EXPERT REPORT

PREPARED BY

STEVE ROWSELL

Expert Witness appointed by the Commission of Inquiry into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the Shatin to Central Link Project

20 December 2018

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Specialist Field	:	Advising on issues relating to corporate management and governance in the public sector, project management, contract management, stakeholder engagement and procurement strategy, as further detailed in **Appendix I**
Appointed on behalf of	:	The Commission of Inquiry into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the Shatin to Central Link Project (the "**Commission**")
Prepared for	:	The Commission
On instructions of	:	Messrs. Lo & Lo, Solicitors for the Commission ("**Lo & Lo**")
Subject matter / Scope of engagement	:	To assist the Commission in discharging its duties under the Terms of Reference and by acting as an expert witness in the Inquiry hearings
Documents	:	I was given access to the documents in the hearing bundles. References in the text of this Report are references to pages in the hearing bundles.
Meetings with relevant persons		**22 November 2018** **(1) Meeting with MTRCL's procurement and commercial team** Meeting with Dr. Peter Ewen (Engineering Director) and Mr. Scott Mackenzie (General Manager – Procurement and Contracts), senior officers of MTRCL's procurement and commercial team.
	:	**(2) Meeting with representatives of Turner & Townsend** Meeting (by video conference) Mr. Tom Muir and Mr Daniel Cheung, the 2 authors of the Turner & Townsend Interim Report **[B17/24421+]** and officers of MTRCL, including Dr. Peter Ewen (Engineering Director), Mr. Henry Yu (Senior Manager – IPO) and Mr. Steven Hamill (Project Manager – Technical Support)

Commission of Inquiry into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the Shatin to Central Link Project

The Terms of Reference of the Commission are as follows [A1/1]:

In respect of the diaphragm wall and platform slab construction works at the Hung Hom Station Extension under the MTR Corporation Limited (MTRCL)'s Contract No. 1112 of the Shatin to Central Link Project,

(a) (i) to inquire into the facts and circumstances surrounding the steel reinforcement fixing works, including but not limited to those works at locations that have given rise to extensive public concern about their safety since May 2018;

(ii) to inquire into the facts and circumstances surrounding any other works which raise concerns about public safety; and

(iii) to ascertain whether the works in (i) and (ii) above were executed in accordance with the Contract. If not, the reasons therefor and whether steps for rectification have been taken;

(b) to review, in the light of (a) above,

(i) the adequacy of the relevant aspects of MTRCL's project management and supervision system, quality assurance and quality control system, risk management system, site supervision and control system and processes, system on reporting to Government, system and processes for communication internally and with various stakeholders, and any other related systems, processes and practices, and the implementation thereof; and

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

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

Instructions

I have been instructed by Lo & Lo to give my opinion on the matters under paragraphs (b) and (c) of the Commission's Terms of Reference ("**ToR**").

In providing my opinion, I have been instructed to consider the following areas and undertake the following tasks:

(a) In relation to paragraph (b)(i) of the ToR, and in the light of matters in paragraph (a) of the ToR, please identify issues of non-compliance, inadequacies and deficiencies (if any) in **MTRCL**'s systems, processes and practices as set out in paragraph (b)(i).

(b) In relation to paragraph (b)(ii) of the ToR, and in the light of matters in paragraph (a) of the ToR, please comment on the extent and adequacy of the monitoring and control mechanisms of the **Government**, and the implementation thereof and identify issues of inadequacies and deficiencies (if any).

(c) In relation to paragraph (c) of the ToR, please provide your opinion (with a view to promoting public safety and assurance on quality of works) on how the system of supervision, monitoring, control and management may be strengthened and enhanced to avoid future incidents of non-compliances, inadequacies and deficiencies.

(d) In addition, to the three main aspects of my instructions as set out above, I was also requested to consider two specific points:

a. the impact of the Instrument of Exemption (IoE) in relation to MTRCL/Leighton seeking approval of design/detail changes; and
b. the potential implications of the use of the Target Cost Contract between MTRCL and Leighton in relation to whether it may have contributed to the events and issues that have happened.

Introduction

1. My instructions to act as an expert to assist the Commission cover three main aspects. I have had access to the documents collected by the Commission which form the paginated hearing bundles as updated from time to time and daily transcripts of the hearing and I have been supplied with hard copies of various documents including witness statements which I have reviewed. I have examined documents in the paginated hearing bundles which in my judgement I considered may be helpful in understanding the methods and systems used to deliver the Entrustment Activities [as defined in **G7/5603**] and in reviewing events and issues that led to this Commission being established. My overall approach to reviewing the three main aspects in my instructions are set out below.

2. The **first part** of my instructions required me to identify issues of non-compliance, inadequacies and deficiencies (if any) in the listed **MTRCL**'s project management and supervision systems, processes and practices. In order to identify any such issues, I have set out in my report the obligations placed on MTRCL in undertaking their duties. For the

purposes of my report I have used my experience and professional judgement to identify what I consider to be the key obligations relating to the events and issues that have arisen, rather than identify a long comprehensive list of all obligations. Nevertheless, the list of key obligations is still quite long.

3. I explain in my report that the overarching obligation on MTRCL is to carry out the Entrustment Activities with the skill and care reasonably to be expected of a professional and competent project manager in an analogous role. It needs to be recognised that on a project of this scale and complexity, involving many thousands of workers over the course of the contract, not everything will go perfectly to plan. It is inevitable that some errors or mistakes will be made in the delivery of services and the execution of the works. The standard required of MTCRL is not such that all mistakes are expected to be avoided but that it carries out its duties with reasonable skill and care and in a professional and competent manner. I will come back to this in more detail.

4. In the light of the above, in undertaking my investigations I have not sought to review the witness statements and other documents with the aim of identifying each and every deficiency. My approach is to consider the adequacy of the overall systems, controls, checks and balances which MTRCL had in place to minimise the risk of mistakes occurring and to enable any such mistakes to be identified and rectified. In my evidence however, I will use individual examples to illustrate how systems and procedures were intended to operate and the possible consequences if they were not robustly implemented.

5. The **second part** of my instructions requested me to comment on the extent and adequacy of the monitoring and control mechanisms of the **Government**, and the implementation thereof and identify issues of inadequacies and deficiencies (if any). As with the first part of my investigations, my approach has been to take a high-level view of the Government's monitoring and control mechanisms in identifying the risks of inadequacies and deficiencies. I have however, used individual examples to indicate how those risks may materialise in practice.

6. The **third part** of my instructions requested me to provide my opinion on how the system of supervision, monitoring, control and management may be strengthened and enhanced to avoid future incidents of non-compliances, inadequacies and deficiencies with a view to promoting public safety and assurance on quality of works. My approach has been to review the issues that have arisen and to seek to understand their causes, and to consider

how similar risks have been addressed and mitigated on other major projects elsewhere and particularly in the United Kingdom. I recognise that there will be differences in regulatory and governance frameworks and in delivery cultures, but I have sought to base my opinions on good practice principles which I consider may be applicable notwithstanding any such differences.

REPORT PART 1: ADEQUACY OF MTRCL'S PROJECT MANAGEMENT SYSTEM AND OTHER SYSTEMS

Introduction to MTRCL's overall obligations

7. In order for me to identify any issues of non-compliance, inadequacies and deficiencies in MTRCL's systems, processes and practices it has been necessary for me to understand MTRCL's obligations and responsibilities as set out in a range of documents. I recognise that the formal interpretation of the obligations is a legal matter, but in order to produce my report I have set out my views on the position as I see it based on my experience in project management, procurement and contracts. The main documents containing obligations are as follows:

- The EA for Construction and Commissioning of the Shatin to Central Link dated 29 May 2012 **[G7/5595+]**.

- The Instrument of Exemption under Section 54(2) of Mass Transit Railway Ordinance in respect of Hung Hom Station Compound and Station at Sung Wong Toi for SCL dated 5 December 2012 (the "**IoE**") **[H7/2220+]**.

- MTRCL's Project Management Plan ("**PMP**") **[B4/1825+]** submitted as required under the IoE procedures.

- The relevant manuals and procedures set out in MTRCL's Project Integrated Management System ("**PIMS**") as listed in the Project Management Manual **[B3/1058+** and **B6/3559-3696]**.

- The BD Code of Practice for Site Supervision 2009 **[B5/2676+]**(**"BD's CoP"**), the associated Site Supervision Technical Memorandum **[B5/2796+]** and the project Site Supervision Plan ("**SSP**") **[B6/4034+ or G2/810+]**.

- The terms, conditions and specification set out in the Target Cost Contract between MTRCL and Leighton which was awarded on 7 March 2013 **[C3/1756+]**.

OBLIGATIONS UNDER THE 2012 ENTRUSTMENT AGREEMENT

8. MTRCL's obligations at the highest-level flow from the Entrustment Agreement ("**EA**") for Construction and Commissioning of the Shatin to Central Link dated 29 May 2012 [**G7/5595+**]. This was established between the Secretary for Transport and Housing, for and behalf of the Government of the Hong Kong Special Administrative Region, and MTRCL. This requires, inter alia, MTRCL to:

    a. EA Clause 4.1 **[G7/5612]** - carry out Entrustment Activities in a manner which reflects its responsibilities and duties under the Ordinance, the Operating Agreement (9th August 2007) and the EA 2012.

    ***My observations**: it is clear that MTRCL is a very experienced company who has extensive experience and capability in the planning, delivery and operation of railway networks and systems in Hong Kong. From the evidence I have seen, I have no doubt that MTRCL has a thorough knowledge and understanding of its responsibilities and duties associated with delivering the Entrustment Activities. The organisational structure and governance arrangements they have established for the project appear to me to be robust and appropriate for the delivery of the Entrustment Activities. They are in line with what I would expect for this type of major project. I do however, have some concerns and other comments on detailed aspects of MTRCL's systems and processes which I set out later in this report.*

    b. EA Clause 4.3 **[G7/5612]** - MTRCL shall, to the satisfaction of Government, carry out the Entrustment Activities for the RRIW (Reprovisioning, Remedial and Improvement Works), the EPIW (Essential Public Infrastructure Works), the Property Development Enabling Works and the Miscellaneous Works (if any), in accordance with specifications and/or standards to be agreed or, in the absence of such agreement, reasonably stipulated by Government or other public bodies.

    My observations: I note that Clause 4.3 does not apply to the full scope of the Works covered by the Entrustment Activities as set out in Appendix A of the EA. The full scope comprises the Railway works, the RRIW, the EPIW, the Property Development Enabling Works and the Interface Works. Clause 4.3 of the EA however, does not include the Railway Works in the list of works required to be

carried out or procured by the Corporation to the satisfaction of Government in accordance with specifications and/or standards to be agreed. That is not to say that the Railway Works do not need to meet the specifications and standards, but they are not specifically covered by Clause 4.3.

c. EA Clause 4.4 **[G7/5612]** - MTRCL shall comply with and satisfy all relevant statutory or other legal requirements applicable to the Entrustment Activities including without limitation the obtaining of all requisite licences, authorisations, permits, approvals or exemptions.

My observations: this obligation is broadly similar to that set out in Clause 4.1 and my observations are the same for this clause.

d. EA Clause 4.6(A) **[G7/5612]** – MTRCL shall let all contracts with Third Parties under the Corporation's conditions of contract provided that the maximum pain share for the Employer under any Third Party Contract which is a target cost contract shall be 10% of the initial target cost.

My observations: I have examined the target cost contract that MTRCL has established with Leighton Contractors (Asia) Limited ("**Leighton**"). *The obligation to cap the Employer's (MTRCL's) pain share to 10% of the initial target cost is set out in Clause 84.6 of the contract* **[C3/1927-1928]** *and Section 6 of the Form of Tender* **[C2/1010-1011]**. *The latter also sets out that the Contractor's share is 50%. These contractual provisions mean that in the range of 100% to 120% of the initial target cost (actual costs exceed the target cost by up to 20%), the Employer and the Contractor each bear 50% of the actual costs - restricting the Employer's share to half of the 20% overrun. Where the actual costs exceed 120% of the initial target cost, the Contractor is liable for all of the actual costs as the Employer's share is capped at 10% of the initial target cost. This approach incentivises the Contractor to deliver the contract below the Target Cost but also exposes the Contractor to a potentially high risk and it is normal for contractors to reflect that risk in developing tender prices. In my experience, failure by the Contractor to allow adequate risk allowance can impact on behaviours during the delivery of the works.*

e. EA Clause 4.6(B) **[G7/5613]** – MTRCL shall in reaching any commercial settlements with Third parties which are not strictly in accordance with the terms of the relevant contract….., seek to ensure that such settlements are in the best interests of the SCL project, act in accordance with the relevant commercial settlement procedures referred to Clause 4.6 (C)(iv) **[G7/5613]** and in a timely manner consult the Project Supervision Committee….before such settlement is considered by the Project Control Group.

My observations: Some evidence has been presented to the Commission in relation to commercial settlements with sub-contractors. I have some observations in relation to these procedures which I cover later on in my report under the specific issue of commercial settlement procedures. Whilst sub-contractors do not come within the definition of Third Parties, I have considered it appropriate to comment on these commercial aspects in my report. This is because, in my opinion, the commercial model and the risk allocation down the supply chain can impact on behaviours displayed in executing the works and on the performance delivered under the contract.

f. EA Clause 4.6(C) **[G7/5613]** - MTRCL shall act in accordance with the Corporation's management systems and procedures in the following areas:

- Organisation and management responsibilities;
- Project management and control;
- Relevant project management and procurement procedures;
- Commercial settlement procedures; and
- The appointment of external legal advisers.

My observations: in relation to the topics covered by the bullets, I comment on compliance with the first three bullets further below in my comments on MTRCL's PIMS. I refer to commercial settlement procedures in paragraph e above. The appointment of external legal advisers is not relevant to the scope of my investigations.

g. EA Clause 5.1(A) **[G7/5615-5616]**: MTRCL warrants that the provision of project management services shall be carried out with the skill and care reasonably to be expected of a professional and competent project manager whose role includes the

procurement, co-ordination, administration, management and supervision (including testing and examining the plant, goods, materials and workmanship) of the design and construction of works and the procurement of goods that are analogous to those being procured under the Third Party Contracts and associated contract management and management and enforcement of claims.

EA Clause 5.1(B) **[G7/5616]**: MTRCL warrants that design services shall be carried out with the skill and care reasonably to be expected of a professional and competent design engineer.

EA Clause 5.1(C) **[G7/5616]**: MTRCL warrants that the carrying out of construction works shall be carried out with the skills and care reasonably to be expected of, and by utilising such plant, goods and materials reasonably to be expected from, a competent and workmanlike construction contractor.

My observations: Clauses 5.1(A to C) **[G7/5615-5616]** *set out that the overarching obligation on MTRCL is to carry out the Entrustment Activities with the skill and care reasonably to be expected of a professional and competent project manager in an analogous role. I consider that it needs to be recognised that on a project of this scale and complexity that not everything will go according to plan and not everything will be done right first time. It is inevitable that errors will be made and not all procedures will be properly followed in the delivery of services and the execution of the works. The standard required of MTCRL is in my opinion, not that all mistakes must be avoided but that it carries out its duties with reasonable skill and care and in a professional and competent manner. I come back to detailed aspects of this obligation further below.*

h. EA Clause 8.1 Modifications **[G7/5619]**: provides for either party to propose material modifications to the contents of Appendix A (Scope) **[G7/5649-5659]**, Appendix B (Entrustment Activities) **[G7/5660-5663]** and/or Appendix C (Entrustment Programme) **[G7/5664-5666]**. It requires the parties to endeavour to agree on the scope and extent of the material modification and the likely effect on the Entrustment Cost and Programme.

My observations: it appears to me that material modifications provided for in Clause 8.1 are high level changes to the elements of scope and activities included in

the Appendices. I have assumed that it was not intended to apply this clause to modifications to the detailed design of the individual elements of scope listed in Appendix A. The approval of design submissions is covered by Clause 35 of the EA **[G7/5643-5644]**.

i. EA Clauses 16 and 17 **[G7/5625-5629]** Consultation, Project Monitoring and Verification (including Appendix K as-constructed drawings **[G7/5697-5699]**): requirements within this Clause include:

- The role of the Government's Project Supervision Committee in reviewing progress including in relation to any issues arising from site inspections, cost control and resolution of contractual claims.
- MTRCL to submit to Government, at the relevant time, preliminary and final versions of the as-constructed documents listed in Appendix K, allowing Government a reasonable time for review of the documents. Appendix K states that MTRCL shall use its reasonable endeavours to ensure that the documents are available at the time of the final report to be provided to Government which is required within three months following the issue of the Handover Certificate, and in any event within six months of the issue of the Handover Certificate.
- MTRCL shall keep Government informed, and provide such financial or other information as may reasonably be required, of all matters which in its opinion are likely to have a material impact on the matters specified in Appendices A to C of the EA.
- MTRCL to provide Government with a monthly progress report on the Entrustment Activities.
- MTRCL shall arrange formal joint site inspections on a quarterly basis to allow Government to review MTRCL's compliance with its obligations under the EA.

My observations: in relation to Consultation and communications with Government, in my opinion, these Clauses set out a clear expectation and requirement that MTRCL must keep Government informed on a regular basis of any material issues relating to the Entrustment Activities. I comment on the extent

and adequacy of the Government's monitoring and control mechanisms in Part 2 of my report.

In relation to the provision of as-constructed drawings, I am aware that the lack of drawings initially led to difficulty in developing a possible appropriate load test on the structural elements about which there is some concern, and subsequently further difficulty in the investigations and site safety analysis involved in assessing the best way forward. I cover the position on as-constructed drawings further below as a specific issue.

j. EA Clause 35 **[G7/5643-5644]** Design Submissions and Construction: this sets out that notwithstanding the difference in respect of applicability of the Buildings Ordinance to the works, MTRCL agrees that it shall carry out Consultation in relation to the Railway Works in substantially the same manner and to the same extent as if the SCL project were being carried out by MTRCL under the Ownership Approach. Clause 35.2(A) defines the matters covered by the Consultation process.

My observations: the provisions for the applicability of the Buildings Ordinance and the associated requirements for Consultation appear, in my opinion, to be quite complex and it is not straightforward to follow how the documents work together. Application of the provisions requires reference to the following documents:

- *The Buildings Ordinance.*
- *The EA for Construction and Commissioning of the SCL, specifically the following clauses:*
    - *Clause 3 General* **[G7/5612]**
    - *Clause 4 Corporation's Obligations* **[G7/5612-5615]**
    - *Clause 5 Corporation's Skill and Care Warranty* **[G7/5615-5617]**
    - *Clause 16 Consultation* **[G7/5625-5626]**
    - *Clause 17 Project Monitoring and Verification* **[G7/5626-5629]**
    - *Clause 35 Design Submissions and Construction* **[G7/5643-5644]**.
- *The Operating Agreement.*
- *The IoE* **[H7/2220+]**.

- *The Instrument of Compliance* **[H7/2416-2431]**.

The clarity of the requirements is not helped by the use of imprecise wording, such as in Clause 35 which requires MTRCL to carry out Consultation in relation to the Railway Works "in substantially the same manner and to the same extent as if the SCL project were being carried out by MTRCL under the Ownership Approach" **[G7/5644]**. *Taken on its own, this would appear to allow some flexibility in the application of the provisions for Consultation.*

My overarching observation is that it would have been clearer and more helpful for all of the provisions to have been pulled together to set out a clear and precise description of the requirements for the project with a clear allocation of responsibilities.

k. A general issue throughout the EA relates to the use of the term "Government". The Agreement is signed by the Secretary for Transport and Housing for and on behalf of the Government of the Hong Kong Special Administrative Region ("Government"). The detailed requirements relating to Consultation with "Government" are set out in paragraph 3.4 of a total of 6 versions of the PMP **[B4/1834 Version A] [B4/1959 Version B] [B4/2091 Version C] [B4/2226 Version D] [B4/2491 Version E] [B4/2359 Version F]** which refers to MTRCL consulting with relevant Government Departments such as BD, GEO, CEDD, HyD, DSD, WSD, ASD, AMO, LCSD, Housing Department etc (indicating that even this long list is not complete).

