duly signed and MTRCL has checked and countersigned the BOSA and Lenton coupler checklists[207] and the BOSA and Lenton thread preparation records[208], in compliance with the BOSA and Lenton QSPs respectively.

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[201] [**T11/45/10-46/19**].
[202] **[BB7/4424-4459]**.
[203] **[BB7/4460-4716]**.
[204] **[BB7/4844-4874]**.
[205] **[BB7/4875-4899]**.
[206] **[BB7/4900-4916]**.
[207] **[BB7/4278-4389]**.
[208] **[BB7/4917-4956]**.

47. The quality and structural safety of the remedial works are of paramount importance to MTRCL, and from 22 March to 1 June 2018 Aidan Rooney (MTRCL's General Manager – SCL Civil – NSL at the time) deployed an IQCT on site:

    47.1 The IQCT consisted of Cano Ngai (SConE), YS Cheung (SIOW), Kine Tong (ConE) and John Leung (ConE) (all with no prior involvement in Contracts 1111 or 1112), who oversaw the remedial works for the defective SJs every day, witnessed the hold point inspections for the rectification works, and worked very closely with MTRCL's inspectorate staff on site[209]. Cano Ngai actually gave evidence at the hearing and explained that: he headed up the IQCT which oversaw the remedial works for the SJs[210]; the other members of the IQCT, like himself, were unrelated, and hence independent, to Contract 1112 prior to their involvement in the IQCT[211]; he was given the method statement and the drawings of the remedial works or the SJs in their rectified status or state[212]; when he was carrying out his quality control surveillance and monitoring, he had the documents (i.e. method statements and drawings) with him so that he could check what was happening and whether everything complied with the drawings and method statement[213];

    47.2 The IQCT also provided daily reports containing its observations and recommendations and Aidan Rooney considered and followed up on those recommendations where appropriate in light of the actual site conditions[214].

48. Moreover, the remedial works were subject to hold point inspections by MTRCL's inspectorate staff, which were recorded in RISC forms and record photos[215]. On this basis, NCRs 066 and 096 were closed out on 5 September

[209] Paragraphs 32 of the witness statement of Lee Chiu Yee, Jacky **[BB1/103]**; paragraphs 6 to 10 of the witness statement of Ngai Kwok Hung **[BB8/5233-5235]**.
[210] **[T13/102/9-12]**.
[211] **[T13/102/13-22]**.
[212] **[T13/103/11-104/9]**
[213] **[T13/105/14-20]**.
[214] Paragraphs 9(b) and 10 of the witness statement of Ngai Kwok Hung **[BB8/5234-5235]**.
[215] Paragraphs 30 to 31 of the witness statement of Lee Chiu Yee, Jacky **[BB1/102-103]**.

2018, and NCR 095 was closed out on 28 June 2018[216].

49. In order to keep the RDO apprised of the nature and locations of the remedial works carried out by LCAL, MTRCL submitted to the RDO a Report on 8th Design Amendment for NAT Tunnel Structures (NSL Tunnel, EWL Tunnel Stitch Joint Remedial Details) (Deliverable No. 3.13B) by letter dated 15 February 2019[217], which contained the as-built records of the drill-in holes/rebars and the reused couplers[218]. By RDO's letter dated 4 April 2019[219], the design amendments were formally accepted[220].

50. It bears emphasis that in addition to the remedial works described above, MTRCL has requested LCAL to provide all details, records and information relating to the defective SJs which are relevant to the safety and quality of LCAL's works:

    50.1 By letter dated 30 July 2018[221], LCAL replied to MTRCL's letter dated 20 July 2018[222] and provided information and records regarding the remedial works for the three SJs;

    50.2 By letter dated 4 October 2018[223], LCAL replied to MTRCL's letter dated 27 July 2018[224] and provided, *inter alia*, what were said to be *'[a]ll available quality control records and as-built documentation'* and *'photograph and contemporaneous evidence to demonstrate that the works were constructed in accordance with the Working drawings and specifications'*.

(ii) Investigation and remediation of water seepage at SJs in 2019[225]

51. MTRCL's inspectorate staff has recently identified further water seepage at the SJs, which has been recorded in a snag list and a number of RISC

[216] Paragraph 36 of the witness statement of Fu Yin Chit **[BB1/83]**.
[217] **[BB6/3678-4274]**.
[218] Paragraphs 33 to 34 of the witness statement of Lee Chiu Yee, Jacky **[BB1/103-104]**.
[219] **[BB6/4275-4277]**.
[220] Paragraph 17 of the 2nd witness statement of Lok Pui Fai **[DD7/10275-10276]**.
[221] **[BB7/5076-5079].**
[222] **[BB7/5067-5072]**.
[223] **[BB7/5081-5085]**.
[224] **[BB7/5073-5075]**.
[225] Paragraphs 1.18 and 1.23 to 1.27 of the NAT Letter **[BB1/6-8]**.

forms[226] containing photographic records[227]:

51.1 On or around 15 February 2019, MTRCL's Tony Tang noticed water seepage at the SJs during his daily site surveillance. Between 15 and 28 February 2019, MTRCL's Jacky Lee (SConE) went on site to inspect the SJs;

51.2 On or around 1 March 2019, a joint site visit between MTRCL's Jacky Lee and Tony Tang and RDO's representatives again observed water seepage at the SJs;

51.3 Between 1 and 20 March 2019, MTRCL's Jacky Lee liaised with LCAL regarding the proposed remedial works, the method of which was approved on 18 March 2019;

51.4 On 20 March 2019, MTRCL's Tony Tang and LCAL's Man Sze Ho (Assistant Engineer) jointly inspected and identified 16 water seepage locations. LCAL's sub-contractor, Merman, carried out grout injections at these locations between around 22 March and 11 April 2019;

51.5 On 12 April 2019, MTRCL's Tony Tang re-inspected the 16 locations and found no water seepage, but identified three new locations with minor water seepage. Merman carried out grout injections at these new locations on or around 13 April 2019;

51.6 On 18 April 2019, MTRCL's Tony Tang re-inspected the three locations with LCAL's Man Sze Ho and found no water seepage, but identified one other location with minor water seepage;

51.7 The current position is that all water seepage has been treated and there are no water seepages.[228]

(iii) Investigation and remediation of defective Shunt Neck CJ[229]

52. As set out in section 3 of the 2nd Shunt Neck Report[230]:

[226] **[BB7/4959-5066]**.
[227] Paragraphs 37 to 45 of the witness statement of Tang Siu Hang, Tony **[BB1/130-131]**; paragraphs 35 to 39 of the witness statement of Lee Chiu Yee, Jacky **[BB1/104-105]**.
[228] See Mayer Brown's letter to Lo & Lo dated 19 July 2019.
[229] Paragraphs 2.20, 2.22 and 2.24 to 2.27 of the NAT Letter **[BB1/12-14]**.
[230] **[DD1/38.64-38.65]**.

52.1 The Shunt Neck structure was completed in May 2017, and during the site inspections for the energisation of the Overhead Line in or around the end of 2017, MTRCL observed minor cracks in the Shunt Neck structure;

52.2 On 6 March 2018, MTRCL instructed LCAL to chip off the concrete at three locations to expose the rebars at the Shunt Neck CJ for investigation, and this revealed that some of the rebars at the CJ were (as in the SJs) not properly spliced and only slotted into the couplers[231]. Accordingly, MTRCL issued NCR 267 to LCAL on 30 October 2018 for the defective Shunt Neck CJ[232]. This NCR remains open pending LCAL's remedial works.

53. A remedial proposal for the defective Shunt Neck CJ was formally submitted by MTRCL to RDO on 30 October 2018[233] and, on 23 April 2019, MTRCL replied to RDO's comments on the said proposal[234]. On 29 April 2019, MTRCL made a re-submission of the remedial proposal[235]. By its letter to MTRCL dated 28 May 2019, RDO accepted the remedial proposal, subject to comments, conditions and requirements contained therein[236].

(iv) MTRCL's position on defective coupler splicing assemblies[237]

54. It is MTRCL's position[238], and there appears to be no dispute so far as the other interested parties are concerned, that there is no design issue in respect of the three SJs[239]. Insofar as there was anything that might conceivably be described as a "design issue" regarding the Shunt Neck CJ, which has already been addressed in paragraph 11 of MTRCL's Opening Statement and as to which there also appears to be no dispute by the other interested parties, it did not cause the defects observed at the Shunt Neck CJ. MTRCL submits that, based on the evidence available, the defective coupler splicing

[231] Paragraph 29 of the witness statement of Fu Yin Chit **[BB1/80]**.
[232] **[DD2/1103-1105]**.
[233] **[DD2/717-1089]**.
[234] Paragraph 37 of the witness statement of Fu Yin Chit **[BB1/83-84]**.
[235] Paragraph 31 of the supplemental witness statement of Fu Yin Chit **[BB8/5225-5226]**.
[236] HyD's acceptance letter dated 28 May 2019 **[DD9/12254-12261]**; **[T8/93/14-94/18]**.
[237] Paragraphs 1.12, 1.17, 1.18, 1.22, 1.29, 2.9, 2.11 and 2.23 of the NAT Letter **[BB1/5-8, 11, 14]**.
[238] As noted in paragraph 44 of MTRCL's Opening Statement.
[239] See e.g. Government's position **[T6/156/9-18]**.

assemblies at the three SJs and the Shunt Neck CJ are attributable to the defective workmanship of LCAL and/or W&K[240].

55. Ng Man Chun, site supervisor of LEEL, W&K's sub-sub-contractor for the steel reinforcement fixing works in NAT and HHS, asserted four main possible causes of the defective coupler splicing assemblies at the three SJs and the Shunt Neck CJ:

    55.1 The sub-contractor for rebar fixing works under Contract 1111 allegedly did not install couplers at the locations where couplers should have been installed;

    55.2 Mismatch between the rebars used by LCAL and the Lenton couplers at the 1111/1112 interfaces of the SJs and the Shunt Neck CJ;

    55.3 Failure to expose the couplers embedded in the concrete; and

    55.4 Some couplers being damaged when the concrete was being chipped off in order to expose the couplers embedded in the concrete [241].

56. As to the allegation that the rebar fixing sub-contractor under Contract 1111 did not install couplers at locations where couplers should have been installed, it is noted that apart from one sub-paragraph in Ng Man Chun's witness statement where this allegation was made [242], this was not substantiated or developed anywhere else in the statement.

