



**HIGHWAYS DEPARTMENT**

Agreement No. HMWSD 2/2018 ( HY )

Independent Review on the Procedures for Hong Kong Link Road (Section between Scenic Hill and Hong Kong Boundary Crossing Facilities) - Investigation

**Review Report (FINAL)**

Deliverable 6.1. ( d )

October 2018

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## LIST OF ABBREVIATIONS / ACRONYMS / DEFINITIONS

The following abbreviation / acronyms / definitions are used in this report.

ARUP	Ove ARUP & Partners Hong Kong
CSCE	China State Construction Engineering (Hong Kong) Limited
CLK Road	Chek Lap Kok Road
C&C	Cut and Cover
DR	Director Representative
DG	Dangerous Goods
DSP	Drainage Sump Station
FFS	Fuel Filling Station
EC Road	East Coast Road
HAT/APT	Airport Tunnel
HKBCF	Hong Kong Boundary Crossing Facilities
HKIA	Hong Kong International Airport
HKLR	Hong Kong Link Road
HKSAR	Hong Kong Special Administrative Region
HMA	Highway Operation and Maintenance Area
HyD	Highways Department
HZMB	Hong Kong-Zhuhai- Macao Bridge
KLW Road	Kwo Lo Wan Road
IT	Information Technology
ITAP	Inspection, Testing & Approval Plan
P-KD	PYPUN-KD & Associates Limited
PQP	Project Quality Plan
OHVD	Overhead Ventilation Duct
QSSP	Quality Site Supervision Plan
RISCFs	Request for Inspection (Witness)/Survey Check Forms
RSS	Resident Site Staff
SPS	Sewage Pump Station
SHT	Scenic Hill Tunnel
SOR	Supervising Officer's Representative
VE Panel	Vitreous Enamel Panel



## 1 INTRODUCTION

### 1.1 Background

The Hong Kong Link Road (HKLR) is a 12km long dual 3-lane (with one additional climbing lane at Zhuhai bound) expressway connecting the Hong Kong-Zhuhai-Macao Bridge (HZMB) Main Bridge at the Boundary of Hong Kong Special Administrative Region (HKSAR) and the Hong Kong Boundary Crossing Facilities (HKBCF) at the northeast waters of the Hong Kong International Airport (HKIA) Island. The HKLR is implemented under two Design and Build Contracts: Contract No. HY/2011/03 and Contract No. HY/2011/09.

Contract No. HY/2011/03 entitled “Hong Kong-Zhuhai-Macao Bridge, Hong Kong Link Road – Section between Scenic Hill and Hong Kong Boundary Crossing Facilities”. The Work mainly comprises the design and build of the new reclamation along the east coast of the HKIA, of approximately 23 hectares; tunnel from Scenic Hill (SHT) to the new reclamation, of approximately 1 km long; an at-grade road on the new reclamation along the east coast of the HKIA to connect with the HKBCF, of approximately 1.6 km long; and other road links between the HKBCF and the HKIA including new roads and modification of existing roads in the HKIA.

The services provided under this agreement are solely related to the works under Contract No. HY/2011/03.

### 1.2 Concerns on RISCfS

Contract No. HY/2011/03 was awarded to China State Construction Engineering (Hong Kong) Limited (CSCE) in May 2012 and commenced on 31 May 2012. Atkins China Limited and Hyder Consulting Limited were appointed by the Contractor as the Contractor’s Designer and Design Checker respectively in respect of detailed design/checking of engineering works for this Contract.

Ove Arup & Partners Hong Kong Ltd (ARUP) is the Consultant for the Contract and is responsible for the construction supervision. It has recently come to Highways Department’s attention that about 13,000 Request for Inspection (Witness)/Survey Check Forms (RISCfS) had not been used for recording the Contractor's request for inspection (including witnessing or survey) and the Supervising Officer's

Representative's (SOR) permission to proceed with the proposed work. It is estimated by ARUP that the total number of RISCFS under the whole Contract is about 52,500 as of 21 August 2018.

The large number of late-RISCFS concerns Highways Department which arises the need to review the integrity and robustness of the supervision system.

### **1.3 Objectives of the Review**

PYPUN-KD & Associates Limited (P-KD) is appointed by Highways Department to carry out an independent review on the late-RISCF and the corresponding supporting materials provided by ARUP and CSCE.

The main objective of this Agreement is to conduct an independent review of the late-RISCFS with the aim to verify whether ARUP has conducted supervisions over the course of the works directly related to the late-RISCFS.

### **1.4 Principles of the Review**

RISCFS is an essential element in the whole record keeping and site supervision system of the project. It serves as communication record of Contractor's request for inspection and/or survey of work performed and the SOR's permission for proceeding onward to the next operation.

P-KD's assessment on whether ARUP is involved in the supervision of the works directly related to the late-RISCFS rest mainly on the completeness, relevancy and authenticity of the supporting materials presented by ARUP. However, P-KD's review does not include the assessment on the actual supervision performance of ARUP nor whether the works were inspected in conformance with the contract documents.

Over the course of the review, P-KD ensures the assessment process are scientific, impartial, authentic, holistic and practical.

## 2 REVIEW PROCESS

### 2.1 Approach and Methodology

#### 2.1.1 P-KD's Database of Key Information

In order to record and organise key information registered in the late-RISCFs efficiently and systematically, P-KD has built up a comprehensive Database in the form of spreadsheet during the review process. Its main function is to facilitate the team to carry out bulk data analysis, sorting of information, tracking of unsettled cases and results of review actions when necessary.

The following key information for each late-RISCF will be registered in the spreadsheet:

#### A. Factual Information of the Inspection / Witnessing Activity

1. sequential no. of the forms;
2. disciplines of work;
3. date of issue;
4. date of inspection;
5. type of works (e.g. foundation, reinforcement, etc.);
6. locations of works (e.g. portion, chainage, etc.);
7. type of inspection (e.g. test witnessing, survey check, inspection);
8. result of inspection;
9. completeness in approval signatures
10. Types of supporting materials (e.g. email, photo, other messaging record and alike)

#### B. Assessment Results / Comments

1. Completeness
2. Relevancy
3. Authenticity
4. Further review actions: check CSCE's record, request for IT's review, check Site Diary, review the relevant Method Statement and ITAP, seek clarifications from ARUP

By compiling and analysing the data holistically, P-KD aims to create a full picture of the late-RISCFs situation, identifies the duration and locations of work activities where these belated RISCFs covered and assists the planning of any necessary follow-up actions.

### 2.1.2 Assessment Procedures

The Engineering team of P-KD reviewed every single late-RISCFs (both for structural and non-structural) and assessed the trustworthiness of supporting materials provided by ARUP from three main aspects: (1) Relevancy, (2) Completeness and (3) Authenticity. In general, the relevancy of the materials represents whether the information given is directly related to the late-RISCFs; completeness of the materials represents whether there is adequate useful information to support the RISCFs; and the authenticity represents whether there are reasons to believe the integrity of the given information. In addition, random check was carried out on CSCE's materials and compare with those provided by ARUP for cross-checking purposes.

After the relevancy, completeness and authenticity of the materials have been evaluated, the engineers will determine which late-RISCFs can be closed/concluded and which will require follow-up actions to further confirm the supervision / inspection relevant to the concerned RISCFs. The DR was reported periodically on the findings and any necessary follow-up actions. Follow-up actions may include but not limited to (1) checking against CSCE's supporting information; (2) seeking further clarification (including viewing more photos, emails, etc.) from ARUP and/or CSCE; (3) seeking support from P-KD's Information Technology specialist in terms of verifying the raw data of materials; (4) checking drawings, method statement, ITAP and site diary, etc. For cases where further substantiations and clarifications are needed, meetings / interview sessions with ARUP were organised to discuss outstanding issues on the substantiations of RISCFs.

In addition, P-KD randomly selected among the late-RISCFs, with higher emphasis given to inspections related to the works quality of critical elements (e.g. piling works, mined tunnel, etc.) for examinations of their procedures and frequency of inspection (or witnessing / survey check) and check their compliance with the supervision / inspection requirements in QSSP, PQP, ITAP and other relevant specifications.

The process flow chart illustrating the review methodology adopted in this assignment is shown in the Figure 2-1.

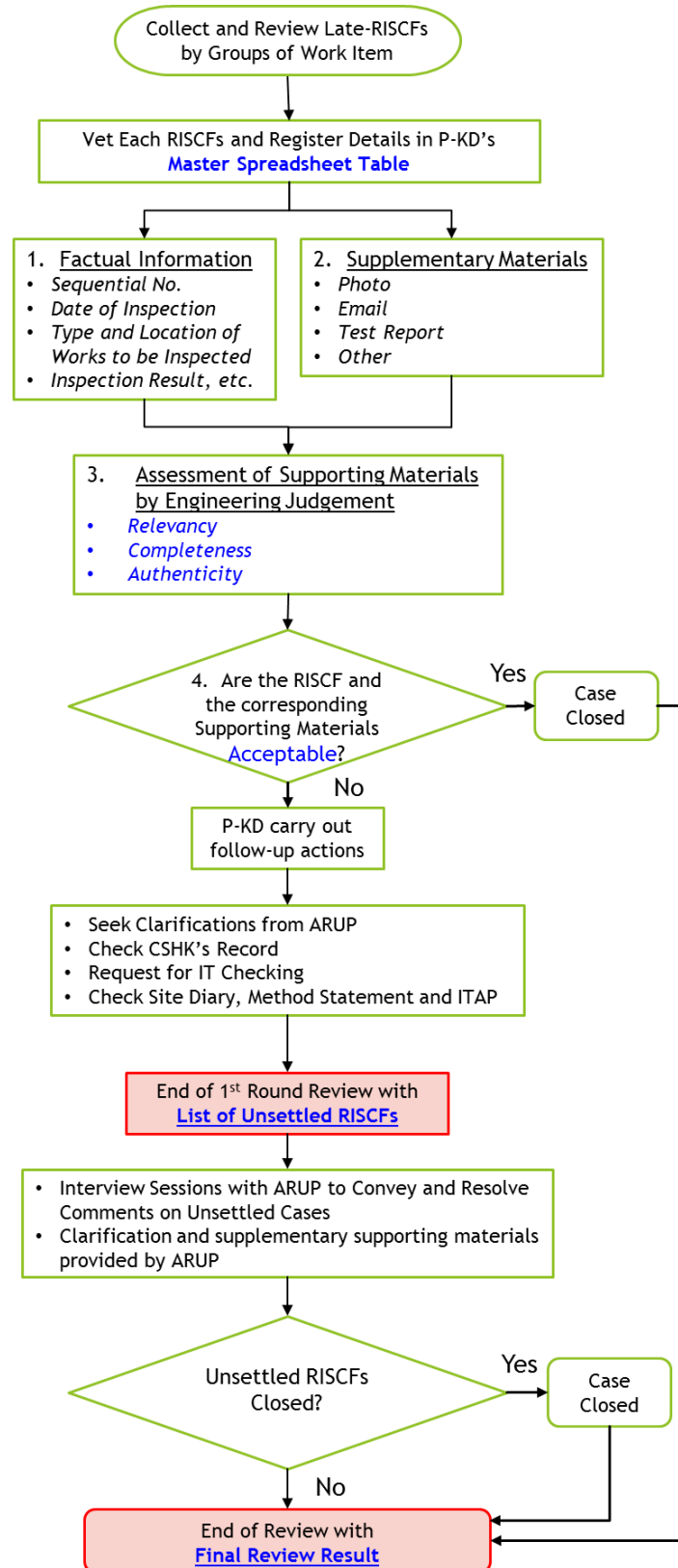


Figure 2-1 Assessment Procedure Flowchart

### 2.1.3 Verification of Information and Data Record

P-KD's Information Technology (IT) team aimed to audit the authenticity and integrity of the computer data of the supporting materials based on the built in or available audit functions of IT application system (e.g. audit trail of the relevant application system(s)) or office automation tools like Microsoft Outlook for those identified Inspection Forms. The IT Review Methodology was discussed and agreed among ARUP, Highways Department and the team. Comprehensive IT review or audit was considered and agreed in the joint meeting to be not feasible because of the following factors:

- (i) ARUP's computer systems would not be available for free access to P-KD in this review due to limit of data storage at site office and the inclusion of commercial sensitive data of ARUP with other clients. P-KD acknowledged the stated constraints and accepted ARUP's arrangement of RISCFS and relevant photos to be provided in hardcopy, and softcopy of these photos also copied to photos albums setup for this review in production server. Therefore, the audit scope could not cover the original information flow in ARUP computer systems.
- (ii) Data export onto removable storage device with Highway Department as custodian for audit purpose was discussed and rejected by ARUP.
- (iii) No external IT application or tool from the Team was allowed to run on ARUP's computer environment.
- (iv) All keyboard operations would be carried out by ARUP staff for review by the P-KD's review teams.
- (v) There was very small amount of email messages printout attached to RISCFS. The printout attached to RISCFS would not be available for audit because the respective audit period fell in middle of 2017 or earlier, and according to ARUP, their Microsoft email system did not have the audit trail function turned on at server end. For the desktop computer at user end, as ARUP's mail box had a storage quota for each user and up to user to delete or archive emails on their PC when the quota limit was reached every few months. As there was no central email archive policy or audit trail, it would be difficult to verify an email one year ago in the email system.

- (vi) There had been small amount of supporting materials to RISCFS in the form of Whatsapp messages and the verification of such message would be close to impossible as it would need the access to relevant personal mobile phones and relevant messages still kept by phone owners.

The final adopted approach of IT audit focused on three data sources of photos, namely (1) the site photo library of ARUP in the production server of ARUP in site office; (2) the backup tapes of this production server with the earliest available backup copy traced back to February 2017; and (3) incremental backup tape with photo files only. Two sets of backup tapes for the periods from February to May 2017 and for July to September 2017 had been delivered from ARUP to Highway Department for safe custody since 24 August 2018. Relevant photos of RISCFS were inspected both on a random basis and by referral from Engineering Team. Photos from the albums in current production server were analysed and classified into 6 scenarios as described in Table 2-1 and **Appendix C1**.

The sampling was determined empirically based on Engineer's assessment on the relevancy, completeness and authenticity of the photographic records attached to the RISCFS. Over the course of the IT checking, P-KD had continuously reviewed the adequacy of sampling. In case frequent irregularities were revealed from the photo data checking, the number of photo checking would have been increased to keep up the effectiveness of the IT checking. As the result of IT checking was continuously found favourable and consistent across different works, the sampling was deemed adequate and maintained throughout the IT review process.

Finally, regarding the checking on full server backup tapes, photos of late-RISCFS in the date range of February – October 2017 were randomly selected for verification of existence in the respective full server backup tapes of the same period. It served to show that the photo files were actually existed at the stated period. A small number of photos taken before Feb 2017 were selected and checked for their existence in another set of photo-only incremental backup tape. Sampling of backup photo checking were mainly limited by the time it takes to retrieve the backup files. In view of the backup photo checking result was continuously found successful and it was served as secondary checking to the primary checking in production server checking, the sampling size was considered sufficient.

**Table 2-1 Classification of Photos Review Scenarios**

<b>SCENARIO</b>	<b>DESCRIPTION</b>	<b>ANALYSIS</b>	<b>FOLLOW UP ACTION</b>
<b>1</b>	No Date/Time stamp on Photo	Despite no date/time stamp on photo, there were embedded date properties in softcopy of the photo	Pass to Engineering Team to follow up
<b>2</b>	Date/Time stamp on photo aligned with “Date Taken” in photo’s file property	Normal acceptable situation	Nil
<b>3</b>	Date/Time stamp on photo aligned with “Date Modified” in photo’s file property	Normal acceptable situation	Nil
<b>4</b>	“Date Taken” and Camera Data all missing in photo’s file property	Source of photo may be indirect or secondary data (e.g. a photo received via Whatsapp)	Pass to Engineering Team to follow up
<b>5</b>	“Date Taken” missing in Photo’s file property and “Date Modified” later than Work Date in RISCf by 1 week or more	Photo taken far later than the specified work date in RISCf. Risk of photo not reflecting the actual status of work carried out	Pass to Engineering Team to follow up
<b>6</b>	“Date Taken” missing in Photo’s file property and “Date Modified” earlier than Work Date in RISCf by 1 week or more	Similar to Scenario 5 but more explainable because RISCf paper work could be pending after photos taken at site	Pass to Engineering Team to follow up

*Note:*

*1. Date Taken: The date/time embedded in a photo’s file by an image capturing device (e.g. digital camera) when a photo was taken.*

*2. Date Modified: The date/time when the photo was last modified/edited from the original.*



## 2.2 References

The following references were considered in the review of late-RISCFs:

- (i) Site Diary
- (ii) QSSP
- (iii) Method Statement & ITAP
- (iv) RSS o-chart in MPR
- (v) Register of authorized RSS signatories
- (vi) Relevant Clauses in Consultancy Agreement No. CE36/2009 and Contract No. HY/2011/03 Documents

## 2.3 Assessment Scope and Timeline

Only the RISCFs that are classified as late submission by ARUP were reviewed in this Assignment. Based on our record, P-KD has reviewed 14,839 late-RISCFs, of which around 5,200 were classified as structural (i.e. the request for inspection (witnessing) is related to structural works) and 9,600 were classified as other or non-structural by ARUP.

The ones related to structural works were grouped into 39 items by ARUP and they were given higher priority in the review than other items. Every RISCFs in these 39 items was assessed and registered in the spreadsheet. These forms cover foundation works and reinforced concrete works including tunnels, bridges, buildings, culverts, and etc.

The other RISCFs related to non-structural works were grouped into 65 items by ARUP. Assessment result of each item was collectively given after every RISCFs belonged to that item had been reviewed. Only the forms that are considered unsettled were registered in our Database. These forms cover drainage, roadwork, seawall, pavement, profile barriers, Architectural Builders Works and Finishes, landscaping, and etc.

Detail numbers and categories of structural and non-structural late-RISCFs shall refer to **Appendix A1 and Appendix A2**.