My observations: I have a concern that there is a potential lack of clarity regarding the management of communications between MTRCL and the Government. The Entrustment Activities involve liaison between MTRCL and a number of different Government Departments. For example, in the IoE at paragraph (g) of the General Notes and Conditions to the Reference Schedule **[H7/2229-2230]***, MTRCL is required to consult <u>relevant</u> Government departments in relation to specified building matters. The PMP identifies at least ten Government Departments with whom consultation may be required.*

I raise this as an issue because in my experience of working on major Government projects in the UK, I consider it to be very important to have clarity of the Government's project sponsorship arrangements and the associated communication and governance procedures. I worked for seven years on the £15 billion Crossrail project in London which is due to open next year. The project had joint Sponsors, the Department for Transport and Transport for London, and understandably they each had internal requirements for governance and reporting. A lesson I learnt from my experience is that it is essential for Government to have very clear sponsor arrangements with a single point of responsibility for the administration of the Agreement, the management of communications between the parties and for ensuring that governance procedures are administered effectively and efficiently to support the project objectives. Where responsibilities are not fully clear or where there are different lines of communication with different Government Departments there are risks of:

- *conflicting or inconsistent requirements;*
- *instructions being given without proper authority;*
- *matters being overlooked;*
- *governance systems not operating efficiently or as intended; and /or*
- *delays in instructions or approvals being given.*

OBLIGATIONS UNDER THE INSTRUMENT OF EXEMPTION AND THE INSTRUMENT OF COMPLIANCE

9. The Buildings Department granted MTRCL exemption in respect of Hung Hom Station Compound from the Buildings Ordinance (BO) in their letter of 5th December 2012 **[H7/2220]** which issued the IoE. The exemption related only to the categories and types of structures specified in the Reference Schedule **[H7/2225-2228]**. The exemption took regard of the draft PMP dated 22 November 2012 **[H7/2220]** and required the formal PMP to be submitted as soon as possible. It is important to note that the exemption was confined to those procedures and requirements relating to the appointment of Authorized Person and Registered Structural Engineer as appropriate, approval of plans, consent to commencement and resumption of works and occupation of buildings [as set out in the BO], such that the Building Authority's duties and sanctioning powers to ensure standards of health and safety are not undermined.

10. The Instrument of Compliance ("**IoC**") issued on 16th July 2013 **[H7/2416-2431]** does not apply to the Hung Hom Station which is excluded from the Reference Schedule in the Instrument. Therefore, I have no further comments on the IoC.

11. In effect the exemption under the IoE does not in my opinion materially alter requirements as the Buildings Ordinance obligations are replaced by a set of conditions imposed on MTRCL under section 54(2) of the Mass Transit Railway Ordinance and as set out in Clauses 2, 4 and 5 of IoE **[H7/2222-2224]**. The conditions, inter alia, include:

    - Clause 2(a) – MTRCL to submit such drawings, plans and calculations as may be necessary to implement the Consultation process detailed in the Reference Schedule. MTRCL to comply with any reasonable request made during such Consultation, including any requirement for modification of designs and working procedures as may be reasonably necessary to maintain standards of health and safety.

    - Clause 2(b) – MTRCL to appoint a competent person, who shall take up the responsibilities and duties of Authorized Person / Registered Structural Engineer, to co-ordinate and supervise each area of the works in accordance with the agreed proposals, to certify the preparation of plans or documents and to certify to the relevant authorities upon completion of works.

    - Clause 2(c) – appoint a Registered Geotechnical Engineer for building works as specified and as described in Section 7 of the BD's CoP **[B5/2714-2716]** to supervise each area of the works in accordance with the agreed proposals.

    - Clause 2(d) – appoint registered general building contractors and registered specialist contractors, as appropriate, to supervise and carry out each area of the works in accordance with the agreed proposals.

    - Clause 2(e) – instigate an assurance system and control scheme to ensure that management of the construction of the works are at a standard not inferior to that required under the Buildings Ordinance and Regulations.

    - Clause 4 – The Building Authority reserves the right to suspend any works in the event of any material deviation from the agreed design or working procedure.

- Clause 5 – MTRCL are required to provide hard and soft copies of as-built drawings to the Building Authority within three months of practical completion of the works.

- The Reference Schedule to the IoE sets out at Category 2 **[H7/2226-2227]**, and in the general notes and conditions to the Reference Schedule **[H7/2229-2233]**, the specific actions to be taken in respect of Hung Hom Station and associated private structures. General Note (d) to the Schedule states that the Station shall be deemed to include platforms, concourses etc **[H7/2229]**.

My observations on MTRCL's obligations under the IoE

12. *The extent of the Consultation process set out in Clause 2(a)* **[H7/2222]** *is described in Category 2 of the Reference Schedule* **[H7/2226-2227]** *and the accompanying General Notes and Conditions* **[H7/2229-2233]**. *The Schedule sets out that full application of the BO applies to alterations and additional works at Hung Hom Station (including the platforms) to all primary structural elements including foundations and interfaces which provide support to existing private structures* **[H7/2226]**. *It is not within my remit to assess how the works could impact on other buildings but I am of the opinion that the full provisions of the BO can be considered to apply to the structural elements which are related to the subject of the Commission of Inquiry.*

13. *On this basis, MTRCL was required to submit such drawings, plans and calculations and other details as necessary to implement the specified Consultation process relating to the design and approval of the structural elements. Further details on, and obligations in relation to, the Consultation process are contained in the EA.*

14. *My understanding is that MTRCL was also required to manage and construct the works in accordance with a formal PMP, as accepted by the Building Authority. The PMP was required to specify an assurance system and a control scheme to ensure that management and construction of the works are at a standard not inferior to that required under the Buildings Ordinance and Regulations. I comment on the adequacy of the PMP later in my report.*

15. *I note that the Buildings Department received the draft PMP on 22 November 2012 and issued the IoE on 5 December 2012. That did not provide a lot of time to consider the adequacy of the PMP albeit that BD would have a further opportunity to review the final PMP. I come back to the PMP later on in my report.*

16. *Provisions relating to the Buildings Ordinance requirements were subsequently set out in the construction Contract awarded by MTRCL to Leighton at clauses 3.1* **[C3/1831]**, *10.5* **[C3/1840-1841]** *and 74.4* **[C3/1908]**.

17. *I comment later in my report on the detailed application of the Buildings Ordinance obligations to the specific structural areas which are being investigated by the Commission.*

MTRCL'S OBLIGATIONS UNDER THE PROJECT MANAGEMENT PLAN

18. The six versions of the Project Management Plan (PMP) produced between January 2013 and June 2016 are in Bundle **B4 at pp.1825-2502**. The PMP states that it outlines the scope of the works and provides details on how the project is to be managed by MTRCL in order to demonstrate that the proposed management process will meet the exemption requirements under Buildings Ordinance for Hung Hom Station Compound and EA for Shatin to Central Link for the other works (See Section 1 at **[B4/1831(A)] [B4/1956(B)] [B4/2088(C)] [B4/2223(D)] [H7/2375(E)] [B4/2356(F)]**. Apart from a very brief introduction which refers to a commitment to providing an efficient and convenient transport service, the PMP does not set MTRCL corporate policies or objectives which should be applied to the delivery of the project. The PMP could for example, set out corporate priorities in relation to aspects such as safety, welfare, quality, sustainability and efficiency. It could also emphasise the culture and behaviours expected of people working on the project particularly in relation to the implementation of any partnering or collaboration arrangements

19. The PMP, at section 5.1 **[B4/1837(A)] [B4/1962(B)] [B4/2094(C)] [B4/2229(D)] [H7/2381(E)] [B4/2362(F)]**, refers to MTRCL's project management system which is fully defined in the PIMS and includes manuals, procedures and practice notes. It is clear to me that much good work has gone into the development and maintenance of these manuals and they appear to me to provide a robust basis for the development and implementation of project specific plans which will vary depending on project requirements, complexity and detailed circumstances. Paragraph 5.1.2 of the PMP **[B4/1837(A)] [B4/1962(B)]**

[B4/2094(C)] [B4/2229(D)] [H7/2381(E)] [B4/2362(F)] recognises that the manuals are generic in nature and Appendix 4 **[B4/1886-1894(A)] [B4/2013-2022(B)] [B4/2145-2154(C)] [B4/2280-2289(D)] [H7/2432-2441(E)] [B4/2413-2422(F)]** lists all of the PIMS Manuals and Procedures which will be applied, where appropriate, to the design and construction of the SCL project. Appendix 4 identifies approximately 153 PIMS documents.

My observations on MTRCL's obligations under the PMP

20. *The PMP may appear to be a detailed plan but on closer examination it can be seen to be lacking in specific detail in relation to procedures to be applied to the management of this project. For many procedures the PMP cross-refers to other procedural documents which are largely generic type documents which require interpretation on how they are to be applied to specific contracts. In my opinion, it would have been better for the PMP to have contained more specific detail on how the generic procedures will be applied to Contract 1112 and other individual contracts. For example, in relation to site supervision, non-conformance reporting and record keeping as set out more fully later in my report.*

21. *In my opinion, the PMP is lacking in certain respects in relation to the application of the generic procedures to Contract 1112 and does not provide clear direction to those responsible for implementing the procedures. The wording of the PMP states that the list of PIMS documents in Appendix 4 of the Plan will be applied "where appropriate"* **[**Para 5.1.2-**B4/1837(A)] [B4/1962(B)] [B4/2094(C)] [B4/2229(D)] [H7/2381(E)] [B4/2362(F)]**. *It does not identify however, who is responsible for determining whether a document or procedure is appropriate. In my opinion, the applicability of documents and requirements should be clearer to ensure that there is a consistent and comprehensive approach to the application of the PIMS manuals and procedures on Contract 1112. It would be very challenging for an individual to read through over 150 procedural documents to determine which ones, or which parts of documents, are appropriate and should be applied. In practice, it is likely that a significant number are not specifically relevant to the project plan and could be omitted from the list in the PMP.*

22. *In relation to the content of the PMP document, specific aspects which in my opinion would have benefitted from greater clarity and more detailed procedures include:*

    - *Para 5.2.2* **[B4/2230(D)] [H7/2382(E)] [B4/2363(F)]***: this sets out the role of MTRCL's General Manager. The last sentence states that "He and his resident site*

staff will supervise the site works and will inform relevant parties if any deficiencies are identified". This sentence may be open to interpretation but it would better if it clarified that the role of the Engineer under the Contract is held by the Head of Project Engineering, originally Mr Stephen Chik, as set out in the letter of acceptance to Leighton on 7th March 2013 **[C1/444]**. *It is important to note that Mr Chik was appointed to the position of Engineer and not the Engineer's Representative. Clause 2.3 of the Contract states that it is for the Engineer to appoint the Engineer's Representative whose function it is to supervise the Execution of the Works* **[C3/1828]**. *This is also important as Clause 2.1(e) states that the Contractor shall take instructions and directions from the Engineer only* **[C3/1828]** *but including people appointed by the Engineer and notified to the Contractor. It is clearly important that the Contractor knows from whom in the Employer's organisation they may take instructions. Clause 2.2 also requires the Engineer to act impartially meaning, in my opinion, that the Engineer should not be inappropriately instructed or directed by senior managers or others* **[C3/1828]**.

- *Para 5.2.8* **[B4/2231(D)] [H7/2383(E)] [B4/2364(F)]***: the role set out in this paragraph for the Head of Project Engineering does not include the role of Engineer which was notified on the award of the contract.*
- *Para 6.1.2* **[B4/2233(D)] [H7/2385(E)] [B4/2366(F)]***: this refers to MTRCL consulting relevant Government departments on design deviations. Clarity is needed in relation to the lines of communication between MTRCL and Government in relation to their appointment under the EA. In my opinion there needs to be single point responsibility for managing MTRCL's contract otherwise there is a risk of a lack of control of instructions or the potential for governance delays.*
- *Para 6.2.1* **[B4/2233(D)] [H7/2385(E)] [B4/2366(F)]***: this sets out certification and check requirements of the overall design process. It does not however, cover the situation of the Contractor suggesting or requesting design changes during the course of the contract and how these should be handled by MTRCL and its designer.*
- *Para 7.3.1* **[B4/2235(D)] [H7/2387(E)] [B4/2368(F)]***: this relates to the requirement for the Contractor to submit working method statements etc., to control construction methods. The PMP does not set out to whom the submission is made but clause 16.1 of the contract* **[C3/1847]** *requires the submission to be made to the Engineer. Para 7.3.1 refers to the initial submission of documents but does not set out the process if the Contractor subsequently proposes a revision to the method statement. This paragraph in the PMP also states that senior construction*

staff will convene technical review meetings with relevant designers and reviewers to address any comments until the Contractor's proposals are acceptable. This does not include reference to the contractual provisions set out in clause 16.2(a) **[C3/1847]** *which state that it is for the Engineer to either give consent to the Contractor's proposals or set out why they fail to meet contract requirements or will be detrimental to the works.*

- *Para 7.5.1* **[B4/2236(D)] [H7/2388(E)] [B4/2369(F)]**: relates to the requirement of *the Contractor to submit a Quality Plan, the requirements for the inspection of the site and focuses on the Engineer's Hold Points. In my opinion, this paragraph of the PMP should also make reference to clause 57.4 of the contract* **[C3/1881-1882]** *and the General Specification* **[C3/2000+]** *which more fully describe the contractual requirements for the Quality Plan and the associated procedures. In relation to the provisions in the PMP for Hold Points, it would also be desirable to make reference to Clause 60.1 of the contract* **[C3/1885]** *which states that no work shall be covered up or made unavailable for testing or examining without consent of the Engineer. I consider that the use of Hold Points is in line with best practice but it should be recognised that the Engineer should have the opportunity to inspect any element of the Works before it is covered up or made unavailable.*
- *Para 7.6.1* **[B4/2236(D)] [H7/2388(E)] [B4/2369(F)]***: sets out (in less than three lines) the requirements for site records and focuses on RISC forms. More detail is provided in other documents as I describe in the section below on the specific issue of record-keeping.*
- *Para 7.9.2* **[B4/2237(D)] [H7/2389(E)] [B4/2370(F)]** *sets out actions required if any non-conformity arises by reference to paragraph 10 of the BD's CoP* **[B5/2739-2740]**. *I note that the requirement set out in this paragraph of the PMP relates to any non-conformity. I comment on the adequacy of non-conformance reporting later in my report.*

23. *There are also some important aspects of project management which are not covered in the PMP. These include:*
    - *Partnering: the PMP does not include any information on how the high-level partnering principles referred to in PIMS/PMK/PM/001/A2 "Non-Contractual Project Partnering"* **[B17/24385+]** *will be applied in practice on the project.*
    - *Ownership / responsibility for implementation: the PMP is not in my opinion sufficiently clear on who owns the various procedures and who is responsible for ensuring that they are implemented.*

- *Sub-contract approvals: the PMP does not contain anything about procedures or methods associated with the approval of sub-contract arrangements and there is nothing apparent in the master list of PIMS documents.*
- *Commercial management procedures: there is a lack of information in the PMP about commercial management arrangements and procedures.*

24. *Overall, I am of the opinion that MTRCL has extensive procedures and generic guidance notes but that more could have been done to translate them into the contract specific requirements. There appears to be some gaps and omissions which carry the risk that procedures are not consistently applied and some requirements may get overlooked.*

MTRCL'S PROJECT INTEGRATED MANAGEMENT SYSTEM

25. MTRCL has put considerable effort into developing and maintaining its Project Integrated Management System (PIMS). The master list of PIMS documents **[B2/1048+]** contains about 153 manuals and project procedure notes. The documents provide generic guidance and need to be translated into project-specific Management Plans, examples of which are also shown in the master list of documents. I note that some of the PIMS documents date back to 2008, whilst others were issued well after the start of construction on the Hung Hom Station works. Clearly these were only applicable to work undertaken after the date of issue of the document.

26. It is reassuring and it is very commendable that MTRCL has achieved ISO 9001 accreditation in relation to the project management of new railways. The objectives of the accreditation process were to confirm that MTRCL's management systems and organisation are effective and conform with the accreditation requirements. Documentary evidence is before the Commission in the audit-related documents **[B9/6293-7031]**. These show that accreditation was awarded in accordance with ISO 9001:2008 by Bureau Veritas Certification China following a main audit in 2016 **[B9/6293+]**. The accreditation was subsequently confirmed in the first surveillance audit in 2017 also under ISO 9001:2008 **[B9/6372+]**. The accreditation was confirmed again in May 2018 this time under the provisions of the recently updated ISO 9001:2015 **[B9/6433+]**.

27. I note that major revisions were made to MTRCL's PIMS documents **[B3/1058+]** to align with the new requirements in ISO 9001:2015 **[B9/6521+]**. For example, the standard has a new key focus on leadership and commitment as set out in clause 5 of the ISO 9001:2015

document **[B9/6535-6536]**. This new requirement is reflected in the PIMS document PIMS/MAN/004/A5 "Organisation and Management Responsibilities" which is included in the master list of PIMS documents attached to the PMP **[B2/1048]** and included in the relevant PIMS documents at **[B3/1147-1210]**. In relation to Leadership and Commitment, the revised PIMS document PIMS/MAN/003/A5 "Project Integrated Management System Requirements" **[B3/1067-1076]** at paragraph 3.1 **[B3/1069]** includes:

> Leadership and Commitment
>
> Top management of Projects Division shall demonstrate leadership and commitment with respect to the PIMS by:
>
> a) taking accountability for the effectiveness of the PIMS;
> b) ensuring that the PIM Policy and Implementation Strategy are established for the PIMS and are compatible with the context and strategic direction of the Projects Division;
> c) ensuring the integration of the PIMS requirements into the Projects Division's business processes;
> d) promoting the use of the process approach and risk-based thinking;
> e) ensuring that the resources needed for the PIMS are available;
> f) communicating the importance of effective quality management and of conforming to the PIMS requirements;
> g) ensuring that the PIMS achieves its intended results;
> h) engaging, directing and supporting persons to contribute to the effectiveness of the PIMS;
> i) promoting improvement; and
> j) supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.