57. During his examination-in-chief, Ng Man Chun was shown a photo that he took on 21 July 2017 at the roof of the 1111/1112 NSL SJ[243] and it was suggested to him that there appeared to be "*a gap*" in a row of yellow caps on the left side of the photo (the Contract 1111 side of the SJ)[244]. To the extent it is suggested that this "*gap*" supports Ng Man Chun's bare assertion that there were couplers missing on the Contract 1111 side of the SJ, it is submitted that little, if any, reliance should be placed on the said photo due to its indistinct and inconclusive nature.

58. As the Chairman, Professor Hansford and counsel for the CoI rightly observed, the fact that there may be missing yellow caps on the surface does

[240] Paragraph 32 of the witness statement of Fu Yin Chit **[BB1/81]**.
[241] Paragraphs 30(2) and 68 of the witness statement of Ng Man Chun **[EE1/354, 363]**; **[EE1/371.16, 371.27-371.28]**; **[T3/83/3-84/7]**.
[242] Paragraph 68(1) of the witness statement of Ng Man Chun **[EE1/363]**; **[EE1/371.27]**.
[243] **[EE1/404]**; **[T3/7/10-9/24]**.
[244] **[T3/11/6-16]**.

not necessarily mean there are missing couplers. This is because the couplers could be there, but hidden by concrete or located deeper in the wall without the cap. In fact, there could be a number of explanations[245].

59. In any event, it is the unchallenged evidence of Jacky Lee, who has been MTRCL's SConE for the SCL Project under Contract 1111 since June 2013, that at no stage did he ever receive any complaint or notification from LCAL or otherwise that the works conducted by and the materials used by GKJV caused any issue in terms of the construction of the 1111/1112 NSL SJ, the 1111/1112 EWL SJ, and the Shunt Neck CJ[246].

60. Accordingly, it is submitted that there is no reliable contemporaneous evidence before the CoI to support the allegation that the defective assemblies were due to GKJV's failure to install the requisite couplers at the 1111/1112 interfaces.

61. Insofar as the defective coupler assemblies were due to any mismatch between the threaded rebars used by LCAL and the Lenton couplers at the 1111/1112 interfaces of the SJs and the Shunt Neck CJ, a matter which has already been introduced in paragraphs 6.7-6.12 above, it is now obvious that such mismatch was caused by an admitted communication breakdown within LCAL:

    61.1 At all material times, LCAL was well aware of the use of Lenton couplers (apart from the use of BOSA couplers for the T40 rebars at the top mat of the base slab of the Shunt Neck CJ[247]) by GKJV at the Contract 1111 side of the 1111/1112 interfaces, and the fact that BOSA T40 rebars (which were not taper-threaded) could not be screwed into the Lenton couplers. As acknowledged by LCAL's witnesses[248], *'certain members of LCAL's construction engineering team were aware'* of this because it was specifically and extensively discussed at, *inter alia*, the 8th to 12th and 14th to 22nd 1111/1112

[245] **[T3/13/12-18/10]**.
[246] Paragraphs 4 and 18 of the witness statement of Lee Chiu Yee, Jacky **[BB1/92-93 & 97]**.
[247] See the accepted drawing of Contract 1111 no. 1111/B/352/ATK/C12/931 **[DD7/10381]**.
[248] Paragraphs 27, 28, 29 and 46 of the 5th witness statement of Karl Speed **[CC1/59, 62-63]**; paragraph 14 of the 3rd witness statement of Joe Tam **[CC1/84]**.

Interface Meetings between 2014 and 2017, the minutes[249] of which recorded that the Material Related Submission Form for Lenton couplers was tabled by GKJV, and that LCAL would *'check with their supplier regarding compatibility in later stage'*[250];

61.2 Notwithstanding, LCAL failed to ensure that this important information was communicated to the responsible personnel within LCAL (particularly, Henry Lai), and as a result LCAL failed to order Lenton threaded rebars for the construction of the SJs and the Shunt Neck CJ at the Contract 1111/1112 interfaces:

61.2.1 Regina Wong (LCAL's then Sub-Agent who attended a number of interface meetings on behalf of LCAL) appreciated at the time of the interface meeting on 19 January 2016 that there may be a compatibility issue with regard to the coupler splicing systems that needed to be checked[251]. However, she claimed that as she was not responsible for the NAT tunnel construction work, she expected that Jim Wong would communicate directly with the team members responsible for those works[252];

61.2.2 Jim Wong (LCAL's then Senior Site Agent who also attended a number of interface meetings on behalf of LCAL), while accepting that he knew about GKJV's use of Lenton couplers by January 2016[253], said that the issues regarding the use of and compatibility of couplers did not require his immediate action at that time, and his priority was to attend to other urgent/ongoing tasks. Jim Wong cannot even remember if he mentioned this matter to any of LCAL's engineers before he left NAT and was re-assigned to another area of the SCL Project (prior to the construction of the SJs). He sought to justify this by the fact that a handover regarding the Interface Meetings was

[249] **[BB3/1678-1795]**; paragraph 14 of the witness statement of Jim Wong **[CC10/6517]**; paragraph 11 of the witness statement of Regina Wong **[CC10/6520]**.
[250] Paragraphs 11 to 16 of the witness statement of Chan Chun Wai Chris **[BB1/109-114]**; paragraphs 16 to 17 of the witness statement of Lee Chiu Yee, Jacky **[BB1/96-97]**.
[251] **[T7/121/13-17]**.
[252] Paragraph 15 of the witness statement of Regina Wong **[CC10/6521]**; **[T7/121/13-17, 21-22]**.
[253] Paragraph 14 of the witness statement of Jim Wong **[CC10/6517]**; **[T9/115/18-116/6]**.

not required because the Interface Meetings were still ongoing at the time when he left NAT[254];

61.2.3 Joe Tam (LCAL's construction manager) admitted that he was aware that GKJV's use of Lenton couplers for rebars other than T40 back in January 2016[255], and that DAmS 390 (referred to in MTRCL's response to LCAL's Request for Information no. 1112-RFI-LCA-CS001510 [256]) indicated that at least the longitudinal bars for the SJs were T32[257] (and, hence, Lenton couplers should be used). However, he did not circulate MTRCL's response and/or DAmS 390 to Henry Lai personally as Henry Lai had access to them through LCAL's INCITE system. While Joe Tam said that Henry Lai should have looked at the meeting minutes, he accepted that Henry Lai would not have been instructed to do so[258];

61.3 Indeed, LCAL's responsibility in this regard is undisputed. This is because Karl Speed, LCAL's General Manager, accepted that it was LCAL's responsibility to ensure that tapered threaded rebar was ordered and used to insert into those couplers[259].

62. Insofar as the defective coupler assemblies were due to a failure to expose the couplers embedded in the concrete and/or that some couplers were damaged during the chipping-off of the concrete, these were matters of workmanship to be resolved between the contractors and sub-contractors[260]:

62.1 In relation to the exposure of the couplers by GKJV, as noted above it is undisputed that no complaint or notification was raised by LCAL or otherwise that the works conducted by and the materials used by GKJV caused any issue in terms of the construction of the 1111/1112 NSL SJ, the 1111/1112 EWL SJ, and the Shunt Neck CJ[261];

62.2 In relation to the exposure of the couplers by LCAL, to the extent that

[254] Paragraphs 15 to 17 of the witness statement of Jim Wong **[CC10/6517]**; **[T9/115/18-116/6, 119/5-10]**.
[255] **[T8/157/23-25]**.
[256] **[CC6/3341]**.
[257] **[CC6/3349]**; **[T9/7/16-20]**.
[258] **[T8/162/18-24, 164/12-15, 167/2-8]**.
[259] **[T8/14/1-12]**.
[260] **[T10/103/12-19]**.
[261] Paragraphs 4 and 18 of the witness statement of Lee Chiu Yee, Jacky **[BB1/92-93 & 97]**.

there was any failure to expose and/or damage to the couplers, these were aspects of defective workmanship on the part of LCAL and/or its subcontractors.

63. As to the issue of whether LCAL requested MTRCL to conduct rebar fixing hold point inspections at the three SJs and the Shunt Neck CJ, the evidence before the CoI is far from clear. As is apparent from in the contents in Section VI herein, this unsatisfactory state of evidence is mainly attributable to LCAL's failure to submit RISC forms for the inspections at these locations, which would have provided contemporaneous documentary records as to whether, and if so, who from MTRCL was requested to, and did in fact, conduct the inspections.

64. Based on the evidence available as set out below, MTRCL submits that the probability is that LCAL never requested MTRCL to conduct the rebar fixing hold point inspections at the three SJs and the Shunt Neck CJ.

65. The consistent evidence of the three possible candidates who would have conducted the rebar fixing hold point inspections on behalf of MTRCL at the three SJs and the Shunt Neck CJ is that he or she either did not conduct or does not recollect having conducted such inspections:

    65.1 Chris Chan's evidence is that he was never asked to carry out inspections for the three SJs and/or the Shunt Neck CJ. At the material times, he was occupied with various other pressing issues, including the co-ordination of civil provisions and interfacing issues which involved multiple designated contractors[262]. When cross-examined on this aspect of his evidence, he said that he was surprised that Henry Lai was adamant that he conducted rebar inspections at the SJs and the Shunt Neck CJ as he did not conduct any hold point inspection at the SJs with him[263]. Moreover, given the preparation work required for conducting inspections at the three SJs and the Shunt Neck CJ, he said that he would have remembered it if he had inspected[264];

    65.2 Kappa Kang's evidence is that she conducted many rebar fixing hold

[262] Paragraph 24 of the witness statement of Chan Chun Wai Chris **[BB1/116-117]**.
[263] **[T11/96/10-97/8]**.
[264] **[T11/98/1-12]**.

point inspections in the NAT (including access roads, underground utilities and transformer room) and other areas such as the NFA and the SAT (including access roads, underground utilities and the cooling tower building) and that the rebar fixing works for the three SJs and the Shunt Neck CJ took place around two years ago. Without the relevant records to refresh her memory, she cannot remember whether she carried out inspections at the three SJs[265]. However, as regards the Shunt Neck CJ, she remembered that she was on honeymoon in New Zealand around the time when the rebar fixing inspection was expected to take place[266];

65.3 Tony Tang's evidence is that he was only responsible for the pre-pour checks in the NAT, and that he did not carry out rebar fixing hold point inspections at the three SJs and/or the Shunt Neck CJ[267]. While he said that he had a habit of calling the relevant ConE to confirm whether the rebar fixing hold point had been passed before he conducted the pre-pour check[268], he could not recall who conducted the inspections or who he contacted[269]. There is also no evidence as to exactly what (if anything) Tony Tang was told about the inspections of the three SJs and the Shunt Neck CJ. It is also noteworthy that Tony Tang was on leave between 22 and 30 July 2017[270], and hence he was not responsible for the pre-pour checks for the walls and the roofs of the 1111/1112 NSL SJ and the 1112/1112 NSL SJ.