After ARUP provided first batch of the late-RISCFs for review on 16 August 2018, they have continued to supplement supporting materials to the RISCFs until 28 September 2018. The chronology of the key dates over the course of P-KD's review

are highlighted below:

<b>NO.</b>	<b>DATE</b>	<b>ACTIVITY</b>
1	30/7/2018	<ul style="list-style-type: none"> <li>ARUP commenced the preparation of late-RISCFs and corresponding supporting materials</li> </ul>
2	10/8/2018	<ul style="list-style-type: none"> <li>P-KD's Agreement commenced</li> </ul>
3	14/8/2018 to 22/8/2018	<ul style="list-style-type: none"> <li>HyD and P-KD, accompanied by ARUP, jointly conducted site visit to various work areas of the HY/2011/03 Contract</li> </ul>
4	16/8/2018	<ul style="list-style-type: none"> <li>P-KD established the review methodology and created the template of the RISCFs master spreadsheet of the review database</li> <li>ARUP provided part of structural late-RISCFs and P-KD began to review structural late-RISCFs and corresponding supporting material</li> </ul>
5	21/8/2018	<ul style="list-style-type: none"> <li>ARUP provided all remaining structural late-RISCFs for P-KD's review</li> </ul>
6	31/8/2018	<ul style="list-style-type: none"> <li>P-KD completed the review for all structural late-RISCFs</li> </ul>
7	1/9/2018	<ul style="list-style-type: none"> <li>P-KD began to review non-structural late-RISCFs</li> </ul>
8	10/9/2018	<ul style="list-style-type: none"> <li>P-KD completed the review for all non-structural late-RISCFs</li> </ul>
9	11/9/2018	<ul style="list-style-type: none"> <li>ARUP reported that the last batch of additional substantiations were supplemented on their own will</li> </ul>
10	12/9/2018	<ul style="list-style-type: none"> <li>P-KD started to revisit the late-RISCFs taking into considerations of ARUP's supplementary materials</li> </ul>

<b>NO.</b>	<b>DATE</b>	<b>ACTIVITY</b>
11	14/9/2018	<ul style="list-style-type: none"> <li>• P-KD completed 1<sup>st</sup> round assessment result of structural late-RISCFs</li> <li>• P-KD conducted interview sessions with ARUP's inspectorate staff to discuss unsettled structural late-RISCFs</li> </ul>
12	17/9/2018	<ul style="list-style-type: none"> <li>• P-KD completed 1st round assessment result of non-structural late-RISCFs</li> <li>• P-KD started interview session with ARUP's inspectorate staff to discuss unsettled non-structural late-RISCFs</li> </ul>
13	20/9/2018	<ul style="list-style-type: none"> <li>• All interview sessions completed</li> <li>• ARUP informed HyD and P-KD at 1730 hours that further supplementary materials related to 50 Unsettled structural RISCFs was inserted into the files for P-KD's consideration</li> </ul>
14	21/9/2018	<ul style="list-style-type: none"> <li>• P-KD reviewed the last batch of supplementary materials and reported to HyD of the assessment result at noon</li> <li>• There were 35 unsettled structural late-RISCFs and 236 unsettled non-structural late-RISCFs remaining at that time</li> </ul>
15	22/9/2018	<ul style="list-style-type: none"> <li>• HyD was notified by ARUP unexpectedly that extra substantiations for the remaining 35 Unsettled structural late-RISCFs was retrieved</li> </ul>
16	24/9/2018	<ul style="list-style-type: none"> <li>• P-KD immediately deployed additional resources to review ARUP's substantiations and incorporated the findings into the updated final assessment results and 1st draft of Review Report accordingly</li> </ul>

<b>NO.</b>	<b>DATE</b>	<b>ACTIVITY</b>
17	28/9/2018	<ul style="list-style-type: none"><li>• ARUP supplemented last batch of additional supporting material to resolve the unsettled late-RISCFs</li></ul>
18	2/10/2018	<ul style="list-style-type: none"><li>• P-KD completed the final review on all unsettled RISCFs and deduced final assessment result.</li></ul>

### 3 FINDINGS

#### 3.1 Review Results

##### 3.1.1 Overall

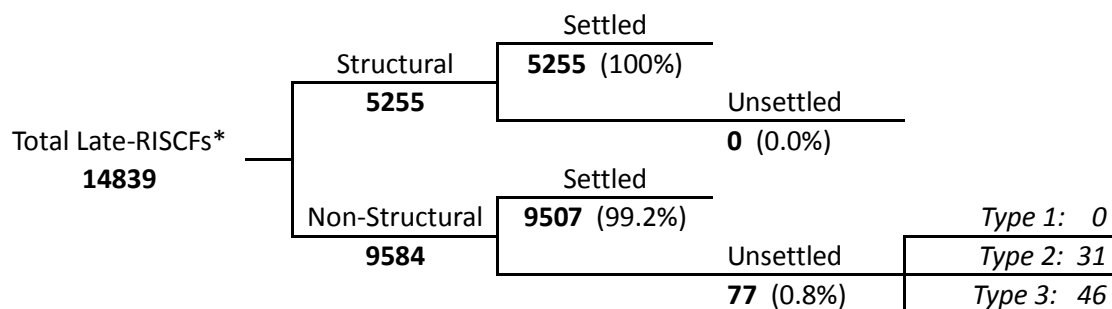
Upon the completion of first-round review (as described in Figure 2-1), a total of 703 late-RISCFs (total of both structural and non-structural) are considered as *Unsettled Cases* and need to seek further clarifications from ARUP's inspectorate staff. The results of first-round review refer to **Appendix A3**. Those *Unsettled Cases* are grouped into the following three types:

- Type 1* - P-KD have comments on RISCFs and pending for ARUP's clarifications or responses;
- Type 2* - ARUP attaches only the Site Diary to the RISCFs as supporting material; and
- Type 3* - ARUP did not attach any supporting material to the RISCFs; or the RISCFs is not provided.

After a series of interview sessions with ARUP's inspectorate staff, their supplementary materials and clarifications on 626 out of 703 late-RISCFs are considered acceptable. Examples of showing how these cases were settled are demonstrated in **Appendix A4**.

P-KD's review on all late-RISCFs including ARUP's clarifications and supplementary materials provided during interview sessions was completed on 28 September 2018. In summary, 14,762 late-RISCFs (i.e. 99.5% of total 14,839 late-RISCFs) are found to be substantiated by authentic and acceptable supporting materials that can demonstrate ARUP's direct involvement in the site supervision activities. With regards to overall supervision (in terms of over 52,500 RISCFs registered as of 21 August 2018 according to ARUP) about 52,423 or 99.9% of all inspection(witnessing) / survey undertaken by ARUP are either covered by timely submitted RISCFs or by late submitted RISCFs with photographic or other kinds of acceptable substantiation.

The overall results in divisions of structural late-RISCFs and non-structural late-RISCFs and distribution of unsettled cases in the non-structural division are shown in Figure 3-1.



\* : Numbers of RISCFs recorded and reviewed by P-KD.

**Figure 3-1 Overview of Results and Distribution of Unsettled Cases**

Two summary tables, one for structural and one for non-structural, showing the breakdown and distribution of the Unsettled Cases in different locations / groupings of works are tabulated in **Appendix A1** and **Appendix A2**, respectively.

### 3.1.2 Unsettled Late-RISCFs

All the remaining unsettled late-RISCFs are associated with non-structural works only.

After P-KD’s interview sessions with ARUP held between 14 and 20 September 2018 for requesting clarifications and supplementary substantiations, all 128 structural and 207 non-structural Type 1 unsettled RISCFs have been satisfactorily settled.

For the 31 non-structural Type 2 unsettled RISCFs, ARUP confirmed that there are no further supporting materials available for these late-RISCFs except Site Diary as already provided. Although P-KD agree in general that the information given on the Site Diary can serve to verify whether the stated inspection date and location written on the RISCFs are reasonable and also to indicate that ARUP is fully aware of the respective work was being carried out at that given day, it is opined that merely showing the Site Diary cannot explicitly demonstrate ARUP's involvement / supervision nor to serve as direct evidence for recording ARUP's inspection on that given day (e.g. permission to proceed, list of deficiencies), which is one of the primary purposes of the RISCF submission.

And for Type 3, 46 non-structural RISCFs remains unsettled as verbally advised by ARUP that no supporting materials can be provided at the time of this report being prepared.

Summary list of unsettled non-structural late-RISCFS for both Type 2 and Type 3 are provided in **Appendix B1** and **Appendix B2**, respectively. The summary statistics of unsettled non-structural late-RISCFS, the assessment results are presented in the following Figures.

The number of unsettled / settled non-structural late-RISCFS shows in Table 3-1 and Figure 3-2 in terms of different works locations. A total of 9507 RISCFS was settled whilst the remaining 77 RISCFS were unsettled. In particular, majority of unsettled forms involved are within Scenic Hill Tunnel (SHT).

*Table 3-1 Summary of Unsettled/Settled Non-structural Late-RISCFS*

<b>LOCATION OF WORKS</b>	<b>NO. OF SETTLED NON-STRUCTURAL LATE-RISCFS</b>	<b>NO. OF UNSETTLED NON-STRUCTURAL LATE-RISCFS</b>
SHT	2585	69
HAT	948	0
Buildings	539	0
Airport Road	1335	0
EC Road & CLK Road	2529	0
HKLR	1381	8
KLW Road	45	0
Seawall	63	0
Landscaping	82	0
<b>TOTAL</b>	<b>9507</b>	<b>77</b>



**Figure 3-2 Location Distribution of Unsettled/Settled Non-structural Late-RISCFs**

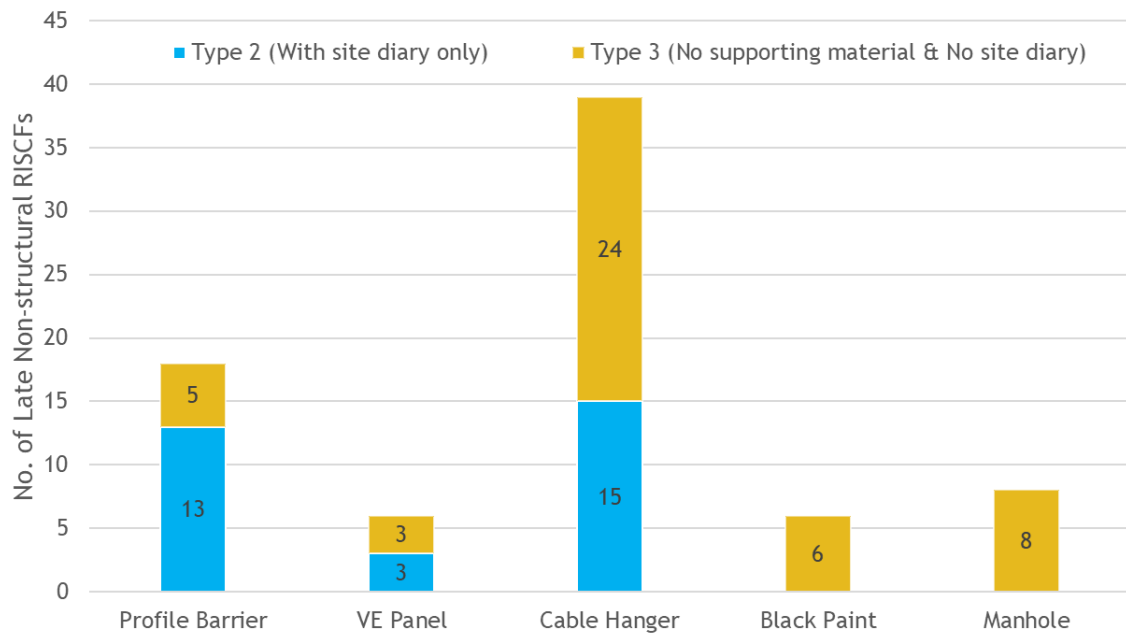
The unsettled late-RISCFs spread out in various kind of non-structural works related to the construction of profile barriers, manholes, black paint, installation of VE panels and cable hangers (see Table 3-2 and Figure 3-3 below). Over half of the unsettled late-RISCFs are related to cable hanger installation with a total number of 39, followed by profile barrier with a total number of 18. Figure 3-4 shows a more detailed distribution of unsettled non-structural late-RISCFs by types of work inspected.

It is noted that the completed works associated with these 77 unsettled RISCFs are not covered up and readily accessible for quality check at any time. The quality of them has little significance to the overall traffic safety and highway operations.

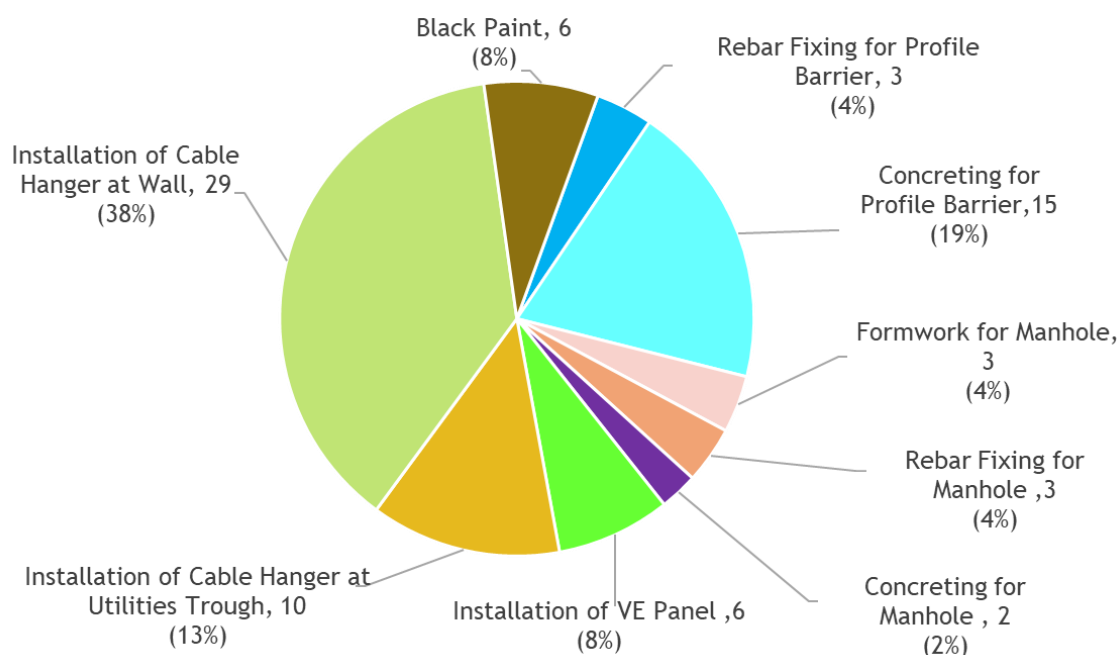


**Table 3-2 Works Element of Unsettled Non-structural Late-RISCFs**

<b>WORKS ELEMENT</b>	<b>TYPE 2</b>	<b>TYPE 3</b>
Profile Barrier	13	5
VE Panel Installation	3	3
Cable Hanger Installation	15	24
Black Paint	0	6
Manhole	0	8
<b>TOTAL</b>	<b>31</b>	<b>46</b>



**Figure 3-3 Works Element of Unsettled Non-structural Late-RISCFs**



**Figure 3-4 Inspection Works of Unsettled Non-structural Late-RISCFs**

### 3.1.3 IT Review

All inspected photos and relevant RISCFs were recorded in an inspection registry. Please refer to **Appendix C2** for details.

All the planned IT checking with emphasis on photo data verification had been completed, which covered photo checking and follow up verifications by Engineering Team (if required) for 1440 out of 5255 structural late-RISCFs (27%) and 767 out of 9584 non-structural late-RISCFs (8%). Table 3-3 shows the distribution of IT review findings based on the 6 scenarios of analysis outlined in Section 2.1.3. Cases 2 and 3 represented the normal acceptable condition of photo(s) in RISCFs.

With respect to structural late-RISCFs, 2920 photos from 1440 late-RISCFs of late-RISCFs were inspected. Out of the 2920 photos inspected, 66% (Cases 2 & 3) of photos were checked with satisfactory result, and 34% of photos under Cases 1, 4, 5 and 6 were followed up by Engineering Team and ARUP.

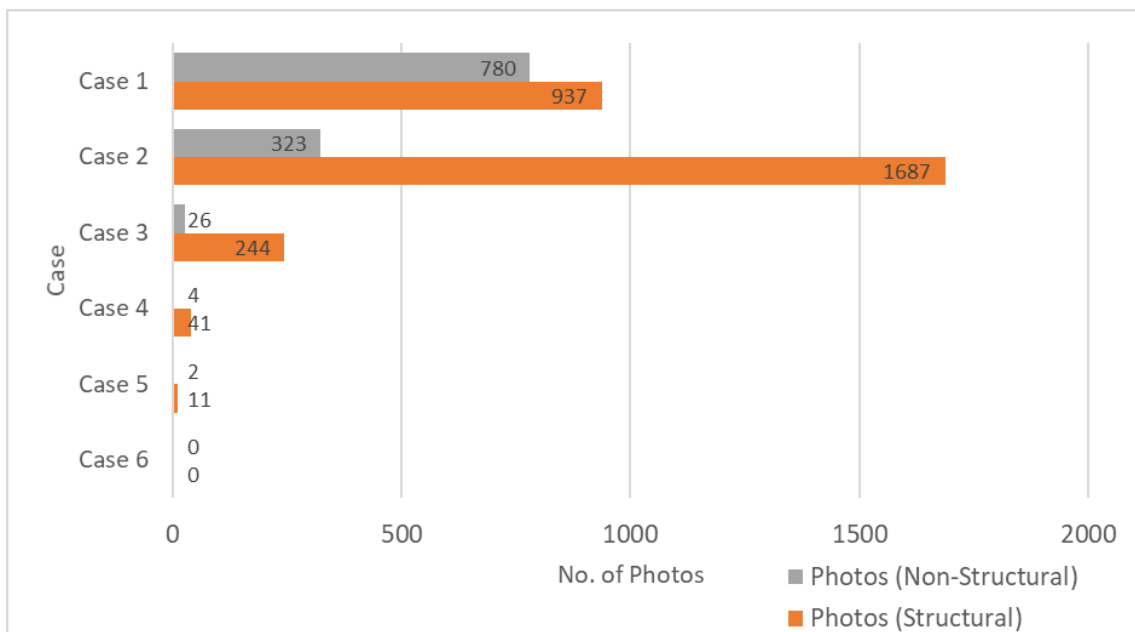
For non-structural late-RISCFs, 1135 photos from 767 late-RISCFs were inspected. Out of the 1135 photos inspected, 31% (Cases 2 & 3) of photos were checked with satisfactory result, and 69% of photos under Cases 1, 4, 5 and 6 were followed up by Engineering Team and ARUP.

Through follow up study, The IT and Engineering Teams had identified one potential cause for Case 5 situation where ARUP inspector(s) might have delayed the uploading of site inspection photos from camera/mobile phone to server if their work schedules had not allowed them to attend office until a later time or after a weekend. The uploaded photo file might also subject to editing for view rotation or down-sizing. The above situations would have caused the “Date Modified” to be later than the “Work Date” on RISCf. For some Case 1 situations where nil Date/Time was shown on photo, it could simply be caused by the OFF setting of printing Date/Time on camera or mobile phone. IT Team had randomly compared photos taken by the same digital device and observed consistent patterns of data fields including the ON/OFF setting of showing Date/Time on photo.

For all exceptional photos and RISCfS under Cases 1, 4, 5 and 6, after the follow up review of Engineering Team and subsequent evidence supplemented by ARUP, they all turned into acceptable condition. Therefore, photo checking result from production server had been 100% satisfactory.