My Observations on MTRCL's Project Integrated Management System

28. *MTRCL's PIMS system has over a period of time, been demonstrated to be effective and conforming with good industry practice through the achievement of the ISO 9001 accreditation. Some of the PIMS manuals do date back to 2008 and some of the advice may not reflect latest thinking on best practice. In my opinion it would be desirable to review and refresh the older documents. There may also be opportunities to rationalise or combine documents to reduce the overall numbers to which practitioners have to refer.*

29. *A concern I set out in relation to the PMP is the process for the translation of the generic requirements in the PIMS manuals and procedural notes into project specific plans to set out how the generic guidance will be applied on a project in a clear and consistent way. It would be helpful if the PIMS manuals could more easily identify aspects which need to be developed into project specific requirements for inclusion in PMPs.*

30. *A key aspect of management systems is how they are communicated to people throughout the organisation so that procedures are understood and implemented on a comprehensive and consistent basis. I have not seen full information about training arrangements for those involved in implementing the system, but I understand that staff appointed to a project are given induction training. I can imagine that it must be quite daunting to be faced with the many PIMS documents and other documents that need to be followed in the execution of the project. It is my opinion that the key guidance and requirements could be pulled together to provide a single source of the project procedures required for specific roles to avoid the need for staff to have to refer a wide range of documents in order to get the full picture. This needs to be supported by regular and on-going training programmes.*

31. *I also consider that there are examples where PIMS procedures do not appear to be fully aligned with the Conditions of Contract. For example, PIMS sets out the need for Hold Points in relation to activities where the Contractor may not proceed but the contract sets out that no work may be covered up without the consent of the Engineer. The lack of integration between the different documents carries risks that duties may be overlooked or procedures may not be applied consistently.*

32. *Initial induction training also needs to be supported by ongoing and focused training on key aspects of the PIMS and contract procedures and associated roles. Where possible this should be joint training between the Engineer's and Contractor's teams so there is a common understanding of roles and how contract procedures will work. This type of joint training is becoming quite common on UK contracts particularly where partnering or collaboration arrangements are in place.*

33. *As set out above, the ISO 9001 accreditation requirements were revised in 2015 to place a stronger focus, amongst other things, on the role of leadership in promoting the right culture and behaviours. This has been generally recognised across the construction industry and there are many good examples of senior leaders being more visible and accessible, getting more closely involved in briefings to project staff and helping to give strong and*

targeted communications to the whole organisation at all levels. The best leaders also put in place procedures to measure the effectiveness of the communications. What struck me in reading the project documents and witness statements was that there is very little to indicate a recognition of the importance of effective leadership and communications, and collaborative behaviours needed to support the delivery of a successful project. The application of updated approaches to the role of leaders applies equally to MTRCL and the Contractor who also states that its procedures are aligned with ISO9001.

34. *The leadership approach that came across to me in the witness statements was a traditional one where senior leaders had little direct contact with staff and workers to promote the required culture and behaviours. As an example, I refer to the evidence given by the Project Director, Dr Philco Wong. I should say that my comments are not intended as criticism but aimed at illustrating the approach to leadership before the organisation and management responsibilities in the PIMS manuals were revised in October 2015. In paragraph 14 of his evidence, Dr Wong sets out that in his role as Projects Director he had an overall supervisory role while the day-to-day leadership and management of this project was headed by those who had direct and indirect reporting lines to him. He goes on to identify that there were three General Managers with Mr TM Lee being the more senior. The other two General Managers, despite having the same job title, reported to Mr Lee. Dr Wong says that he did not typically engage with the two less senior General Managers* **[B1/137-138]**. *In my opinion, based on industry change in the UK, this type of approach does not reflect the revised requirements of the new approach to leadership and commitment expected at a senior management level, as set out in ISO 9001:2015 and the revised PIMS documents. I recognise that MTRCL are likely to have taken steps to implement the new aspects relating to leadership performance in the three years since the new ISO9001 guidance was published. I consider that it would be desirable to have a section on leadership in the PMP.*

MTRCL'S OBLIGATIONS UNDER THE CONTRACT WITH LEIGHTON

35. In relation to my remit to consider the adequacy of MTRCL's project management and supervision systems, I have also considered MTRCL's obligations as Employer and Engineer under the terms of the target cost contract with Leighton **[C3/1756+]**. I identify below key provisions which in my opinion are linked to potential issues arising from matters being considered by the Commission of Inquiry. I have included commercial aspects in my report because in my opinion, commercial arrangements can be a significant factor in influencing behaviours and the development of relationships between the parties:

- Clause 1.1.26 Disallowable Costs **[C3/1816-1817]**:

The commercial basis of the target cost contract is that the Contractor is paid its actual costs and is incentivised through a pain/gain mechanism to manage actual costs to below the contractual target cost. The contract provisions set out costs which are reimbursable in the Schedule of Cost Components at Appendix F **[C3/1981-1985]**. Costs are reimbursed for the Execution of the Works which is defined at Clause 1.1.33 **[C3/1818]** and includes "the correction of defects in the Works". Generally, therefore, the correction of defects by the Contractor is reimbursed (albeit that the word "defect" is not defined in the contract). The incentive to avoid defective work is that if the cost of additional work increases the total actual cost to above the target then the pain share mechanism will apply and the Contractor will have to pay its share of the costs.

The contract also sets out costs which are disallowable and not reimbursable to the Contractor. The contract identifies around 27 types of disallowed cost **[C3/1800-1801]**, including:

- Clause 1.1.26 (i) **[C3/1816-1817]**: the cost of work of repair, amendment, reconstruction and rectification or making good defects where such work is carried out to parts of the Works supplied or carried out by sub-contractors and is required under the terms of the sub-contract to be at the sub-contractor's expense;
- Clause 1.1.26 (iii) **[C3/1816-1817]**: any cost due to negligence on the part of the Contractor in his compliance with any of his obligations under the Contract; and
- Clause 1.1.26 (iv) **[C3/1816-1817]**: any cost which cannot reasonably be justified by the Contractor's accounts and records.

In relation to the diaphragm wall and platform slab works, the rectification of defective couplers and the modification works to the top of the wall, the Engineer would have needed to consider whether there would be any justification for classifying any of the associated costs as disallowable costs. The starting point for the Engineer would have been to consider whether any of the works were defective and if so, who was responsible for correcting the defects ie the Contractor or a Sub-contractor. Further considerations would have been whether there was any case for negligence or whether the costs could not be justified by the Contractor's records. The end position however, is that even if any of the coupler works or the diaphragm wall or platform slab works were to be considered defective, possibly because they may not have

followed an approved plan or process, the Contractor may still have been entitled to payment.

My observations: the administration of the provisions for disallowable costs relies on robust and reliable record keeping, and Clause 1.1.26 (iv) **[C3/1816-1817]** *puts the onus on the Contractor to keep accounts and records which allow payment to be justified. Likewise, the Engineer needs to have reliable records in order to verify work and to certify payment. The site teams need to have a good knowledge of sub-contracting arrangements and who is undertaking work, because in the event of any rectification work being necessary it may be disallowable in accordance with Clause 1.1.26 (i)* **[C3/1816-1817]**. *It is interesting to note that under the provisions of the contract, the main Contractor would get paid for correcting defects but a sub-contractor may not. In a situation where the main Contractor were to carry out the rectification of defects in work carried out by a sub-contractor, the main Contractor may not get paid if the risk lay with the sub-contractor. This is because the Schedule of Cost Components states that any payment made must be included in only one cost component, and the risk of the need for rectification work could already be in the sub-contract cost.*

It is not for me to assess the application of the provisions for disallowable costs to specific elements of work. What I would say however, is that the commercial administration of a target cost contract relies heavily on comprehensive and reliable site records of the work that has been undertaken by the Contractor and its sub-contractors. There has been evidence before the Commission relating to who was responsible for certain actions apparently in connection with the cutting of threaded re-bars. As far as I am aware it has not been possible in some cases to identify for whom the workers were working. This would indicate to me that the record-keeping required for contract administration purposes may not have been robust.

- Clause 2.1(e) **[C3/1828]**: states that the Contractor shall take instructions and directions from the Engineer only.

  My observations: I note that with MTRCL being the Employer and the Engineer, there would appear to be a risk of instructions or directions being given by others than the Engineer. I have seen indications in witness statements about commercial matters being raised directly with MTRCL's Project Director who is not the

Engineer[1]**[B1/150-151]**. *These types of communication outside of the contractual arrangements should be avoided or governance processes may be undermined.*

- Clause 2.1(f) **[C3/1828]**: states that instructions and directions of the Engineer shall be given in writing save in cases of emergency when instructions or directions may be given orally and confirmed in writing.

  My observations: I recognise that verbal instructions will inevitably happen during the course of the delivery of a major project with constant time pressures, but the key thing is that significant instructions are formally confirmed in writing.

- Clause 2.2 **[C3/1828]**: requires that the Engineer shall, except in connection with matters requiring the specific approval of the Employer under Clause 2.1(c)**[C3/827]**, act impartially within the terms of the Contract having regard to all the circumstances.

  My observations: with the Engineer being part of the Employer's organisation, there is a risk that decisions may not be perceived to be fully impartial. Having said that I accept that it is not necessary to be independent to be impartial. It is necessary, to be able to show that decisions have been taken impartially, that thorough reasons are recorded to demonstrate the basis of decisions and that they have been taken impartially.

- Clause 2.3 **[C3/1828]**: states that the functions of the Engineer's Representative are to watch, inspect and supervise the Execution of the Works and to test and examine any materials or workmanship to be used or provided by the Contractor.

  My observations: the wording of the contract separates out the roles of watching, inspecting, supervising, testing and examining to be undertaken by the Engineer's Representative. In reality, during day-to-day attendance on site it is very difficult to separate out those roles and for example to determine whether the Engineer's Representative is watching, supervising, examining etc. This would not be a problem except for other documents such as Supervision Plans which specify that levels of "supervision" need to be at minimum defined levels. It would be my opinion that the term "supervision" would normally be taken to include activities

[1] §§42-45, WS of Dr Philco Wong **[B1/150-151]**

such as watching and examining even though the contract makes separate mention of them.

- Clause 5.2 **[C3/1831]**: states that the Contractor shall be responsible for the acts, defaults, omissions and neglect of any sub-contractor, his agents, servants or workmen, as fully as if they were the acts, defaults, omissions or neglect of the Contractor, his agents, servants or workmen.

  My observations: the position is very clear that the Contractor has to take full responsibility for any work or actions of sub-contractors.

- Clause 5.6 **[C3/1832]**: states that the Contractor shall at all times remain responsible for all matters relating to the Execution of the Works, but notwithstanding this the Engineer shall be entitled to communicate with sub-contractors. Such communication shall in no way detract from the Contractor's overall responsibilities. Copies of any correspondence between the Engineer and the sub-contractor shall be forwarded to the Contractor through whom all final decisions on matters of design will be conveyed.

  My observations: the Engineer may communicate with sub-contractors but under the terms of the sub-contracts, sub-contractors are restricted from communicating with the Engineer. If the latter happens, the Contractor should be informed.

- Clause 9 series Design Data **[C3/1836-1839]**: this sets the Contractor's obligations to prepare and submit for Approval in accordance with the Design Approval Process such Design Data as are called for in the Specification, or as are required by the Contractor for the Execution of the Work.

  My observations: this contractual approval process can be part of, or additional to, the obligations for Consultation under Buildings Ordinance (BO). Regardless of whether BO applies to the specific design data submission, the Contractor requires the Engineer's Approval before proceeding.

- Clause 10 series Contractor's Obligations **[C3/1839-1841]**: this sets out the general obligations of the Contractor including those in relation to the Buildings Ordinance.

My observations: amongst other things this requires the Contractor to do all things which it is within his power to do in order to ensure that the Execution of the Works is undertaken in accordance with the Buildings Ordinance. This places a responsibility on the Contractor to ensure that Buildings Ordinance obligations are delivered. The Contractor's obligations lie alongside MTRCL's Buildings Ordinance obligations under the EA. The joint obligations could not have been achieved under the contract without a joined-up approach between MTRCL and the Contractor.

- Clause 16 series Methods of Construction **[C3/1847-1849]**: clause 16.1 requires the Contractor to obtain the Engineer's acceptance to proposed methods of construction. Clause 16.2 states that the Contractor shall not change the methods of manufacture, construction or installation which have received the Engineer's consent without the further consent in writing of the Engineer.

  My observations: construction processes should not proceed without the proposed method of construction being accepted by the Engineer. In the event of changed proposals or the need for rectification work, the construction work should not proceed without the acceptance of the Engineer to the proposed method of working. In the case of defective couplers for example, remedial works should not have proceeded without the Engineer's acceptance to the proposed methodology. In the case of the construction of the top of the diaphragm wall and the subsequent modifications to it, regardless of the position on the need to get BD approval, the method of working should have been submitted to the Engineer for acceptance before the initial construction work commenced and a revised proposal submitted for acceptance before the subsequent modification work to reduce the height of the wall.

- Clause 17.1 Contractor's superintendence **[C3/1849-1850]**: the Contractor shall give or provide necessary superintendence during the Execution of the Works whether carried out on the Site or elsewhere. Such superintendence shall be given by such number of persons having adequate knowledge of the Specification and the Approved Design Data and of the operations to be carried out.

My observations: this places the responsibility on the Contractor to provide superintendence of all work and it shall be undertaken by people with adequate knowledge of the work being carried out. This is complementary or additional to the requirements set out in the BD's CoP as translated into the BD approved SSP. I note that the contract refers to superintendence rather than supervision but I have taken this to be the same thing. It would be desirable for the terminology to be consistent.

- Clause 19.2 Correction of Errors **[C3/1852]**: this requires the Contractor at any time during the progress of the Works to draw the attention of the Engineer to any error that appears or arises in the position, levels, dimensions or alignment of any part of the Works, and on being required so to do the Contractor shall rectify such error to the satisfaction of the Engineer.

  My observations: this requires the Contractor to ensure that the Engineer is satisfied with any rectification work. This would include rectification work such as that carried out to damaged couplers. And modifications to the diaphragm wall.

- Clause 57.4 Quality Plan **[C3/1881-1882]**: this requires that the Contractor shall by the date stated in the Specification submit to the Engineer for Approval a quality plan, which shall set out details of the quality management system to be implemented by the Contractor in order to control all design, procurement, manufacture, construction and installation activities required by the Contract in such a way as to ensure completion of the Works in accordance with the Contract, with the Approved Design Data and with any drawings or documents submitted by the Contractor pursuant to Clause 8 and Approved **[C3/1835-1836]**.

  My observations: this is not just a matter of having a quality plan in place but also requires the plan to be communicated and applied to the execution of the works. It requires all work undertaken by the Contractor to be in accordance with the approved quality plan submitted under this clause. The Quality Plan needs to be developed specifically for the requirements of the contract rather than relying on a generic corporate model. Staff need to be briefed and trained on any contract specific obligations to avoid them following procedures which may have been relevant to other contracts they have been working on. Whilst it is the Contractor's quality plan, MTRCL staff would need to have known how the quality procedures

would operate in order to allow them to monitor that the Works were being delivered in accordance with the plan.

- Clause 60.1 Examination of Work before Covering-Up **[C3/1885]**: this requires that no work shall be covered up or made unavailable for testing or examining without consent of the Engineer.

  My observations: this in effect places hold points on any work which will be covered up and requires the consent of the Engineer before work proceeds. There is a potential confusion with formal hold points set out in the contract specifications. The requirement for formal hold points does not mean that the general requirement in clause 60.1 for the Engineer to give consent before anything is covered up does not apply. In my opinion the specified hold points highlight them as being associated with higher risk activities giving these hold points a higher priority and importance.

- Clause 79.5 / 79.7 / 79.8 Changes **[C3/1918-1919]**: the Contractor may request a Change (as defined in clause 1.1.9) **[C3/1813-1814]** and shall submit to the Engineer full particulars and details of adjustments in the Cost and the programme. If the Engineer considers it desirable the Engineer shall issue an order recording the Change and the anticipated adjustments and the Contractor shall implement the change. The Target Cost shall not be adjusted.

  My observations: the implementation of a Change requested by the Contractor is implemented by an Order from the Engineer. The process needs to be read in conjunction with clause 7.6.2 of the Particular Specification **[C3/2217]** *which sets out the procedure for alternative works design including consultation with and submissions to Government. I am concerned that the terminology and the procedures in the Contract and the Particular Specification do not appear to be fully aligned. In particular, it is important that at the end of the submission and approval process the Change is implemented by way of an order by the Engineer. This is necessary because although the Target Cost is not changed as a result of a Change ordered by the Engineer, that does not mean that the actual Cost may not increase. The Employer is exposed to its share of any additional costs incurred in the implementation of the Change. Any proposed Changes by the Contractor must to be ordered on the basis of the anticipated adjustments to Cost and programme*

before construction work associated with the Change commences. Change control is very important on a Target Cost Contract because of the commercial arrangements which involve a sharing of costs. In relation to the Change associated with the modification to the top of the diaphragm wall, I have not seen an Order from the MTRCL Engineer implementing the Change.

SPECIFIC ISSUES RELATING TO MTRCL PROJECT MANAGEMENT PROCEDURES ARISING FROM THE OBLIGATIONS

36. In the previous part of my report, I have set out my understanding of MTRCL's main obligations associated with the Hung Hom Station extension contract. The delivery of major projects such as this requires extensive experience, considerable skilled resources, robust and effective systems and much hard work and commitment from all of the individuals involved who can be subject to considerable pressure to maintain programmes, budgets and quality. If the investigations were into things that have gone well there would be much to report on. I am however, required to focus on the aspects of project management where there is possible opportunity for improvement. I set out below more detailed comments on seven specific issues which are in my opinion of particular relevance to the project management issues being investigated by the Commission. The issues are:
    - Issue A: Consequences of adopting a Target Cost Contract.
    - Issue B: The production of as-built drawings.
    - Issue C: Atkins joint roles.
    - Issue D: Levels of site supervision and record keeping.
    - Issue E: Non-conformance reporting.
    - Issue F: Application of the Buildings Ordinance consultation provisions.
    - Issue G: Commercial settlement procedures.

A. CONSEQUENCES OF ADOPTING A TARGET COST CONTRACT

37. MTRCL adopted a Target Cost Contract for the construction of the Hung Hom Station extension. Key features of the contract include:
    - A Target Cost which is used to incentivise the Contractor to deliver the Works at a lower actual Cost. The initial Target is tendered by the Contractor but it may be varied in line with the contract, for example for Variations ordered by the Engineer.
    - Payment to the Contractor on the basis of the actual Cost incurred with five main components of cost as set out in Appendix F of the contract **[C3/1981-1985]**
        - People;
        - Contractor's Equipment and Temporary Works;
        - Plant and Materials;
        - Miscellaneous Charges, eg. utilities costs etc; and
        - Sub-contractor costs.

- In addition to the above components of cost, the Contractor is paid a Fee for its overheads and profits.
- A pain / gain mechanism under which the Employer and the Contractor share any savings under the Target or additional costs over the Target. It should be noted that whilst it is MTRCL who procures and awards the contract, it is the HKSAR Government who fund the contract and so it is the Government who take the cost risk / opportunity.
- A cap on the Government's exposure to additional costs of 10% of the initial Target Cost [Clause 84.6, **C3/1927-1928][**Section 6 of the Form of Tender, **C2/1010-1011**].
- The use of open book accounting arrangements to justify and demonstrate the Contractor's entitlement to payment [Clauses 81.1-81.6, **C3/1922-1925**].
- Contract provisions for disallowable costs for which the Contractor does not receive payment [Clause 1.1.26, **C3/1816-1817**].
- For this contract the Employer retained ownership of the design except as provided for in the contract [Clause 36.4, **C3/1868-1869**].
- Controls on Variations and Changes which require an order by the Engineer before they are implemented by the Contractor [Clause 16, **C3/1847-1849**].
- Overall requirements and obligations on the Contractor including the superintendence of the works and the production of a Quality Plan and method statements [Clause 17.1, **C3/1849-1850**].

My observations in relation to the use of a Target Cost Contract

38. *Target cost contracts for the delivery of this type of civil engineering contract are widely considered to represent best practice. In my opinion they provide a fair allocation of risk and incentivise the parties to work together to achieve best value in the delivery of the requirements.*

39. *The form of contract does require an appropriate procurement strategy, the development of a collaborative culture and appropriate controls, checks and balances to help ensure that the contract operates in the way intended. In my opinion factors that need to be addressed in the formation and delivery of a successful target cost contract include:*

    - *A target cost that is adequate for the purpose of delivering the contractual requirements. If the target cost is too low then there will be considerable*

commercial pressures on the Contractor which will result in adverse consequences and the target cost incentive mechanism will no longer operate as intended. The use of lowest price tendering should be avoided and contract award criteria based on best value that takes account of quality and price should be used. I understand that MTRCL used a method that included a risk adjustment of the tender prices as part of an assessment of best value which I would support.