66. The only direct evidence that LCAL requested MTRCL to carry out rebar fixing hold point inspections for the three SJs and the Shunt Neck CJ is that of Henry Lai who said he carried out such inspections with Chris Chan, and not Kappa Kang nor Tony Tang or any other MTRCL inspectorate personnel [271]. This directly contradicts Chris Chan's evidence that he was never asked to inspect the three SJs and the Shunt Neck CJ[272].

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[265] Paragraph 14 of the witness statement of Kang Pu **[BB14/9466]**; **[T12/31/14-32/5]**.
[266] **[T12/23/18-23]**.
[267] Paragraph 29, 33, 49 and 52 of the witness statement of Tang Siu Hang, Tony **[BB1/127-129, 133 and 134]**.
[268] **[T12/91/25-92/5]**.
[269] **[T12/92/6-9, 93/1-3]**.
[270] Paragraph 32 of the witness statement of Tang Siu Hang, Tony **[BB1/129]**.
[271] **[T11/127/21-133/10]**.
[272] Paragraph 25 of the witness statement of Chan Chun Wai Chris **[BB1/117]**; **[T11/95/20-24- 97/4-8]**.

67. It is submitted that Henry Lai's evidence should be scrutinised with great care and that the reliability of his alleged recollection must be critically assessed in context:

67.1 Henry Lai failed to assist the CoI on many questions that were put to him due to his apparent lapse of memory. Examples:

67.1.1 whether he talked to his superiors in relation to the issues at the SJs[273];

67.1.2 whether LCAL's Jon Kitching showed him the letter from W&K or told him that a sub-contractor accused him of instructing them to do defective work[274];

67.1.3 whether he spoke to anyone about the mismatch after he discovered the issue of mismatch in February 2018[275];

67.1.4 whether he was criticised for not doing his job properly[276];

67.1.5 whether he saw MTRCL's Kenneth Kong's email to LCAL's Ian Rawsthorne sent on or around 24 March 2017 complaining about the fact that LCAL's frontline engineers/agents were not submitting RISC forms to carry out the on-site inspections at SAT, NAT and HHS[277]; and

67.1.6 the details or the conclusion of his conversation with Joe Tam regarding his failure to complete RISC forms[278];

67.2 Having apparently failed to recall any of the above-mentioned important events (many of which would have taken place, if at all, in 2018 and after the alleged rebar fixing inspections at the three SJs and Shunt Neck CJ), Henry Lai somehow remembers specifically that he carried out such inspections with Chris Chan back in 2017;

67.3 Further, having stated unambiguously in his statement that he had inspected the rebar fixing at the Shunt Neck CJ with Chris Chan[279], when questioned Henry Lai said he was '*unsure*' who from MTRCL

[273] **[T5/69/8-17]**.
[274] **[T5/71/6-7, 21-25]**.
[275] **[T5/74/13-21]**.
[276] **[T5/132/12-20]**.
[277] **[T5/17/2-4]**.
[278] **[T5/122/6-123/15]**.
[279] Paragraph 35 of the witness statement of Henry Lai **[CC1/95]**.

he conducted the inspection with. It was only when he was shown the relevant part of his witness statement that he was able to say that he was *'sure'* that it was Chris Chan[280]:

"Q. So you were involved in both the routine inspections and the hold-point inspections in relation to the bay 3 and the shunt neck joint; is that right?

A. Yes, correct.

Q. And at paragraph 24 of your witness statement you say:

"I was involved in the joint inspection of the rebar fixing works with MTR."

Q. … As I understand it, again, your evidence is that was Chris Chan; is that right?

A. This one, you are referring to the shunt neck joint?

Q. Yes.

A. I gave my evidence for the stitch joint.

Q. Yes, but who do you say inspected the shunt neck joint then, if it wasn't Chris Chan?

A. For that, I'm unsure.

Q. Could I ask you, please, to look at paragraph 35 of your witness statement. Sorry, Mr Lai, it's not my intention to try to catch you out, but can I just ask you to look at paragraph 35:

"I was the Leighton engineer responsible for conducting the rebar fixing check with the MTR's construction engineer for the 3 stitch joints and the shunt neck joint. I confirm that I conducted those checks with MTR's construction engineer (Chris Chan) ..."

So it seems to me that you were including the shunt neck joint for Mr Chan as well as the other three joints, but you are now not quite so sure?

[280] **[T4/131/19-133/10]**.

A. No, now I'm sure, yes.

Q. Who were the other candidates if it wasn't Mr Chan?

A. Ms Kappa Kang.

Q. So you think it's at least possible that she was involved in the inspection of the shunt neck joint?

A. No. I stand by my statement.

Q. What?

COMMISSIONER HANSFORD: He stands by his statement.

MR PENNICOTT: Okay. So you are not sure that it was Chris -- you are sure it was Chris? "Now I'm sure", I'm so sorry.

CHAIRMAN: Just to avoid any ambiguity, your memory satisfies you that it was Chris Chan?

A. Yes." (Emphasis added);

67.4 The above matters, it is submitted, cast serious doubts upon the reliability and credibility of Henry Lai's asserted recollection regarding the involvement of Chris Chan in the rebar fixing inspections at the three SJs and the Shunt Neck Joint and it is submitted that Chris Chan's evidence on the point should be accepted by the CoI.

68. Importantly, in assessing Henry Lai's evidence in this regard, one must not lose sight of W&K's case that it was Henry Lai who instructed W&K's worker, Ng Man Chun, to carry out defective work[281]. Interestingly, Henry Lai described Ng Man Chun during the course of his evidence as a *"hard-working, conscientious sort of chap"*[282] which the CoI may well think makes it all the more improbable that he would have carried out defective work unless he had been instructed by Henry Lai to do so. While MTRCL remains neutral in this respect, as it is obviously not privy to what went on between LCAL and W&K, if the CoI finds in favour of W&K's case in this regard, it would be entirely consistent with a situation in which Henry Lai deliberately

[281] See, for example, paragraphs 42 to 51, 55 to 58, 63, 70 to 72, 76, 78 to 79, 85 to 87 of the witness statement of Ng Man Chun **[EE1/356-358, 360-362, 364-367]; [EE3/71.19 - 371.22, 371.24, 371.26, 371.28-371.33]**, [**T3/67/16-68/18**] and [**T3/96/1-97/2**].
[282] [**T5/30/5-18]**.

did not contact Chris Chan (or, indeed, any of MTRCL's inspectorate personnel) to conduct the inspections because he would not have wanted MTRCL's inspectorate team to see the defective work, as was put by MTRCL's counsel when cross-examining Henry Lai[283].

69. While LCAL's Karl Speed asserted that the site diary entries, which record all activities of the rebar fixing, pre-pour work, and concrete pours in the NAT, evidence that all formal inspections took place and that LCAL and MTRCL supervised and approved the works and authorised the pouring of concrete[284], as observed by counsel for the CoI, the site diaries do not in fact record whether inspections took place[285]. Indeed, MTRCL's Tony Tang explained that the fact that a particular item of work is contained in the site diaries does not mean that it had passed inspection. The site diaries only reflect the activities at the site and nothing more[286].

70. Alternatively, if the CoI finds that LCAL in fact did request and MTRCL did conduct the rebar fixing hold point inspections at the three SJs and the Shunt Neck CJ, MTRCL submits that the evidence as placed before the CoI is consistent with a situation in which the now known defective coupler splicing assemblies were not sufficiently apparent to be detected by MTRCL's inspectorate personnel at the hold point inspections:

    70.1 Tony Tang disclosed a number of photographs taken at the SJs and the Shunt Neck CJ[287] and assisting the CoI as best that he could carried out a detailed and close examination of these photos and identified those[288] that may possibly show defective coupler connections[289]. However, what became apparent during the course of the hearing was that, even with the benefit of after the event wisdom and the luxury of time to closely examine the photos, any defective connections were not immediately apparent from the photos[290]. This illustrates just how

[283] **[T5/114/13-23]**.
[284] **[T8/29/13-23]**.
[285] Paragraph 16(c) of the 6th witness statement of Karl Speed **[CC6/3754]**.
[286] **[T12/121/1-24]**.
[287] **[BB14/9499-9532]**.
[288] **[BB14/9504]; [BB14/9511]**.
[289] Paragraph 4 of the supplemental witness statement of Tang Siu Hang, Tony **[BB14/9495]**; **[T12/103/17-20, 104/4, 104/23-105/1, 105/20-23]**.
[290] For example: **[T12/97/14-18, 104/5, 104/11-16 & 105/24-25]**.

difficult it was to visually identify the defective coupler connections during site surveillance, which took place in an open area albeit that the NSL level was dimly lit and relatively congested, the purpose of which was not in any event to inspect coupler splicing assemblies;

70.2 While Leung Chi Wah, LEEL's steel reinforcement worker, asserted in his statement that when Leighton or MTRCL representatives carried out their inspections the defective coupler splicing assemblies would "*definitely have been noticed*" [291], he agreed during cross-examination that he was never present at those inspections and his assertion was pure speculation[292];

71. Further, the defective coupler splicing assemblies in the SJs and the Shunt Neck CJ were not detected by MTRCL in the proper discharge of its obligations as a project manager in carrying out daily site surveillance and pre-pour inspections:

71.1 The consistent evidence of MTRCL's ConE and IOW teams is that the rebar fixing works at the three SJs and the Shunt Neck CJ were covered by, *inter alia*, their day-to-day site surveillance activities, and that objections were raised with LCAL if e.g. couplers were not properly installed[293];

71.2 However, it bears emphasis that the site surveillance carried out by the ConE and IOW teams was not entirely or solely devoted to the locations of the three SJs and the Shunt Neck CJ, and that the NAT is a very large area indeed[294];

71.3 In the event, no sub-standard or abnormal rebar fixing works were observed during MTRCL's daily site surveillance or pre-pour checks, and LCAL never raised any issues with the coupler splicing assemblies at the three SJs or the Shunt Neck CJ (whether on site or at any of the Works Meetings or weekly MTRCL Team Meetings)[295];

[291] Paragraphs 26 of the witness statement of Leung Chi Wah **[EE1/56]**; **[EE1/57.7-57.8]**.
[292] **[T4/91/7-92/7]**.
[293] Paragraphs 21 to 22 of the witness statement of Chan Chun Wai Chris **[BB1/116]**.
[294] Paragraphs 21 of the witness statement of Chan Chun Wai Chris **[BB1/116]**; paragraph 10 of the witness statement of Tang Siu Hang, Tony **[BB1/123]**.
[295] Paragraphs 22, 25 to 26 of the witness statement of Chan Chun Wai Chris **[BB1/116-117]**; paragraphs 33 to 36 of the witness statement of Tang Siu Hang, Tony **[BB1/129-130]**.