**Table 3-3 Distribution of IT Review Results**

CASE	SIMPLIFIED DESCRIPTION	PHOTOS (STRUCTURAL)	PHOTOS (NON-STRUCTURAL)
1	“No Date /Time” on Photo	937	780
2	Date/ Time on Photo aligned with “Date Taken”	1687	323
3	Date/ Time on Photo aligned with “Date Modified”	244	26
4	“Date Taken” & Camera Data Missing	41	4
5	“Date Taken” Not-Exist & “Date Modified” is LATER than RISCf	11	2
6	“Date Taken” Not-Exist & “Date Modified” is EARLIER than RISCf	0	0
	<b>SUBTOTAL</b>	<b>2920</b>	<b>1135</b>
	<b>TOTAL</b>	<b>4055</b>	



**Figure 3-5 Distribution of the Six Scenarios of Analysis**

During the above mentioned inspection of photos against the softcopy in the production server, massive amount of site photos with quantity substantially more than those submitted for inspection was observed in a well organized filing system on computer. Photos were filed according to date, location and nature of work, and this filing structure was also observed in the backup tapes generated back in 2017. All these evidences had helped to draw the conclusion that the photos and relevant filing system was not a sham.

IT Review had also included verification of photos' existence in respective backup tapes. Photos of late-RISCFs in the date range of February – October 2017 were randomly selected for verification of existence in the respective full server backup tapes of the same period. It had served to show that the photo files were actually existed at the stated period. As the earliest full server backup could only be traced back to February 2017, another set of backup tapes which had a longer backup period coverage and contained photo only, had been used to support checking selective photos taken in 2016.

Table 3-5 summarises the backup tapes checking result on photos for structural and non-structural late-RISCFs respectively.

Overall result of photo checking against backup records of structural and non-structural photos had been 97.5% (78 out of 80 photos) successful as stated in Table 3-4 and Table 3-5. 100% of structural photo could be verified while 2.5% (2 out of 80 Photos) of non-structural late-RISCFs could not be found in backup tapes. The cases had been passed to Engineering Team to review and follow up, and was found out later that the 2 photos in question had been kept in the personal desktop computer instead of server and thus did not include in the backup content. Eventually, the result of these cases was confirmed positive and satisfactory after ARUP retrieved additional photos to confirm the date of inspection. Accordingly, the adjusted checking result was 100% successful.

**Table 3-4 Summary of Verification of Photos in Backup for Structural Late-RISCFs**

<b>BACKUP CHECKING DATE</b>	<b>NO. OF RISCF FORMS</b>	<b>NO. OF PHOTOS</b>	<b>DATE RANGE</b>	<b>BACKUP TAPE</b>
24 Aug 2018	1	1	Feb – May 2017	May 2017
27 Aug 2018	10	11	Feb – May 2017	May 2017
28 Aug 2018	11	17	Jul – Sep 2017	Oct 2017
28 Aug 2018	7	8	Aug – Sep 2017	Oct 2017
29 Aug 2018	11	11	Jul – Sep 2017	Oct 2017
30 Aug 2018	6	6	June 2017	Incremental Backup
30 Aug 2018	5	6	June – Sept 2016	Incremental Backup
<b>TOTAL</b>	<b>51</b>	<b>60</b>		

**Table 3-5 Summary of Verification of Photos in Backup for Non-structural Late-RISCFs**

<b>BACKUP CHECKING DATE</b>	<b>NO. OF RISCF FORMS</b>	<b>NO. OF PHOTOS</b>	<b>DATE RANGE</b>	<b>BACKUP TAPE</b>
10 Sep 2018	1	1	Feb – May 2017	May 2017
10 Sep 2018	14	14	Jul – Sep 2017	Oct 2017
11 Sep 2018	3	5	Feb – Sep 2017	Incremental Backup
<b>TOTAL</b>	<b>18</b>	<b>20</b>		

### 3.1.4 Cross-checking on CSCE's Supporting Information

A total of 36 RISCFS forms were selected for random check on CSCE's supporting materials and comparing with those provided by ARUP for cross-checking. The checking results are summarized in Table 3-6 below. 31 RISCFS were found in CSCE's record whilst 5 RISCFS could not be found. Amongst the 31 RISCFS, there were 26 RISCFS without any attachment of supporting materials; 5 RISCFS were attached with photos. It is noted that one photo attached is exactly the same as the photo attached in ARUP's record. Upon the review, no conflicting information and irregularities was noted.

**Table 3-6 Summary of Cross-checking Results**

CROSS-CHECKING RESULTS	NO. OF RISCFS	
	RISCFS Found in CSCE's Records	Without supporting materials:
With photos attached:		4
With same photo attached as in ARUP's records:		1
RISCFS Not Found in CSCE	5	
<b>TOTAL</b>	<b>36</b>	

### 3.2 Overall Statistics

#### 3.2.1 Structural

The location of works covered by the structural late-RISCFs are divided into 6 categories including Airport Tunnel (HAT), Box Culvert and Pump Stations, Bridges A1 & A2, Buildings, Ramps and Walls Structures for Road and Scenic Hill Tunnel (SHT). The number and period of the late-RISCFs for the 6 categories are summarized in Figure 3-6.

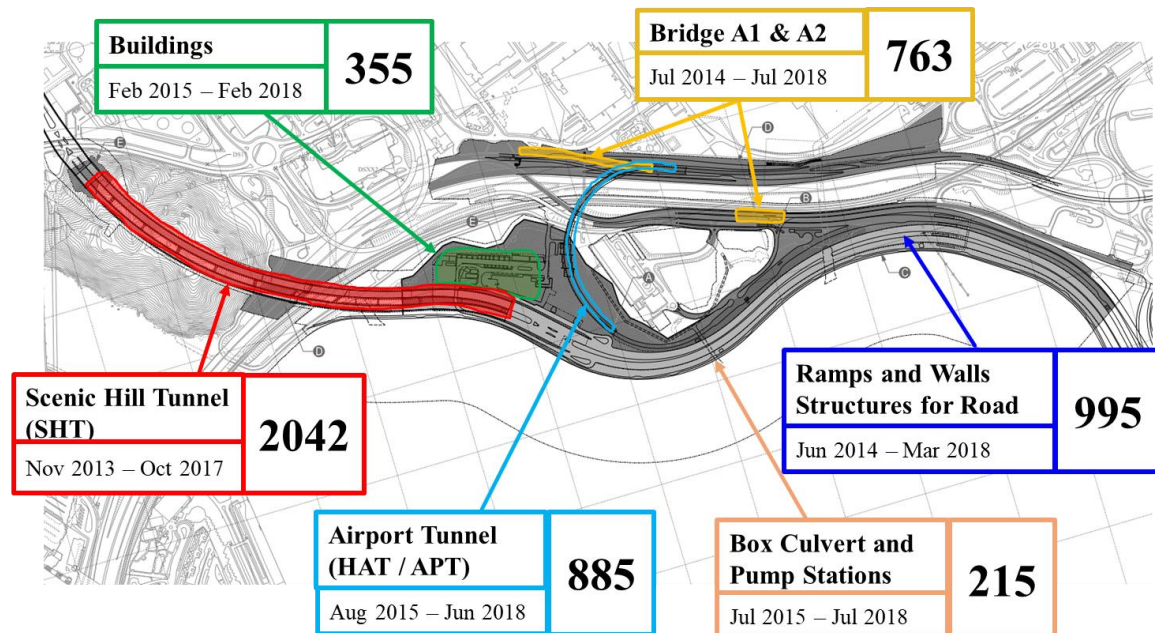


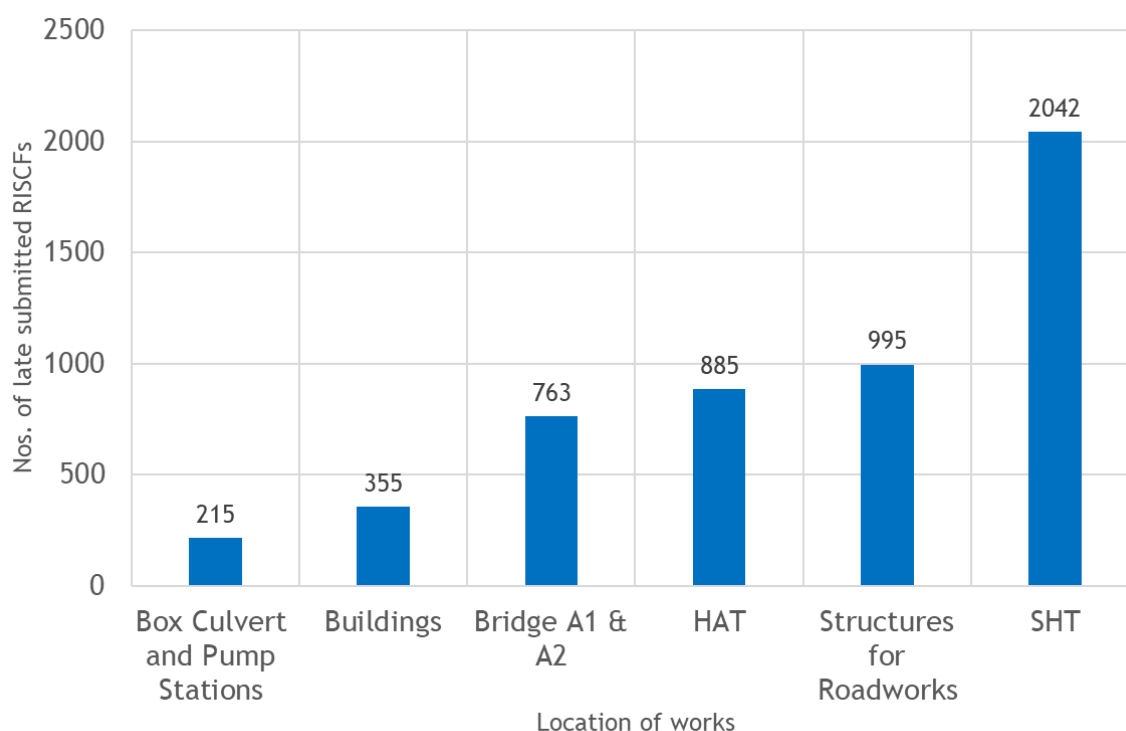
Figure 3-6 Summary for Structural Late-RISCFs Visualized on Plan



A total of 5255 structural late-RISCFs has been received. Most of the structural late-RISCFs are from Scenic Hill Tunnel (SHT) with a total number of 2042, followed by Structures for Roadworks and Airport Tunnel (HAT) with a total number of 995 and 885 respectively (see Table 3-7 and Figure 3-7 below).

**Table 3-7 Location of Works of Structural Late-RISCFs**

LOCATION OF WORKS	NO. OF LATE-RISCFs
Box Culvert and Pumping Station	215
Buildings	355
Bridge A1 & A2	763
HAT	885
Structures for Roadworks	995
SHT	2042
<b>TOTAL</b>	<b>5255</b>



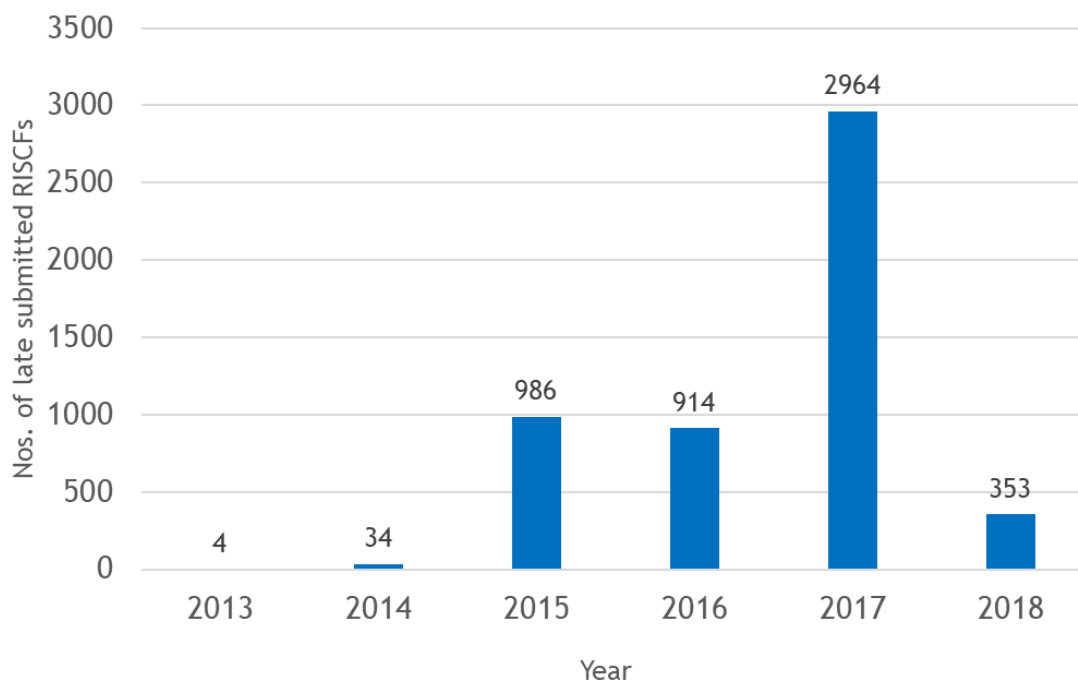
**Figure 3-7 Distribution of Structural Late-RISCFs by Location of Works**

The period of the structural late-RISCFs reviewed is ranging from year 2013 to year 2018. The number of late-RISCFs shows an increasing trend from year 2013 and reach the peak in year 2017 with 2964 RISCFs (56.4%). The number dropped to 354 in year 2018 (as of July 2018) (see Table 3-8 and Figure 3-8 below).

**Table 3-8 Structural Late-RISCFs by Year**

<b>YEAR</b>	<b>TOTAL</b>
2013	4
2014	34
2015	986
2016	914
2017	2964
2018	354
<b>TOTAL</b>	<b>5255*</b>

\* Correspond to number of Individual Inspection (*Number of RISCFs for piling works counted by sequential form numbers*)



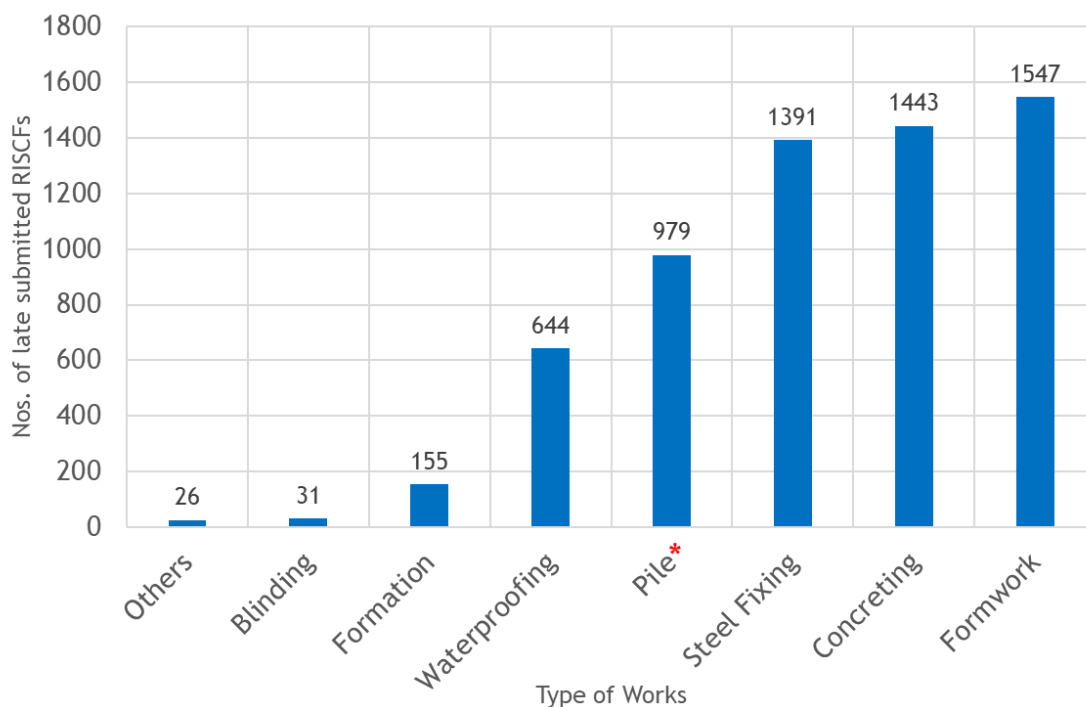
**Figure 3-8 Distribution of Structural Late-RISCFs by Year**

More than 80% of the 5255 structural late-RISCFs are attributable to inspection of activities related to R.C. works with a total number of 4381 (83.4%) (See Table 3-9 and Figure 3-9).

**Table 3-9 Type of Works of Structural Late-RISCFs**

<b>TYPE OF WORKS</b>	<b>NO. OF SUBMITTED LATE-RISCFs</b>
Formwork	1547
Concreting	1443
Steel Fixing	1391
Pile*	979 <i>(18 if counted by sequential form numbers)</i>
Waterproofing	644
Formation	155
Blinding	31
Others	26
<b>TOTAL</b>	<b>6216</b> <i>(5255 if RISCFs of Pile is counted by sequential form numbers)</i>

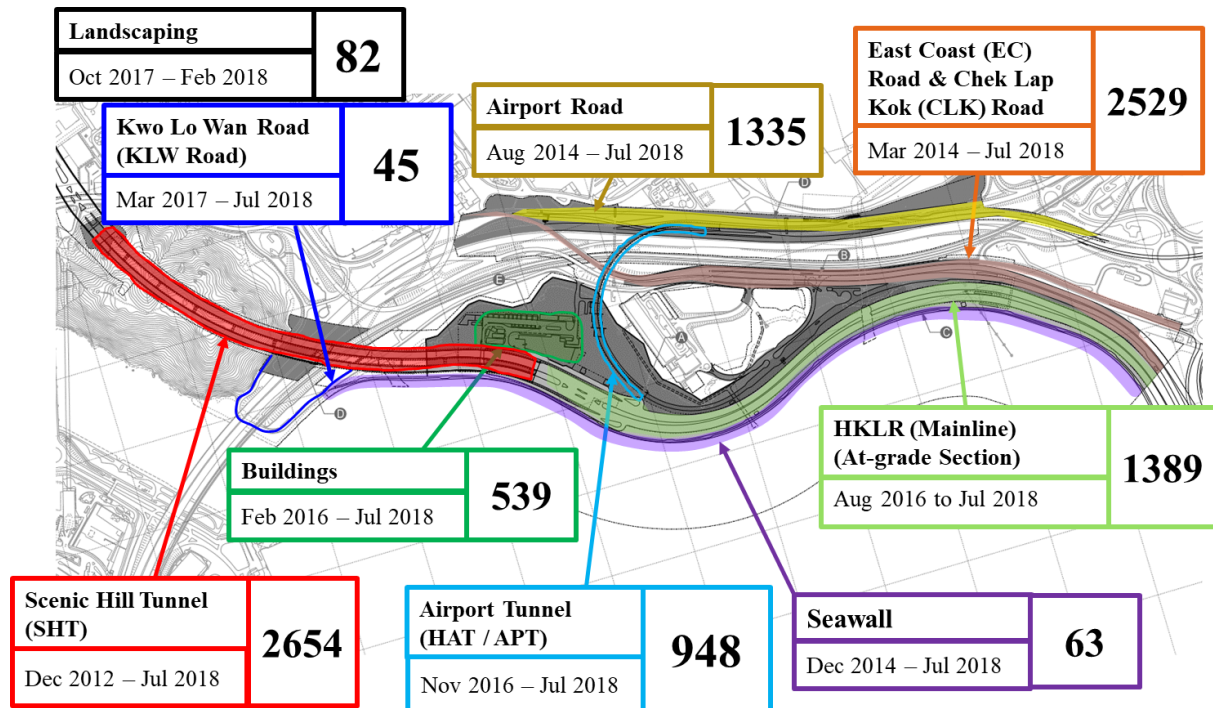
\* Corresponds to numbers of discrete piling days. Late-RISCFs associated with piling works of HAT Tunnel, SHT Cut and Cover tunnel, are covered by 18 late-RISCFs, each of the 18 late-RISCFs covers one major construction stage of piling works for all of the piles in one location (e.g. rockhead level inspection for all H-piles in HAT Tunnel).