- *Target contracts operate best within a collaborative culture which on this contract was encouraged through the adoption of a non-contractual partnering arrangement. The contract provides a sharing of risk and the intention of a partnering arrangement should be to get the parties working closely together to plan the works, identify risks and work jointly in mitigating them to ensure quality, prevent cost overruns and avoid programme delays. The establishment of the right culture and behaviours does require a strong input from senior leaders and I have not seen evidence to show that was achieved on this contact. I also have some concerns that the contract does not specifically support or encourage collaborative working. There are standard forms of industry of contract which do contain provisions to support collaboration, such as the NEC, and it would in my opinion be worthwhile considering the use of such a contract.*

- *The nature of the payment and incentive mechanism does require robust open book accounting and record keeping to support the payment of actual costs. It has not been part of my role to look at commercial records. There does appear, however, from the evidence I have seen, to have been some weakness in the recording of work activities.*

- *In relation to design responsibility, the retention of responsibility by the Employer does mean that there is an interface between design and construction with different parties being responsible. That can mean that the Contractor may have an entitlement to claims for delay and disruption if design problems are encountered. This is commonly overcome by clients using design and build forms of contract with the Contractor taking ownership of design which may include the novation of a design subject to due diligence by the Contractor. Having single point responsibility for design and construction simplifies procedures for developing changes even if technical approvals have to be obtained.*

- *Sub-contracts can typically represent around 70% of the value of the main contract and are a major component of the Target Cost. It is important therefore, to have robust procedures for the award of sub-contracts, the control of changes and the settlement of final accounts. I comment later in my report on sub-contract procedures and settlements based on evidence presented to the Commission.*

B. PRODUCTION OF AS-BUILT DRAWINGS

40. The requirements for the provision of as-built drawings flow from the EA at paragraph 16.5(A) **[G7/5625]** and the associated Appendix K **[G7/5697-5699]**. These set out the obligations on MTRCL to submit the specified documents to Government preferably within three months following issue of the Handover Certificate (Clause 17.6) **[G7/5627]** and in any event within six months of the issue of the Handover Certificate (Appendix K) **[G7/5698-5699]**.

41. In order for MTRCL to fulfil this obligation it has incorporated requirements for the production and provision of as-built drawings into the construction contract awarded to Leighton. Provisions are included in the conditions of contract, the General Specification and the Particular Specification.

42. The contractual responsibilities for the preparation of as-built drawings are set out in Clause 9.10 of the Contract **[C3/1838]** and states "The Contractor shall during the progress of the Works prepare drawings showing those parts of the Works which have been designed by the Contractor as-built. The Contractor shall, as required by the Engineer, provide copies of such as-built drawings to the Engineer. Design Data which have been submitted and Approved under this Clause 9 shall be modified if necessary to correspond with the Works as-built" **[C3/1836-1839]**. Atkins was appointed as a sub-contractor to Leighton and the role included supporting the production of as-built drawings. Leighton however, retained overall responsibility.

43. Clause 58.1 **[C3/1885]** requires that "The Contractor shall keep records of levels and dimensions during the course of the Execution of the Works in an Approved form and shall submit records as and when required by the Engineer". The index to the contract **[C3/1795]** indicates that this requirement is in relation to as-built records.

44. Special Condition of Contract 5.1(d) **[C3/1978]** states that "The costs of preparing drawings showing the Works as-built and submitting for approval under Clause 9.10" shall be deemed to be included in the Fee. It was not a cost therefore, that was reclaimable as a sub-contract cost.

45. The General Specification for the contract sets out the Contractor's obligations in relation to as-built records and drawings at the following paragraphs:

- G1.10.1 As-Built Record Survey **[C3/2019]**: requires that the Contractor shall ensure that the as-built surveys are undertaken within 2 Days, in whole or in part, of the completion of the Permanent Works and the survey record submitted for review within 7 Days. The Contractor shall prepare and maintain a set of drawings of the Permanent Works to show the as-built survey records and identify all deviations with respect to the design. The Contractor shall ensure that the data from the as-built surveys is incorporated into the as-built survey record drawings and submitted for review within 14 Days of the date of the as-built survey.
- G1.19.1 **[C3/2022-2023]** sets out the specification for the presentation of the as-built survey record drawings.
- G1.20.1 **[C3/2023-2024]** sets out the information to be included in the Contractor's monthly report in relation to as-built record surveys undertaken, the survey records completed and the planned survey programme.
- G15.4.1 **[C3/2131]** requires the Contractor, on completion of the work, to compile and certify a set of as-built drawings for the Engineer's Approval. The clause sets out the information to be included in the as-built drawings.
- G15.4.2 **[C3/2131]** requires the as-built drawings to be submitted by the Contractor for Approval not later than the dates specified in the Particular Specification for completion of the relevant part of the Works.

46. In relation to as-built records, Exhibit 7.15 attached to the PIM Practice Note **[B6/3665]** requires the ConE and SIOW to ensure that "as-built" records are prepared "**as a continuous operation as construction proceeds**, and that brand-names of actual materials used, instructed and proposed changes, actual details of works determined on site are recorded." Louis Kwan, Construction Engineer of MTRCL, gave evidence that as built records include as-built drawings[2]. Both Louis Kwan and Derek Ma, Construction

[2] Louis Kwan **[Day 29/pp.67:8-69:5]**

Engineers of MTRCL, however, confirmed that no such records or as-built drawings were prepared for the EWL slab at the time when it was being constructed [3]. This remains the position today notwithstanding that an Incident Report was issued two years ago, on 27 July 2015, by the MTRCL investigating the cause of non-conformity to the original design accepted by BD which was not identified by the MTRCL until the preparation of the Certificate of completion of works (BA14) to BD in January 2015. The 2015 Incident Report provided an account of the events leading to the occurrence of the non-conformity and the actions which would be implemented to prevent its recurrence in the future **[H11/5542]**. Steps purportedly taken by MTRCL and Leighton at the time (ie. 2015) to avoid future recurrence were stated in the conclusion of the Incident Report (paragraphs 4.4, 4.5 and 4.7)**[H11/5546]**:

> "4.4 In additional to the procedures (PIMS/PN/11-4/ A4, refer to Appendix B) stipulated for reviewing contractor's submissions in MTRCL's Project Integrated Management System (PIMS) which is included in the PMP of SCL, **TCPs shall not allow changes to be made to the permanent works in contractor's shop drawing submissions. TCPs in the CP stream shall supervise the works to ensure they are executed in accordance with the Working Drawings/Accepted Plans. They should bring CP's attention to any deviations in a timely manner**;
>
> 4.5 1112 Contractor shall deploy adequate resource to compile the BA14 submission **in a timely manner.**.....
>
> 4.7 In additional to the original procedures for design and drawing management in the 1112 Quality Management System, the Contractor has implemented a robust control system to track the progress of all proposed changes to the permanent works until they are approved and incorporated into the Working Drawings."

47. A further complication in relation to the as-built records is generated by the requirement in Appendix 9 of the PMP **[B4/2075]** whereby "as-built record plans" should be submitted upon completion of works - the subject matter of a "consultation submission" under the IoE. This is what happened in relation to the diaphragm walls when the as-built records were submitted in a series of 6 batches and eventually approved by BD. It follows at least in theory that all aspects of the works which are the subject of a consultation require separate as-built records to be submitted to BD, leaving aside an obligation to submit as-built records upon completion of the entirety of the works[4].

<u>My Observations on the Requirements for As-Built Drawings</u>

48. *Starting with MTRCL's obligations under the EA, the provisions set out in the General Specification do appear to cover the requirements in relation to the submission of the final version of the documents to Government which are not due until after the issue of the Handover Certificate. The EA also requires the submission of preliminary versions of the*

[3] Derek Ma **[Day 27/pp.113:22-115:6]**; Louis Kwan **[Day 29/pp.69:20-72:8]**
[4] Humphrey Ho **[Day 37/p.80:7-21]**

drawings although it does not define when these are required except that reasonable time needs to be allowed for Government to review the documents. The overall process would require MTRCL to ensure that they receive preliminary as-constructed drawings from the Contractor well in advance of the deadline for the final as-constructed drawings. This requirement is supported by the General Specification which requires the Contractor to continually update the as-built records as the work progresses.

49. *Based on my experience, it is normal practice to require the drawings to be updated during the course of construction to reflect the as-built details and any revisions made to the original design. Not maintaining and updating the drawings would carry a high risk that changes may not be incorporated into the final as-built drawings. The question here is whether the Contractor has been carrying out the as-built surveys and recording the details on the drawings, and if not, what steps has the Engineer taken to rectify the position? The evidence appears to indicate that, whilst the final as-built documents are not yet required, the Contractor has not been able to make available the preliminary as-built drawings based on the regular survey and updating requirements which should have been produced in accordance with the General Specification during the course of the contract*[5]*. Clause 58.1* **[C3/1838]** *of the contract requires the Contractor to keep records and dimensions during the course of the Execution of the Works. The General Specification* **[C3/2023-2024]** *sets out the Contractor's obligations for the provision of as-built surveys and records. In my opinion, the use of photographs on their own, as described in witness statements, would not deliver these requirements.*

50. *One concern I would flag up in relation to contractual responsibilities is that the main contract at Clause 9.10* **[C3/1838]** *sets out that the Contractor is to prepare drawings showing those parts of the Works which have been designed by the Contractor as-built. This would appear to place a restriction on the drawings which need to be produced by the Contractor to those parts of the Works which the Contractor has designed. The General Specification however, provides greater detail on the requirements and requires as-built surveys and drawings for the whole of the Permanent Works (without referring to design responsibility). It may be that the Contractor is considered to have designed aspects of all of the Works, but this difference between the Conditions of Contract and the General Specification could be considered an ambiguity or discrepancy between the documents. If this were the case then the provisions of Clause 6.2* **[C3/1833]** *would apply and it would be*

[5] Chan Kit Lam **[Day 26/pp.79:9-80:10];** Raymond Brewster **[Day 22/pp.122:17-126:2]**; Brett Buckland **[Day 23/pp.180:17-184:15]**; Louis Kwan **[Day 29/pp.67:8-72:6]**

for the Engineer to resolve any such ambiguity or discrepancy. The Engineer would however, need to take account of Clause 6.1 **[C3/1832-1833]** *which states that the provisions of the Conditions of Contract shall prevail over those of any other document forming part of the Contract.*

51. *In relation to MTRCL's PMP, the management of the production of as-built drawings does not appear to be specifically covered in the Plan apart from by reference to the generic documents which form the PIMS listed in Appendix 4 to the Plan* **[B4/2287(D)] [H7/2439(E)]**. *This includes a reference to document PIMS/PN/13-4/A2 "Submission of As-built Drawings, O&M Manuals and General Project Records". This document is shown as being deleted on 10 July 2015 and replaced by PIMS/PN/02-4 "Handling and Archiving of Project Records"* **[B2/1054 and 1048]**. *Due to the sheer volume of documents in the PIMS system, I have not examined this document and because it is not specifically called up by the contract. I also note that the original document was superseded after the award of contract and so the PIMS procedures changed during the course of the contract.*

52. *In conclusion on the issue of as-built drawings, my opinion is as follows:*

- *The Contractor is responsible for undertaking as-built surveys and recording the position on the as-built drawings and this is paid as part of the Fee. The Contractor has included the work in a sub-contract but it remains the responsibility of the Contractor to ensure that it is done.*

- *If the Contractor had any uncertainty about the extent of the as-built drawings it was required to produce by the General Specification, then this should have been clarified at the time when the obligations first commenced at the start of the construction work.*

- *It is MTRCL's responsibility to submit as-constructed drawings to the Government as required under the provisions of Clause 16.5 of the EA* **[G7/5625-5626]**. *In order to ensure this obligation is delivered, MTRCL's procedures should have ensured that the Contractor was producing and submitting updated as-built records and drawings during the course of the work as required by the contract. This was an area that would have benefitted from a strong collaborative approach with full clarity of roles and programme requirements.*

- *The Commission has received evidence that the detail of the re-bar connections between the EWL slab and the diaphragm wall were not recorded contemporaneously as required by the contract apart from photos. This indicates to me a failure by the Contractor to either carry out the required survey of the as-built works and/or a failure to record the survey detail on as-built drawings. It also indicates to me a weakness in MTRCL's systems which should have monitored the execution of the works and the production and receipt of as-built drawings showing the differences from the approved plans. I consider that use of photos to support site records is helpful but on their own they are insufficient for the purposes of providing a complete record. A photo reflects a specific moment in time and can be difficult to interpret.*

C. ATKINS' ROLES IN SUPPORTING MTRCL AND LEIGHTON

53. I have considered evidence presented to the Commission relating to the appointment of Atkins to roles on contract 1112 supporting MTRCL and also to the Contractor, Leighton. The arrangement involving Atkins working for the Employer and at the same time for the Contractor is, in my experience, unusual. It raises the potential for a real or perceived conflict of interest. It is possible that measures can be taken to mitigate any conflict but it is very difficult in my opinion to eliminate perceived conflicts or unconscious behaviours which may represent a real conflict. My understanding is that Atkins initial appointment by Leighton was to provide temporary works design services and this was approved on the basis that there would be complete separation of the Atkins teams and the services for Leighton would not involve permanent works design[6] **[B1/241-242]**. Their role for Leighton was however, subsequently expanded to include additional design work including some permanent works design and services relating to as-built drawings[7] **[J1/59]**. Under Clauses 5.1 and 5.3 of the sub-contracting provisions of the contract, it was required that the initial appointment and subsequent revisions should have been approved by the Engineer **[C3/1831-1832]**.

My observations on Atkins' roles in supporting MTRCL and Leighton

54. *Issues which I have identified relating to Atkins' dual roles in working for MTRCL and Leighton are as follows:*

[6] §§11-13, WS of Andy Leung **[B1/241-242];**
[7] §14, WS of John Blackwood **[J1/59]**

a. *In his witness statement* **[J1/60]** *Mr Blackwood states (para 16) that there was a need throughout to keep both Team A and Team B independent with no conflicts of interest, and further (at para 23)* **[J1/62]** *that from Atkins perspective, Team A and Team B were separate and had separate responsibilities. Mr McCrae (para 18 of his statement* **[J4/3347])** *states that Team A functioned separately from Team B and that it was important to MTRCL that the teams were separate. In my opinion, the need for separation was not achieved in practice as Mr Blackwood was Project Director for Team A and Team B, and Mr McCrae was Design Team Leader for Team A and Project Manager for Team B. Mr Blackwood also set out that there was some overlap in personnel in the teams (para 23)* **[J1/62])**. *Justin Taylor of Leighton went further and said (para 10 of his second statement* **[C32/24370]***) that the same people at Atkins were handling the work for MTRCL and for Leighton, and there was no difference in the teams. In the end, Mr Blackwood accepted that "in retrospect, it probably would have been better to have totally separate people in the 2 teams"*[8]*.*

b. *Mr Blackwood and Mr McCrae state that MTRCL approved the appointment of the Atkins' Team B to support Leighton. The initial approval of the B team arrangements was however, only for temporary work design (Andy Leung's statement at para 11* **[B1/241]***) and that the Atkins teams must be independent with no conflicts of interest. In addition, the engagement of Atkins' Team B included the caveat that should the B team services involve design or redesign of permanent structure, Leighton would need to obtain the approval of the Engineer. Mr Blackwood sets out at paragraphs 12 and 14.2* **[J1/58-59]** *that subsequent to their initial appointment, the B team's scope was extended to include over 200 items of additional works including the preparation of as-built drawings and matters which appear to relate to design changes to permanent works. I have seen no indication that the subsequent changes to the Team B sub-contract scope were submitted to the Engineer for further approval or whether they did receive approval. Nor is it clear to me that it was specifically pointed out to the Engineer that there was an overlap of personnel between the teams. Even when Yueng Wai-hung Ron of Pypun carried out his audit in January 2016, he was led to believe (on the basis of the original organisation charts of Team A and Team B) that there was no overlapping of personnel between the teams*[9]*.*

[8] John Blackwood **[Day 31/pp.65:1-68:2]**
[9] Yueng Wai Hung Ron **[Day 35/pp.10:3-13:22]**

c. *Potential conflicts which could have arisen from the Atkins dual-role arrangements could have included the following:*

i. *Submissions produced by Atkins' Team B being reviewed by Atkins' Team A with both teams under the leadership of the same individuals.*
ii. *Atkins' Team A potentially being reluctant to identify any faults in designs prepared by the Atkins' Team B.*
iii. *Atkins' Team A not reviewing Team B's submissions as thoroughly as they might otherwise have done, because the design was produced by the Atkins company.*
iv. *A risk of inappropriate lines of communication becoming established between the two Atkins teams.*
v. *In performing duties associated with permanent works design for Leighton, the B Team could have identified deficiencies in design work originally undertaken by the A Team, but may have been reluctant to report it.*
vi. *If there were any aspects of disagreement between the views of the A Team and the B Team they would have to be elevated for resolution by the individuals who were responsible for both teams.*
vii. *Changes proposed under clause 79.5 of the conditions of contract* **[C3/1918]** *need to be supported by details of the anticipated adjustments in time and cost. If Atkins' people are reviewing submissions on these topics produced by the other Atkins' team, there could be a perception that decisions could have influenced by the outcome that would give Atkins the best commercial position.*
viii. *With personnel sitting in both teams, there is a potential risk that work and charging is not accounted for accurately between MTRCL and Leighton, particularly as the cost of the production of as-built drawings is reimbursed under the contract through the Contractor's Fee* **[C3/1978].**
ix. *It can be argued that the conflicts of interest will not occur because of the professionalism and integrity of the people involved. It is however, important to have a consistent policy for the avoidance or management of conflicts of interest and it will not always be the case that an Employer can rely on the individuals involved to manage potential conflicts appropriately.*

55. *Mr Blackwood describes (para 100 of his statement* **[J1/75]***) the process for statutory submission procedures for alternative proposals by Leighton. The process appears to ignore the provisions of the contract (Clauses 79.5 to 79.7)* **[C3/1918-1919]** *as highlighted in red italics below. The process in Mr Blackwood's statement*[10] *involves the following stages* **[J1/75]***:*

- *Leighton (supported by Atkins' Team B) produce alternative proposal.*
- *Proposal is submitted to MTRCL's Construction Management Team. [The contract requires it to be submitted to the Engineer.]*
- *Proposal is reviewed and passed on to MTRCL's Design Management Team.*
- *Proposal is reviewed and passed on to the designer, Atkins' Team A (containing some of the same people as Team B who produced the submission), for comment.*
- *When it is accepted by MTRCL and Team A, and where directed by the Competent Person, Team A would prepare a submission to BD for approval. [The contractual position is that if in the Engineer's opinion it is desirable that the proposed Change be implemented, the Engineer shall issue an order recording the Change and the anticipated adjustment in time and/or the estimated change in Cost (if any) resulting therefrom, and the Contractor shall implement the Change.]*

56. *If the procedure described by Mr Blackwood was followed, it could mean that the administration of the contractual process was inadvertently taken away from the Engineer. The process for taking decisions needs to be managed by the Engineer even if he needs to involve other teams within MTRCL and BD. In theory it would be possible for BD to approve a design submission but for the Engineer to reject it on grounds such as cost, risk or programme. It is for the Engineer to decide whether it is desirable for an order to be given confirming that the Change will be implemented. In addition, if there are process delays in the BD approvals that could result in claims being made by the Contractor if they resulted in the Contractor incurring additional costs.*

57. *Mr Blackwood also gave evidence about the role of Atkins during the construction stage. He confirmed that Atkins' Team A, the designer of the works, was not required to supervise any of the site works, and Team B did not have any on-site presence*[11]*. Atkins' Team A had a design liaison representative role on-site which was described by Mr Blackwood as being heavily loaded and did not have capacity to involve in site supervision. Atkins' Team A role was determined by MTRCL as part of its organizational and sub-contracting strategy. In*

[10] §100, WS of John Blackwood **[J1/75]. See** also John Blackwood [**Day 31/pp.73:25-76:21**].
[11] John Blackwood [**Day 33/pp.85:10-90:15**]

my opinion, the non-involvement of the designer in the supervision of the works does present potential risks particularly on projects with complex structural designs such as this contract. Those risks are associated with inspectors and supervisors, responsible for examining the works, not being as familiar with the detailed design or the design principles as the designer. Any errors or omissions in reinforcement detail, for example, would be more likely to be identified by people involved in the design. The involvement of the designer in the supervision of the construction does in my opinion provide a higher level of assurance that the constructed works is compliant with the design. It also facilitates a speedier resolution of any design issues that may arise during construction.