71.4 The focus of the daily site surveillance and the pre-pour checks was not on coupler splicing assemblies. As explained by Tony Tang (MTRCL's IOW responsible for the NAT): (i) the focus of daily surveillance was on general works being constructed/installed, general progress of site works, general site management, and safety[296]; and, (ii) the focus of the pre-pour check was on cleanliness and debris, and he paid attention to the bottom of the structure instead of the rebars – which should be the focus of the rebar fixing inspection[297];

71.5 To be clear, MTRCL has never been expected to conduct any '*man-marking'* on site, and LCAL (rather than MTRCL) was responsible for providing full-time and continuous supervision of the works[298]. To this end, it is noteworthy that in paragraph 399 of the CoI Interim Report it is stated that '*the Commission has found that Leighton was obliged to provide 'full-time and continuous' supervision of the coupler assembly process'*.

72. In any event, the three defective SJs have already been fully rectified. The defective Shunt Neck CJ will also be rectified soon, the remedial proposal for which was accepted by the HyD on 28 May 2019[299].

73. The CoI has heard evidence from the PM experts already that there is no project management system that can avoid any and all mistakes during the construction process[300]. Insofar as it has been established that there were project management issues in respect of the NAT, SAT, and HHS, and as will be elaborated in Section IX herein, MTRCL has already taken significant steps and is in the process of taking yet further steps to enhance its project management systems. It is confidently expected that these measures will address any project management issues that are found to be relevant to this Extended CoI, including the works at the three SJs and the Shunt Neck CJ.

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[296] Paragraph 8 of the witness statement of Tang Siu Hang, Tony **[BB1/123]**; **[T12/74/4-11]**.
[297] Paragraph 29-32, 34 of the witness statement of Tang Siu Hang, Tony **[BB1/127-129]**; **[T12/109/13-19]**.
[298] Paragraphs 27 of the witness statement of Chan Chun Wai Chris **[BB1/117]**; paragraph 36 of the witness statement of Tang Siu Hang, Tony **[BB1/129-130]**.
[299] HyD's acceptance letter dated 28 May 2019 **[DD9/12254-12261]**.
[300] Paragraph 5 of the PME's JS **[ER1/9/T-1]**; paragraph 3 of Rowsell's report **[ER1/1/5]**; [**T39/108/1-7 from CoI Part 1]**.

VIII. The use of coupler connections in the NAT, SAT and HHS

74. Coupler connections and CJs were introduced at various locations during the construction of the NAT, SAT and HHS which are shown in a number of draft design amendment proposal drawings prepared and provided by LCAL[301].

75. MTRCL's, LCAL's and LEEL's[302] evidence was that the purpose of these changes in construction details was to maintain temporary vehicular access and accommodate the co-ordination and sequencing of the works[303] and as LCAL's William Holden explained:

> *'A. […] NAT we had two situations – actually, three. There's logistics to get access across the EWL which cut the site in half. We needed to get access through the trough walls. We used couplers in those locations. We also used couplers at NSL where we had clashes with the ELS, the strutting from the cofferdam. So where they were set at a level, we needed to continue and build the permanent structure within the cofferdam, and where the starter bars clashed with the strut, above the structure that was being cast, we used couplers in those locations.*
>
> *[…]*
>
> *A. […] The other situation we used couplers in the NAT is in the base slab and in the roof slabs there was up to three layers in the top and bottom mat, and if you're doing one bay and then you cast that and you leave laps, it's very difficult to put the bar that goes at 90 degrees to those within those bars for the adjacent bay or the subsequent bay.*
>
> *So what we did generally was the base bar that was running*

[301] Paragraph 24 of the 2nd witness statement of William Holden **[CC6/3776-3777]**; paragraphs 50 to 52 of the witness statement of Chan Kit Lam **[BB8/5202-5204]** – the drawings are contained in **[CC7/4115-4158]** (NAT), **[CC8/4803-4824]** (SAT) and **[CC10/6141-6188]** (HHS).
[302] Paragraphs 46 to 48 of the witness statement of Chan Kit Lam **[BB8/5200-5202]**; paragraphs 10 to 13 of the supplemental witness statement of Chan Chun Wai Chris **[BB8/5238-5239]**; paragraphs 25 to 27 of the 2nd witness statement of William Holden **[CC6/3777-3778]**; paragraph 13 of the 2nd witness statement of Henry Lai **[CC6/3788]**; paragraph 26 of the witness statement of Raymond Tsoi **[CC6/3797]**; paragraph 25 of the witness statement of Sean Wong **[CC6/3807]**; paragraph 27 of the witness statement of Jeff Lii **[CC6/3816]**; paragraph 30 of the witness statement of Alan Yeung **[CC6/3826]**; paragraph 29 of the witness statement of Ronald Leung **[CC6/3834-3835]**; paragraph 25 of the witness statement of Saky Chan **[CC6/3846]**; paragraph 22(3) of the witness statement of Ng Man Chun **[EE1/350-351]; [EE1/371.12-371.13]**, and Exhibits NMC-4 and NMC-5 **[EE1/390-396]**. See also paragraph 63 of MTRCL's Opening Statement **[OA1/5/24-25]**.
[303] This has already been addressed in paragraph 59 of MTRCL's Opening Statement **[OA1/5/22-23]**.

longitudinally to the structure we used as a lap, and then the bars for, say, second and third layer above we used couplers, so we could easily work from the bottom up with the bars that ran across the structure.

COMMISSIONER HANSFORD: And all of these were because the constructability or the way in which it was going to be constructed had not been considered by the designer?

A. *That's right, yes.'*[304]

76. William Holden also explained that in HHS couplers were used quite extensively (in the stem of the wall and in the trough walls of the track slabs) to allow temporary access of vehicles/plant. Otherwise, there would have been protruding starter bars which would have obstructed access, and there was also a risk of damaging the rebars if bend-down bars were used[305].

77. This evidence was not challenged in the hearing. In fact, BD's senior structural engineer Lok Pui Fai openly acknowledged that every building project and, in particular, a complex project like this one has coordination/sequencing issues due to changing site conditions such as the site getting more congested which would have to be resolved during construction[306], and he accepted that in the NAT, SAT and HHS specifically, couplers had to be used in certain locations so as not to prevent vehicles/plant from getting where they needed to be on site and that such issues have to be resolved on site[307].

78. Importantly, the evidence shows there was a general consensus between MTRCL's CM team and LCAL's construction team that these minor changes in construction details were necessary and acceptable[308]. As MTRCL's Chris Chan explained during the hearing, which Lok Pui Fai did not dispute[309]:

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[304] [**T8/124/22-126/8**].
[305] [**T8/121/12-124/13**].
[306] [**T15/104/9-106/11**].
[307] [**T15/106/12-109/25**].
[308] Paragraphs 48 and 54 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5202, 5204]**; paragraphs 10 to 13 of the supplemental witness statement of Chan Chun Wai Chris (NAT and SAT) **[BB8/5238-5239]**; paragraph 47 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5260]**; paragraph 28 of the 2nd witness statement of William Holden **[CC6/3778]**; the oral evidence of Sean Wong at **[T9/66/8-67/2]**.
[309] [**T15/110/1-8**].

'A. ***I think both sides would come to a decision. The senior management of Leighton and MTR would have meetings on a regular basis. The message I got was that for the benefit of the entire project, there should be some areas where the vehicles could go in, and they picked SAT and NAT.***

When we talked with the contractors, we discussed how we could maintain the opening, and eventually we could link up the rebars, that the contractors would leave some couplers, and when the access was no longer needed, they would be able to link up the rebars with the couplers.

I didn't anticipate any particular problems. There was some change of a minor nature. Therefore, I didn't object to the contractor going ahead like this.

[…]

A. Yes, ***there was a consensus and that was an acceptable way forward****.'*[310] (Emphasis added)

79. Against the foregoing background, there are two issues which fall to be considered by the CoI and they will be dealt with in turn:

(i) Whether as a matter of project management, a change in construction details involving the use of couplers in lieu of lapped bars required a consultation submission to the BD was required as a matter of project management?

80. Government relies on Appendix 9[311] and Appendix 11[312] of MTRCL's PMP in order to contend that *'all designs of permanent works 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'*[313]. In MTRCL's submission, such a selective reading of the PMP is simply

[310] [**T11/119/16-120/12**].
[311] **[H7/2498]**.
[312] **[H7/H2503-2504]**.
[313] Paragraph 41 of the 2nd witness statement of Lok Pui Fai **[DD7/10284]**; paragraph 16 of the 3rd witness statement of Lok Pui Fai **[DD7/10289-10290]**; paragraph 14 of the 4th witness statement of Lok Pui Fai **[DD7/10295]**; paragraphs 7 to 10 of the 5th witness statement of Lok Pui Fai **[DD9/12277-12278]**.

incorrect as a matter of contractual interpretation.

81. It is trite that contractual interpretation is a unitary and iterative process, and it is necessary to have regard to all the provisions as a whole:

    81.1 In **Arnold v Britton** [2015] 2 WLR 1593 (UK Supreme Court) at [77], Lord Hodge JSC observed that:

    'This unitary exercise involves ***an iterative process by which each of the rival meanings is checked against the provisions of the contract and its commercial consequences are investigated****: In re Sigma Finance Corpn [2010] 1 All ER 571, para 12, per Lord Mance JSC. […]'* (Emphasis added);

    81.2 The Hong Kong Court of Final Appeal adopted the same approach in **Secretary for Justice v Joseph Lo Kin Ching and Others** (2015) 18 HKCFAR 169, in which Lord Walker NPJ explained at [31] that:

    'Two all-important general principles of construction are that ***words must be read and understood in their context, and that the will must be read as a whole****. In Charter Reinsurance Co Ltd v Fagan [1997] AC 313, 384, Lord Mustill neatly combined the two principles in a single phrase, referring to the need to read words "in the landscape of the instrument as a whole". […]* ***The iterative process is often laborious. It may require the court to go forwards and backwards painstakingly between the various words and phrases, occurring in different parts of the document, which give rise to the problem****.'* (Emphasis added);

    81.3 These well-established principles were recently cited with approval in **Chun Wo Construction & Engineering Co Ltd and Others v The Hong Kong Housing Authority** [2019] HKCA 369 (CACV 338 & 431/2018, 27 March 2019) per Cheung JA at [6.1]–[6.5].