**Figure 3-9 Distribution of Structural Late-RISCFs by Type of Works**

### 3.2.2 Non-Structural

For non-structural late-RISCFs, there is a total of 9584 of forms contained 130 box files. Over 4000 late-RISCFs are from year 2017. The distribution of these late-RISCFs is over 9 work locations as indicated in Figure 3-10.

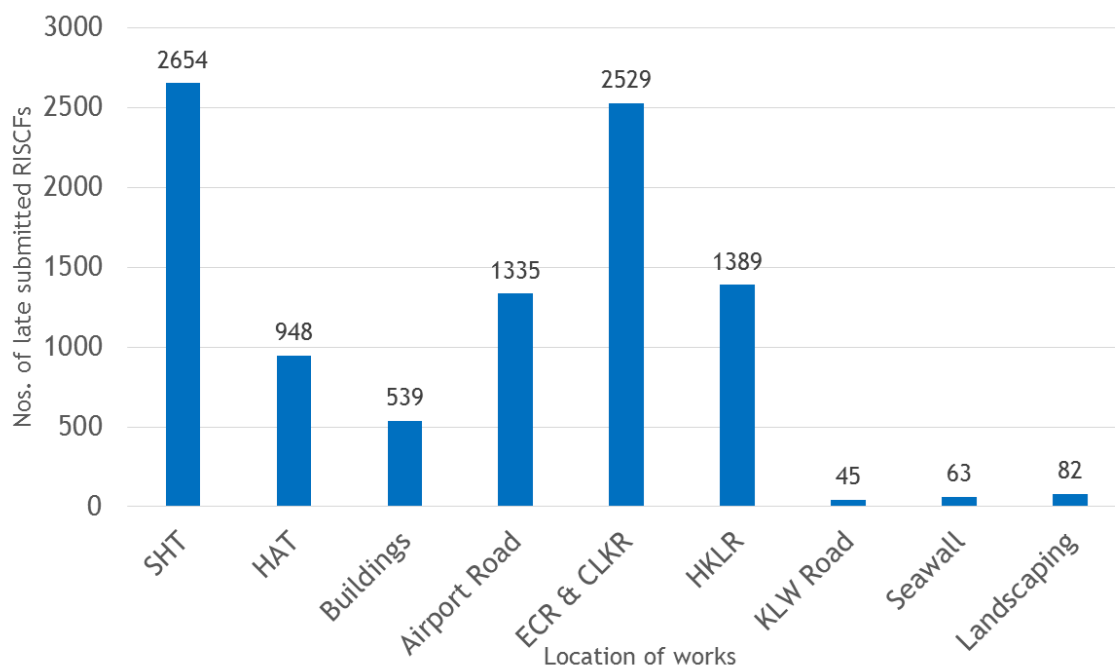


*Figure 3-10 Summary for Non-structural late-RISCFs Visualized on Plan*

Most of non-structural late-RISCFs are distributed in Scenic Hill Tunnel (SHT) with a total number of 2654, followed by East Coast Road and Chek Lap Kok Road (EC Road & CLK Road) and HKLR (Mainline) (At-grade section) with a total number of 2529 and 1389 respectively. The distribution of non-structural late-RISCFs in different locations was shown in Table 3-10 and Figure 3-11.

**Table 3-10 Location of Works of Non-structural Late-RISCFs**

<b>LOCATION OF WORKS</b>	<b>NO. OF LATE SUBMITTED RISCFs</b>
SHT	2654
HAT	948
Buildings	539
Airport Road	1335
EC Road & CLK Road	2529
HKLR	1389
KLW Road	45
Seawall	63
Landscaping	82
<b>TOTAL</b>	<b>9584</b>



**Figure 3-11 Distribution of Non-structural Late-RISCFs by Location of Works**

### 3.3 Findings of Visual Inspection on 4 October 2018

As discussed in Section 3.1.2, there are 77 unsettled late-RISCFs without acceptable substantiations. All of them are related to inspections of non-structural works and their completed conditions are readily exposed for visual inspections (except for 6 unsettled late-RISCFs are related to rebar fixing works).

On 4 October 2018, P-KD has carried out visual inspection on superficial conditions of the completed works pertained to the 77 unsettled late-RISCFs. No anomalies on superficial conditions and no sign of distress were observed during the visual inspection. Table 3-11 tabulated the type of completed works and findings of the visual inspection. Photos taken during the visual inspection are appended in **Appendix D** for reference.

*Table 3-11 Findings of Visual Inspections on Superficial Conditions*

TYPE OF INSPECTION SPECIFIED IN THE UNSETTLED RISCFs AND TYPE OF COMPLETED WORKS	FINDINGS OF VISUAL INSPECTIONS
Rebar Fixing for Profile Barrier	No anomalies were observed during visual inspection on superficial conditions of the completed works on 4 Oct 2018.
Concreting for Profile Barrier	
Installation of VE Panel	
Installation of Cable Hanger at Utilities Trough	
Installation of Cable Hanger at Wall	
Formwork for Manhole	
Rebar Fixing for Manhole	
Concreting for Manhole	
Application of Black Paint	

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Summary of Review Results

In between 16 August 2018 to 28 September 2018, P-KD has reviewed a total of 14,839 late-RISCFs as counted by individual inspection activity (or 11,963 late-RISCFs if counted by sequential form's registration numbers according to ARUP) and their corresponding supporting materials, mainly in the form of photographic record. These 11,963 late-RISCFs represents roughly 22% of total RISCFs used in this Contract (based on approximately 52,500 RISCFs registered as of the end of August 2018). About 30% of these late-RISCFs are related to structural works including construction of precast box segment for box jacking section, pre-bored H piling works, etc.

Our assessment shows that 5,255 structural late-RISCFs out of total 5,255 structural late-RISCFs (100%) and 9,507 non-structural late-RISCFs out of total 9,584 total non-structural late-RISCFs (99.2%) are found to be substantiated by authentic and acceptable supporting materials provided by ARUP. The authenticity of photographic record attached to the RISCFs is validated by the satisfactory results revealed from our IT checking in both production server (i.e. current server) and in backup tapes as discussed in Section 3.1.3.

The completed works associated with the 77 nos. of unsettled late-RISCFs (all non-structural works, namely installation of cable hangers, VE panels, profile barriers, etc.) have been visually inspected on 4 October 2018. No anomalies on superficial conditions and no sign of distress were observed during the visual inspection.

### 4.2 P-KD's Assessment and Conclusion

Arup's inspectorate staff retrieved over 20,000 acceptable photographic record from their server and allotted them to the corresponding RISCFs in about a month. This reflects ARUP has maintained a system to keep abundant photographic record since the early stage of constructions. It is unlikely that such large amount of substantiation can be retrieved in such short duration in the absence of established records and system. The authenticity of the records and the system was verified by P-KD's IT review. In supporting the photo checking, ARUP's engineering site staff had demonstrated their good understanding of the photo filing system on their server and

could efficiently locate the required photos from the huge photo album for IT Team. The huge volume of photos and the staff's level of familiarisation with the filing system had strengthened the belief that the submitted photos and the filing system were not mock up recently built to satisfy this Review Exercise. Over the course of the review, P-KD interviewed over 15 nos. of RSS's personnel of posts ranging from Inspector of Works to Resident Engineer, for the purposes of clarifying details of the construction and the supporting materials of the inspections. The interviewed RSS personnel were found to be familiar and knowledgeable with the details of inspection. This reflects that they were genuinely involved in the respective inspections

77 nos. of non-structural late-RISCFs are considered unsettled, which accounts for 0.5% only of the total 14,839 late-RISCFs. Also, the inspections associated with these unsettled late-RISCFs spread out in various kinds of work. From statistic point of view, it is reasonable to conclude ARUP's substantiations extensively covered all the late-RISCFs. Furthermore, P-KD considers that in normal practice some supervisions may not need to keep photographic record, in particular for non-structural works.

Based on the above assessment and the materials presented by ARUP, P-KD considers that that ARUP has provided adequate and authentic substantiations to demonstrate that RSS has discharged their duties in supervision / inspections pertinent to the late-RISCFs.

### **4.3 Recommendations on Future Improvement**

As presented in Section 3.2, majority of the late-RISCFs (over 7,000) are related to inspections carried out in the year 2017. According to ARUP, this is the time when construction programme was extremely tight and most of the constructions were running 24-hours daily. In view of the late-RISCFs submission situation appears to be in relation to the construction work load, it will be useful in controlling the outburst of late-RISCFs submission by implementing the following measures as necessary especially when RSS is expected to experience intense work load for a prolonged period:

- (i) Add dedicated inspectorate staffs to enforce the established RISCFs system during construction period with intense time pressure.
- (ii) Regularly monitor the status of RISCFs submission (nos. of inspection performed vs nos. of RISCFs submitted) by SOR.



- (iii) Create and update register / schedule of RISCFS submission to log the status.
- (iv) Mandate SOR to periodically report the status of RISCFS submission directly to the Employer.
- (v) Include RISCFS status checking as one of the items to be audited periodically by external QA officer / Auditor.
- (vi) Establish an electronic RISCFS and Inspection Record System which can be conveniently accessible by mobile devices and provides auto-prompting function to urge for timely actions by SOR/Contractor. It will become a real-time operation platform accessible to both Client and Consultant to support continuous uploading of inspection photos/results and track communications between SOR/Contractor. The use of established Construction Information Management System / Construction Management Software similar to Oracle Aconex, e-PlanSoft, Procore, etc. may be considered.

- END -

## **Appendix A1      Results of Structural late-RISCFs Review**

**Results of Structural Late-RISCFs Review**

<b>Structural Late-RISCFs Result</b>				<b>No. of Late RISCFs</b>			
<b>Group of Works</b>	<b>Item No.</b>	<b>Location</b>	<b>Works Elements</b>	<b>Total Count</b>		<b>Nos. of Unsettled</b>	<b>%</b>
				<b>Counted by Sequential Form No. by ARUP</b>	<b>Counted by No. of Individual Inspections</b>		
SHT	2a	Tunnel SHT	Waterproofing	290	335	0	0%
	2b	Tunnel SHT	Mined Tunnel Structure (in-situ)	1015	890	0	0%
	2c	Tunnel SHT	Tunnel Structure (Box Segment)	140	112	0	0%
	2d	Tunnel SHT	Overhead Ventilation Duct Slab and Hanger Wall (Box Segment)	201	171	0	0%
	2e	Tunnel SHT	Stitch Joint of Segment	77	44	0	0%
	2g (Box file 1 & 3)	Tunnel SHT	Mined Tunnel Structure (in-situ)	148	159	0	0%
	2m	Tunnel SHT	Cross Passage	67	67	0	0%
	4a	Tunnel SHT	Cut and Cover Tunnel Structure (in-situ)	212	264	0	0%
HAT	8a	Tunnel HAT	Tunnel Structure (in-situ)	544	596	0	0%
	8b	Tunnel HAT	Mined Tunnel Waterproofing	106	105	0	0%
	8o	Tunnel HAT	Cut and Cover Tunnel Structure	184	184	0	0%
Bridge	13a	Bridge A1	Retaining Wall	108	356	0	0%
	13b	Bridge A1	Bridge	70	152	0	0%
	14a	Bridge A2	Bridge	81	255	0	0%
Building	6e	Reclamation Area	Master Meter Room	4	4	0	0%
	17a	HAT Plant Room	Structure	231	231	0	0%
	7a	SHT Ventilation Building	Structure	3	3	0	0%
	7d	HyD Workshop	Structure	11	11	0	0%
	7e	DG Store & FFS	Structure	11	11	0	0%
	7f	HMA Covered Carpark	Structure	26	26	0	0%
	7b	HMA Administration Building	Structure	32	32	0	0%
	7c	TD Workshop	Structure	37	37	0	0%
Roadworks	10a	Maintenance Subway	Structure	8	7	0	0%
	6b	HKLR At-grade Road	Sign Gantry Footing	11	12	0	0%
	15f	M008	L4 Parapet Wall	86	245	0	0%
	15d	HKBCF Ramp	Structure	64	215	0	0%
	12e	Airport Road	Utility Culvert 1	12	25	0	0%
	15h	Depressed Roundabout	Utility Culvert 1	33	30	0	0%
	15i	Depressed Roundabout	Structure	272	396	0	0%
	15j	East Coast Road	Watermain Inspection Chambers	11	17	0	0%
	15k	Airport Road, ECR & CLKR	Other Works	48	48	0	0%
Drainage	9a	Box Culvert PR10	Structure	24	30	0	0%
	6i	Drainage Pump Station 9	Structure	22	22	0	0%
	6j	Drainage Pump Station 10	Structure	21	17	0	0%
	9b	Box Culvert PR14	Structure	86	86	0	0%
	9c	Box Culvert PR9	Structure	17	17	0	0%
	6c	Sewage Pump Station 6	Structure	8	8	0	0%
	6d	Sewage Pump Station 7	Structure	16	16	0	0%
	15a	Drainage Pump Station 3	Structure	18	19	0	0%
<b>Count:</b>	39		<b>Total</b>	<b>4355</b>	<b>5255</b>	<b>0</b>	<b>0%</b>

## **Appendix A2      Results of Non-Structural late-RISCFs Review**



**Results of Non-Structural Late-RISCFs (Status as 28 September 2018)**

Type 1: Supporting materials are available but Arup's clarification is needed.  
 Type 2: With site diary only.  
 Type 3: No supporting material. No site diary.