58. *Traditionally with contractual arrangements where the Employer has retained design responsibility, as in this contract, the design organisation normally had a site supervisory role. On contracts of this nature it is common for the designer to perform the Engineer role, whereas on this contract it was the project management organisation, MTRCL, that took on the Engineer role. Historically, the designer often appointed a very large supervision team on site to ensure that construction aligned with the design. This is sometimes referred to as "man-on-man marking" and generally the level of resource was unjustified and did not represent value for money to the Employer. Where these forms of "Employer design" contract are still used, the size of designer's supervisory teams have been significantly reduced by Clients but are still much greater than the design liaison representative role adopted on the Hung Hom Station contract.*

59. *In the last 20 years or so, the use of design and build and early contractor involvement (ECI) contracts have been used more widely. In these contracts, the Contractor takes on design responsibility and is required to provide supervisory arrangements which involve the designer. This is widely accompanied by collaborative working, integrated quality assurance and self-certification procedures. The working arrangements are normally overseen by a site-based Employer's Agent who acts in a monitoring and auditor role. In my opinion, there is significant potential benefit in moving to ECI contracts where the Contractor takes on design responsibility even if it is through the novation of a preliminary design produced for the Employer. If however, contract strategies similar to that used for the Hung Hom Station are to be used on future HK SAR Government projects, then in my opinion it would be sensible to look at an enhanced role for the designer in a site supervisory role during construction.*

60. *My overall conclusions in relation to Atkins joint roles:*

- *The requirement for independence of the two Atkins teams and separation between them was not achieved.*
- *It is not clear that the Engineer's approval was obtained for the subsequent revisions to Atkins' Team B's scope of sub-contract.*
- *There were potential conflicts of interest in Atkins performing roles for both the Employer and the Contractor.*
- *It is surprising that the scope of Atkin's Team B was extended to include design of permanent elements of the work.*
- *Having two teams involved in the development of detailed design of permanent design may have contributed to the apparent confusion over the status of the submission on the modifications to the top of the diaphragm wall. I cover this specific issue later in my report.*
- *It does appear that on occasions there has been a tendency for MTRCL internal governance procedures and the Buildings Ordinance procedures to be implemented without reflecting on how they should interact with the provisions of the contract in relation to Changes and the role of the Engineer.*

D. LEVELS OF SITE SUPERVISION & RECORD KEEPING

61. The initial obligations for project management and site supervision flow from the EA to MTRCL as set out in the Entrustment Activities at Appendix B of the Agreement **[G7/5660-5663]**.

62. In granting exemption from the Buildings Ordinance for the specified parts of the project, one of the conditions imposed by the Buildings Department was for site supervision to be undertaken in accordance with the agreed proposals (as set out in MTRCL's PMP) including reference to the BD's CoP **[B5/2676+]**.

63. The BD Code and Technical Memorandum require the preparation of supervision plans **[B5/2821-2822]**, and on 18 June 2015, MTRCL submitted the project Supervision Plan to the Building Authority **[H10/4482-4528]**, also pursuant to the IoE **[H7/2220+]**, comprising the Supervision Plan of the Competent Person **[H10/4489]**, the Supervision Plan of the Registered Geotechnical Engineer **[H10/4510]** and the Supervision Plan of the Registered Contractor **[H10/4490]**.

64. The PMP at paragraph 7.5.1 **[B4/2236(D) H7/2388(E) B4/2369 (F)]** calls up the BD's CoP **[B5/2676+]**. The code deals in generic terms with the site supervision requirements and provides guidance on how the level of inspections required should be determined in relation to different elements of the works. The code also cross-refers to the BD Technical Memorandum for Supervision Plans 2009 **[B5/2796+]**. These documents set out the obligations on the roles of both parties to the main contract. The guidance in these documents needs to be interpreted and clear proposals set out for a specific project or contract identifying the level of inspections for the specific elements of the works. The content of the main body of the PMP provides limited detail on supervision arrangements and requirements and relies on individuals cross-referring to at least eight other documents and interpreting how the guidance and requirements are to be applied and duties undertaken:

- The BD's CoP **[B5/2676+]**
- The BD Technical Memorandum for Supervision Plans 2009 **[B5/2796+]**
- MTRCL's PIMS document PIMS/PN/11-4/A4 "Monitoring of Site Works" **[B3/1581-1625]**.
- The main works Conditions of Contract **[C3/1756+]**
- General Specification for Civil Engineering Works **[C3/2000-2157]**
- Site Supervision Plan pursuant to Instrument of Exemption on Building Standards (June 2015) ("**SSP**") **[H10/4482-4501]**
- Quality Supervision Plan for the enhanced supervision and independent audit checking for the Installation of Couplers (August 2013)("**QSP**") **[B6/4096+]**
- Leighton's Quality Assurance Plan ("**Leighton's QAP**")(Nov 2014) **[B6/3966+]**

65. I set out below some of the more significant requirements of the documents providing guidance and directions to those involved in the site supervision process. Note that I cover non-conformance reporting as a specific topic later in this report.

66. The BD's CoP sets out a range of specific requirements for recording and reporting of site inspections including the handling of non-conformities. The requirements include:

- Para 6.6 of the code **[B5/2705]** states that inspection records should be kept for each member of the supervision team (who should report any non-conformities to the RSE, RGE or AS [Authorised Signatory], as the case may be).

- Paragraph 10.2 of the code **[B5/2739]** sets out that site supervision reports are required to be completed by all TCPs whenever they carry out site safety supervision activities. These reports should be filed and maintained at the site office for the inspection of the BA. AP/RSE/RGE/AS are required to keep their inspection records at site such as notes/photo records and the works items inspected on site, particularly during the critical stages of works. It is not clear that this has been done consistently and comprehensively. Obligations are shared between MTRCL and the Contractor.
- Para 10.3 of the code **[B5/2739]** provides a detailed process for dealing with Non-conformity and Rectification Reports. All non-conformities are covered.

67. Site supervision has to be in accordance with the procedures set out in the PMP which was a condition of the award of the IoE. There is little reference in the PMP to site supervision; paragraph 7.6.1 **[B4/2236(D) H7/2388(E) B4/2369(F)]** sets out in less than three lines, the requirements for site records and focuses on RISC forms. The PMP does however, make reference to MTRCL's PIMS document PIMS/PN/11-4/A4 "Monitoring of Site Works" **[B3/1581-1625]**.

68. The PIMS document "Monitoring of Site Works" sets out the processes of monitoring and recording key site works activities including non-conformance reports, site surveillance and site records. Aspects which appear to me to be particularly relevant to the Commission include:
    - Section 5.7 Site Surveillance **[B3/1588-1589]**: guidance is provided on areas of activities where particular attention should be given during site surveillance. These include the first time when the Contractor performs a particular activity, activities where poor performance of the Contractor were observed in the past and activities where problems are envisaged. This, in my opinion, is all good guidance, which represents common sense and would be expected of people who are trained to perform the role.
    - Section 5.8 Site Records and Photographs **[B3/1589]**: requirements are set out for producing, signing and keeping constructional records. A typical schedule of the records required is provided at Exhibit 7.15 attached to the PIM practice note **[B3/1624-1625]**. The note states that the requirements will vary between projects, but the PMP does not appear to provide specific details of record keeping requirements, and I have not seen any other evidence of specific requirements.

69. Turning to the Conditions of Contract provisions relating to inspection, monitoring and record keeping include:

- Clause 50.1 **[C3/1878]**: labour returns to be kept by the Contractor to the satisfaction of the Engineer. The General Specification at Appendix B/3 **[C3/2150]** provides the standard reporting format covering total direct and indirect labour and the Contractor's supervisory staff.
- Clause 60.1 Examination of Work before Covering up **[C3/1885]**: this states that no work shall be covered up or made unavailable for testing or examining without consent of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any work which is about to be covered up or made unavailable before permanent work is placed thereon. In addition, the General Specification and the Monitoring of Site Works set out requirements for Quality Hold Points and Quality Control Points. The requirements of Clause 60.1 **[C3/1885]** are more onerous in that no work involving covering up can proceed without the consent of the Engineer. It would in my opinion, be standard industry practice for a record to be kept by the Engineer's team of all such inspections.
- Clause 81.1 **[C3/1922-1923]**: the Contractor shall maintain a true and correct set of up to date records relating to all aspects of his performance of the Contract and all transactions entered into by him for the purposes of the Contract.
- Clause 82.2 **[C3/1925]**: contemporary records relating to claims.

70. The requirements of Clause 50.1 for labour records **[C3/1878]** should be noted together with the standard labour reporting requirement set out in the General Specification. The labour information is of vital importance to the Target Contract as it provides the basis for the people component of the payment mechanism as set out in the Schedule of Cost Components. Many target contracts use site entry technology to validate the time records of people working on site. Access to sites is commonly strictly controlled for security reasons as well as for time-keeping purposes. I note that on this contract the entry / exit records do not appear to have provided a reliable source of people records. I also understand that it was possible to bypass the electronic controls in operation at some gates[12] **[D2/1113-1115]**. I understand there appears to have been uncontrolled access for vehicular access and management staff did not have to use the electronic entry system[13].

[12] §§5-17, WS of Ngai Chun Kit **[D2/1113-1115];** Jason Poon **[Day 11/pp.114:24-115:22]**
[13] Emily Cho **[Day 17/pp.41:12-42];** Ngai Chun Kit **[Day 17/ p.76:13-23];** Jason Poon **[Day 11/pp.114:24-115:22]**

71. The General Specification **[C3/2000+]** is one of the contract documents and includes 28 references to the various record keeping requirements. In particular paragraph G3.9.1 **[C3/2040]** sets out that the Works shall be arranged so that the Works are supervised at a minimum ratio of 1 supervisor to no more than 10 workers.

72. The SSP **[B6/4034-4095]** identifies the proposed resources, sets out the required technical competences for the supervisors and the required levels of supervision.

73. The QSP for the Installation of Couplers **[B6/4096-4114]** requires that the frequency of the quality supervision should be full time and continuous supervision by the Contractor of the mechanical coupler works **[para. 5)1.i, B6/4103]**, and by MTRC a supervision of at least 20% of the splicing assemblies **[para. 5)2.i, B6/4103]**. The QSP also requires that the details of quality supervision should be recorded in the log book kept in the site office for inspection by BD **[para. 6, B6/4104]**. Supervision and inspection by the Contractor is required to be recorded in the Record Sheets and written into the inspection log book by Quality Control Supervisors **[para. 5)1.ii, B6/4103]**. MTRC Quality Control Supervisors will record the inspection by countersigning the inspection record sheet **[para. 5)2.ii, B6/4103]**.

74. Leighton's QAP is a further document with which the MTRCL construction management and site inspection teams needed to be familiar **[B6/3966+]**. Part of their duties is to ensure that the Works are being delivered in accordance with the Contractor's approved procedures. Evidence has been provided to the Commission that a number of key people in the Leighton's supervision and inspection teams were either not aware, or not fully aware, of the QAP or the QSP[14]. I would have expected it to have become apparent to MTRCL supervisors that the requirements of the Plans were not being followed.

75. I have also considered the role of Pypun as the Government's Monitoring and Verification Consultant. Pypun's key objectives, as set out in the Inception Report **[K1/43]**, included:

    - Monitoring MTRCL's performance in meeting their obligations as stated in the advance works and construction phase EAs[15]**[K1/43]**; and

[14] Anthony Zervaas **[Day 17/p.150:13-17]**; Gabriel So **[Day 18/pp.113:25-117:4]**; Chan Chi-ip **[Day 19/pp.25:24-26:18; pp.67:25-68:8]**; Joe Tam **[Day 19/p.103:4-25]**; Gary Chow **[Day 19/p.125:10-15];** Joe Leung **[Day 20/pp.6:8-7:15];** Andy Ip **[Day 20/p.29:18-22];** Edward Mok **[Day 21/p.13:14-18];** Man Sze-ho **[Day 22/pp.24:10-25:2]**

[15] §2.1, Inception Report **[K1/43]**

- Monitoring and verifying the work undertaken by MTRCL in the aspects of the status of cost, programme and public safety standards throughout the construction, testing and commissioning phase of the SCL by providing regular monitoring and verification reports using a risk based approach[16] **[K1/43]**.

76. Pypun's role did not involve undertaking site supervision[17] **[G9/7654]** but it did require them to undertake audits of project procedures designed to ensure that MTRCL's obligations were being delivered[18] **[G9/7654]**. Pypun interpreted this as not covering quality aspects[19] **[K1/14, 20 and 24]**. I set out my views on the role of the MVC in Part 2 of my report.

My observations in relation to site supervision – record keeping

77. *To start with I have a general observation on the terminology used to describe supervision activities. It is likely that most people involved in the construction industry has a reasonable understanding of what is meant by supervision, there does not however, appear to be a precise and agreed definition explaining the role and the duties. The documents before the Commission use a number of different terms to describe supervision related activities including supervision; superintendence; surveillance; inspection; watching; observing; examining; attending; and witnessing.*

78. *In my opinion, I consider that where formal obligations are imposed on a project management or a contracting organisation then there needs to be precise definitions and consistency of terminology. For example, on this contract there is a requirement that the quality supervision should be full time and continuous supervision by the Contractor of the mechanical coupler works* **[QSP, para. 5)1.i, B6/4103]**. *It is likely that this requirement was included because it was recognised that it would be a technically difficult process with a high risk of problems being encountered. I consider that the interpretation of this requirement is very simple and requires the need for the coupler works to have continuous supervision. That means, in my opinion, that a Contractor's supervisor needs to be present at all times where mechanical coupler works are underway. The objective being to ensure that the work is done properly in accordance with the specifications and any problems are*

[16] §2.1, Inception Report **[K1/43]**
[17] §4.2, MVC Brief **[G9/7654]**
[18] §4.1(c), MVC Brief **[G9/7654]**
[19] §30 (Note 3) and §§ 46.5 and 52, WS of Mak Yu-man **[K1/14 ,20 and 24]**

resolved without delay. It does not have to be the same supervisor for the whole of a working day but continuous supervision has to be provided for the full time that work is underway. Mr Paulino Lim of BOSA Technology (Hong Kong) Limited, the manufacturer and supplier of rebars and couplers for the SCL Project, provided training sessions to MTRCL and Leighton's quality supervisors and sub-contractor bar fixers. He confirmed that he had gone through the entire QSP with the attendees and emphasised the requirement of full-time continuous supervision on site. There was no doubt in his mind that the QSP requirements applied to both the diaphragms walls and the platform slabs[20]*. This is in accordance with the evidence of Mr Aidan Rooney.*[21] *In my opinion, the obligation requires a supervisor to be present at the site of work activity rather than for example, being present elsewhere on site or in the site office carrying out other tasks. The General Specification requires that the Works shall be arranged so that the Works are supervised at a minimum ratio of 1 supervisor to no more than 10 workers* **[para G3.9.1,C3/2040]**. *Therefore, if the number of workers involved in the coupler works is greater than 10 then there should be more than one supervisor in attendance.*

79. *In relation to the requirements for approved resources for site supervision and their technical competence as set out in the SSP, evidence has been provided by witnesses from the Contractor that they were unaware of the SSP and/or the QSP* [22]*. This included the Contractor's Construction Manager*[23]*. Without the knowledge of the requirements it was clearly impossible to ensure that the requirements for supervision set out in these documents were being delivered. I would have expected that the MTRCL supervisory and inspection teams to have identified that the Contractor was working in ignorance of those key supervision documents. I would have expected the MTRCL teams to have checked that the levels of the Contractor's supervisory resource met the requirements in terms of numbers set out in the General Specification and also met the approved named resources and requirements for technical competence set out in the SSP and QSP.*

80. *On the subject of site supervision record keeping, I am of the opinion that the specific requirements for the information that needed to be recorded and retained by the MTRCL and Leighton's site supervision and inspection teams were not clearly set out. I have*

[20] Paulino Lim **[Day 36/pp.75:6-76:7; 111:21-115:10].**
[21] Aidan Rooney **[Day 28/p.14:9-15]**
[22] Anthony Zervaas **[Day 17/p.150:13-17]**; Gabriel So **[Day 18/pp.113:25-117:4]**; Chan Chi-ip **[Day 19/pp.25:24-26:18; pp.67:25-68:8]**; Joe Tam **[Day 19/p.103:4-25]**; Gary Chow **[Day 19/p.125:10-15];** Joe Leung **[Day 20/pp.6:8-7:15];** Andy Ip **[Day 20/p.29:18-22];** Edward Mok **[Day 21/p.13:14-18];** Man Sze-ho **[Day 22/pp.24:10-25:2]**
[23] Joe Tam **[Day 19/p.103:4-25]**; Gary Chow **[Day 19/p.125:10-15]**

identified at least eight documents which include requirements in relation to the level of site superintendence, supervision, inspection and record keeping **[see para.63 above]**. *Most of them are quite generic without setting out clear and specific requirements to be applied to the project. This means that the documents are open to different interpretations and individuals will take different decisions on what and when to record and report incidents and issues that arise on site.*

81. *Notwithstanding the lack of specific instructions, the supervisors should in my opinion have known that they were required to keep records and should have had sufficient experience to know that was a fundamental part of the role. In Mr Louis Kwan's evidence, he set out that the only records he kept were photographs and that he kept no written records*[24]*. In my opinion that is insufficient and not in line with the guidance in the BD's CoP. The BD's CoP requires that inspection records should be kept for each member of the supervision team and indicates that notes / photo records together with details of the works items inspected must be kept at site, particularly during critical stages of works* [paras 6.6 and 10.2 of the BD's CoP, **B5/2705 and 2739]**. *I consider that it is recognised good practice that site supervisory staff should keep daily site diaries with sufficient detail to know what inspections have been made and any issues arising. In my opinion it is unsatisfactory for a supervisor to say that if there were any issues then I would have ensured that they were rectified and so there was no need to keep a record. Robust record keeping is required to demonstrate that requirements have been carried out. It may be something simple such as somebody is away sick or is otherwise unavailable and the team need to know if an inspection has been carried out.*