82. The PMP was prepared by MTRCL (and submitted to the Government) in order to comply with, *inter alia*, clause 4.6(c) of the Entrustment Agreement for Construction and Commissioning of the SCL dated 29 May 2012[314] and

[314] **[G7/5613]**.

the arrangements under the IoE[315]. This context is of particular importance:

82.1 The IoE relaxed the usual statutory requirements and exempted MTRCL from, *inter alia*, the '*approval of plans, consent to commencement and resumption of works and occupation of buildings provided for in section 4, sections 14 to 17A and sections 19 to 21 of the Buildings Ordinance*' [316]. In substitution, the less stringent consultation process (see Appendix 7 and Appendix 9 of the PMP) was put in place, to facilitate the progress of the construction works;

82.2 Even under the stricter approval process under the Buildings Ordinance, the accepted practice under the BD's PNAP ADM-19[317] is that minor amendments (including, *inter alia*, changes which do not affect the overall structural stability of a building) do not require the BD's approval prior to construction, as long as such minor amendments are approved before certifying completion and applying for an occupation permit;

82.3 Accordingly, it stands to reason that minor amendments must be treated in an analogous fashion under the less stringent consultation process provided by the IoE and fleshed out in Appendix 7 and Appendix 9 of the PMP. Otherwise, MTRCL would effectively be required to submit each and every amendment (however minor) for prior consultation, which would be far more restrictive than the usual approval process under the Buildings Ordinance and would run counter to the very intent and purpose of the IoE.

83. With the above context in mind, MTRCL submits that, properly construed, the contractual meaning and effect of the PMP in respect of consultation submissions are as follows:

83.1 Appendix 9 of the PMP [318] sets out the steps involved in the consultation submission procedure generally. It distinctly does not specify the circumstances in which a consultation submission to the

[315] See paragraphs 11 and 54 of the witness statement of Aidan Rooney **[B1/183, 200]**.
[316] **[H7/2222]**.
[317] **[C13/8555-8580]** – see in particular paragraphs 3 and 17 to 21 therein.
[318] **[B4/2480-2481]**.

BD is required, the precise timing of a consultation submission, or the types of amendments which require a consultation submission prior to implementation on site;

83.2 In fact, Appendix 9 of the PMP expressly states that MTRCL has to *'ensure acceptance of consultation submission and necessary amendments before certification of as-built records'*. This is consistent with the usual practice, as evidenced in this CoI[319], that a final amendment submission can be made prior to the certification of completion in order to 'wrap up' all outstanding changes to the works;

83.3 In order to ascertain the circumstances in which a consultation submission is mandatory, it is necessary to have regard to the rest of the PMP. In particular, Appendix 7 of the PMP[320] clearly and expressly refers to *'Amendments Necessary to Suit Site Conditions'*, which (according to the flowchart) do not require any design and consultation submissions unless the amendments do not conform to MTRCL's Design Standards Manual or Specifications;

83.4 Thus, amendments to suit site conditions are generally considered not to require a consultation submission prior to construction, so the procedure set out in Appendix 9 of the PMP is inapplicable;

83.5 Importantly, there is no rational or contractual basis for construing either Appendix 7 or Appendix 9 of the PMP in isolation, or for one to take precedence over the other. Instead, the entire PMP must be construed as whole, and the above interpretation represents a reasonable and sensible arrangement which was accepted by both the Government and MTRCL at all material times.

84. Based on the foregoing, MTRCL submits that the substitution of coupler connections for lapped rebars falls squarely within the category of *'Amendments Necessary to Suit Site Conditions'* as contemplated by Appendix 7 of the PMP, such that it was not necessary to make a consultation submission to the BD prior to construction:

[319] See the oral evidence of MTRCL's Chris Chan **[T11/135/11-136/1]** and Kit Chan **[T14/35/1-36/3]**.
[320] **[B4/2475-2476]**.

84.1 As already explained in the preceding section, the witnesses of MTRCL, LCAL, LEEL and the Government all accept that the use of coupler connections was for the purpose of maintaining temporary vehicular access and accommodating the co-ordination and sequencing of the works, and that these were changes in construction details which were necessary to suit site conditions;

84.2 MTRCL's Chris Chan's unchallenged evidence was that such minor changes are common and, indeed, inevitable in a railway project of this scale:

> *'[…] Now, with regard to a railway project, […] the railway is a confined area and, as we carry on building, the space would be getting more and more limited. So we have to leave some space for the service vehicles to convey the E&M equipment and track equipment and also materials for the fitting-out into the site.* ***So in this kind of project, it is quite inevitable that we need this kind of access. My understanding is that there is a necessity for that. It is also a common occurrence.***
>
> *[…]*
>
> *But in NAT, it is rather narrow.* ***We don't have enough space for us to leave a lapped bar. So the only thing we could do was to resort to couplers instead of a lapped bar, and provide a temporary access for the vehicles****.'*[321] (Emphasis added);

84.3 Accordingly, MTRCL's Kit Chan explained that the decision to implement the coupler connections and then subsequently incorporate these minor changes into a final amendment submission was consistent with the PMP guidelines:

> *'I would put it this way. At that moment, when they propose to replace the lapped bars by couplers at SAT and NAT,* ***as far as we are concerned they are minor changes****. In our PIMS system, all these minor changes are allowable.* ***If you look at appendix 7 [of the PMP], saying that if they comply with the specification, the***

[321] [**T11/136/6-137/4**].

site conditions, you can go ahead and do it, without seeking prior approval from the Building Authority.'[322] (Emphasis added);

84.4 The fact that the use of BOSA couplers (which had previously been approved by the BD) was a minor change from a structural engineering perspective was expressly conceded by the BD's Lok Pui Fai:

'Q. And if it be the case that BOSA couplers were used, and we've got evidence on that […] it's the sort of change from lapped bars to BOSA couplers that would not require any supporting calculations to be carried out, would it? That's correct as a statement of fact, isn't it?

A. Yes, from a structural point of view, you are correct.

Q. Thank you. And what I suggest to you is that Kit Chan was also correct when he told the learned Commissioners […] that the change from lapped bars to couplers was a minor change. That's correct as a description, is it not, Mr Lok?

A. From a structural point of view, it is correct.'[323]

Lok Pui Fai also readily conceded by reference to the CoP 2013 that a coupler was a mechanical device of the kind referred to in sub-paragraph (c) of clause 8.7 thereof and that both lapped bars and couplers served the same purpose[324].

85. Insofar as the Government[325] purported to contend for the contrary position on the basis of the incident report[326] which was issued by MTRCL in 2015 in response to the change in reinforcement details in the diaphragm walls (referred to as the "**1st Change**" in the first part of the CoI), that is simply untenable. To do so will be to read more into what is clearly absent in the flow charts set out in Appendices 7 and 9. There are no routes or "arrows" directing consultations of the nature contended by the Government. The conclusion in the incident report that consultation submissions are required

[322] [**T14/39/4-11**].
[323] [**T15/115/8-21**].
[324] [**T15/111/19-114/7**].
[325] Paragraph 12 of the 5th witness statement of Lok Pui Fai **[DD9/12279-12280]**.
[326] **[H11/H5538-5720]**.

prior to construction clearly contemplated design changes of structural significance (akin to the changes to the diaphragm wall), and not minor changes like the use of couplers instead of lapped bars in the NAT, SAT and HHS[327]. As the BD's Lok Pui Fai ultimately accepted during cross-examination:

> '*Q. […] I suggest to you – and I really didn't think there would be any dispute over this – is a change from lapped bars to couplers. As you deal with in your report,* ***the comparison is between lapped bars to couplers, and at least those three changes that you just agreed with me on the diaphragm wall and which are referred to in the 2015 incident report.*** *I'll give you another opportunity, and what I'm going to suggest is that there's absolutely no comparison between the two.* ***There's no comparison between the two; that's correct, isn't it****?*
>
> *A.* ***I can only say that from a structural point of view, you cannot make the same comparison.*** '[328] (Emphasis added)

86. As MTRCL's Kit Chan rightly pointed out during the hearing, it would be impractical to have an updated drawing for every minor change, and the usual practice is to incorporate various minor changes in one fell swoop in a final amendment submission:

> *'[…] As long as you know the extent of coupler, where normally – we don't issue a drawing, updated drawing, when there's a minor change.* ***Normally we group – could be 10 or 20 minor changes, at the end of the day incorporate. Every time there's minor change you update a drawing, it's just tedious. It's not practical. I don't think many contractors will do that. That's why we have a system that you've got to submit a final amendment for approval and put everything in the final as-built drawing.*** *I think the system says "any major change" but not every minor detail. That's the spirit of the PIMS. Because this minor replacement is so easy, everyone can*

[327] See the cross-examination of BD's Lok Pui Fai at **[T15/117/17-120/4]**.
[328] [**T15/119/13-25**].

know, no need to use a new drawing to do the rebar checking.'[329] (Emphasis added)

87. Accordingly, it is important to keep contemporaneous construction records while the works were carried out (including, *inter alia*, site photos and CJ layout plans), and in this regard, the expectation was that LCAL would maintain all necessary construction records in accordance with the relevant contractual requirements under Contract 1112:

87.1 Paragraph G15.4.1 of the Contract 1112 General Specification[330] provides that:

'*On completion of the work, the Contractor shall compile and certify a set of as-built drawings for the Engineer's Approval.* ***The as-built drawings shall provide the Employer with a permanent record of each project features****. This set of record drawings shall consist of the following:*

(a) ***actual locations, dimensions and structural details of the completed Works****;*

(b) ***actual method and sequence of construction and installation****;*

(c) left-in Temporary Works or permanent formwork;

(d) ***Approved/used construction materials and products****, including, but not limited to, grade of concrete, movement joints, construction joints, waterproofing membranes, structural bearing, cast-in structural brackets, pipe work, cable works, and ductworks; and*

(e) provisions for future extensions.' (Emphasis added);

87.2 The Contract 1112 Particular Specification defines '*As-Built Drawings'* as the drawings which are the as-built record of the Works incorporating all dimensioned amendments, change modification and alterations to the Works, which LCAL shall provide in accordance with Section 15 of the General Specifications[331];

87.3 Particular Specification para P28.6 states LCAL '*shall submit all*

[329] [**T14/35/8-36/3**].
[330] **[C3/2131]**.
[331] **[B16/12534]**.

construction records in PDF format, required for the preparation of a comprehensive Project Record within 21 days or as soon as practicable after the completion of the activity to which the records relate. Preliminary records shall be submitted within 24 hours';

87.4 Further, Particular Specification para P28.9 states '*[p]rior to substantial completion of the Works, the Contractor shall prepare, provide and submit As-built Drawings or records as required under the Specification to the Engineer for Approval and to the Government departments and relevant authorities as required'*;

87.5 Therefore, it is clear that LCAL must maintain proper construction records, and this would include, *inter alia*, contemporaneous records of the amount and locations of couplers used at each CJ on site, in order to be able to prepare a comprehensive Project Record and draw up the necessary as-built drawings;

87.6 Insofar as the foregoing is not accepted by LCAL[332], MTRCL submits that the clear and express wording of the General Specification and the Particular Specification under Contract 1112 speaks for itself, such that LCAL is plainly under a contractual obligation to keep proper contemporaneous records relating to all couplers used on site.