Item No.	Location of Works	No. of Volumes	No. of Late-RISCFs Counted by No. of Individual Inspections	No. of Late-RISCFs Counted by Sequential Form No.	Type of Works	Type of inspection works involved in the Unsettled RISCFs	Seek Clarification (Total No.)	Seek Clarification (Total %)	Type 1 (No.)	Type 1 (%)	Type 2 (No.)	Type 2 (%)	Type 3 (No.)	Type 3 (%)
1a, 1b, 1c, 1d	Seawall	1	63	56	Rock Armour/Inspection for Profile/Rockfill Core/Underlayer	None	0	0%	0	0%	0	0%	0	0%
2f	Scenic Hill Tunnel (SHT)	3	459	408	Profile Barrier	None	0	0%	0	0%	0	0%	0	0%
2g	Scenic Hill Tunnel (SHT)	2	241	203	Road base and utility trough mass concrete	None	0	0%	0	0%	0	0%	0	0%
2h	Scenic Hill Tunnel (SHT)	3	162	78	Underground utility and roadworks	None	0	0%	0	0%	0	0%	0	0%
2i	Scenic Hill Tunnel (SHT)	4	407	351	VE panel and cable hanger installation	None	0	0%	0	0%	0	0%	0	0%
2j	Scenic Hill Tunnel (SHT)	2	287	148	Black paint	None	0	0%	0	0%	0	0%	0	0%
2k	Scenic Hill Tunnel (SHT)	5	202	188	Water mains and drainage	None	0	0%	0	0%	0	0%	0	0%
2l	Scenic Hill Tunnel (SHT)	1	29	24	ABWF	None	0	0%	0	0%	0	0%	0	0%
2n	Scenic Hill Tunnel (SHT)	1	9	NA	Other works items	None	0	0%	0	0%	0	0%	0	0%
3a	Scenic Hill Tunnel (SHT)	1	148	155	RC for buttress wall, staircase, drainage	None	0	0%	0	0%	0	0%	0	0%
3b	Scenic Hill Tunnel (SHT)	1	38	33	Mass concrete fill	None	0	0%	0	0%	0	0%	0	0%
3c	Scenic Hill Tunnel (SHT)	1	3	2	Grouting works for buttress wall grout dowel	None	0	0%	0	0%	0	0%	0	0%
3d	Scenic Hill Tunnel (SHT)	1	3	3	Raking drain extension	None	0	0%	0	0%	0	0%	0	0%
3e	Scenic Hill Tunnel (SHT)	1	61	74	Security fence	None	0	0%	0	0%	0	0%	0	0%
3f	Scenic Hill Tunnel (SHT)	1	2	2	Landscaping	None	0	0%	0	0%	0	0%	0	0%
4b	Scenic Hill Tunnel (SHT)	1	275	275	Profile Barrier	Formwork; Rebar Fixing; Concreting	18	7%	0	0%	13	5%	5	2%
4c	Scenic Hill Tunnel (SHT)	1	3	3	Mass concrete fill for utility	None	0	0%	0	0%	0	0%	0	0%
4d	Scenic Hill Tunnel (SHT)	1	49	51	Black paint	Black Paint	6	12%	0	0%	0	0%	6	12%
4e	Scenic Hill Tunnel (SHT)	1	178	172	VE Panel	Installation of VE Panel	6	3%	0	0%	3	2%	3	2%
4f	Scenic Hill Tunnel (SHT)	1	60	70	Cable hanger	Installation of Cable Hanger	39	65%	0	0%	15	25%	24	40%
4g	Scenic Hill Tunnel (SHT)	1	38	38	Bitumen pavement	None	0	0%	0	0%	0	0%	0	0%
5a	Hong Kong Link Road (HKLR) - M014 & M015	1	23	23	Roadworks at M014	None	0	0%	0	0%	0	0%	0	0%
5b	Hong Kong Link Road (HKLR) - M014 & M015	2	50	24	Roadworks at M015	None	0	0%	0	0%	0	0%	0	0%
5c	Hong Kong Link Road (HKLR) - M014 & M015	1	89	77	Drainage manholes at Road M014	Formwork; Rebar Fixing; Concreting	2	2%	0	0%	0	0%	2	2%
5d	Hong Kong Link Road (HKLR) - M014 & M015	1	90	99	Storm drainage manholes in between HMA-HAT Plant Room-M014	Formwork; Rebar Fixing; Concreting	6	7%	0	0%	0	0%	6	7%
5e	Hong Kong Link Road (HKLR) - M014 & M015	1	3	9	Security fence at Zone B	None	0	0%	0	0%	0	0%	0	0%
5f	Hong Kong Link Road (HKLR) - M014 & M015	1	30	15	DN450 Watermain	None	0	0%	0	0%	0	0%	0	0%
6f	Hong Kong Link Road (HKLR) Mainline (At-grade Section)	3	303	294	Security fence	None	0	0%	0	0%	0	0%	0	0%
6g	Hong Kong Link Road (HKLR) Mainline (At-grade Section)	1	147	258	Roadworks	None	0	0%	0	0%	0	0%	0	0%
6h	Hong Kong Link Road (HKLR) Mainline (At-grade Section)	1	11	11	Road marking and testing	None	0	0%	0	0%	0	0%	0	0%
6k	Hong Kong Link Road (HKLR) Mainline (At-grade Section)	3	631	672	Storm water drainage	None	0	0.0%	0	0%	0	0%	0	0%
6l	Hong Kong Link Road (HKLR) Mainline (At-grade Section)	1	12	NA	Watermain	None	0	0%	0	0%	0	0%	0	0%
6m	Highways Depot Extension & Reclaimed Area	2	37	NA	Other works items	None	0	0%	0	0%	0	0%	0	0%
7g	Buildings	1	100	82	HMA Drainage system	None	0	0%	0	0%	0	0%	0	0%
7h	Buildings	1	49	49	Bitumen pavement at HMA compound	None	0	0%	0	0%	0	0%	0	0%
7i	Buildings	1	76	32	Concrete pavement at HMA compound	None	0	0%	0	0%	0	0%	0	0%
7j	Buildings	1	50	53	HMA Security fence	None	0	0%	0	0%	0	0%	0	0%
7k	Buildings	2	176	129	Other works items	None	0	0%	0	0%	0	0%	0	0%
8c	Airport Tunnel (HAT)	1	34	34	Bitumen pavement at HAT, M005, HAT Plant Room EVA	None	0	0%	0	0%	0	0%	0	0%
8d	Airport Tunnel (HAT)	1	52	52	VE Panel	None	0	0%	0	0%	0	0%	0	0%
8e	Airport Tunnel (HAT)	1	36	36	Cable hanger installation	None	0	0%	0	0%	0	0%	0	0%
8f	Airport Tunnel (HAT)	1	119	118	Cable trough	None	0	0%	0	0%	0	0%	0	0%
8g	Airport Tunnel (HAT)	1	25	25	Black paint	None	0	0%	0	0%	0	0%	0	0%
8h	Airport Tunnel (HAT)	1	34	34	Watermain	None	0	0%	0	0%	0	0%	0	0%
8i	Airport Tunnel (HAT)	1	47	46	Drainage	None	0	0%	0	0%	0	0%	0	0%
8j	Airport Tunnel (HAT)	1	61	61	Sewerage	None	0	0%	0	0%	0	0%	0	0%
8k	Airport Tunnel (HAT)	3	326	369	Profile barrier	None	0	0%	0	0%	0	0%	0	0%
8l	Airport Tunnel (HAT)	1	11	11	Insitu testing for drainage	None	0	0%	0	0%	0	0%	0	0%
8m	Airport Tunnel (HAT)	1	12	12	Insitu testing for sewage	None	0	0%	0	0%	0	0%	0	0%
8n	Airport Tunnel (HAT)	1	9	9	Insitu testing for watermain	None	0	0%	0	0%	0	0%	0	0%
8p	Airport Tunnel (HAT)	1	181	94	Road M005	None	0	0%	0	0%	0	0%	0	0%
8q	Airport Tunnel (HAT)	1	1	1	Other works items	None	0	0%	0	0%	0	0%	0	0%
11a	Kwo Lo Wan Road	1	45	43	Watermain	None	0	0%	0	0%	0	0%	0	0%
12a	Airport Road	1	29	28	Reinstatement	None	0	0%	0	0%	0	0%	0	0%
12b	Airport Road	4	232	147	Roadworks	None	0	0%	0	0%	0	0%	0	0%
12c	Airport Road	1	92	33	Sign gantry & directional signs	None	0	0%	0	0%	0	0%	0	0%
12d	Airport Road	12	982	138	Storm drainage works	None	0	0%	0	0%	0	0%	0	0%
15b	East Coast Road & Chek Lap Kok Road	3	265	147	Roadworks	None	0	0%	0	0%	0	0%	0	0%
15c	East Coast Road & Chek Lap Kok Road	3	95	32	Sign gantry	None	0	0%	0	0%	0	0%	0	0%
15e	East Coast Road & Chek Lap Kok Road	1	20	22	CLKR fireman works	None	0	0%	0	0%	0	0%	0	0%
15g	East Coast Road & Chek Lap Kok Road	15	1361	276	ECR storm drainage works	None	0	0%	0	0%	0	0%	0	0%
15k-1	East Coast Road & Chek Lap Kok Road	8	788	791	Other works items	None	0	0%	0	0%	0	0%	0	0%
15k-2	East Coast Road & Chek Lap Kok Road	1	NA	(304 Excluded)	Other works items	NA	NA	NA	NA	NA	NA	NA	NA	NA
16b	Site Wide	2	82	82	Landscaping	None	0	0%	0	0%	0	0%	0	0%
17b	Airport Tunnel (HAT) Plant room	1	47	34	Drainage	None	0	0%	0	0%	0	0%	0	0%
17c	Airport Tunnel (HAT) Plant room	1	4	4	Testing of drainage	None	0	0%	0	0%	0	0%	0	0%
<b>Total</b>		<b>130</b>	<b>9584</b>	<b>6840</b>			<b>77</b>	<b>0.80%</b>	<b>0</b>	<b>0%</b>	<b>31</b>	<b>0.32%</b>	<b>46</b>	<b>0.48%</b>



# Unsettled Non-structural Late-RISCFs Register & Assessment Summary

**Manhole**

Note: Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Total No. of Type 3 =

8

Item No.	Inspection Date	Location of Works	Manhole No.	Part of Manhole	Type of Works to be Inspected <sup>2</sup>	Type of Clarification
<b>5c</b>	24 - 2 - 2018	Road M014	SRA14, SR14	Wall & Top Slab	Formwork	Type 3
<b>5c</b>	9 - 3 - 2018	Road M014	SRA14, SR14	Wall & Top Slab	Reinforcement	Type 3
<b>5d</b>	14 - 3 - 2018	M014 & M015	AB29	Wall & Top Slab	Formwork	Type 3
<b>5d</b>	15 - 3 - 2018	M014 & M015	ABA29	Wall & Top Slab	Formwork	Type 3
<b>5d</b>	13 - 3 - 2018	M014 & M015	AB29	Wall & Top Slab	Reinforcement	Type 3
<b>5d</b>	15 - 3 - 2018	M014 & M015	AB29	Wall & Top Slab	Concreting	Type 3
<b>5d</b>	15 - 3 - 2018	M014 & M015	ABA29	Wall & Top Slab	Reinforcement	Type 3
<b>5d</b>	16 - 3 - 2018	M014 & M015	ABA29	Wall & Top Slab	Concreting	Type 3

## Unsettled Non-structural Late-RISCFs Register & Assessment Summary

### Black Paint & VE Panel

Note: Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Total No. of Type 2 = 3

Total No. of Type 3 = 9

Item No.	Inspection Date	Location of Works (Tunnel)	Wall	Chainage (From)	Chainage (To)	Length (m)	Type of Works to be Inspected	Type of Clarification
4d	20 - 9 - 2017	SHT T001 OHVD	Wall 1 & Wall 2	14216	14246	30	1st Layer black paint	Type 3
4d	28 - 3 - 2017	SHT T001 OHVD	Wall 1 & Wall 2	14483	14489	6	2nd Layer black paint	Type 3
				14505	14513	8		
				14546	14553	7		
				14557	14563	6		
				14574	14582	8		
4d	27 - 3 - 2017	SHT T001 OHVD	Wall 1 & Wall 2	14557	14563	6	1st Layer black paint	Type 3
				14574	14582	8		
4d	31 - 7 - 2017	SHT T001 OHVD	Wall 1 & Wall 2	14563	14582	19	1st Layer black paint	Type 3
				14582	14598	16		
4d	25 - 2 - 2017	SHT T002 OHVD	Wall 3 & Wall 4	14354	14435	81	2nd Layer black paint	Type 3
4d	23 - 4 - 2017	SHT T002 OHVD	Wall 3 & Wall 4	14458	14506	48	2nd Layer black paint	Type 3
				14517	14524	7		
4e	9 - 8 - 2017	SHT T002	Wall 3 (Lower VE Panel)	14326	14346	20	VE Panel	Type 2
4e	15 - 12 - 2017	SHT T002	Wall 3 (Upper VE Panel)	14571	14577	6	VE Panel	Type 3
4e	11 - 3 - 2018	SHT T002	Wall 4 (Upper VE Panel)	14176	14177	1	VE Panel	Type 2
				14192	14195	3	VE Panel	
4e	11 - 3 - 2018	SHT T002	Wall 4 (Upper VE Panel)	14245	14246	1	VE Panel	Type 2
				14295	14298	3	VE Panel	
				14349	14350	1	VE Panel	
				14373	14374	1	VE Panel	
				14401	14404	3	VE Panel	
				14450	14453	3	VE Panel	
				14500	14502	2	VE Panel	
				14546	14548	2	VE Panel	
				14593	14596	3	VE Panel	
				14596	14613	17	VE Panel	
4e	14 - 8 - 2017	SHT T002	Wall 4 (Lower VE Panel)	14289	14295	6	VE Panel	Type 3
4e	4 - 8 - 2017	SHT T002	Wall 4 (Lower VE Panel)	14343	14349	6	VE Panel	Type 3

**Unsettled Non-structural Late-RISCFs Register & Assessment Summary**

**Cable Hanger Installation at Wall**

Total No. of Type 2 = 13  
 Total No. of Type 3 = 16

Note: Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Item No.	Inspection Date	Location of Works (Tunnel)	Wall	Chainage (From)	Chainage (To)	Length (m)	Type of Works to be Inspected	Type of Clarification
4f	16 - 11 - 2017	SHT T001	(Wall 1)	14205	14220	15	cable hanger installation at Wall	Type 3
4f	30 - 10 - 2017	SHT T001	(Wall 1)	14220	14252	32	cable hanger installation at Wall	Type 3
4f	27 - 10 - 2017	SHT T001	(Wall 1)	14418	14424	6	cable hanger installation at Wall	Type 3
4f	29 - 8 - 2017	SHT T001	(Wall 1)	14472	14473	1	cable hanger installation at Wall	Type 3
4f	29 - 8 - 2017	SHT T001	(Wall 1)	14523	14527	4	cable hanger installation at Wall	Type 3
4f	29 - 8 - 2017	SHT T001	(Wall 1)	14576	14577	1	cable hanger installation at Wall	Type 3
4f	29 - 5 - 2017	SHT T001	(Wall 1)	14577	14598	21	cable hanger installation at Wall	Type 3
4f	30 - 10 - 2017	SHT T001	(Wall 2)	14205	14208	3	cable hanger installation at Wall	Type 2
4f	31 - 10 - 2017	SHT T001	(Wall 2)	14208	14216	8	cable hanger installation at Wall	Type 3
4f	27 - 10 - 2017	SHT T001	(Wall 2)	14216	14253	37	cable hanger installation at Wall	Type 2
4f	22 - 7 - 2017	SHT T001	(Wall 2)	14253	14273	20	cable hanger installation at Wall	Type 2
4f	22 - 7 - 2017	SHT T001	(Wall 2)	14275	14277	2	cable hanger installation at Wall	Type 2
4f	22 - 7 - 2017	SHT T001	(Wall 2)	14279	14316	37	cable hanger installation at Wall	Type 2
4f	31 - 10 - 2017	SHT T001	(Wall 2)	14322	14324	2	cable hanger installation at Wall	Type 3
4f	31 - 10 - 2017	SHT T001	(Wall 2)	14347	14353	6	cable hanger installation at Wall	Type 3
4f	27 - 10 - 2017	SHT T001	(Wall 2)	14374	14384	10	cable hanger installation at Wall	Type 3
4f	27 - 10 - 2017	SHT T001	(Wall 2)	14402	14405	3	cable hanger installation at Wall	Type 3
4f	23 - 5 - 2017	SHT T001	(Wall 2)	14405	14426	21	cable hanger installation at Wall	Type 3
4f	27 - 10 - 2017	SHT T001	(Wall 2)	14426	14428	2	cable hanger installation at Wall	Type 3
4f	23 - 5 - 2017	SHT T001	(Wall 2)	14428	14449	21	cable hanger installation at Wall	Type 2
4f	15 - 9 - 2017	SHT T001	(Wall 2)	14449	14455	6	cable hanger installation at Wall	Type 2
4f	30 - 5 - 2017	SHT T001	(Wall 2)	14455	14477	22	cable hanger installation at Wall	Type 3
4f	15 - 9 - 2017	SHT T001	(Wall 2)	14477	14483	6	cable hanger installation at Wall	Type 2
4f	14 - 9 - 2017	SHT T001	(Wall 2)	14527	14528	1	cable hanger installation at Wall	Type 2
4f	13 - 5 - 2017	SHT T001	(Wall 2)	14528	14549	21	cable hanger installation at Wall	Type 2
4f	14 - 9 - 2017	SHT T001	(Wall 2)	14549	14555	6	cable hanger installation at Wall	Type 2
4f	13 - 5 - 2017	SHT T001	(Wall 2)	14555	14576	21	cable hanger installation at Wall	Type 2
4f	14 - 9 - 2017	SHT T001	(Wall 2)	14576	14585	9	cable hanger installation at Wall	Type 2
4f	29 - 5 - 2017	SHT T001	(Wall 2)	14585	14598	13	cable hanger installation at Wall	Type 3

Total Length of Wall 1 **80**  
 Total Length of Wall 2 **277**



# Unsettled Non-structural Late-RISCFs Register & Assessment Summary

## Cable hanger installation at utility trough

Total No. of Type 2 = 2

Total No. of Type 3 = 8

Note: Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Item No.	Inspection Date	Location of Works (Tunnel)	Wall	Chainage (From)	Chainage (To)	Length (m)	Type of Works to be Inspected	Type of Clarification
4f	28 - 12 - 2017	SHT-T001	(Wall 1)	14205	14207	2	cable hanger installation at utility trough	Type 2
4f	18 - 12 - 2017	SHT-T001	(Wall 1)	14207	14216	9	cable hanger installation at utility trough	Type 3
4f	26 - 12 - 2017	SHT-T001	(Wall 1)	14216	14219	3	cable hanger installation at utility trough	Type 3
4f	18 - 12 - 2017	SHT-T001	(Wall 1)	14219	14233	14	cable hanger installation at utility trough	Type 3
4f	26 - 12 - 2017	SHT-T001	(Wall 1)	14233	14265	32	cable hanger installation at utility trough	Type 3
4f	28 - 12 - 2017	SHT-T001	(Wall 1)	14265	14269	4	cable hanger installation at utility trough	Type 2
4f	26 - 12 - 2017	SHT-T001	(Wall 1)	14269	14278	9	cable hanger installation at utility trough	Type 3
4f	30 - 12 - 2017	SHT-T001	(Wall 1)	14278	14345	67	cable hanger installation at utility trough	Type 3
4f	30 - 12 - 2017	SHT-T001	(Wall 1)	14348	14375	27	cable hanger installation at utility trough	Type 3
4f	24 - 7 - 2017	SHT-T001	(Wall 1)	14375	14439	64	cable hanger installation at utility trough	Type 3
						from Ch.14205 to 14345 =	140	
						from Ch.14348 to 14439 =	91	

# Unsettled Non-structural Late-RISCFs Register & Assessment Summary

## Profile Barrier

Total No. of Type 2 = 13

Total No. of Type 3 = 5

Note: Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Item No.	Inspection Date	Location of Works (Tunnel)	Zone	Wall	Chainage (From)	Chainage (To)	Length (m)	Type of Works to be Inspected	Type of Clarification
4b	13 - 10 - 2017	SHT -T001	Zone A	Wall 2	14246	14258	12	Reinforcement	Type 2
4b	27 - 6 - 2017	SHT -T001	Zone B	Wall 2	14353	14378	25	Concreting	Type 2
4b	6 - 6 - 2017	SHT -T002	Zone A	Wall 3	14176	14182	6	Reinforcement	Type 3
4b	7 - 6 - 2017	SHT -T002	Zone A	Wall 3	14176	14182	6	Concreting	Type 3
4b	5 - 6 - 2017	SHT -T002	Zone A	Wall 3	14182	14194	12	Concreting	Type 3
4b	2 - 6 - 2017	SHT -T002	Zone A	Wall 3	14218	14242	24	Concreting	Type 3
4b	31 - 7 - 2017	SHT -T002	Zone A1	Wall 3	14242	14268	26	Reinforcement	Type 3
4b	1 - 6 - 2017	SHT -T002	Zone A1	Wall 3	14242	14268	26	Concreting	Type 2
4b	9 - 6 - 2017	SHT -T002	Zone B	Wall 3	14320	14344	24	Concreting	Type 2
4b	7 - 6 - 2017	SHT -T002	Zone B	Wall 3	14344	14356	12	Concreting	Type 2
4b	26 - 3 - 2017	SHT -T002	Zone C	Wall 3	14488	14500	12	Concreting	Type 2
4b	28 - 3 - 2017	SHT -T002	Zone C	Wall 3	14500	14512	12	Concreting	Type 2
4b	30 - 3 - 2017	SHT -T002	Zone C	Wall 3	14524	14536	12	Concreting	Type 2
4b	30 - 3 - 2017	SHT -T002	Zone C	Wall 3	14536	14548	12	Concreting	Type 2
4b	31 - 3 - 2017	SHT -T002	Zone C	Wall 3	14548	14560	12	Concreting	Type 2
4b	1 - 4 - 2017	SHT -T002	Zone C	Wall 3	14560	14572	12	Concreting	Type 2
4b	2 - 6 - 2017	SHT -T002	Zone A1	Wall 4	14250	14274	24	Concreting	Type 2
4b	1 - 6 - 2017	SHT -T002	Zone A1	Wall 4	14274	14298	24	Concreting	Type 2

Total Length of Wall 2 **37**

Total Length of Wall 3 **176**

Total Length of Wall 4 **48**

## **Appendix A3      First-Round Review Results**

## Appendix A3

### First-Round Review Results

<b>Unsettled Cases</b>	<b>Structural</b>	<b>Non-structural</b>
Type 1	128	207
Type 2	88	180
Type 3	17	83
<b>Total</b>	<b>233</b>	<b>470</b>