82. *The procedure for undertaking inspections described by Mr Louis Kwan (a construction engineer of MTRCL) in his evidence does not appear to me to be well-controlled. He explained that as far as he was concerned, he was only responsible for the inspection of reinforcement bars in the slabs and not the coupler connections although he might look at them. He was not aware however, of who was responsible for coupler inspections. He considered that it was the inspection team which should conduct inspection of the coupler connections in the EWL slab.*[25] **[B1/396]**. *Mr Kobe Wong, a Senior Inspector of Works ("**IoW**") of MTRCL, however, considered that the responsibility for inspecting the couplers connections should lie with the construction engineer team and not the IoWs*[26]*. There would appear to have been a breakdown in the management communications if it was not clear*

[24] Louis Kwan **[Day 29/pp.9:11-10:18]**
[25] Louis Kwan **[Day 29/pp16:7-24:19; 46:11-21; 58:20-60:6];** see also §58 of his WS **[B1/396]**
[26] Kobe Wong **[Day 29/p125:14-23]**

where responsibilities lay. The contractual process requires the Contractor to give the Engineer the opportunity to examine any work before it is covered up or made unavailable **[Clause 60.1, C3/1885]**. *This relates to any covering up and not just the defined Hold-Points. It is for the Engineer and/or Competent Person ("**CP**") to organise who will undertake any examination but it would be very inefficient if different Inspectors or Engineers were to examine different components of the work. In my opinion it would not be reasonable to expect to carry out more than one inspection of the same element of work with different members of the Engineer's and/or CP team before it is signed off that it can be covered up. If there was a justifiable reason for having more than one Inspector from the Engineer's and/or CP team then in my opinion it would be a matter of basic good management that they should know who else would be undertaking inspection so that they could coordinate their work.*

83. *In relation to the timing of inspections for the bottom and top reinforcement mats in the slabs, the contract does require the Contractor to allow the Engineer the opportunity to examine work before it is covered up* **[Clause 60.1, C3/1885]**. *On that basis, if the lower layers of a mat are going to be obscured by subsequent layers then the Contractor is under an obligation to allow an examination to be made before the lower layers become unavailable for inspection. In my opinion, the inspections of any layers of reinforcement should have been recorded in a suitable format to confirm that the inspection was undertaken and those records maintained in the site office. I am of the opinion that a concise written record, or the use of a technology device, should have been used for the purpose supported by photographs if necessary, of any specific issues. The inspection should have also noted any records required to inform the production of as-built drawings.*

84. *A further issue in relation to Mr Louis Kwan's evidence is the drawings that were used for inspection purposes. My understanding is that he has confirmed that the drawings used did not represent the actual reinforcement detail applied to the Works nor did they illustrate the breaking down of the top of the wall*[27] **[B1/397]**. *This should have been challenged as it would have meant that there was no approved method statement in place and that the design change had not been ordered by the Engineer and without those two requirements the construction work should not have taken place.*

85. *Other incidents such as those observed in relation to the inappropriate re-bar cutting should in my opinion have been recorded in daily diaries even if NCRs were not issued. The need*

[27] Louis Kwan **[Day 29/pp.35:21-36:4; 78:20-79:4];** see also §43.2 of his WS **[B1/397]**

for records to be completed retrospectively, and for incidents to be recalled from memory, indicates to me that the importance of producing and retaining records by all those involved in the MTRCL and the Contractor's teams was not fully embedded in the inspection teams. The importance of records is often only recognised when something goes wrong. Professionalism in the application of robust processes is required to maintain comprehensive records despite the time pressures and the natural optimism that nothing will go wrong.

86. *In my opinion there clearly have been issues identified which indicate non-compliances with required project management and contractual procedures in relation to the execution and the supervision of the Works. I recognise that these need to be considered in the context of the scale and complexity of the overall contract. On this contract it appears to me that there has been insufficient communication of the project quality and supervision plans and inadequate clarity of responsibilities and requirements for record keeping. As a consequence, inspectors and supervisors may have in some cases delivered their roles based on their general experiences rather than working to project-specific procedures.*

E. SITE SUPERVISION – NON-CONFORMANCE REPORTS

87. Provisions for the identification, reporting and recording of non-conformities are set out in a number of documents and in particular, the following:
    - BD's CoP **[**paras 5.4, 6.6, 10.3, **B5/2703; 2705; 2697 and 2739]**;
    - MTRCL's PMP **[**para 7.9.2,**[B4/2237(D)] [H7/2389(E)] [B4/2370(F)]**;
    - PIMS document PIMS/PN/11-4/A4 "Monitoring of Site Works **[**section 5.3 and exhibits 7.8 and 7.9, **B3/1585, 1614,** and **1660-1662]**;
    - General Specification to the Contract **[**para G9.2.3., **C3/2107]**
    - Leighton's Guideline G121 on Non-Conformance Report Classification **[C35/26663]**;
    - Leighton's QA Plan **[**section 11.11, **B4/2631-2632]**

88. The BD's CoP sets out a range of specific requirements for the handling of non-conformities. The requirements include:

    - Para 5.4 of BD's CoP **[B5/2697]** states that all non-conformities detected during the checking of typical items for specific tasks by the TCPs must be properly

recorded in the Non-Conformity and Rectification Reports, Form B at Appendix III to this code **[B5/2753]**. Detailed procedures for dealing with non-conformities are specified in paragraph 10.3 of this code **[B5/2739]**.

- Table 5.4 of BD's CoP at Item C33 **[B5/2703]** states that RCs and TCPs are required to "Investigate and identify causes for non-conformity and set up systems and procedures to avoid recurrence".

- Para 6.6 of BD's CoP **[B5/2705]** states that inspection records should be kept for each member of the supervision team who should report any non-conformities to the RSE, RGE or AS, as the case may be.

- Para 10.3 of BD's CoP **[B5/2739]** provides a detailed process for dealing with Non-conformity and Rectification Reports. All non-conformities are covered.

89. The PMP makes brief reference to Non-conformity Reports. At paragraph 7.9.2 **[B4/2237(D); H7/2389(E); B4/2370(F)],** it states that "If <u>any non-conformity</u> arises and comes to attention of the site supervisors, the MTR Corporation will deal with the non-conformity in accordance with paragraph 10 of the Code of Practice for Site Supervision as necessary". The point to note is that the requirement relates to any non-conformity.

90. The PIMS Monitoring of Site Works identifies in section 5.3 **[B3/1585]** that non-conforming works may be identified by either the MTRCL project team or by the Contractor, A standard form for Non-conformance Reports is provided at Exhibit 7.8 of the document **[B3/1614]**. Guidance on circumstances when a Non-conformance Report shall be issued to the Contractor is provided in Exhibit 7.9 **[B3/1660-1662]**. This states that a Works Non-conformance Report is raised when the non-conforming product is significant and that corrective and preventive actions are required to prevent recurrence of similar nature. Detailed examples of Works NCRs are provided in Exhibit 7.9 and these include missing re-bars in structures per design requirements and where installed work does not comply with statutory requirements. Guidelines are also provided in relation to maintaining records and maintaining a Works NCR register for sharing within own CM team and across contracts and projects (which relates to sharing knowledge and helping to prevent problems elsewhere).

91. The General Specification for the contract sets out at paragraph G9.2.3 **[C3/2107]** that Inspection and testing plans shall make provision for records of any non-conformance identified during inspection.

92. Leighton's Guideline G121: Non-conformance Report Classification **[C35/26663-26665]** describes Leighton classifying defective work non-conformances. Leighton may use whatever process they wish for their own internal purposes of monitoring and managing non-conforming work. However, the administration of non-conformances for contractual purposes needs to be undertaken in accordance with contractual requirements.

93. Leighton's QAP **[B4/2574–2639]** at section 11.11 sets out procedures for the identification, classification and recording of non-conformances on Leighton's Incite Keystone Electronic Document Management System **[B4/2631-2632]**.

<u>My observations on Non-Conformance reporting</u>

94. *The requirements in relation to the reporting of non-conformances are not in my opinion fully clear due to the differing requirements in the various documents produced by the different parties. Generally, there is a lack of alignment between the documents. In my opinion the following findings can be made in relation to the requirements in the documents:*
    - *The overarching requirements should flow from the BD's CoP which requires that all non-conformances are reported.*
    - *The procedures also need to be in accordance with the PMP which is part of the IoE provisions. The PMP states that non-conformance procedures apply to any non-conformance which aligns with the BD's CoP.*
    - *The PMP does however, also call up the MTRCL PIMS document "Monitoring of Site Works" which limits the need to report non-conformances to those which are significant and that corrective and preventive actions are required to prevent recurrence of similar nature.*
    - *The Leighton Guideline 121 and quality assurance procedures do not limit the reporting of non-conformances.*

95. *In my opinion the overarching requirement set out in the key documents is for all non-conformances to be reported. It is surprising to me therefore, that evidence given by Mr Chan Kit Lam, MTRCL's Construction Manager, states that in his view the issuing of a*

NCR was a measure of last resort[28] **[B1/268-269]**. *This view appears to contradict the requirements of the BD's CoP and the PMP and in my opinion it is an inappropriate approach. It would seem reasonable and pragmatic to apply a degree of significance to the reporting requirements. The reporting of every incident of non-conformance, no matter how trivial, could overwhelm the system and take resources away from investigating higher priority issues. The definition of significance does, however, need to be set quite low as it is important to learn from non-conformances to support continuous improvement. The position can be compared with "near miss" reporting in relation to health and safety incidents, where the encouragement of "near miss" reporting in the UK has resulted in an overall improvement in health and safety performance. The reporting of non-conformances should be viewed as an opportunity to improve quality performance rather than to simply criticise and blame.*

96. *In my opinion, the lack of clarity in reporting requirements may have led to uncertainty and inconsistency in the reporting processes. This is supported by evidence that the Commission has received relating to the recording of non-conformances and the production of non-conformance reports. I refer specifically to the evidence of Mr Wong Chi Chiu Kobe ("**Kobe Wong**")* **[§§66-88, B1/437-442]** *and Mr Wong Kai Wing, Andy* **[§§17-37, B1/452-456]**, *both of MTRCL. Mr Kobe Wong recalled five incidents of non-compliant rebars/couplers, four from memory and one was formally recorded. The first two incidents involved the cutting of threads and he notified the Contractor to rectify the position but he chose not to report the matter to any colleagues or any other parties. A similar situation arose on a third occasion which resulted in the Contractor serving a non-conformance report (NCR) on Fang Sheung* **[B7/4611-4616]**. *Two further similar incidents were observed but again, because rectification works were undertaken, the matters were not formally recorded or non-conformance reports issued to the Contractor*[29]*. The evidence of Mr Andy Wong describes two incidents of the cutting of the threads of re-bars. The first appears to be the same incident as the third described by Mr Kobe Wong which resulted in the Contractor serving NCR 157* **[C27/20697-20704] [B7/4611-4616]** *on Fang Sheung. The second incident described in his evidence did not result in any formal contractual action being taken*[30] **[B1/452-456]**.

97. *In relation to NCR 157, it was served by Leighton on Fang Sheung* **[C27/20697-20704] [B7/4611-4616]**. *It was copied to MTRCL with the note that the NCR had been sent to the*

[28] §19, WS of Chan Kit Lam **[B1/268-269]** and Chan Kit Lam **[Day 26/pp.67:23-72:8; 73:25-74:17]**
[29] Kobe Wong **[Day 29/pp.140:8-158:19]**
[30] §§17-37, WS of Andy Wong **[B1/452-456]**; Andy Wong **[Day 30/pp.121:11-130:19]**

responsible party and was being sent to MTRCL for information **[B7/4618-4624]**. *It should be noted that under the contract at Clause 5.2* **[C3/1831]** *the Contractor shall be responsible for the acts, defaults, omissions and neglect of any sub-contractor.*

98. *In relation to the identification of the observation of non-compliant re-bars / couplers by the MTRCL inspectors, I am surprised that formal non-conformance action was not taken by MTRCL. I recognise that the incidents need to be considered in the context of the scale of the overall project, but the evidence provided by the MTRCL representatives shows that they knew that the cutting of the bars was not normal practice and they did not know who had undertaken the inappropriate work. This type of incident should have raised a warning flag and I would have thought that even on the first incident this would have justified further investigation to find out why it had occurred and who had done it rather than just saying "put it right". The fact that the defective bar was replaced very quickly should not in my opinion, have determined whether or not to issue a NCR. Due to the nature of the incident it was more important to try and find out why the bars had been cut and by whom and should have resulted in a NCR being issued. I would also have expected details of the incident to be shared with colleagues and senior managers so that they could look out for any further occurrences. The Contractor acknowledged that the cutting of the bars was inappropriate by issuing the NCR following the third reported incident, and so all parties appear to have been agreed that the re-bar cutting was inappropriate.*

99. *I conclude that the process for dealing with non-conformities was not fully robust as it did not clearly describe the types on non-conformance that should have been recorded and reported. The BD's CoP indicates that any non-conformance should get reported* **[**Para 5.4 of the code, **B5/2697]** *but this was not clarified in the project plans and it did not occur in practice. It is important for non-conformances to be shared across the team so that different inspectors are aware of any emerging problems. The reporting of all non-conformities would allow trends or widespread bad practices to be picked up more quickly and addressed. This would be a straightforward process with the use of the technology devices such as smart phone applications.*

F. DESIGN SUBMISSIONS AND APPLICATION OF THE BO CONSULTATION PROVISIONS

100. In terms of how the IoE consultation and approval procedures impact on the matters being considered by the Commission, I have focused on the design submissions for

development of the modifications to the steel reinforcement connection details for the diaphragm walls and platform slabs. I have set out earlier in my report requirements relating to design submissions, contract procedures for Changes and the BO Consultation process[31].

My observations on the application of the BO Consultation process

101. *The procedures that were followed in the development of the detailed design and the associated submission requirements for the final solution for the top of diaphragm wall and connections to the platform slabs appear to me have been complicated and rather confused. Rather than reviewing the detailed procedures and seeking to understand the submission strategy that was developed I have reviewed the position on a high-level basis.*

102. *My understanding is that the initial approved design for the diaphragm walls and platform slabs was produced for MTRCL by the Atkins permanent works design team (referred to as Atkins' Team A)[32]. This was the original design to which Leighton was required to construct the works. However, prior to the construction taking place the detail design of parts of the structural elements of the permanent works were subject to review and change by the Contractor. The Contractor had appointed Atkins to undertake design services associated with temporary works (referred to as Atkins' Team B). Leighton had received approval to the appointment on the basis that there would be separation of roles between the two Atkins teams. Atkins' Team B's role was subsequently extended by Leighton to include services to revise the design of elements of permanent works. I am not clear as to whether approval was given to this change of scope of the sub-contracted services but I believe that it was not given. Atkins' Team B undertook design revisions to the detail of the diaphragm wall and associated connections. Various iterations of the design were developed and eventually revised proposals for parts of the areas that were affected were included in a submission which focused mainly on temporary works issues[33]* **[J1/69-73]**. *The submission was prepared by Leighton supported by the Atkins' Team B and was submitted by Leighton to MTRCL for review including a review by the Atkins' Team A (I comment earlier in my report on possible conflict of interest issues). The submission was subsequently sent by*

[31] See paragraphs 9-11 above.
[32] §11, WS of John Blackwood **[J1/58]**. List of accepted drawings produced by Atkins' Team A as MTRCL's Detailed Design Consultant ("**DDC**")**[H2/409-435]**.
[33] §§66-90, WS of John Blackwood **[J1/69-73]**.

MTRCL to the Buildings Department[34]*. I make the following observations on this high-level overview of the process that was followed:*

- *For the purposes of meeting MTRCL's obligations under the EA and the IoE I consider that it would have been desirable for the design submission to the Building Authority to have been specific and transparent. In the interests of transparency and efficiency, the submission relating to design revisions to permanent works should in my opinion, have been clearly presented as such rather than being part of a temporary works submission.*
- *I note that Mr Andy Leung, MTRCL's Design Manager, in his witness statement* **[§26, B1/246]** *states that the submission of temporary works design submissions to the BD should be done separately from any submission of permanent works design submissions*
- *Notwithstanding MTRCL's obligations under the EA there were also the contractual procedures to be applied in relation to changes of design and/or construction methodology. Having identified the need for, or the desirability of, a change the Contractor should have submitted a request to the Engineer for a Change as set out in Clause 79.5 of the contract* **[C3/1918]**. *It was for the Engineer to consider whether in his opinion it was desirable that the proposed Change be implemented, and then it would have been for the Engineer to order the Change* **[Clause 79.7, C3/1918]**. *Construction work on the Change should not have commenced until an Order had been given. Clause 79.2 is very clear in stating that no Change shall be made by the Contractor without an Order by the Engineer* **[C3/1916]**.
- *If the change to the detail was as a consequence of a Value Engineering Modification it should have been submitted under the provisions of Clause 79.10 of the construction contract* **[C3/1919]**. *It is for the Engineer to consider whether in his opinion it is desirable that the proposed modification be implemented before being submitted under the Consultation procedures.*
- *The construction Contract at Clause 16.1* **[C3/1847]** *requires the Contractor to submit to the Engineer for his consent, a written description of the methods of manufacture, construction or installation which the Contractor proposes to adopt*

[34] §91, WS of John Blackwood **[J1/74]**. Leighton and Atkins' Team B submitted TWD-004B (§22 WS of Justin Taylor) **[C27/20873 and C22/16282]** and MTRC submitted it to BD on 29 July 2015 **[B10/7256]**. PWD-059A report (produced by Leighton and Atkins' Team B) was submitted by MTRC to BD on 30 July 2015 **[B10/7322+]**.

in the Execution of the Works. The methodology would have needed to have been updated to take account of any subsequent design changes.

103. *In my opinion the procedure that was followed was at best, lacking in clarity and transparency. I am aware that the parties do not appear to be agreed on whether the change in the diaphragm wall detail was properly submitted for approval in accordance with the Consultation procedures. It does not appear that the different teams within MTRCL were agreed on the application of the appropriate procedures. In his witness statement* **[§37, B1/276]**, *Mr Chan Kit Lam, MTRCL's Construction Manager considered that an appropriate submission had been made, whereas Mr Andy Leung considered that an appropriate procedure had not been followed [35]. This indicates to me that on this issue there was a lack of liaison and communication between the MTRCL CM and DM teams.*

104. *Evidence has also been provided to the Commission that there were MTRCL people involved in site supervision at the time who were aware of the changed construction details in the east diaphragm wall but the change had not been communicated to the DM team or the management. For example, Mr Derek Ma, a construction Engineer, confirmed that he was aware of the design change and so was the rest of the CM team* **[B1/358]** *while the evidence of Mr Wong Chi Chung Jason, General Manager-SCL-EWL and competent person representing MTRCL* **[§50, B1/179]**, *suggests that he was not aware of the changed detail. Mr Andy Leung, the Design Manager, pointed to a series of miscommunications between the CM and DM teams[36]. This indicates to me that the change had either not been submitted and approved and / or it had not been communicated to the supervision or design management team for further action.*

105. *In my opinion, a further possible example of a lack of liaison between the teams is in Mr Andy Leung's witness statement at paragraph 28* **[B1/179]**. *He states that the DM team had to ask the CM team to advise on any changes to the permanent works made during the construction process that had not been reflected in the latest working drawings to allow a final round of consultation submissions to BD to be made. I would have anticipated that this information would have been fed through as a matter of routine.*

106. *I have some difficulty in understanding what drawings and construction methodology were used by Leighton's and MTRCL's site inspectors when it came to inspecting the*

[35] Andy Leung [**Day 25 /pp.114:24-115-4][Day 26 /pp1:9-4:17]**
[36] Andy Leung **[Day 25/pp.114:24-116:4; 118:14-123:5]**

reinforcement and works at the hold point prior to the concrete pouring. If Leighton and MTRCL considered that the detailed change had been submitted and approved under the Consultation procedures then it appears to me that they should have identified that the changes had not been incorporated in the reinforcement fitted in the works. On the other hand, if either Leighton or MTRCL were of the opinion that the request for a change had not been formally approved then I would have expected one or other, or both, of the parties to stop the concrete pour going ahead until the position was clarified and it was determined whether approval had been given or declined.