88. In order to improve record-keeping and communication of minor amendments to suit site conditions, MTRCL is implementing measures which include e.g. the use of digitised platforms and tools to facilitate the improved communication and recording of design changes, and the introduction of the CDE for BIM as a data management tool in future projects.

(ii) Whether the use of couplers at the CJs is structurally safe?

89. MTRCL maintains that from a structural engineering perspective, the use of couplers in lieu of lapped bars at the various CJs in the NAT, SAT and HHS does not pose any material structural or safety concerns:

[332] See footnote 6 in the 2nd witness statement of William Holden **[CC6/3777]**; also the oral evidence of William Holden at **[T8/99/19-108/15]**.

89.1 CoI has previously received expert evidence[333] (in the context of the change in connection details in the east diaphragm wall of the EWL slab) confirming that couplers or welding can be used in lieu of lapped rebars and vice versa, as expressly contemplated by paragraph 8.7.1 of the CoP 2013[334];

89.2 MTRCL maintains that paragraph 8.7.1 of the CoP 2013 is equally applicable to the change from lapped rebars to couplers in the NAT, SAT and HHS, as confirmed by MTRCL's Chris Chan[335] and Kit Chan[336], and by BD's Lok Pui Fai in his statement[337] and oral evidence[338];

89.3 It bears emphasis that the change was simply the substitution of coupler connections for lapped bars (i.e. the method of splicing rebars). As confirmed by MTRCL's Chris Chan[339] and Kit Chan[340] during the hearing, there were no changes to the rebar arrangement, number, diameter and spacing, such that MTRCL's ConEs could still use the same working drawings to check the rebar fixing works at the relevant hold points. It also bears emphasis that the BD's Lok Pui Fai accepted that the change from lapped bars to couplers involved no change to the diameter of the rebars that were used in the works as shown in the accepted or working drawings and that he could not dispute Chris Chan's evidence that there was no change to the spacing of the rebars as shown in the accepted or working drawings[341];

89.4 It is also important to bear in mind that despite the absence of any ductility requirements in the CJ locations where couplers were used, LCAL and its sub-contractor actually used ductility couplers in any event for the sake of convenience, as confirmed by LCAL's William Holden during the hearing[342]. This means that the materials used in

[333] See e.g. paragraph 53 of the Expert Report of Professor Don McQuillan **[ER1/3/28]**.
[334] **[H8/2946].**
[335] [**T11/135/11-136/1]**.
[336] [**T14/43/25-46/8]**.
[337] Paragraph 40 of the 2nd witness statement of Lok Pui Fai **[DD7/10284]**.
[338] [**T15/111/19-114/7**].
[339] [**T11/137/5-25**].
[340] [**T14/35/8-14**].
[341] [**T15/110/9-111/15**].
[342] [**T8/128/2-8**].

fact exceeded the design requirements, which lends further support to the overall safety and integrity of the structures.

90. Above all, it is the consistent evidence of both MTRCL's witnesses[343] and LCAL's witnesses[344] that MTRCL's inspectorate team and LCAL's site engineers were properly qualified professionals who checked that the coupler splicing assemblies were satisfactory and in accordance with the manufacturer's recommendations, by means of visual inspections and random manual checks:

    90.1 For instance, Jeff Lii recalls that during informal inspections and also formal inspections, he tried to rotate some of the rebars in order to check that they were tightly screwed into the couplers[345]. Alan Yeung similarly recalls checking that the rebars were properly screwed into the couplers, based on a tolerance of two to three exposed threads as per BOSA's guidelines[346];

    90.2 It bears emphasis that it was neither practical nor possible for MTRCL's inspectorate team to check each and every coupler, as it was not the responsibility of MTRCL to conduct any "man-marking" or continuous supervision over the rebar fixers (the latter being LCAL's responsibility). This is supported by the PMEs' opinion in the first part of the CoI, which is equally applicable in the present context[347].

(iii) The use of couplers at the VRV room

91. In the VRV room in the HHS, the rebar fixing inspection was rejected on 30 June 2017 due to non-compliant coupler splicing assemblies (as formally recorded in an email from MTRCL's Jason Kwok (ConE II) to LCAL on the same day[348]), but concreting began without any pre-pour check. MTRCL notified LCAL by WhatsApp that permission to proceed had been denied,

[343] See the oral evidence of MTRCL's Kit Chan at **[T14/39/12-43/18]**.
[344] See the oral evidence of LCAL's Jeff Lii at **[T7/36/5-39/1]**; William Holden at **[T8/128/9-131/5]**; Saky Chan at **[T9/82/12-83/9]**; and Alan Yeung **[T9/49/24-52/10]**.
[345] **[T7/36/5-39/1]**.
[346] **[T9/49/24-52/1]**.
[347] Paragraphs 26 to 27 of the Joint Statement of the PMEs **[ER1/9/T-4]**.
[348] **[BB8/5789-5793]**.

and the RISC forms which were later submitted by LCAL were similarly rejected to record the non-conformances[349]. Although no NCR was issued by MTRCL at that time[350], the effect of the defective rebar fixing at the VRV room was identified by LCAL in a review report dated 5 March 2019[351] as *"minimum"*[352] and MTRCL continued to consider the position[353].

92. LCAL by its letter to MTRCL dated 25 June 2019[354] confirmed that it was unnecessary to demolish the works as they were structurally acceptable. Further, on 26 June 2019, LCAL submitted to MTRCL a formal incident report[355] in which the root causes for the VRV room incident were attributed to, *inter alia*: (i) LCAL's subcontractor's failure to act on LCAL's instructions to rectify the defects; and (ii) LCAL's resources being stretched as the incident took place at the time close to completion of major works at the HHS and LCAL's resources were spread across large work areas concurrently[356]. This has resulted in MTRCL issuing a NCR to LCAL dated 28 June 2019 which is referred to in MTRCL's letter to RDO dated 4 July 2019[357]. LCAL's review report and related correspondence concerning the VRV room is currently being considered by MTRCL, who will consult with the Government in relation to the same.

IX. MTRCL's continuous efforts to enhance its project management systems

93. MTRCL is renown as an organisation with wide-ranging experience and capability in the planning, delivery and operation of railway networks and systems in Hong Kong with a proven track record in delivering many major railway projects[358]. In fact, since 1994, MTRCL has successfully delivered *inter alia* the following major rail projects: the Airport Express Line; the

[349] Paragraphs 33, 35 and 36 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5255-5257]**.
[350] Which is noted in the Pypun Report [**GG3/1026**].
[351] **[BB9/6330]**.
[352] **[BB9/6333]**.
[353] See Victor Tung's evidence [**T13/5/13-10/7**].
[354] **[DD12/13678]**.
[355] **[DD12/13680]**.
[356] **[DD12/13683]**. MTRCL's notes, but does not accept, that one of the causes identified in LCAL's incident report was inadequate communication between MTRCL and LCAL as the incident report's chronology **[DD12/13682]** acknowledges multiple complaints made by MTRCL to LCAL.
[357] [**DD12/13919-13933]**.
[358] Paragraphs 3 to 4 of the Joint Statement of PMEs **[ER1/9/T-1]**; paragraph 21 of the witness statement of Peter Ewen **[BB8/5158]**.

Tseung Kwan O Line; the Disneyland Resort Line; the West Island Line; the Kwun Tong Line Extension; the South Island Line; and, the Express Rail Link, all of which are operating safely and efficiently[359].

94. It is trite, however, that there is no project management system that can avoid any and all mistakes during the construction process. This is, indeed, recognised by both of the independent PMEs engaged by the CoI and MTRCL respectively, who previously gave evidence before the CoI:

> "*It is common that some mistakes or oversights will inevitably be made in the performance of the works of such scale and complexity. However, procedures should be in place to mitigate errors and enable the works to be executed in a professional manner.*"[360]

95. MTRCL reiterates that: it is a "*learning organisation*" where safety is paramount and continuous efforts are made to enhance the project management systems[361]; its track record shows it learns from its many successes, but also from the many challenges faced in its projects[362]; it has already taken significant steps and will take yet further steps to improve its project management systems[363].

96. Peter Ewen, MTRCL's Engineering Director, explained that in terms of the steps that MTRCL is in the process of taking to improve its project management system, it had decided to do a full and comprehensive review of PIMS and that external expertise would be used to assist with this task. Further, in terms of what he referred to as the 'digital piece', Peter Ewen emphasised that MTRCL was also going beyond the enhanced arrangement it has already put in place in recent months and is looking at how it is going to be a leader in the use of digital tools in project management. He said that MTRCL has also put various taskforces in position and, under the project management organisation office, it is constituting six projects with project initiation documents, covering digitalisation, quality, governance,

[359] Paragraph 25 of the witness statement of Peter Ewen **[BB8/5159]**.
[360] Paragraph 5 of the Joint Statement of PMEs **[ER1/9/T-1]**; paragraphs 21 to 22 of the witness statement of Peter Ewen **[BB8/5158]**.
[361] Paragraphs 2 to 3 and 17 to 18 of MTRCL's Skeleton Opening Statement **[OS/5/1, 3-4]**; paragraphs 1 to 3 of MTRCL's Closing Submissions **[CS1/2.2/1]**.
[362] Paragraph 22 of the witness statement of Peter Ewen **[BB8/5159]**.
[363] Paragraph 87 of the witness statement of Peter Ewen **[BB8/5176]**.

contracting, competence, and a PIMS review. In addition, MTRCL had put a complete formal body around not just taking the recommendations forward, but looking forward into the projects that are coming in the future to make sure that it is fit and ready for them when they come along[364].

97. In July 2018 MTRCL engaged T&T, a leading management consultancy, to carry out a review to assist MTRCL in updating and improving its management systems[365]. The recommendations of the T&T review align substantially with the recommendations made by the two independent PMEs. The recommendations canvassed by T&T and the independent PMEs are continuously being implemented[366], which is "*a clear indication, in the opinion of the Commission, of the desire to achieve continuous improvement of its management process*" [367].