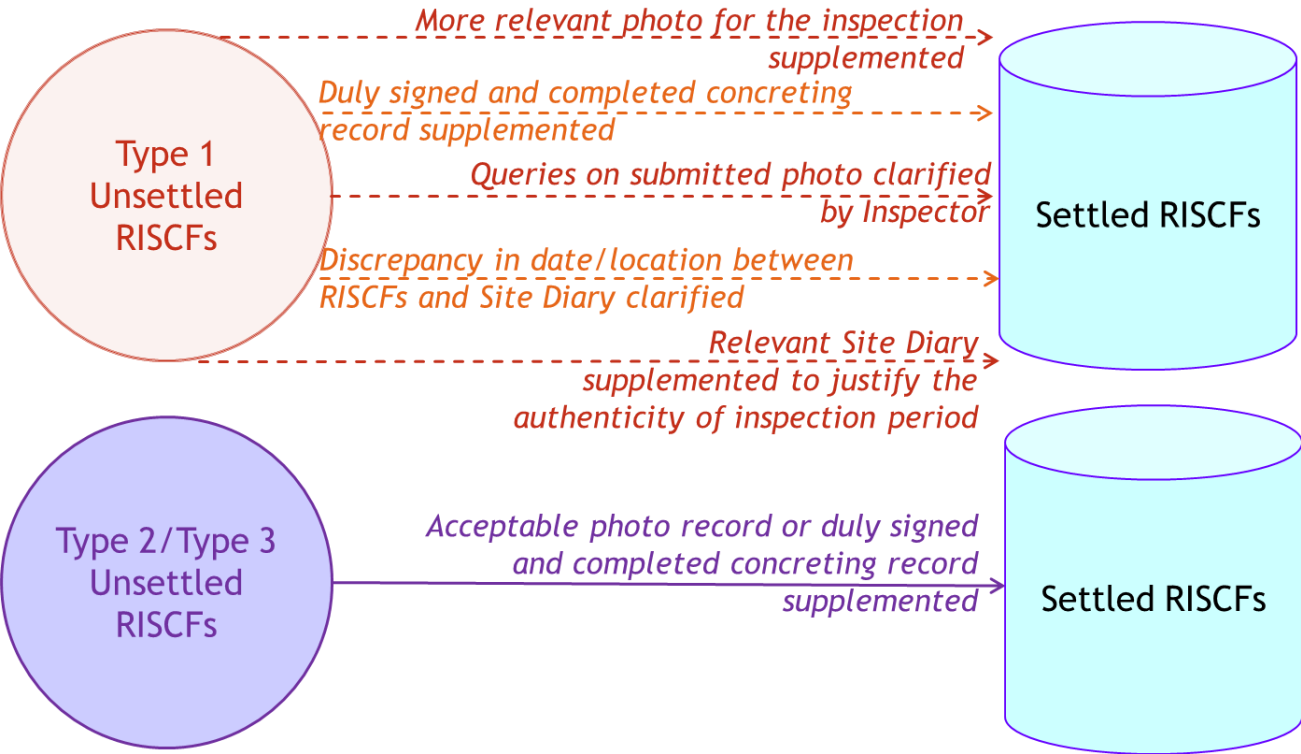
Remarks:

- Type 1 - P-KD have comments on RISCFS and pending for ARUP's clarifications or responses;
- Type 2 - ARUP attaches only the Site Diary to the RISCFS as supporting material; and
- Type 3 - ARUP did not attach any supporting material to the RISCFS; or the RISCFS is not provided.

## **Appendix A4      Examples of Follow-up Process of Unsettled RISCs**

Examples of Follow-up Process of Unsettled RISCs

**Follow-up Process of Types 1, 2 and 3 Unsettled RISCs**





Examples of Follow-up Process of Unsettled RISCs

**Example: Settled Case after 1<sup>st</sup> Round Assessment**

Adequate supporting material is provided by ARUP.

Settled Cases

**Contract No. HY/2011/03**

**Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road - Section Between Scenic Hill and Hong Kong Boundary Crossing Facilities**

**REQUEST FOR INSPECTION (WITNESSING) / SURVEY CHECK\* FORM (RISCF)**

Ref. No.: RISCF / TUW / 42065 / A  
Abbreviation Sequential Number Revision

To Supervising Officer's Representative,  
 (Attention: K C Leung)

The following work is expected to be ready for your inspection / ~~testing~~ / ~~survey check~~ / witnessing\*

SHT Top 1 Mined Tunnel (H 13705-13737) Right Kicker Lower  
 (e.g. portion, location, chainage, level)

Reinforcement  
 (e.g. foundation, reinforcement, formwork)

at 10:00 on 1/6/2015 before proceeding to the next operation of  
(time) (date)

steel fixing     concreting     backfilling     pipelaying     covering up

(others) Formwork

which is scheduled for \_\_\_\_\_ using the following plant :  
(time) (date)

Details of plant: \_\_\_\_\_

Issued 11:00 8/8/2018 by Lucas Fan AE \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

Received 14:00 8/8/18 by Kelsey R/W \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

To Project Manager, Lucas Fan  
 (Attention: \_\_\_\_\_)

The work has been witnessed.  
 There is no objection to you proceeding with the work.

The following deficiencies have been noted :  
ARE Inspection Low witnessed

Please advise me when these deficiencies have been made good.

Issued 15:00 9/8/18 by K7 Tsang R/W \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

Received 16:00 9/8/18 by Ching Yung Va GE \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

Work reinspected/re-surveyed\*, no objection to you proceeding.

Issued \_\_\_\_\_ by \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

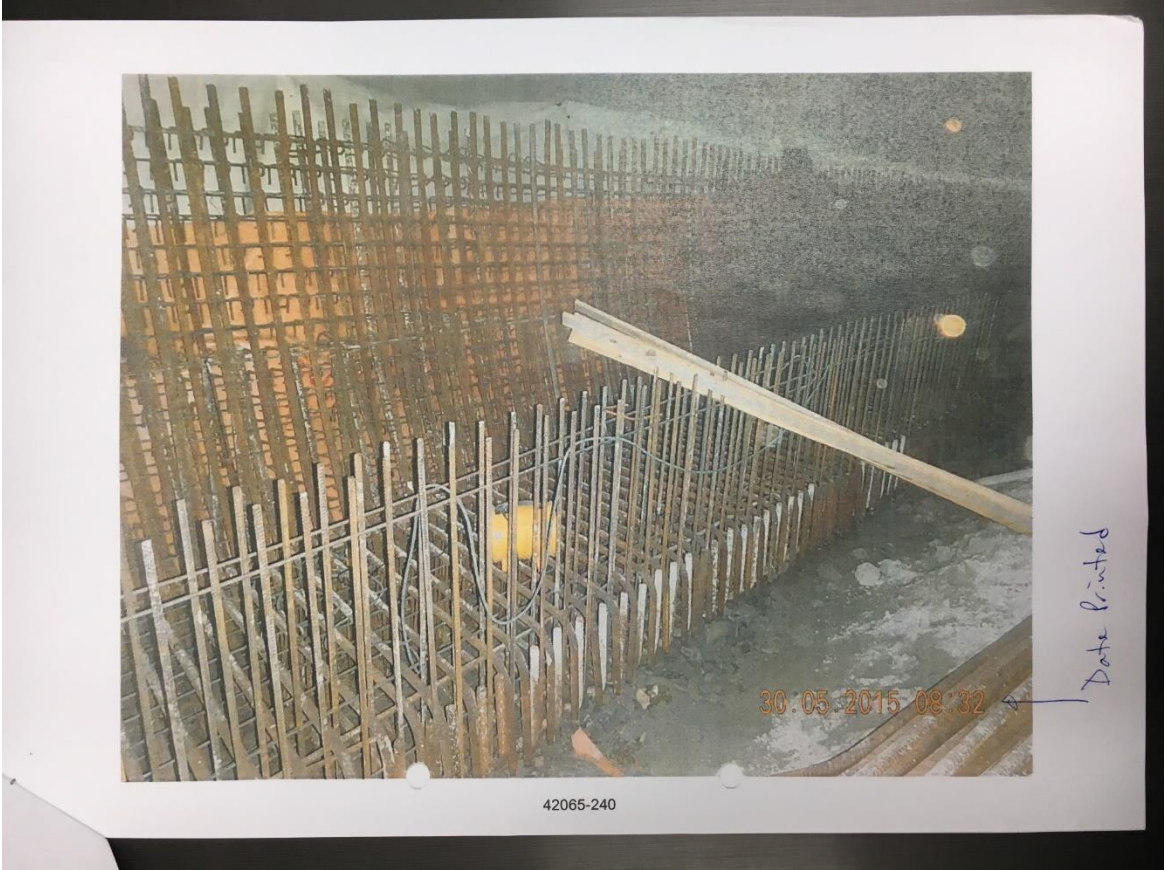
The giving of this information and this inspection shall not relieve the Contractor of any liabilities or obligations under the Contract.

Abbreviation: BAW - Building/Architectural Works BRW - Bridge Works TUW - Tunneling Works GEO - Geotechnical Works  
 RDU - Road, Drain & Utilities Works MAW - Marine Works LPW - Landscaping Works SUW - Surveying Works  
 E&M - Electrical & Mechanical GEN - General Works OTH - Other Works

Two copies retained by SOR (White - original + Blue)    Yellow - retained by CSHK    Pink - returned to CSHK  
 \*Delete as appropriate



Examples of Follow-up Process of Unsettled RISCs





Examples of Follow-up Process of Unsettled RISCFs

**Example: Type 1 Unsettled Case → Settled**

Additional supporting materials required from ARUP

Type 1 Resolved

**Contract No. HY/2011/03**

**Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road - Section Between Scenic Hill and Hong Kong Boundary Crossing Facilities**

**REQUEST FOR INSPECTION (WITNESSING) / SURVEY CHECK\* FORM (RISCF)**

Ref. No.: RISCF/ TUW / 14809 / A  
Abbreviation Sequential Number Revision

To Supervising Officer's Representative,  
 (Attention: KC Leung)  
 The following work is expected to be ready for your inspection / testing / survey check/ witnessing\*

SHT- Tool whole Lining Ch 13554 - 13564  
 (e.g. portion, location, chainage, level)

Concreting  
 (e.g. foundation, reinforcement, formwork)

at 10:00 on 21/3/16 before proceeding to the next operation of

steel fixing     concreting     backfilling     pipelaying     covering up

(others) \_\_\_\_\_

which is scheduled for \_\_\_\_\_ using the following plant :  
(time) (date)

Details of plant: \_\_\_\_\_

Issued 10:00 26/7/18 by CH Tsang GE [Signature]  
(time) (date) (Name) (Designation) (Signature)

Received 1630 26/7/18 by [Signature] RJW [Signature]  
(time) (date) (Name) (Designation) (Signature)

To Project Manager, (Attention: M Tsang)

The work has been witnessed.  
 There is no objection to you proceeding with the work.  
 The following deficiencies have been noted : \_\_\_\_\_

---

Please advise me when these deficiencies have been made good.

Issued 1800 26/7/2018 by K/Tsang RJW [Signature]  
(time) (date) (Name) (Designation) (Signature)

Received 1800 27/7/18 by Alex Lee GE [Signature]  
(time) (date) (Name) (Designation) (Signature)

Work reinspected/re-surveyed\*, no objection to you proceeding.

Issued \_\_\_\_\_ by \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

The giving of this information and this inspection shall not relieve the Contractor of any liabilities or obligations under the Contract.

Abbreviation: BAW - Building/Architectural Works BRW - Bridge Works TUW - Tunneling Works GEO - Geotechnical Works  
 RDU - Road, Drain & Utilities Works MAW - Marine Works LPW - Landscaping Works SUW - Surveying Works  
 E&M - Electrical & Mechanical GEN - General Works OTH - Other Works

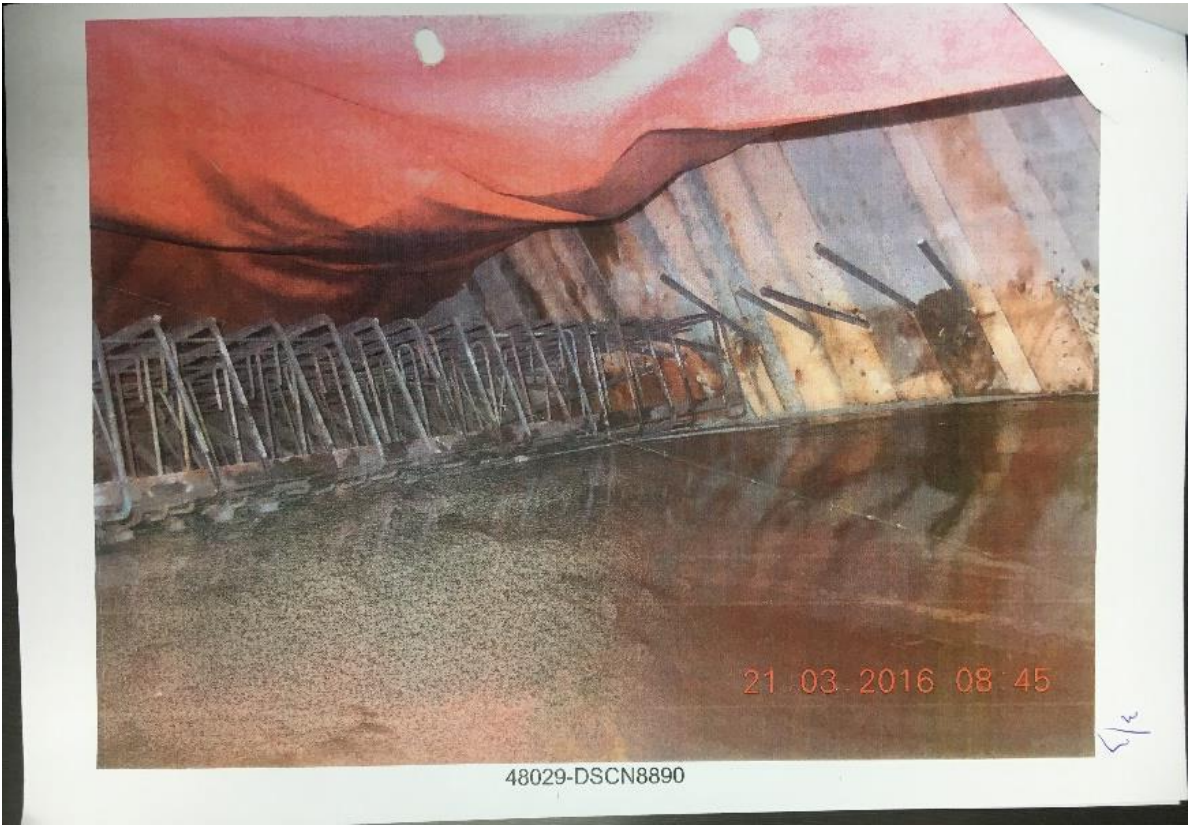
Two copies retained by SOR (White - original + Blue) Yellow - retained by CSHK Pink - returned to CSHK  
 \*Delete as appropriate

RECEIVE  
 26 JUL 2018  
 BY: 16:30



Examples of Follow-up Process of Unsettled RISCs

Original submitted photos to support concreting of lining which are not accepted by P-KD:



Examples of Follow-up Process of Unsettled RISCs

Supplementary materials provided by ARUP after interview sessions and found acceptable by P-KD:

**Contract no: HY/2011/03**  
**Hong Kong - Zhuhai - Macao Bridge - Hong Kong Link Road (West Portal)**

Location of Pour : <u>West Portal Tool lining CH1355.25 - CH1356.25</u>										Batching Plant Location : <u>Tsing Yi</u>		Date : <u>21-3-2016</u>	
Grade of Concrete : <u>45D20(CR1545D620)</u>			Slump : <u>135mm</u>			Acceptable Slump and Tolerance : <u>±25mm / ±33%</u>			Weather Condition : <u>Rainy</u>		Acceptable Conc. Temp. : <u>28°C</u>		
No. of truck	Truck No.	Delivery Docket No.	Time of Water Add	Time of Arrival on site	Slump (mm)		Concrete Temp.	Time Start Placing	Time Finish Placing	Nominal Quantity (m3)	Accum. Quantity (m3)	Security Labels on Concrete Cube	Remarks
					1/10 Load	9/10 Load							
1	PD3549	GB0308480	8:37	9:17	175	175	23	9:22	9:30	7.1	7.1	CA1995225-26	
2	PE225	GB0308482	8:49	9:32	175	175	23	9:39	9:51	7.1	14.2		
3	PV3551	GB0308485	9:18	10:05	170	170	23	10:12	10:22	7.1	21.8		
4	RG3200	GB0308487	9:42	10:22	175	175	23	10:27	10:38	7.6	29.4	CA1995227-28	
5	RY6723	GB0308488	9:50	10:33	170	170	23	10:41	10:55	7.6	37		
6	SB1507	GB0308489	10:07	10:50	175	175	23	10:57	11:10	7.6	44.6		
7	SA9945	GB0308490	10:11	10:54	170	170	23	11:12	11:24	7.6	52.2	CA1995229-30	
8	MV2243	GB0308492	10:27	11:17	170	170	23	11:28	11:43	7.6	59.8		
9	PA6152	GB0308494	10:42	11:25	175	175	23	11:45	11:54	7.3	67.1		
10	SA6188	GB0308496	11:00	11:46	170	170	23	11:56	12:06	7.6	74.7		
11	TP6438	GB0308497	11:15	11:58	175	175	23	12:08	12:19	7.6	82.3	CA1995231-32	
12	PS3350	GB0308498	11:29	12:17	175	175	23	12:21	12:32	7.2	89.5		
13	TX2543	GB0308499	11:42	12:25	175	175	23	12:35	12:51	7.6	97.1		
14	RG1519	GA0464171	12:15	13:03	175	175	23	13:07	13:16	7.6	104.7	CA1995233-34	
15	PG5606	GA0464174	12:33	13:14	160	160	23	13:18	13:30	7.1	111.8		
16	SB1134	GA0464180	13:03	13:44	165	170	25	13:50	14:02	7.6	119.4		
17	PV3551	GA0464182	13:12	13:53	175	175	24	14:03	14:13	7.6	127	CA1995235-36	
18	SB4975	GA0464183	13:18	13:57	175	175	24	14:14	14:24	7.6	134.6		
19	SG7889	GA0464185	13:25	14:10	165	170	24	14:25	14:35	7.6	142.2		
20	3H3973	GA0464188	13:42	14:20	165	170	24	14:36	14:40	7.6	149.8		
Record prepared by : <u>KC Hui</u>			Name			Signature			Designation : <u>RWS2</u>		Date : <u>21-03-2016</u>		

Supplemented by Arup after interview



Examples of Follow-up Process of Unsettled RISCFS

**Example: Type 2 Unsettled Case → Settled**

Only site diary attached as supporting material

Type 2 Resolved

**Contract No. HY/2011/03**

**Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road - Section Between Scenic Hill and Hong Kong Boundary Crossing Facilities**

**REQUEST FOR INSPECTION (WITNESSING) / SURVEY CHECK\* FORM (RISCF)**

Ref. No.: RISCF/ TUW / 4425P / 1 A  
Abbreviation Sequential Number Revision

To Supervising Officer's Representative,  
 (Attention: KC Tang)

The following work is expected to be ready for your inspection / ~~testing / survey check / witnessing\*~~

SH7701 Minet ch 13695.25 to 13710.25 (crown)  
(e.g. portion, location, chainage, level)

Air Test  
(e.g. foundation, reinforcement, formwork)

at 1000 on 11/7/15 before proceeding to the next operation of  
(time) (date)

steel fixing     concreting     backfilling     pipelaying  
 (others) /

which is scheduled for / using the following plant:  
(time) (date)

Details of plant: /

Issued 1000 8/8/18 by Mark SA [Signature]  
(time) (date) (Name) (Designation) (Signature)

Received 1000 9/8/18 by KC Tang RJOW [Signature]  
(time) (date) (Name) (Designation) (Signature)

To Project Manager, Mark  
 (Attention: Mark)

The work has been witnessed.  
 There is no objection to you proceeding with the work.  
 The following deficiencies have been noted:

---

Please advise me when these deficiencies have been made good.