107. *The subsequent modification works to the top of the diaphragm wall also appear to have been undertaken without any further clarity on the position of the formal approval of the revised design or a revised construction methodology. It is surprising to me that the modification works went ahead without apparent challenge by the MTRCL Inspectors as there does not appear to have been clarity on the status of the design or the modification work. I would have expected the supervision procedures to have noted and recorded the work on replacing the reinforcement arrangements as there may have been a possibility of disallowed costs being applied.*

108. *The opinion I have formed is that the contractual procedures had at this stage broken down and the position reached could be described as build and design (rather than design and build). I do understand the pressures that can develop on site during construction and the need to maintain programme but there always comes a stage where either the Contractor or the Engineer (or jointly, particularly in a partnering environment) should halt construction activity to ensure that approved designs are clear, procedures have been followed and are being implemented in practice. The events that occurred indicate to me that it was inappropriate to give approval to the works going ahead following the hold point inspections.*

G. COMMERCIAL SETTLEMENT PROCEDURES

109. I have referred earlier in my report to the provisions of the EA. Clause 4.6(B) **[G7/5613]** which MTRCL shall follow in reaching any commercial settlements with Third Parties which are not strictly in accordance with the terms of the relevant contract. This requires MTRCL to seek to ensure that such settlements are in the best interests of the SCL project, act in accordance with the relevant commercial settlement procedures referred to Clause

4.6(C)(iv) **[G7/5613]** and in a timely manner consult the Project Supervision Committee before such settlement is considered by the Project Control Group.

110. The definition of Third Parties means any contactor, consultant, adviser or other third party employed or otherwise engaged by the Corporation in connection with the Entrustment Activities **[**Clause 1.1, **G7/5607]**. This indicates that sub-contracts entered into by the Contractor are not covered by the provisions for commercial settlements set out in the EA. I would note however, that typically around 70% of the value of the main contract is paid to sub-contractors. It is important therefore, that there is transparency and effective accounting and governance procedures to ensure that sub-contract settlements are in accordance with the approved terms and conditions.

My observations in relation to commercial settlements

111. *In my opinion, whilst recognising that sub-contracts do not come under the EA definition of Third Parties, the procedures to be followed for commercial settlements between the Contractor and Sub-contractors should be subject to effective oversight and control. Sub-contract settlements are a direct and substantial component of the total sums paid under the main contract.*

112. *I have seen evidence in the documents before the Commission which relate to the commercial settlement of the final account between Leighton and China Technology Corporation Ltd ("**China Technology**"). These are included in the evidence of Mr Anthony Zervaas*[37] **[C12/7674-7678] [C35/26499-26501] [**. *The first agreement on the final account was made between Leighton and China Technology on 12 December 2016* **[C12/7841-7843]**. *The second agreement is shown as being between Leighton, China Technology and MTR on 23 January 2017* **[C12/7944-7947]**. *The third and final agreement was made between Leighton and China Technology on 18 September 2017* **[C12/7992-7998].**

113. *Sub-contractors to the main Contractor are approved by the Engineer (MTRCL) and are engaged in connection with the Entrustment Activities. Under the terms of the main contract the Engineer is required to approve any sub-contract for any part of the works before it is awarded including the proposed price and terms and conditions for sub-contracting. In total, the commercial settlements with sub-contractors make up a substantial amount of the overall contract sum paid to the main Contractor. The sub-*

[37] §§5-26, WS of Anthony Zervaas **[C12/7674-7678]** and §§11-15, WS3 of Anthony Zervaas **[C35/26499-26501]**

contract final settlements need to be within the terms of the approved sub-contract arrangements otherwise they would be paid in accordance with the provisions of the main Contract. In my opinion, payments outside the terms of the sub-contract, whilst not formally covered by the provisions of Clause 4.6 (B) of the EA, should be subject to the oversight of the Engineer to ensure that they are in line with the approved sub-contract arrangements and can be seen to be fair and appropriate.

114. *Under the terms of the main contract between MTRCL and Leighton, payment is based on the Cost Components set out in Clause 5 of Appendix F* **[C3/1985]**. *This includes payments to Subcontractors, except amongst other things for: (a) sums not payable in accordance with the sub-contract; or (b) sums in excess of the subcontractor's reasonable entitlement where the subcontract allows additional payment to be made.*

115. *The first agreement between Leighton and China Technology on 12/12/2016* **[C12/7841-7843]** *states that it is an additional agreement and "all terms and conditions of the Subcontract Agreement, including any addendum(s), remains in place except where amended specifically above". This indicates that the agreement amends the terms and conditions of the Sub-contract Agreement and is not fully in line with the original approved sub-contract. On this basis it is my opinion based on the evidence provided, that the final account payment should have been referred to the Engineer before payment. I am not saying that the payment was not justified but that the appropriate process may not have been followed. I note that in relation to the second final account agreement, MTR are shown as being a party to the agreement with China Technology albeit that the document is not signed by MTR* **[C12/7945]**.

116. *In any event, MTRCL should have been aware of or involved in the commercial settlement with China Technology because if the settlement resulted in the actual cost exceeding the target cost, then the Employer and the Government would be liable for 50% of the costs under the target cost pain/gain sharing mechanism*[38]*. MTRCL would have been able to consider whether it was appropriate to inform the PSC of the settlement as part of the reporting of project financial matters.*

117. *In my opinion, the possible relevance of this commercial settlement with China Technology to the terms of reference of the Commission is that it may indicate a weakness in MTRCL's*

[38] I recognise that there is evidence from Mr Aidan Rooney of MTRCL that he encouraged Leighton to close out the sub-contract with China Technology and that he was aware of the settlement amounts being discussed. This was on the basis of informal discussions with Mr Zervaas of Leighton [**Day 28/pp.54-61**].

project management, control and reporting systems. In addition, I am of the opinion that contract commercial management can impact on relationships between the parties and so it is important that they are dealt with in a fair and transparent manner in accordance with specified contractual processes. In this instance the process for the settlement of China Technology's final account has been associated in witness statements (Mr Zervaas) with Mr Poon's actions of providing information to the media[39] **[C12/7675-7679]**. *It is possible, in my opinion, to infer, that the motivation for the actions was to influence the commercial settlement. Whilst the inference may be wrong, it illustrates the need for due process to be rigidly followed, justification recorded and effective governance applied. In my opinion it is more likely that commercial pressures will be applied if expeditious deal-making is used to reach final account settlements rather than following a formal process based on robust propriety. On this occasion the deal-making process has been associated with a release of information about possible defective work, giving a perception that this could have been to influence the commercial settlement.*

[39] §§11, 21-23, 30-32 WS of Anthony Zervaas **[C12/7675-7679]**

REPORT PART 2: ADEQUACY OF THE GOVERNMENT'S MONITORING AND CONTROL MECHANISMS

118. Based on my investigations into the issues set out in Part 1 of my report, I have considered the elements which either involved Government directly or where there was an interface with Government. This Part 2 of my report sets out my views on the adequacy of the Government's monitoring and control mechanisms. I cross refer to Part 1 where appropriate to provide the reasoning for my conclusions rather than repeating it. My opinion on how systems for supervision, monitoring, control and management may be strengthened is set out in Part 3 of my report.

The Government's organisation to support project delivery

119. In paragraph 8k above, I set out a general issue about how Government organises itself for the management of its interests in the railway project. The PMP identifies the need for MTRCL to consult at least ten different Government Departments as part of its responsibilities for delivering the project. Whilst the Agreement with MTRCL is signed by the Secretary for Transport and Housing on behalf of the Hong Kong SAR Government, I consider that there is scope for improving the Government's project sponsorship arrangements to provide greater clarity in communication and reporting lines and more efficient project controls.

120. Efficient and effective communications and controls are required to administer and coordinate the Government's input into the environment of a live construction contract. The Government's governance, controls and administrative procedures need to operate alongside the contractual procedures and timetables to allow work to proceed without delay. I set out in paragraph 8k above potential risks which may occur where there are different lines of communication with different Government Departments or where responsibilities are not fully clear. In my opinion, the Government should review roles, responsibilities and lines of communication to provide improved clarity of the Government's project sponsor role. I consider that there should be single point responsibility for administering the Agreement with MTRCL and for managing internal Government consultations.

121. The nature of target contracts means that it is in the Government's interest to organise their input into the project as efficiently and effectively as possible. The Government has a

direct interest and incentive in delivering the contract within the target cost. It should see itself as a delivery partner in the project who can help to manage cost and programme risk as efficiently as possible. I recognise that it can be difficult for Government to contribute effectively when it is reliant on others for robust and comprehensive reporting of key issues particularly where there may be reluctance to give notification of things that may not be going well. It is very important that Government improves its access to reliable information required to protect its interests and that it is in a position to challenge performance when necessary. In my view this could be achieved by enhancing the role of the Monitoring and Verification Consultant.

The role of the Monitoring and Verification Consultant

122. The Government's use of a Monitoring and Verification Consultant (MVC) is in my opinion in line with international best practice albeit that the name used to describe the role varies between Clients. Paragraphs 74 and 75 of my report set out that the Government appointed Pypun as its MVC on the project. This is a similar, but less extensive role, to the appointment of Project Representatives by UK Government Departments in the UK that are involved in the delivery of major transport infrastructure projects such as Crossrail and HS2. In my opinion, there is potential to expand the MVC role to help ensure that Government has access to more reliable project performance data which would put it in a stronger position to plan its involvement at key stages and to respond to any issues that emerge during the delivery of the project.

123. I found it surprising that the MVC role, according to Pypun, did not include oversight or audit of quality procedures[40] **[K1/14 and 24]** although I fully accept that the role does not, and should not, include supervision of the works. The MVC does have responsibility for monitoring cost and programme issues and in my opinion, the delivery of a quality product on a "right first-time basis" is inextricably linked to the successful delivery of cost and programme objectives. I consider that the three elements need to be monitored on an integrated basis. This is particularly important on a target contract where the Government shares the risk of cost overruns. I consider that the MVC role could be extended to provide a wider "eyes and ears" enhanced MVC or Project Representative role which would include high-level monitoring and auditing of quality assurance procedures. The enhanced MVC or Project Representative should have the authority to attend project meetings as it considers necessary to fulfil its duties.

[40] §§19 and 46.5, WS of Mak Yu-man **[K1/14 and 24]**

124. I note that the MVC undertakes audits of project procedures at the instruction of Government. In my opinion the role should make provision for the MVC to identify areas at risk and to propose an audit programme. If proposals for audits are not accepted and the MVC remains concerned about potential risks to Government, then the MVC should have a facility to challenge the programme and make representations to a senior position in Government.

125. Evidence has been presented to the Commission about the MVC's contractual and commercial arrangements. Basically, the MVC is paid on a lump sum basis **[G9/7747]** and is required to deliver the defined services for the price agreed and fixed at the start of the contract, albeit with provision for the MVC to seek additional payment if asked to do something not covered by the Brief. The lump sum has to cover minimum staffing requirements[41] as for example as set out in relation to the minimum BSRC staffing requirement[42] **[K1/66]**. At the same the Consultant is required to be proactive throughout the course of the assignment[43] **[G9/7660]** in undertaking audits and surprise checks to construction sites for the compliance with building standards[44] **[G9/7665]** and site inspections to identify irregularities, contraventions or non-compliances with building standards. I am of the view that the form of contract involving payment to the MVC on a lump sum basis does not support the proactive approach that the Government was seeking. The commercial incentive of a lump sum agreement encourages the service provider to minimise its costs by performing the minimum level of work. Other forms of agreement such as target cost arrangements can be used to incentivise a higher level of performance and in my opinion alternative contractual arrangements should be considered.

126. Generally, the frequency and extent of audits should be based on performance results and the level of confidence that there is in the implementation of, and compliance with, project procedures. When procedures are being applied effectively and good demonstrable performance is being achieved then the need for validation audits can be reduced. When procedures are breaking down and there is concern about performance then the need for audits is likely to be higher. To incentivise compliance and good performance by the organisations involved, the Government could consider an option of specifying an expected level of monitoring and audit and if it proves necessary, at the Government's discretion, to

[41] Mak Yu Man **[Day 34/pp.96:16-99:12]**
[42] §5.6.4, Inception Report **[K1/66]**
[43] §6.2.4 M&V Agreement **[G9/7660]**
[44] §6.6.4(f) M&V Agreement **[G9/7665]**

increase those levels due to poor performance by the contracted parties then the extra costs may be recovered by the Government.

127. Evidence was also provided to the Commission about the requirement for the MVC to undertake audits and "surprise checks"[45] **[G9/7665]** on the construction site. On day 34 of the Hearing, Mr Mak Yu Man said that due to the practicalities of gaining entry to the site Pypun did not undertake any surprise checks and that he did not believe there is such a thing as a surprise check[46]. My opinion is that it does not have to be their attendance on site at a particular time that is the surprise, but it can be the activity or procedure that they choose to check or inspect. For example, the MVC could arrive and then choose and its discretion to check that the necessary level of supervision is in place, or inspect site records, or check that as-built records are being produced as required etc.

128. In his evidence, Mr Mak also commented on the position on resources in the event that its proactive role made it desirable to do something extra. Mr Mak said that *"we [Pypun] have no spare effort to dig out extra work for ourselves"*[47]. This is not intended as a criticism of Pypun, but I refer to it to make the point that the Government needs to ensure that companies appointed to these roles do have access to the levels of resource required if additional monitoring and validation services are required.

Government's Monitoring Committees

129. Ms Rebecca Pun (STHB) [G3/1854-1858] and Mr Daniel Chung Kam Wah (DS(T)1)[G3/2066-2068] provided evidence on the meetings structure the Government has established to monitor MTRCL's work[48]. They include:

- the Project Supervision Committee (PSC) described as a high-level inter-departmental committee which meets monthly[49][G3/1855] [G3/2066-2067];
- Project Coordination Meetings (PCM) held monthly and chaired by a Government engineer from RDO and attended by senior staff of the RDO, MTRCL and the MVC[50][G3/202067];

[45] §6.6.4(f) M&V Agreement **[G9/7665]**
[46] Mak Yu Man **[Day 34/p.133:6-18]**
[47] Mak Yu Man **[Day 34/p.98:6-13]**
[48] §§4-12 of WS of Rebecca Pun [G3/1854-1858] and §§23-33 of WS of Daniel Chung [G3/2066-2068]
[49] §5 of WS of Rebecca Pun [G3/1855] and §§24-27 of WS of Daniel Chung [G3/2066-2067]
[50] §28 of WS of Daniel Chung [G3/202067]

- Project Progress Meetings (PPM) held monthly and chaired by MTRCL's SCL General Manager and attended by RDO and the MVC[51][G3/202067];
- Project Control Group (PCG) normally held on a weekly basis is an MTRCL internal meeting to which Government is entitled to send its representative and HyD and the MVC would comment on any MTRCL proposals received[52][G3/2067-2068].

130. This meeting structure is in line with what I would expect and in my opinion is in line with good practice. My only observation is in relation to the highest-level committee, the PSC. The notes of the 26 September 2018 meeting **[G14/11788]** show that it was attended by 29 people (with 2 absent with apologies) including 16 people from the HyD and 9 people from MTRCL. In my opinion, with such a large number of attendees, it would be difficult to focus on high level performance and associated strategic issues. I would be concerned that the number of people attending the meetings may mean that the focus is on less strategic issues which could / should be addressed at the other meetings.

131. If Government considers that existing attendance is at the right level then an alternative option may be to consider a higher-level Project Board consisting appropriate Government Directors supported by external non-executive Board Members from specialist backgrounds who could bring experience of best practice from the wider industry to provide strategic advice.

132. MTRCL's reporting obligations should be reviewed to ensure that the PSC is provided with reliable information relating to quality assurance matters such as a strategic view of non-conformance reporting, compliance with quality assurance plans, production and submission of as-built drawings, confirmation of appropriate levels of supervision and sub-contract commercial settlements.

133. In addition to a robust meeting structure, other effective governance measures I have experienced elsewhere include a degree of integrated working to help work planning and approval procedures operate more efficiently. For example, this could involve Government staff members working alongside members of the project delivery team in their offices on a regular basis of say one day every fortnight. That would allow any issues relating to the need for, or handling of, design submissions to be resolved on a face-to face basis to avoid

[51] §29 of WS of Daniel Chung [G3/202067]
[52] §§30-32 of WS of Daniel Chung [G3/2067-2068]

any uncertainty and to help speed up the procedures. Integration of members of the different teams by working alongside each other on a regular basis has been shown to be more beneficial than traditional meeting arrangements.

Conflict of Interest Policy

134. Evidence has been presented to the Commission which has involved potential conflict of interest issues[53]. It would be helpful, in my opinion, for one of the committees, possibly the PCM, to have formal responsibility for considering and determining appropriate action in relation to any identified conflicts of interest. If there were to be any uncertainty about any arrangements where a conflict may be perceived then there should be a requirement to notify it to the Committee for a decision. It would be desirable for the arrangement to be supported by a Government policy statement setting out what might constitute a conflict of interest and how any such conflicts should be managed. In general, this should include the avoidance of companies working on both the client side and the supplier side.

Contracting Strategy

135. There has been a gradual shift in the industry in recent years away from traditional contracts involving Employer designed solutions to ECI contracts with the Contractor responsible for design and construction. MTRCL did adopt elements of early contractor involvement in the procedures applied to this project but it was not as comprehensive as delivered on ECI contracts elsewhere. Bringing together design and construction responsibilities has benefits for the delivery of the Works and the management of the contract. Experience has shown that driving change of this nature in the industry needs to be Employer led. The Government, in my opinion, should consider producing policy or guidance on procurement strategies that would achieve the potential benefits of using ECI principles and methods.

Culture and Behaviours partnering arrangements

136. Part of MTRCL's PIMS procedures is to apply a non-contractual partnering arrangement to the delivery of the project **[B17/24385]**. In my opinion the adoption of partnering or collaboration principles is very important to the delivery of successful outcomes and is line with best industry practice. I am of the view that all parties and stakeholders involved in

[53] See paragraphs 52 to 59 above.

the effective and efficient delivery of project systems and procedures, including Government, should be brought within the partnering arrangements in an appropriate way. In particular, the use of partnering or collaborative principles and methods should help to clarify roles and responsibilities, ensure that working procedures are understood, confirm the lines of communication and establish an environment in which there is transparency for all parties in relation to forward programmes and encourages parties to give early warning of risks that may impact on key outcomes if they are not mitigated. It is important for Government to see itself as part of the overall project partnership as it is involved in project approval procedures and shares in the risk of project outcomes.

Rationalisation of documents setting out obligations on MTRCL

137. In paragraph 7 above, I summarise the range of documents which place obligations on MTRCL to deliver the project in line with Government's requirements. It is quite a complex task to pull together all obligations and the range of documents carries the risk that some obligations may get overlooked and that some requirements may conflict. There would be benefit, in my opinion, in Government reviewing the structure of the relevant documents, considering how they work together to define obligations and consider whether there is simpler and more effective way of pulling obligations and requirements together into a joined-up and simpler structure.