98. A Special Taskforce was set up in November 2018 to oversee the implementation process of the steps and measures set out in T&T's Interim Report which was issued on 15 October 2018[368]. The membership of the Special Taskforce was drawn deliberately from both MTRCL's Projects and Engineering Divisions and includes representation from the design, construction, quality assurance, contracts and procurement sections and the Intelligent Portfolio Office[369]. The Special Taskforce is undertaking the following tasks and works[370]:

    98.1 Establishing a high level implementation programme for addressing T&T's recommendations;

    98.2 Identifying and appointing individual owners to champion or support the implementation of T&T's recommendations;

    98.3 Seeking the Executive's direction on strategic related recommendations prior to implementing detailed actions;

    98.4 Providing guidance to drive action owners to ensure recommendations are appropriately addressed in a timely manner; and

[364] **[T14/49/15-51/7]**.
[365] Paragraphs 33 to 43 of the witness statement of Peter Ewen **[BB8/5161-5164]**; paragraph 40 of the witness statement of Frederick Ma Si-hang **[B1/113]**; paragraphs 49 to 50 of the witness statement of Lincoln Leong Kwok Kuen **[B1/126]**.
[366] Paragraph 19 of the witness statement of Peter Ewen **[BB8/5157]**.
[367] Paragraph 397 of the CoI Interim Report.
[368] **[B17/24421-24476]**.
[369] Paragraphs 35 to 36 of the witness statement of Peter Ewen **[BB8/5162]**.
[370] Paragraph 38 of the witness statement of Peter Ewen **[BB8/5162-5163]**.

98.5 The provision of regular progress updates to the Executive.

99. As Peter Ewen explained, the cross-disciplinary nature of the Special Taskforce is crucial to its success because members from the Engineering Division can propose solutions and members from the Projects Division can offer practical feedback from the end-user perspective to ensure the effective implementation of the recommendations on site and in practice[371].

100. MTRCL has already taken steps to address T&T's recommendations, a summary of which is set out in the T&T Recommendations with Action Taken/To be Taken as of 17 May 2019[372]. However, it is important to note that T&T's recommendations cannot all be implemented immediately as they are a mix of short, medium, and long-term initiatives that will need to be introduced over a number of years[373].

101. To enhance co-ordination in the implementation of T&T's recommendations, a Project Transformation Steering Group is being developed. This group will also be cross-disciplinary and be co-chaired by the Projects and Engineering Directors, and will be tasked to oversee the works by the various groups established to implement T&T's recommendations [374] as well as the recommendations contained in the CoI Interim Report.

102. In order to implement the recommendations in a more effective and holistic way, with an objective to verify whether these recommendations could reduce the risk of quality issues to an acceptable minimum, and to provide the assurance that the necessary checks and balances are in place to identify any instances where the quality is not being correctly applied, MTRCL invited T&T to return to Hong Kong in May 2019 to:

102.1 Carry out a light touch '*health check*' on progress (i.e. not a formal audit); and

102.2 Assess the CoI Interim Report and align those recommendations with T&T's recommendations[375].

103. T&T has since carried out the '*health check*' and produced a set of

[371] Paragraph 37 of the witness statement of Peter Ewen **[BB8/5162]**.
[372] Paragraph 40 and Appendix II of the witness statement of Peter Ewen **[BB8/5163, 5180-5186]** and **[T14/49/15-51/7]**.
[373] Paragraph 39 of the witness statement of Peter Ewen **[BB8/5163]**.
[374] Paragraph 41 of the witness statement of Peter Ewen **[BB8/5163]**.
[375] Paragraph 42 of the witness statement of Peter Ewen **[BB8/5163]**; page 2 of the T&T Health Check **[BB16/9747]**.

PowerPoint slides reporting its findings[376]. The Executive Summary contains, *inter alia*, the following encouraging findings:

103.1 "*A good start has been made in organisational design and digitalisation with considerable effort achieving good results*";

103.2 "*A long term strategy and plan is developing*";

103.3 "*MTRCL have the opportunity to be 'leading' digitalisation in infrastructure projects*";

103.4 "*There is a plan in place to answer all of the 'recommendations'*"; and

103.5 "*There is an opportunity to have a long term improvement plan in place across all areas*"[377].

As Peter Ewen explained, this gave him "*comfort*" so far as the measures that MTRCL had put in place to date to improve, *inter alia*, its project management procedures were concerned[378]. It is submitted that Peter Ewen's "*comfort*" was well-founded.

104. MTRCL's on-going improvements to its management system are equally relevant to the project management issues in respect of the NAT, SAT, and HHS. It is confident that the following measures will address the project management issues relevant to this Extended CoI:

104.1 Digitalisation of the site inspection process and the adoption of Building Information Modelling;

104.2 Enhanced training of frontline staff for better implementation of PIMS;

104.3 Enhancements to the quality assurance system; and

104.4 Fundamental revision of PIMS.

Each of these measures will now be addressed in turn:

(i) Digitalisation of the site inspection process and the adoption of BIM

105. The consistent evidence of MTRCL's ConE and IOW teams is that gaps in the RISC form records were occasioned by LCAL's omissions during the construction works, despite MTRCL's repeated complaints to LCAL[379].

[376] Paragraph 43 of the witness statement of Peter Ewen **[BB8/5164]**; T&T Health Check **[B16/9746-9772]**; **[T14/48/4-49/14]**.
[377] Page 3 of the T&T Health Check **[BB16/9748]**.
[378] **[T14/48/4-49/14].**
[379]Paragraphs 19 to 20 of the witness statement of Chan Chun Wai Chris **[BB1/115]** (NAT and SAT); paragraphs 16 to 22 of the witness statement of Tang Siu Hang, Tony **[BB1/125-126]** (NAT); paragraphs 12 to 15 of the witness statement of Kong Sebastian Sai Kit (HHS)

106. In this regard, it is noted that the consistent excuse put forward by LCAL's frontline staff for their failure to submit the requisite RISC forms was that they were constantly so busy supervising the works, completing inspections and attending other necessary tasks that they forgot to attend to the corresponding paperwork[380]. However, and as Peter Ewen explained during the course of his cross-examination, it is expected that through digitalisation the inspection process can be simplified rendering it easier for the relevant staff members/engineers to undertake the work and to do the work correctly[381].

107. In or around late September 2018, MTRCL's Projects Division established the PDTF, the objective of which is to define the scope and requirements for digitalisation tools to be procured in order to enhance the quality management processes and site communications, including the capture of site records[382].

108. With the support of the Engineering Division, the PDTF has, to date, overseen the introduction of several initiatives, including: (i) iComm (Intelligent Communication for Projects); and, (ii) iSuper (Intelligent Supervision for Projects)[383]. Each has very useful 'state of the art' features and facilities as explained below.

109. iComm is an instant messaging tool which closely resembles messaging applications found on smart phones:

    109.1 An important aspect of this tool is that it allows site staff to communicate on a secure platform the status of works on site via texts, videos and photos, and all communications are time and date stamped and archived with details of both to whom and when they were issued;

    109.2 Distribution lists are also set up to ensure that important information

[BB8/5246-5247]; paragraphs 20 to 32, 36, 39 and 40 of the witness statement of Tung Hiu Yeung (SAT and HHS) **[BB8/5252-5255, 5257-5258]**; paragraphs 19 to 30 of the supplemental witness statement of Fu Yin Chit (NAT, SAT and HHS) **[BB8/5223-5225]**; paragraphs 36 to 41 of the witness statement of Chan Kit Lam (NAT, SAT and HHS) **[BB8/5197-5198]**.

[380]Paragraph 29 of the witness statement of Henry Lai **[CC1/93]**; paragraphs 5 to 6 of the second witness statement of Henry Lai **[CC6/3786-3787]**; paragraphs 19 to 20 of the witness statement of Raymond Tsoi **[CC6/3795]**; paragraphs 18 to 19 of the witness statement of Sean Wong**[CC6/3804]**; paragraphs 20 to 21 of the first witness statement of Jeff Lii **[CC6/3814]**; paragraphs 20 to 22 of the first witness statement of Alan Yeung **[CC6/3823-3824]**; paragraphs 4 of the second witness statement of Alan Yeung **[CC10/6492-6493]**; paragraphs 19 to 21 of the first witness statement of Ronald Leung **[CC6/3832-3833]**; paragraphs 18 to 19 of the witness statement of Saky Chan's **[CC6/3843]**.

[381]**[T14/77/11-23]**.

[382] Paragraphs 47 to 48 of the witness statement of Peter Ewen **[BB8/5165-5166]**.

[383] Paragraph 50 of the witness statement of Peter Ewen **[BB8/5166]**.

is getting to the correct people quickly and efficiently. Both DM team members and contractors can be included in the distribution lists to facilitate decisions that need to be taken when issues develop on site; and

109.3 Decisions taken through iComm can be recorded in a controlled environment for follow up action and MTRCL can extract all past communications through the database[384].

110. iSuper is an intelligent supervision tool:

110.1 This tool has been used for the digitalisation of the RISC form process and also includes an element of process control. It will also be used for managing NCRs and the site diary;

110.2 A major issue during the NAT, SAT, and HHS works is that signed RISC forms which should have documented the relevant hold points, were in many instances unavailable for review;

110.3 With so much pressure to achieve the deadlines set out in the programme and to open the railway on time, site team members explained that they were under significant pressure, but digitalisation of the inspection process will significantly simplify the works that site team members are required to carry out, enabling them to conduct the actual inspection and to complete all the necessary recording and filing works more efficiently under such a high pressure working environment;

110.4 One of the most significant improvements brought about by iSuper in the inspection process is that the process can now be carried out by the frontline staff themselves (and instantaneously archived), as opposed to relying on office based colleagues to complete the documentation[385]. In doing so, iSuper substantially reduces the risk of inspection records being missed;

110.5 In order to address the risk of works being checked against the incorrect design data without the knowledge of the DM team, a new

[384] Paragraph 51 to 52 of the witness statement of Peter Ewen **[BB8/5166-5167]**.
[385] Paragraph 15 of the witness statement of Tang Siu Hang, Tony **[BB1/123-125]**; see also paragraphs 30 to 32 of the witness statement of Chan Kit Lam **[BB8/5195-5196]**.

digital format of the RISC form has been introduced to also require permission from the DM team before the works can proceed beyond the relevant hold points; and

110.6 The iSuper framework is designed to ensure a unified project wide RISC form process to avoid the risk of misplacing RISC forms due to different approaches being adopted across different works areas for circulation and archiving of RISC forms[386]. In addition, and as Peter Ewen explained, a further advantage of digitalisation is that inspection records can be maintained for a much longer period and form part of the quality records[387].