Issued 20:00 9/8/18 by Ky Bay RZOW [Signature]  
(time) (date) (Name) (Designation) (Signature)

Received 1000 10/8/18 by Ching Yung Ng GE [Signature]  
(time) (date) (Name) (Designation) (Signature)

Work reinspected/re-surveyed\*, no objection to you proceeding.

Issued \_\_\_\_\_ by \_\_\_\_\_  
(time) (date) (Name) (Designation) (Signature)

The giving of this information and this inspection shall not relieve the Contractor of any liabilities or obligations under the Contract.

Abbreviation: BAW - Building/Architectural Works    BRW - Bridge Works    TUW - Tunneling Works    GEO - Geotechnical Works  
 RDU - Road, Drain & Utilities Works    MAW - Marine Works    LPW - Landscaping Works    SUW - Surveying Works  
 E&M - Electrical & Mechanical    GEN - General Works    OTH - Other Works

Two copies retained by SOR (White - original + Blue)  
 \*Delete as appropriate    Yellow - retained by CSHK    Pink - returned to CSHK

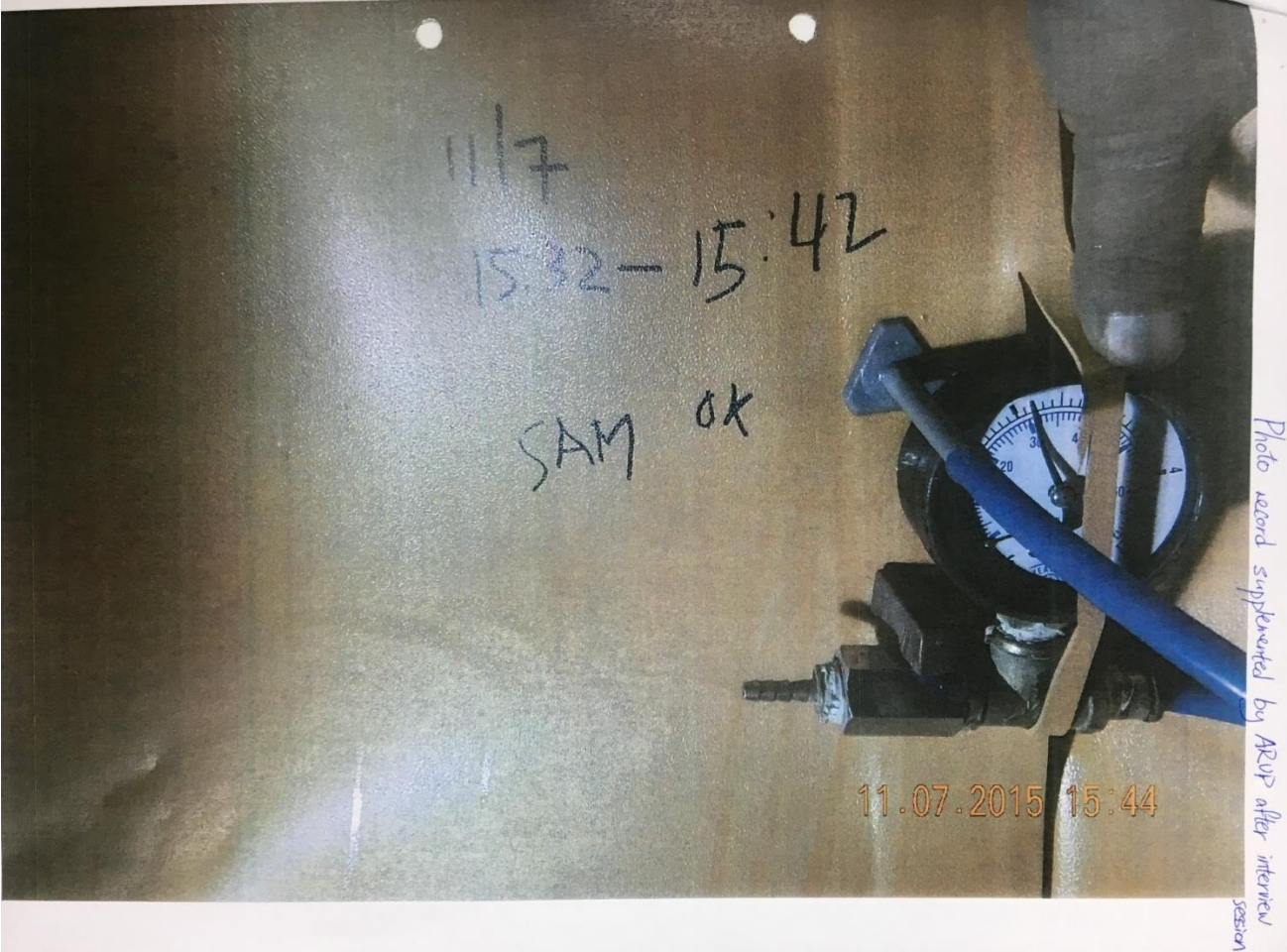






Examples of Follow-up Process of Unsettled RISCs

Supplementary photo provided by ARUP after interview sessions and found acceptable by P-KD:



## **Appendix B1                      Summary of Final Unsettled Structural Late-RISCFs (Type 2)**

**Summary of Final Unsettled Non-structural Late-RISCFs**

**APPENDIX B1**

Note

\* TUV - Tunneling Works; RDU - Road, Drain & Utilities Works

\*\* Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Item No.	Volume	Discipline*	Sequencial No.	Inspection Date (Day)	Inspection Date (Month)	Inspection Date (Year)	Location of Works to be Inspected	Type of Works to be Inspected	Any Photo?	Any Test Report?	Any Other Materials?	Type of Clarification**	Remarks	Follow-up Actions
4f	-	TUV	50151	28	12	2017	SHT T001 CH 14205-14207 (Wall 1)	cable hanger installation at utility trough	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50146	28	12	2017	SHT T001 CH 14265-14269 (Wall 1)	cable hanger installation at utility trough	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50111	30	10	2017	SHT T001 Ch 14205- 14208 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50109	27	10	2017	SHT T001 Ch 14216- 14253 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50108	22	7	2017	SHT T001 Ch 14253- 14273 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50106	22	7	2017	SHT T001 Ch 14275- 14277 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50104	22	7	2017	SHT T001 Ch 14279- 14316 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50089	23	5	2017	SHT T001 Ch 14428- 14449 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50088	15	9	2017	SHT T001 Ch 14449- 14455 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50086	15	9	2017	SHT T001 Ch 14477- 14483 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50083	14	9	2017	SHT T001 Ch 14527- 14528 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50082	13	5	2017	SHT T001 Ch 14528- 14549 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50081	14	9	2017	SHT T001 Ch 14549 - 14555 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50080	13	5	2017	SHT T001 Ch 14555 - 14576 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4f	-	TUV	50079	14	9	2017	SHT T001 Ch 14576 - 14585 (Wall 2)	cable hanger installation at Wall	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4b	-	TUV	48667	27	6	2017	SHT T001 Zone B Wall 2 CH14353-14378	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48794	1	6	2017	SHT T002 Zone A1 Wall 3 Ch14242-14268	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48791	9	6	2017	SHT T002 Zone B Wall 3 CH14320-14344	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.



**Summary of Final Unsettled Non-structural Late-RISCFs**

**APPENDIX B1**

**Note**

\* TUV - Tunneling Works; RDU - Road, Drain & Utilities Works

\*\* Type 2 - With site diary only; Type 3 - No supporting material. No site diary.

Item No.	Volume	Discipline*	Sequencial No.	Inspection Date (Day)	Inspection Date (Month)	Inspection Date (Year)	Location of Works to be Inspected	Type of Works to be Inspected	Any Photo?	Any Test Report?	Any Other Materials?	Type of Clarification**	Remarks	Follow-up Actions
4b	-	TUV	48790	7	6	2017	SHT T002 Zone B Wall 3 CH14344-14356	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48785	26	3	2017	SHT T002 Zone C Wall 3 CH14488-14500	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48784	28	3	2017	SHT T002 Zone C Wall 3 CH14500-14512	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48782	30	3	2017	SHT T002 Zone C Wall 3 CH14524-14536	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48781	30	3	2017	SHT T002 Zone C Wall 3 CH14536-14548	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48780	31	3	2017	SHT T002 Zone C Wall 3 CH14548-14560	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48779	1	4	2017	SHT T002 Zone C Wall 3 CH14560-14572	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48749	2	6	2017	SHT T002 Zone A1 Wall 4 CH14250-14274	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48748	1	6	2017	SHT T002 Zone A1 Wall 4 CH14274-14298	Concreting	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4b	-	TUV	48695	13	10	2017	SHT T001 Zone A Wall 2 Ch14246-14258	Reinforcement	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide relevant photos.
4e	1	TUV	50367	9	8	2017	SHT C&C Tunnel T002 - Lower VE Panel Wall 3	VE Panel	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4e	1	TUV	50382	11	3	2018	SHT C&C Tunnel T002 - Upper VE Panel Wall 4	VE Panel	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
4e	1	TUV	50383	11	3	2018	SHT C&C Tunnel T002 - Upper VE Panel Wall 4	VE Panel	No	No	Yes	Type 2	With site diary only.	No photo. Site Diary only. Arup to provide supporting materials.
<b>Total</b>												Type 2	<b>31</b>	

## **Appendix B2      Summary of Final Unsettled Non- Structural Late-RISCFs (Type 3)**

**Summary of Final Unsettled Non-structural Late-RISCFs**

**APPENDIX B2**

**Note**

\* **TUW** - Tunneling Works; **RDU** - Road, Drain & Utilities Works

\*\* **Type 2** - With site diary only; **Type 3** - No supporting material. No site diary.

Item No.	Volume	Discipline*	Sequencial No.	Inspection Date (Day)	Inspection Date (Month)	Inspection Date (Year)	Location of Works to be Inspected	Type of Works to be Inspected	Any Photo?	Any Test Report?	Any Other Materials?	Type of Clarification**	Remarks	Follow-up Actions
4d	-	TUW	51276	31	7	2017	SHT T001 - Wall 1, 2, OHVD Ch 14563 - 14582, ch14582-14598	1st Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4d	-	TUW	51277	27	3	2017	SHT T001 - Wall 1, 2, OHVD Ch14557-563, Ch14574-582	1st Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4d	-	TUW	51291	20	9	2017	SHT T001 - Wall 1, 2, OHVD Ch14216-14246	1st Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4d	-	TUW	51293	28	3	2017	SHT T001 - Wall 1, 2, OHVD Ch14483-489, Ch14505-513, Ch14546-553, Ch14557-563, Ch14574-582	2nd Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4d	-	TUW	51561	23	4	2017	SHT T002, Wall 3, 4, OHVD Ch14458-14506, Ch14517-14524	2nd Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4d	-	TUW	51563	25	2	2017	SHT T002, Wall 3, 4, OHVD Ch14354-14435	2nd Layer black paint	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4f	-	TUW	50149	26	12	2017	SHT T001 CH 14216-14219 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50150	18	12	2017	SHT T001 CH 14207-14216 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50148	18	12	2017	SHT T001 CH 14219-14233 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50147	26	12	2017	SHT T001 CH 14233-14265 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50145	26	12	2017	SHT T001 CH 14269-14278 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50144	30	12	2017	SHT T001 CH 14278-14345 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50142	30	12	2017	SHT T001 CH 14348-14375 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50141	24	7	2017	SHT T001 CH 14375-14439 (Wall 1)	cable hanger installation at utility trough	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50126	16	11	2017	SHT T001 Ch 14205- 14220 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50125	30	10	2017	SHT T001 Ch 14220- 14252 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50120	27	10	2017	SHT T001 Ch 14418- 14424 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50118	29	8	2017	SHT T001 Ch 14472- 14473 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.



**Summary of Final Unsettled Non-structural Late-RISCFs**

**APPENDIX B2**

Note

\* **TUW** - Tunneling Works; **RDU** - Road, Drain & Utilities Works

\*\* **Type 2** - With site diary only; **Type 3** - No supporting material. No site diary.

Item No.	Volume	Discipline*	Sequencial No.	Inspection Date (Day)	Inspection Date (Month)	Inspection Date (Year)	Location of Works to be Inspected	Type of Works to be Inspected	Any Photo?	Any Test Report?	Any Other Materials?	Type of Clarification**	Remarks	Follow-up Actions
4f	-	TUW	50115	29	8	2017	SHT T001 Ch 14523- 14527 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50113	29	8	2017	SHT T001 Ch 14576- 14577 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50112	29	5	2017	SHT T001 Ch 14577- 14598 (Wall 1)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50110	31	10	2017	SHT T001 Ch 14208- 14216 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50098	31	10	2017	SHT T001 Ch 14322- 14324 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50096	31	10	2017	SHT T001 Ch 14347- 14353 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50094	27	10	2017	SHT T001 Ch 14374- 14384 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50092	27	10	2017	SHT T001 Ch 14402- 14405 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50091	23	5	2017	SHT T001 Ch 14405- 14426 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50090	27	10	2017	SHT T001 Ch 14426- 14428 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50087	30	5	2017	SHT T001 Ch 14455- 14477 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4f	-	TUW	50078	29	5	2017	SHT T001 Ch 14585 - 14598 (Wall 2)	cable hanger installation at Wall	No	No	No	Type 3	No supporting material. No site diary.	No supporting material. Arup to provide.
4b	-	TUW	48798	7	6	2017	SHT T001 Zone A Wall 3 CH14176-14182	Concreting	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4b	-	TUW	48797	5	6	2017	SHT T002 Zone A Wall 3 CH14182-14194	Concreting	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4b	-	TUW	48795	2	6	2017	SHT T002 Zone A Wall 3 CH14218-14242	Concreting	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5d	-	RDU	50718	15	3	2018	M014 & M015 - AB29 Wall & Top Slab	Concreting	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5d	-	RDU	50716	16	3	2018	M014 & M015 - ABA29 Wall & Top Slab	Concreting	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5c	-	RDU	46905	24	2	2018	Road M014 - SRA14, SR14 - Wall and Top Slab	Formwork	No	No	No	Type 3	No supporting material. No site diary.	Please provide photos for formwork inspection of SRA14 & SR14 on 9 Mar 2018

**Summary of Final Unsettled Non-structural Late-RISCFs**

**APPENDIX B2**

**Note**

\* **TUW** - Tunneling Works; **RDU** - Road, Drain & Utilities Works

\*\* **Type 2** - With site diary only; **Type 3** - No supporting material. No site diary.

Item No.	Volume	Discipline*	Sequencial No.	Inspection Date (Day)	Inspection Date (Month)	Inspection Date (Year)	Location of Works to be Inspected	Type of Works to be Inspected	Any Photo?	Any Test Report?	Any Other Materials?	Type of Clarification**	Remarks	Follow-up Actions
5d	-	RDU	50779	14	3	2018	M014 & M015 - AB29 Wall & Top Slab	Formwork	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5d	-	RDU	50777	15	3	2018	M014 & M015 - ABA29 Wall & Top Slab	Formwork	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4b	-	TUW	48830	6	6	2017	SHT T001 Zone A Wall 3 CH14176-14182	Reinforcement	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4b	-	TUW	48834	31	7	2017	SHT T002 Zone A1 Wall 3 Ch14242-14268	Reinforcement	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5c	-	RDU	46904	9	3	2018	Road M014 - SRA14, SR14 - Wall and Top Slab	Reinforcement	No	No	No	Type 3	No supporting material. No site diary.	Please provide photos for steel reinforcement inspection of SRA14 & SR14 on 7 Mar 2018
5d	-	RDU	50746	13	3	2018	M014 & M015 - AB29 Wall & Top Slab	Reinforcement	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
5d	-	RDU	50745	15	3	2018	M014 & M015 - ABA29 Wall & Top Slab	Reinforcement	No	No	No	Type 3	No supporting material. No site diary.	No photo. Arup to provide supporting materials.
4e	1	TUW	50331	4	8	2017	SHT C&C Tunnel T002 - Lower VE Panel Wall 4	VE Panel	No	No	No	Type 3	No supporting material. No site diary.	No photos. Arup to provide supporting materials.
4e	1	TUW	50334	14	8	2017	SHT C&C Tunnel T002 - Lower VE Panel Wall 4	VE Panel	No	No	No	Type 3	No supporting material. No site diary.	No photos. Arup to provide supporting materials.
4e	1	TUW	50351	15	12	2017	SHT C&C Tunnel T002 - Upper VE Panel Wall 3	VE Panel	No	No	No	Type 3	No supporting material. No site diary.	No photos. Arup to provide supporting materials.
<b>Total</b>												Type 3	<b>46</b>	

## **Appendix C1      Explanation of Photo Review Scenarios**


# Explanation of Photo Review Scenarios

## Scenario 1

### NO Date/Time on Photo but with Dates in File Property

**Properties Embedded**

- Date Taken : 1-Jan-2018 09:00
- Camera Model: Nikon Coolpix
- etc ...



**Scenario 1**


Filename	File Path	Date Modified	...
IMG_123	//site_photo/2018/...	1-Jan-2018 09:00	...

## Scenario 2

### Date/Time on Photo aligned with "Date Taken" in File Property

**Properties Embedded**

- Date Taken : 1-Jan-2018 09:00
- Camera Model: Nikon Coolpix
- etc ...