138. I think this is particularly important in relation to the presentation of the Buildings Ordinance and consultation procedures and requirements. There is no doubt that Government staff have a very clear understanding of how the governance procedures are required to operate. However, people working in the supply chain on Hong Kong projects may not be so familiar with the requirements and procedures. In my opinion they may well struggle to fully grasp the procedures when they have to refer to BO, EAs, IoEs, IoCs and CoPs. With the current arrangements Government should not be too surprised if occasionally the procedures are not followed in the way that was intended. In addition, as I set out in paragraph 8j above, some of the wording in the documents does not precisely define the obligations and it would be desirable to review the wording to ensure that requirements are clearly defined.

Project Management Plan

139. The PMP produced by MTRCL is a key document which is submitted to Government as part of the granting of the IoE. The Government's requirement for a PMP to be in place is a sensible control mechanism. The Government appears quite rightly to take confidence from MTRCL's PIMS system and procedures as they have developed over the course of a long period of time in the delivery of successful railway projects. The Government also takes confidence from the ISO9001 accreditation MTRCL has obtained for its project management systems. In my opinion however, the Government could set higher standards for the PMP to make it a more effective project management tool. It is important that Government gives scrutiny of draft PMPs to ensure that project specific obligations, requirements and proposed procedures are translated into clearly defined project plans and arrangements. The PMP for contract 1112 does not, in my opinion, fully set out all of the detail necessary for the effective management of the project. In particular it cross refers to a range of other documents which are generic in nature and in some cases are open to interpretation, as set out in paragraph 63 above, making it difficult for project staff to apply consistent procedures.

140. In my opinion, Government should exercise greater scrutiny over MTRCL's draft PMP to ensure that it provides clarity on requirements without extensive cross-referencing to generic documents. In particular, Government should ensure that its requirements in the BD's CoP are translated adequately and clearly into project specific plans. It should be ensured that the role of leadership, as out in ISO9001:2015 is reflected in the PMP and that there are clear strategies and plans for communicating the plans throughout the organisation supported by ongoing training and development. The MVC or a similar Project Representative role could be used to review draft PMPs as part of the Government acceptance procedures.

141. Other aspects of project delivery which should in my opinion be included in the PMP, which were not included in the contract 1112 PMP are:
    - details of partnering arrangements;
    - procedures for the approval of sub-contracts including subsequent revisions to sub-contract terms and arrangements; and
    - commercial management procedures

Design Submission and Approval Procedures

142. Some issues have arisen on the project in relation to the application of procedures relating to design submissions. There appears to have been different interpretations about when submissions are required and also in relation to the process that needs to be followed. The position is made more complicated by the requirement for BD approvals as well as approvals by the Engineer under the contract. I consider that Government should review the existing procedures for design submissions to ensure that requirements are clear. The overall procedures need to recognise the formal role of the Engineer to the contract as the person with responsibility for administering the contract. The BO and contract procedures need to work together to ensure that they are complementary and that there is no conflict with the role of the Engineer.

Commercial Settlements

143. The EA places obligations on MTRCL in relation to any commercial settlements with Third Parties. The definition of Third Parties does not appear to cover sub-contractors to the main contract. Sub-contracts do, however, typically represent around 70% by value of the main contract. In my opinion, it would be prudent for the Government to include sub-contracts within the provisions for commercial settlements set out in the EA. This would provide Government with greater transparency of commercial settlements which have a significant impact on the settlement of the final contract value and greater control on the settlement of the contract final account.

Supervision of the Works

144. There is a range of documents which set out requirements in relation to supervision of the Works as identified in paragraph 63 above. They include the BD's CoP which provides the basis for supervision requirements set out in most of the other documents. The documents however, use different terminology for supervision activities and it appears that requirements are open to interpretation. This relates to the level of supervision as well as the type of records that should be kept. The Government could consider specifying the use of technology to support efficient record keeping and possibly the actual system to be used so that there is consistency across programmes of work. In my opinion the BD's CoP should be reviewed and clarified as necessary to ensure that there is no potential misunderstanding of requirements.

145. In relation to site supervision of contracts involving complex structural elements, I consider that the Government would achieve a higher level of assurance by requiring that the designer should have an adequate role in the site supervision arrangements to confirm that the intent of the design has been delivered in the construction. This does not need to be a full supervision team observing all construction activity but it should be significantly greater than the design liaison representative role performed by Atkins' Team A on this contract.

146. In relation to levels of supervision and particularly where continuous supervision is specified, it should be recognised that this is very onerous and expensive requirement. It may not give good value for money when the Contractor has a skilled workforce working to robust procedures and is producing good quality with little input from supervisors. A possible alternative approach would be to commence a project with a high level of supervision but with a phased reduction when the Contractor has demonstrated good performance and created a good level of confidence. Ongoing performance can be monitored by a combination of more limited supervision supported by audit. The level of supervision can be increased again if performance and compliance is not satisfactory. Provisions can be made in the contract for the Contractor to be liable for additional audit and inspection costs incurred by the Employer where they arise from poor performance by the Contractor.

147. The BD's CoP states that as part of site supervision duties, all non-conformances detected must be properly recorded in Non-Conformity and Rectification Reports. In practice, it appears that individuals take a necessarily subjective view on whether the non-conformances are material before deciding whether to record and report them. The requirement for all non-conformances to be reported would create a high administrative burden and it may be sensible to have regard to the significance of the non-conformance. Having said that each non-conformance offers an opportunity to improve performance and prevent future recurrences. I consider that the Government should review the requirement for non-conformance reporting and provide a clear definition of what constitutes a non-conformance. It should then seek to ensure that the requirements are incorporated into project plans and into the job descriptions of site supervision and inspection staff and the requirements delivered in practice.

Government improvement initiatives

148. I note from the minutes of the PSC meeting on 26th September 2018 that a number of initiatives are already underway for improvement measures for site supervision and communications within MTRCL and with Government in the light of issues that have arisen on the contract **[G14/11792-11793; 11797-11811]**. The focus areas for improvement are:

- enhancing NCR management protocols including categorising NCRs;
- enhancing team communications on works inspections, including the use of team briefings and the use of new technology such as smartphone applications which are being tested;
- enhancing procedures for tracking and reporting work issues; and
- building a stronger quality culture including establishing a quality working group under the PIMS steering group.

149. I am supportive of these initiatives and consider that they are in line with possible measures I have set out in my report for improvements to existing arrangements and procedures.

REPORT PART 3: OPINION ON HOW SYSTEMS FOR SUPERVISION, MONITORING, CONTROL and MANAGEMENT MAY BE STRENGTHENED

150. Based on my opinions set out in Parts 1 and 2 of this report, I consider that the actions set out in this Part should be considered to help strengthen the existing systems for supervision, monitoring, control and management. I have classified them into categories for ease of presentation.

Leadership

151. Strengthen the involvement of senior leaders in all parties in establishing appropriate behaviours across the organisations to support a collaborative approach in the delivery of the project. Leadership roles should be developed in line with the principles set out in ISO9001:2015 and would involve senior leaders being more visible to the workforce and in them taking a lead role in communicating key messages throughout the organisations.

152. To support collaborative working on projects, establish a cross-party Senior Leadership Forum to monitor working relationships and cultural aspects of service delivery and to agree ways of developing collaborative working.

MTRCL Organisation

153. Consider ways of improving closer working between different groups within the project organisation to avoid the risk of silo-working in which information and knowledge is not shared. Consider the effectiveness of existing communication arrangements between the teams and throughout the organisation. Review information databases and systems to ensure that there is a single source of the true position which is accessible as appropriate to all people.

154. Review and clarify MTRCL roles and responsibilities in relation to the provisions and requirements of the Conditions of Contract. In particular ensure that the position of Engineer to the Contract is understood and that roles and responsibilities respect the need for the Engineer to act impartially in the administration of the contract. The role of the Engineer needs to be integrated and compatible with the roles of others in MTRCL who have responsibilities for delivering obligations under EAs.

155. Review arrangements for managing relationships with stakeholders to ensure that there is clarity on responsibilities and clear lines of communications particularly with Government Departments. Arrangements should be set out in a Stakeholder Management Plan which is accessible by all involved in the project delivery.

Government related enhancements

156. Review how Government organises itself for the management of its interests in the railway project. The structure needs to take account of the requirement for MTRCL to consult ten or more different Government Departments as part of its responsibilities for delivering the project. Whilst the Agreement with MTRCL is signed by the Secretary for Transport and Housing on behalf of the Hong Kong SAR Government, there would appear to be scope for improving the Government's project sponsorship arrangements to provide greater clarity in communication and reporting lines and more efficient project controls.

157. In relation to BO and consultation, the current structure of documents setting out requirements is quite complex and not easy to follow. I consider that for a specific project it would be helpful for Government to pull together the provisions into a clearer and more precise description of the requirements and responsibilities.

158. Consider extending the role of the MVC to provide a wider "eyes and ears" role to help protect Government's interests in the delivery of the project. The role should also provide high level monitoring of the operation of the project quality assurance systems as well as the current role in monitoring cost and programme issues. The MVC role could be developed into a Government's Project Representative role who works more closely within the MTRCL organisation to monitor performance and to identify emerging issues.

159. Consider options for working arrangement in which Government staff would be integrated within MTRCL teams on a regular basis, say one day a fortnight, to help ensure a common understanding of requirements, improve communications, undertake joint forward planning and to resolve issues more efficiently.

160. Review the attendance at the PSC to ensure that it is operating as intended, as a high-level committee focusing on strategic issues and performance. Ensure that the reporting arrangements to PSC are providing the Committee with reliable performance data which

will allow substantive issues relating to time, cost and quality to be identified and acted upon.

161. Review the BD's CoP to give clarity on the definition of supervision, record keeping requirements and non-conformance reporting. Terminology such as "continuous and full time supervision" requires further explanation. It would also be desirable for the BD's CoP to set out requirements of the communication of the supervision plan and associated obligations. The overall supervisory arrangements should provide an adequate role for the designer to give assurance that the intent of the design is delivered in the construction of the Works.

162. Develop a conflicts of interest policy appropriate and applicable to projects of this nature. Allocate responsibility for administering the policy to the PCM or other committee as appropriate.

163. Review the lump sum contractual arrangement used to employ the MVC and consider options which may provide a more effective incentive to be proactive in the execution of its duties.

164. Clarify in MVC briefs clearer requirements in relations to site audits and surprise checks.

165. Ensure that companies appointed to MVC roles have access to the necessary levels of resource if the level of monitoring by the MVC has to be increased due to concerns about poor performance.

166. Consider the option of recovering MVC audit costs if poor performance by the contracting parties results in additional audits being required above that normally required.

Design Submissions, BD Consultation Procedures and Changes

167. Review the wording of the Particular Specification in relation alternative works design proposals to ensure that the process and terminology is aligned with the contract conditions.

168. Ensure that construction method statements are in place based on the latest approved designs before construction commences.

169. Review the liaison arrangements between the Contractor's design team, the BA and MTRCL's design and construction management teams to ensure that there is common understanding of submission requirements and that all parties are aware of design issues and the forward programme of potential submissions.

Supervision requirements

170. Review the significant number of various documents which set out supervision requirements and guidance with the aim of rationalising the documents to a more manageable and readable number. Ideally, it would be better to have all supervision requirements and responsibilities pulled together into a single Supervision Manual made accessible to all involved in the supervision and inspection procedures and such Supervision Manual should be translated into the Chinese language which workers are familiar with. There is evidence before the Commission that there might not be any Chinese version of the SSP and the provisions of the SSP were not explained to site supervisors[54].

171. Develop a clear definition of supervision for the purposes of contractual obligations and adopt a consistent approach to terminology throughout the documentation. The requirements need to be specific about the information that needs to be recorded and certified.

172. To deliver best value for money and to make best use of resources, the frequency of supervision and inspections should be flexible and reactive to the compliance and performance of work with requirements. Demonstration of consistently high-quality work should allow supervision requirements to be reduced with confidence being maintained by less frequent supervision supported by self-certification and audits.

173. Review the requirements for formally defined hold-points in relation to the contract provisions for not covering-up work without inspection. Clarify whether inspection certificates apply to both hold-points and pre-covering up inspections. In the evidence given before the Commission, there seems to be confusion and misunderstanding over the requirements to keep contemporaneous inspection records and RISC forms. Mr Aidan Rooney, General Manager of MTRCL, took the view that RISC forms alone were more than

[54] Chan Chi Ip **[Day 19/pp.26:29:9; 66:17-68:8]**

enough evidence to show that the rebar and couplers were properly completed and connected[55]. Mr Louis Kwan, Construction Engineer of MTRCL responsible for the inspection of bar-fixing works, however, gave evidence which suggested that the RISC forms which he signed did not, in fact, signify that couplers had been inspected. As far as he was concerned, he was never even assigned to inspect the couplers, hence he did not inspect the couplers on formal inspection, and the RISC forms which he signed did not cover couplers[56]. Mr Kobe Wong as a Senior Inspector of Works of MTRCL, on the other hand, gave evidence that he was expressly told by his superior that inspection of couplers for the EWL slab was the responsibility of the Construction Engineer team (which included Mr Louis Kwan) and that he should refrain from inspecting the couplers. This is notwithstanding that he was assigned to inspect the couplers when the diaphragm walls were built[57].

174. Review options for the use of the latest technological applications and tools, such as tablets or smartphones, to support the efficient effective recording of site records.

175. Ensure that there are procedures in place to record who are undertaking supervision duties on a daily basis and that supervisors have the required level of competence.

176. Ensure that records are kept to support the possible application of the contractual disallowable cost provisions.

Site entry / exit systems and records

177. Review the adequacy of existing entry / exit site staff recording system in relation to:
    - knowing who is on site;
    - supporting the payment of people under the commercial model;
    - knowing who undertook work inspections and who certified work;
    - helping to confirm that the required level of supervision and the numbers supervisors to workers is provided.

Non-Conformance Reporting

[55] Aidan Rooney **[Day 28/p.53:16-24]**
[56] Louis Kwan **[Day 29/pp.16:7-29:20]**
[57] Kobe Wong **[Day 30/pp.4:17-12:25]**

178. Review current guidance on NCRs to ensure that there is clarity and consistency on when non-conformance reports should be issued.

179. Encourage a culture that treats non-conformance reporting in a similar way to "near-miss" reporting on health and safety so that lessons learnt drives continuous improvement.

180. Maintain a single NCR database across all parties which is accessible to all supervisors and inspectors to allow recurrent issues to be readily identified.

181. Review and enhance the NCR close-out procedures including effective monitoring arrangements.

Project Management Plans

182. Review and improve the detailed content of Project Management Plans, as set out in paragraphs 22 and 23 of this report, to make them more comprehensive and relevant to the project by translating generic guidance into project specific requirements. The Plan should minimise the need to cross refer to other documents for details of project specific requirements.

183. Consider including an introductory section in PMPs setting out MTRCL's corporate policies and the project strategic objectives to help steer the development of the project.

184. It would be desirable to be more specific about which PIMS manuals are applicable to a project and job roles rather than just including a long list of all PIMS documents.

185. Consider including in the PMP, proposals for:
    - partnering arrangements and initiatives;
    - checklists for sub-contract approval procedures, including revisions to sub-contract terms and arrangements; and
    - commercial management procedures including the settlement of sub-contract final accounts.

PIMS Manuals

186. Review PIMS procedures, and update as necessary, to ensure alignment of project management guidance and procedures with contractual procedures. As part of this, highlight in the manuals the aspects of the guidance which need to be assessed for the specific circumstances of a project and translated into project-specific guidance in the PMP.

187. Review and refresh the older PIMS manuals which date back as far as 2008.

188. Review training on PIMS and contract procedures, including ongoing refresher training and the coverage of any updates to the procedures. Where appropriate, consider integrated training sessions with the Contractor to ensure a common understanding of requirements.

189. Highlight the aspects of PIMS manuals which need to be converted from generic advice into project specific proposals.

As-built Drawings

190. Review the current documents setting out requirements for as-built drawings to ensure that there is consistency and clarity on roles, responsibilities and procedures. Pull together responsibilities and procedures associated with as-built drawings in the PMP.

191. Clarify and maintain site records to support the delivery of the contractual requirements for the prompt recording of as-built dimensions and details.

192. Rigorous monitoring of as-built drawing production to be introduced and progress reported as part of the monthly progress to PSC.

Partnering / Collaborative working

193. Review and clarify the procedures for the submission and acceptance of working method statements.

194. Introduce the standard use of an industry standard collaborative form of contract such as NEC4.

195. Reiew options for more integrated and co-located working between the parties to achieve greater transparency of issues, better forward planning and joint risk management.

196. Develop and implement the use of BIM as a collaboration tool.

Commercial issues

197. Review the procedures for the approval of sub-contracts and any subsequent revisions which change the conditions and / or prices.

198. Review the arrangements for the commercial settlements of sub-contracts to include a stage for MTRCL to verify and accept that proposed settlements are in line with the approved sub-contract terms and conditions.

199. Review and rationalise the provisions for disallowable cost and consider incorporating works not undertaken in accordance with approved plans and procedures as a disallowable cost. This would be achieved by the use of the NEC contract.

Turner Townsend Review of MTRCL procedures

200. I have seen the report of the review carried out by Turner & Townsend into MTRCL's Processes and Procedures **[B17/24421+]**. I consider that there is good alignment between the recommendations of that report and the findings of my report. I understand that MTRCL has already established an implementation group to take forward the TT recommendations and I consider that to be a positive indication of MTRCL's desire to learn lessons and achieve continuous improvement.

201. Expert's Declaration

I, STEVE ROWSELL DECLARE THAT:

1. I declare and confirm that I have read the Code of Conduct for Expert Witnesses as set out in Appendix D to the Rules of High Court, Cap. 4A and agree to be bound by it. I understand that my duty in providing this written report and giving evidence is to assist the Commission. I confirm that I have complied and will continue to comply with my duty.

2. I know of no conflict of interests of any kind, other than any which I have disclosed in my report.

3. I do not consider that any interest which I have disclosed affects my suitability as an expert witness on any issues on which I have given evidence.

4. I will advise the Commission if, between the date of my report and the hearing of the Commission, there is any change in circumstances which affect my opinion above.

5. I have exercised reasonable care and skill in order to be accurate and complete in preparing this report.

6. I have endeavoured to include in my report those matters, of which I have knowledge or of which I have been made aware, that might adversely affect the validity of my opinion. I have clearly stated any qualifications to my opinion.

7. I have not, without forming an independent view, included or excluded anything which has been suggested to me by others, including my instructing solicitors.

8. I will notify those instructing me immediately and confirm in writing if, for any reason, my existing report requires any correction or qualification.

9. I understand that:

(a) my report will form the evidence to be given under oath or affirmation;

(b) questions may be put to me in writing for the purposes of clarifying my report and that my answers shall be treated as part of my report and covered by my statement of truth;

(c) the Commission may at any stage direct a discussion to take place between the experts for the purpose of identifying and discussing the issues to be investigated under the Terms of Reference, where possible reaching an agreed opinion on those issues and identifying what action, if any, may be taken to resolve any of the outstanding issues between the parties;

(d) the Commission may direct that following a discussion between the experts that a statement should be prepared showing those issues which are agreed, and those issues which are not agreed, together with a summary of the reasons for disagreeing;

(e) I may be required to attend the hearing of the Commission to be cross-examined on my report by Counsel of other party/parties;

(f) I am likely to be the subject of public adverse criticism by the Chairman and Commissioners of the Commission if the Commission concludes that I have not taken reasonable care in trying to meet the standards set out above.

Statement of Truth

I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. I believe that the opinions expressed in this report are honestly held.

S. G. Rowsell

Steve Rowsell
20 December 2018