111. In relation to the missing RISC forms issue in the NAT, SAT and HHS, Peter Ewen is of the view that there should have been a measuring system and a monitoring system in place that would have taken that information up to the highest level of management within MTRCL[388].

112. It is submitted this makes good sense and in this regard it should be noted that the Intelligent Portfolio Office of MTRCL's Engineering Division is currently working on a new initiative on RISC forms underpinned by iSuper, known as iRISC. The main purpose of this initiative is to keep track of the number of RISC forms that are necessary for the contractor to submit. The intended operation of iRISC would be as follows:

112.1 The ITP submitted by the contractor should include the estimated number of RISC forms required for the works, which would be reviewed by MTRCL's CM team. This information would then be put into the iSuper database;

112.2 The estimated number of RISC forms required will be regularly re-visited and updated during the construction phases;

112.3 As the construction progresses, the number of RISC forms submitted by the contractor will be checked against the number of RISC forms that should have been submitted by the relevant construction stage (based on the estimate of the CM team). If a RISC form is missing, an

[386] Paragraphs 53 to 58 of the witness statement of Peter Ewen **[BB8/5167-5169]**.
[387] **[T14/80/15-81/17]**.
[388] **[T14/55/21-55/25]**.

explanation by the contractor will be demanded to minimise the possibility of any RISC form inspection being missed and overcome the problem of missing forms. This will also serve as part of the independent quality assurance audit process[389].

113. Both iComm and iSuper are licensed to MTRCL on an annual subscription basis. iComm has already been formally launched across all ongoing SCL contracts and the PDTF has received and evaluated feedback from MTRCL and contractors' staff. iSuper has also been piloted on SCL Contracts 1123 and 1128. The PDTF has received and evaluated feedback from MTRCL and the contractors' staff on these two contracts[390].

114. BIM delivers an integrated set of geometric models, data and documentation that builds and captures all knowledge related to an asset. A software model of the asset is developed and shared within a CDE, thereby increasing transparency and coordination between the parties. BIM provides clarity regarding the asset requirements at each phase of the project life cycle. Data from all parties is linked, allowing all parties to collaborate, understand and make informed decisions. This can assist in making sure the project is kept on schedule and on budget[391].

115. In 2017, the MTRCL approved the adoption of BIM as the primary means of design and project management for future RDS2014 Projects. Funding was approved to set up a CDE to manage federation of models across all disciplines during the design and construction of new works, as well all data required for the design, construction and future maintenance of new projects, including quality management[392].

116. A contract to design and install the CDE was awarded to BIM Academy in the second quarter of 2018 and the first phase of the CDE was completed and went 'live' at the end of 2018. The bespoke design of the CDE will be owned and managed by MTRCL and its use will be mandatory for all future projects, from preliminary design to construction and to future facility

[389] Paragraphs 59 to 60 of the witness statement of Peter Ewen **[BB8/5169]**; see also Paragraphs 61 to 62 of the witness statement of Peter Ewen **[BB8/5170]**; **[T14/58/7-59/17]**.
[390] Paragraphs 63 to 64 of the witness statement of Peter Ewen **[BB8/5170]**.
[391] Paragraph 66 of the witness statement of Peter Ewen **[BB8/5170-5171]**.
[392] Paragraphs 68 of the witness statement of Peter Ewen **[BB8/5171]**.

management. Staff of all consultants, contractors and MTRCL will be given training on how the CDE works and they will be required to ensure all future works will be carried out using BIM. An initial set of training modules, concentrating mainly on the design phases and roles of the DM and CM teams, are currently being prepared[393].

117. One important development that is planned by MTRCL is to link BIM to other digital management tools being adopted for enhanced site management and inspection, such as iComm and iSuper. The compatibility upgrade has not yet commenced, but will be ready in time for the first construction contract fully designed in BIM in 2020[394].

118. With a common information platform, all relevant parties would have access to the most up to date information during the construction process. The adoption of BIM will greatly reduce communication issues, such as those concerning structures at contract interfaces[395]. Peter Ewen explained that: the introduction and utilisation of BIM, with a single commendatory environment is probably the best way of identifying any interface issues because everyone is working from the same set of drawings and any changes or alterations would automatically get seen and one can track everything that goes through that[396]; and, enabling project management staff to do their jobs more effectively with appropriate use of technology is critical and the above initiatives are all designed for this purpose[397].

(ii) Enhanced training of frontline staff for better PIMS implementation

119. The PDQWG was established under the PIMSSG with the stated objective to promote a sustainable quality culture amongst frontline construction teams for a higher degree of compliance with statutory requirements and PIMS requirements in the areas of communication and site inspection[398].

120. The PDQWG has instigated an introduction to PIMS training module which

[393] Paragraphs 69 and 71 of the witness statement of Peter Ewen **[BB8/5171-5172]**.
[394] Paragraph 70 of the witness statement of Peter Ewen **[BB8/5171-5172]**; see also paragraphs 72 to 73 of the witness statement of Peter Ewen **[BB8/5172]**.
[395] Paragraph 74 of the witness statement of Peter Ewen **[BB8/5172]**; **[T14/62/6-64/2]**.
[396] **[T14/61/12-62/19]**.
[397] Paragraph 75 of the witness statement of Peter Ewen **[BB8/5172]**.
[398] Paragraph 77 of the witness statement of Peter Ewen **[BB8/5173]**.

all frontline Projects staff have attended in 2018 or 2019. This training module explains what PIMS are, where to find them, and how they should be used and implemented. This has been followed up by more job specific training for frontline staff on the specific PIMS that relate to their current roles. In addition, a training programme on PIMS for staff is being developed for use later in 2019 based on the programme of works that will be carried out across all SCL contracts[399].

121. The PDQWG is also developing staff competency mapping and training for specific roles that the Projects staff members perform. MTRCL already has a model for staff training competency mapping that has been used by the Operations Divisions for many years. The PDQWG is working to develop one that is suitable for the Projects Division[400].

(iii) Enhancements to the quality assurance system

122. MTRCL has reformulated and enhanced the "3 Lines of Defence" policy for quality management of projects which is to be introduced in 2019 as follows:

122.1 The 1st line of defence: The Quality Management Team will continue to carry out audits on the works and the processes of contractors on a regular basis. The site team will continue to manage the day-to-day activities on site with inspections and reporting processes being enhanced by the use of new digital technology. They will continue to report to the Projects Director;

122.2 The 2nd line of defence: This will be formed under the leadership of a newly appointed Quality Manger[401] who will report independently through a General Manager to the Engineering Director. His team will be split into two divisions:

122.2.1 The M&V (Monitoring and Verification) Section, which will be based permanently on site. This team will have the authority to carry out both quality control and quality

[399] Paragraphs 78 to 79 of the witness statement of Peter Ewen **[BB8/5173]**; **[T14/71/15-72/5]**; see also Item 4.22.2 of Notes of the 134th SCL Project Progress Meeting **[DD12/13719]**.
[400] Paragraph 80 of the witness statement of Peter Ewen **[BB8/5173]**.
[401] Andy Yeung, a highly experienced quality professional who has experience across multiple industries, including transportation, reported for duty on 3 May 2019: paragraph 82 of the witness statement of Peter Ewen **[BB8/5174-5175]**.

assurance checks on site at any time. The team will particularly be charged with ensuring that quality assurance processes and procedures are being adhered to and that adequate checks are being carried out on the quality of the works on site;

122.2.2 The Auditing Section, which will be office based and managed by the Engineering Division, will be carrying out a rolling programme of audits on the implementation of MTRCL processes and procedures across all contracts.

Both Sections will have the power to suspend works which are not in compliance with MTRCL processes and procedures and will have the authority to audit all and any works on site. Until such time as the new quality team is fully constituted, the Engineering Division has enlisted the support of WSP to provide a team of auditors to carry out audits on SCL contracts (which work is separate and distinct from the audit on quality supervision in relation to the NAT, SAT and HHS)[402]. This team commenced service in December 2018 and will remain until recruitment commences for the permanent staff;

122.3 The 3rd line of defence: MTRCL's Internal Audit Office will continue to carry out an overview of all MTRCL's activities, including those of the Projects and Engineering Divisions[403].

(iv) Fundamental revision of PIMS

123. MTRCL is implementing T&T's recommendations for which purpose it has set up a PIMS Review Panel. MTRCL has also gone further in that the Executive Committee has approved the award of an External Consultancy Contract to completely overhaul PIMS, with the intention of addressing T&T's recommendations *and* adopting '*world best practice*' in project management. It is anticipated this External Consultancy Contract will be awarded in the second half of 2019, together with a target for the review to

[402] Paragraphs 11 to 18 of the witness statement of Peter Ewen **[BB8/5155-5157]**.
[403] Paragraphs 81 to 84 of the witness statement of Peter Ewen **[BB8/5174-5175]**; **[T14/63/3-8]**.

be completed[404]. The current situation is that MTRCL is using T&T to help draft the scope of works and instructions for this Consultancy Contract.

124. Thus, it is submitted that it is clear MTRCL has already taken significant steps and will take yet further steps to improve its project management systems, which address both comprehensively and satisfactorily the project management issues arising from Issues 1, 2, and 3. MTRCL welcomes and looks forward to receiving any further recommendations by the CoI in the Final Report at the end of these proceedings[405].

X. Leave to call expert evidence

125. In the light of the foregoing and subject to reviewing the other interested parties' closing submissions, MTRCL reserves the right to adduce expert evidence in due course in order to assist the CoI on the following issues:

125.1 as to the adequacy of the steps it took in performing its monitoring role in terms of managing the contractors during the Interface Meeting processes;

125.2 the adequacy of the ground conditions when the SJs were constructed;

125.3 the quality and adequacy of rebars which are supported by manufacturer's testing and mill test certificates;

125.4 the water seepage at the SJs;

125.5 the structural safety and integrity of the structures in the NAT, SAT and HHS, including the SJs and the Shunt Neck CJ;

125.6 (i) the project management issues that concerned the works in the NAT, SAT and HHS; and, (ii) the steps that MTRCL has already taken and which are being taken to improve its project management systems.

Dated 19th July 2019.

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[404] Paragraphs 85 to 86 of the witness statement of Peter Ewen **[BB8/5175-5176]**.
[405] Paragraph 87 of the witness statement of Peter Ewen **[BB8/5176]**.