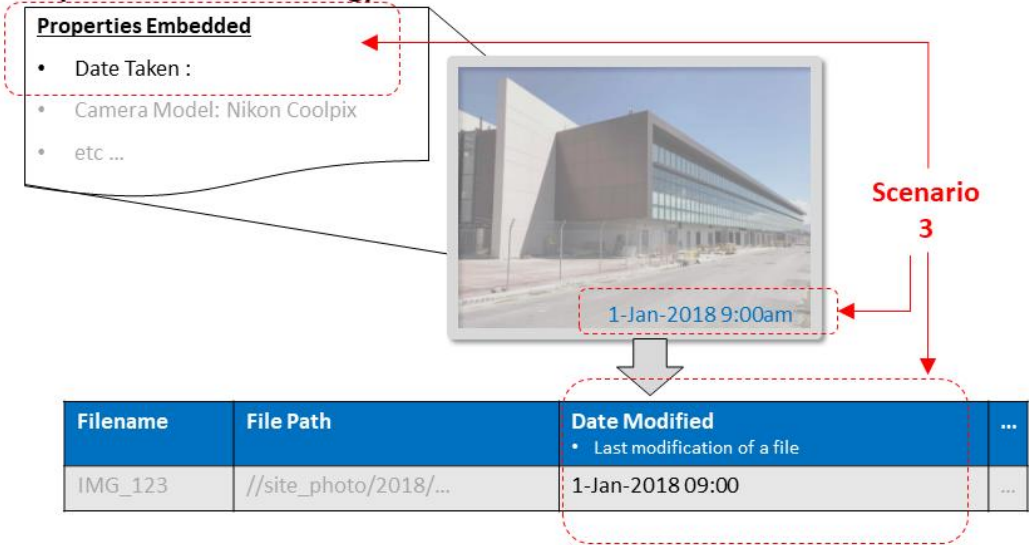
**Scenario 2**

Filename	File Path	Date Modified	...
IMG_123	//site_photo/2018/...	1-Jan-2018 09:00	...

Explanation of Photo Review Scenarios

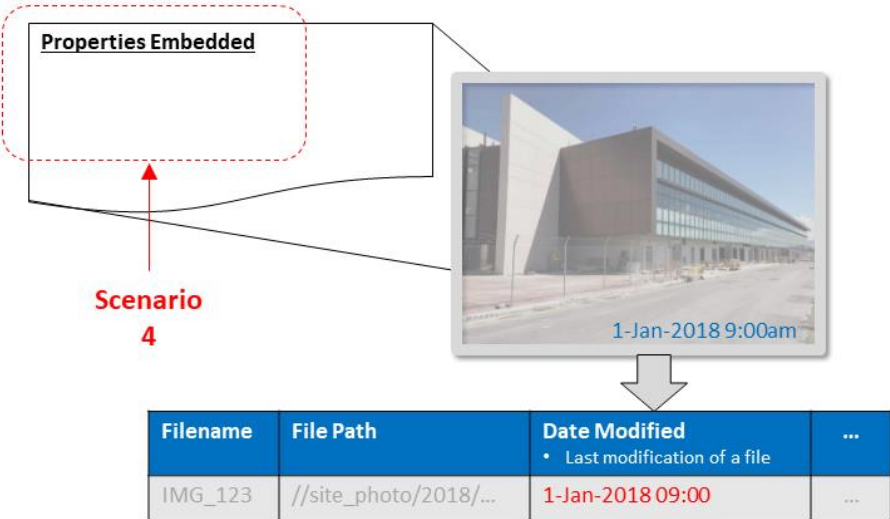
Scenario 3

**Date/Time on Photo aligned with "Date Modified" in File Property ("Date Taken" missing)**



Scenario 4

**"Date Taken" and camera device data missing in File Property**

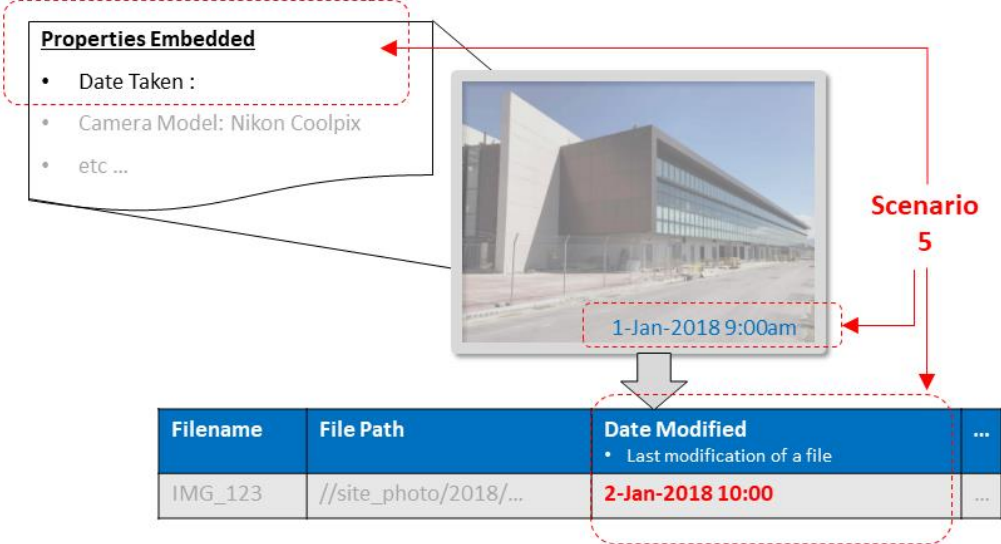




Explanation of Photo Review Scenarios

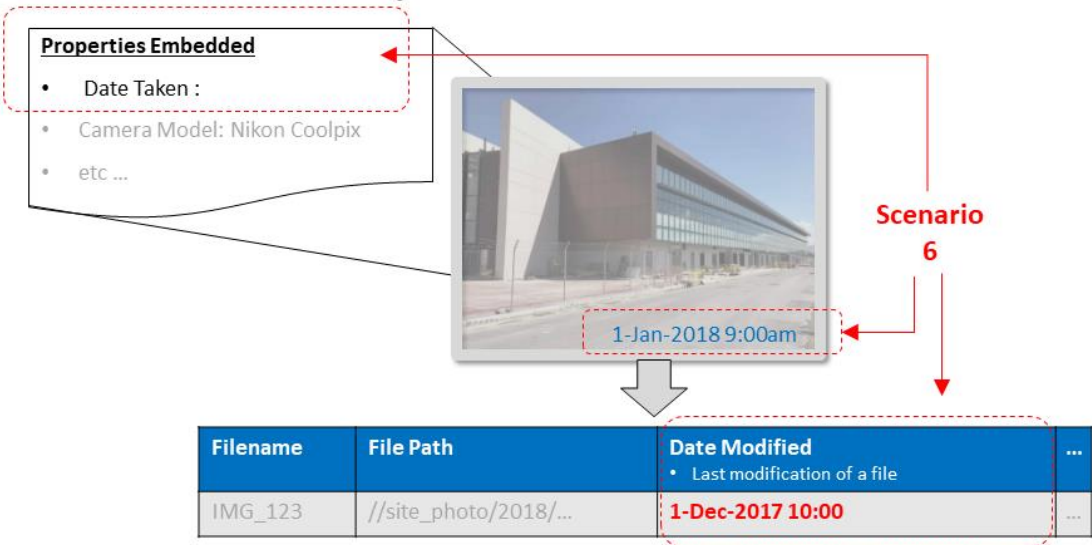
Scenario 5

**Date/Time on Photo, "Date taken" missing, and "Date Modified" is LATER than the activity date on RISCf**



Scenario 6

**Date/Time on Photo, "Date Taken" missing, and "Date Modified" is EARLIER than the activity date on RISCf**



## **Appendix C2      Photos Data Inspection Results**

# Photo Data Inspection Results

## Summary of Late RISCFS Submission (Structural) - Photos Inspection Results Status as 12 Sep 2018

Scenario 1: No Date/Time stamp on Photo

Scenario 2: Date/Time stamp on photo aligned with "Date Taken" in photo's file property

Scenario 3: Date/Time stamp on photo aligned with "Date Modified" in photo's file property

Scenario 4: "Date Taken" and Camera Data all missing in photo's file property

Scenario 5: "Date Taken" missing in Photo's file property and "Date Modified" later than Work Date in RISCFS by 1 week or more

Scenario 6: "Date Taken" missing in Photo's file property and "Date Modified" earlier than Work Date in RISCFS by 1 week or more

Item No.	Location of Works	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Grand Total
2a	Tunnel SHT	15	50	21	2	0	0	88
2b	Tunnel SHT	60	238	78	4	2	0	382
2c	Tunnel SHT	59	25	0	0	0	0	84
2d	Tunnel SHT	32	95	13	27	1	0	168
2e	Tunnel SHT	11	36	4	0	0	0	51
2m	Tunnel SHT	10	36	11	0	0	0	57
4a	Tunnel SHT	121	166	4	0	0	0	291
6b	HKLR At-grade Road	31	10	0	0	0	0	41
6c	SPS 6	0	14	0	0	0	0	14
6d	SPS 7	1	12	0	0	4	0	17
6e	Reclamation area	10	0	0	0	0	0	10
6i/6j	DPS 9 / DPS 10	35	8	0	0	0	0	43
7a	SHT Ventilation Building	0	10	0	0	0	0	10
7b	HMA Administration Building	1	27	1	1	0	0	30
7c	TD Workshop	1	7	9	0	1	0	18
7d	HyD Workshop	1	8	0	0	0	0	9
7e	DG Store & FFS	0	18	0	0	0	0	18
7f	HMA Covered Carpark	21	0	0	0	0	0	21
8a	Tunnel HAT	81	147	15	0	1	0	244
8b	Tunnel HAT	2	33	0	0	0	0	35
8o	Tunnel HAT	10	45	7	0	1	0	63
9a	Box Culvert PR10	28	5	0	0	0	0	33
9b	Box Culvert PR14	0	6	0	0	0	0	6
9c	Box Culvert PR9	1	15	0	1	0	0	17
10a	Maintenance Subway	0	6	0	0	0	0	6
12e	Airport Road	0	14	0	0	0	0	14
13a	Bridge A1	73	61	21	2	0	0	157
13b	Bridge A1	2	78	7	0	0	0	87
14a	Bridge A2	7	300	8	1	0	0	316
15a	DPS 3	22	0	0	0	0	0	22
15d	HKBCF Ramp	114	4	0	3	0	0	121
15f	M008	44	12	21	0	1	0	78
15h	Depressed Roundabout	0	27	11	0	0	0	38
15i	Depressed Roundabout	116	36	6	0	0	0	158
15j	East Coast Road	9	5	1	0	0	0	15
17a	HAT Plant Room	19	133	6	0	0	0	158
							<b>Total:</b>	<b>2920</b>

## Photo Data Inspection Results

Summary of Late RISCFS Submission (Non-Structural) - Photos Inspection Results Status as 12 Sep 2018

Scenario 1: No Date/Time stamp on Photo

Scenario 2: Date/Time stamp on photo aligned with "Date Taken" in photo's file property

Scenario 3: Date/Time stamp on photo aligned with "Date Modified" in photo's file property

Scenario 4: "Date Taken" and Camera Data all missing in photo's file property

Scenario 5: "Date Taken" missing in Photo's file property and "Date Modified" later than Work Date in RISCf by 1 week or more

Scenario 6: "Date Taken" missing in Photo's file property and "Date Modified" earlier than Work Date in RISCf by 1 week or more

Item No.	Location of Works	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Grand Total
1a, b, c, d	Seawall	0	7	0	0	0	0	7
2f	Tunnel SHT	16	15	0	0	0	0	31
2g	Tunnel SHT	3	27	0	0	0	0	30
2h	Tunnel SHT	12	13	0	0	0	0	25
2i	Tunnel SHT	17	6	0	0	0	0	23
2j	Tunnel SHT	5	3	0	0	0	0	8
2k	Tunnel SHT	6	11	2	0	0	0	19
2l	Tunnel SHT	0	2	0	0	0	0	2
2n	Tunnel SHT	8	0	0	0	0	0	8
3a	Tunnel SHT	9	0	0	0	0	0	9
3b	Tunnel SHT	1	2	0	1	0	0	4
3c	Tunnel SHT	0	3	0	0	0	0	3
3d	Tunnel SHT	0	2	0	0	0	0	2
3e	Tunnel SHT	1	3	0	0	0	0	4
3f	Tunnel SHT	0	2	0	0	0	0	2
4b	Tunnel SHT	15	0	0	0	0	0	15
4c	Tunnel SHT	18	0	1	0	0	0	19
4d	Tunnel SHT	2	3	0	0	0	0	5
4e	Tunnel SHT	7	0	0	0	0	0	7
4f	Tunnel SHT	13	5	2	0	0	0	20
4g	Tunnel SHT	9	0	0	0	0	0	9
5a	M014 & M015	10	0	0	0	0	0	10
5b	M014 & M015	0	9	0	0	0	0	9
5c	M014 & M015	2	4	0	1	0	0	7
5d	M014 & M015	6	0	0	0	0	0	6
5e	M014 & M015	16	1	0	0	0	0	17
5f	M014 & M015	4	0	0	0	0	0	4
6f	HKLR (At-grade)	71	7	0	0	0	0	78
6g	HKLR (At-grade)	69	17	1	0	0	0	87
6h	HKLR (At-grade)	3	1	0	0	0	0	4
6k	HKLR (At-grade)	41	9	3	1	0	0	54
6l	HKLR (At-grade)	7	0	0	0	0	0	7
6m	Hyd Depot Ext. & Recl. Area	9	1	1	0	0	0	11
7g	Buildings	3	7	0	0	0	0	10
7h	Buildings	11	0	0	0	0	0	11
7i	Buildings	14	2	0	0	0	0	16
7j	Buildings	9	1	0	0	0	0	10
7k	Buildings	5	13	0	0	0	0	18
8c	Tunnel HAT	2	1	0	0	0	0	3
8d	Tunnel HAT	2	0	1	0	0	0	3
8e	Tunnel HAT	0	1	0	0	0	0	1
8f	Tunnel HAT	28	0	1	0	0	0	29
8g	Tunnel HAT	0	2	0	0	1	0	3
8h	Tunnel HAT	2	0	1	0	0	0	3
8i	Tunnel HAT	2	0	0	0	0	0	2
8j	Tunnel HAT	0	5	0	0	0	0	5
8k	Tunnel HAT	14	0	6	0	0	0	20
8l	Tunnel HAT	0	3	0	0	0	0	3
8m	Tunnel HAT	1	2	0	0	0	0	3
8n	Tunnel HAT	0	0	3	0	0	0	3
8p	Tunnel HAT	9	0	1	0	0	0	10
8q	Tunnel HAT	0	0	1	0	0	0	1
11a	KLW Road	10	0	0	0	0	0	10
12a	Airport Road	2	1	0	0	0	0	3
12b	Airport Road	9	2	0	0	0	0	11
12c	Airport Road	0	3	0	0	0	0	3
12d	Airport Road	15	43	0	0	0	0	58
15b	ECR & CLKR	17	0	0	0	0	0	17
15c	ECR & CLKR	8	9	0	1	0	0	18
15e	ECR & CLKR	50	1	0	0	0	0	51
15g	ECR & CLKR	26	29	0	0	0	0	55
15k	ECR & CLKR	141	35	0	0	0	0	176
16b	Site Wide	18	6	2	0	1	0	27
17b	HAT Plant Room	2	2	0	0	0	0	4
17c	HAT Plant Room	0	2	0	0	0	0	2
							<b>Total:</b>	<b>1135</b>

## **Appendix D      Visual Inspection Photos**

## Visual Inspection for Unsettled Non-structural Late-RISCF

### Details of Inspection

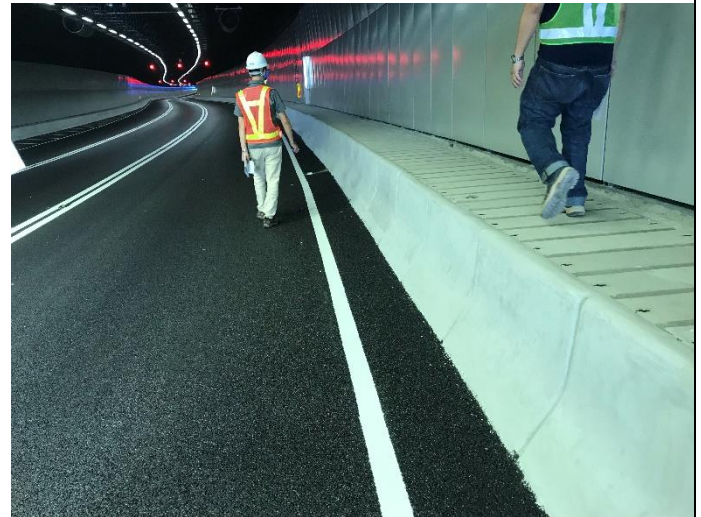
Date: 4 Oct 2018

Time: 10:30am – 13:15pm

Locations: SHT T001 (Ch.14205 – Ch. 14598) and T002 (Ch.14176 – Ch.14613); Manhole Nos. SRA14, SR14, ABA29 and AB29 at M014 & M015

### Record Photos

#### Inspection of Profile Barrier





**Inspection of Black Paint**



**Inspection of Cable Hanger at Utilities Trough**

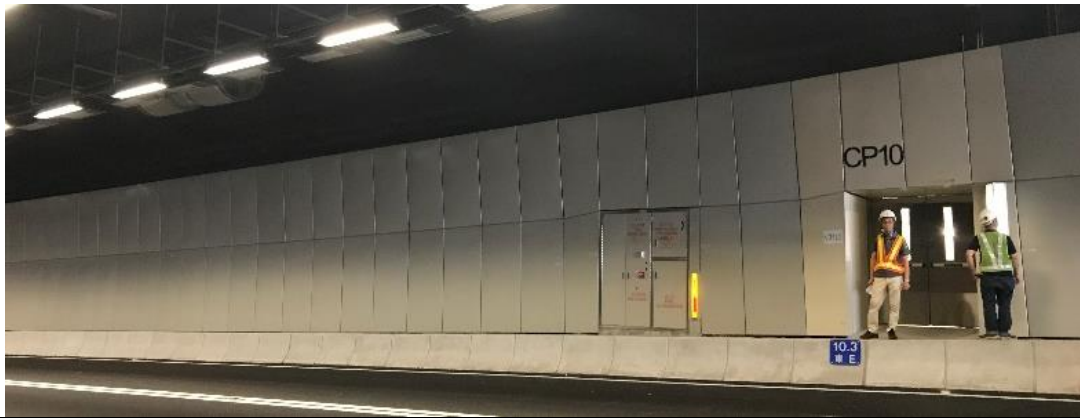




Inspection of Cable Hanger at Wall



Inspection of VE Panel





Inspection of Manhole No. SR14



Inspection of Manhole No. SRA14





Inspection of Manhole No. AB29



Inspection of Manhole No. ABA29

