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Hyder MEINHARDT
Hyder-Meinhardt JV

25 April 2013

BY FAX AND HAND

Civil Engineering and Development Department
Civil Engineering Office
Fill Management Division
Strategy 2 Section
5/F, Civil Engineering and Development Buildign
101 Princess Margaret Rd
Homantin, Kowloon

Your Ref:
Our Ref: A0978-EB000560-MIEL-HKL-00

For the attention of Mr. HO On Sum

Dear Sir,

Agreement No. CE 38/2008 (HY)
Kai Tak Development – Trunk Road T2 and Infrastructure at South Apron
-Investigation, Design and Construction

Updated Construction and Demolition Material Management Plan for Trunk Road T2 and Infrastructure at South Apron

Hyder Meinhardt Joint Venture has been commissioned by Civil Engineering and Development Department (CEDD) to undertake the captioned assignment.

Further to your email on 25 April 2013, please find attached 15 copies of the captioned report for your onward circulation to PFC Members for endorsement.

Should you have any queries, please feel free to contact the undersigned at 2911-2048.

Yours faithfully,
for Hyder-Meinhardt Joint Venture

James Penny
Deputy Project Manager

Encl.

JP/sw
c.c. Meinhardt (Attn: Mr. Stephen Mak – w/e)
CEDD (Attn: Mr. LEUNG Wing Tak, David – w/e)

[] **MEMO** *Urgent By Fax*

From Secretary, Public Fill Committee, CEDD	*To* PM(K), CEDD
Ref. ( ) *in* FM PF/CDM/00 Pt.	*(Attn :* Mr David W T LEUNG *)*
Tel. No. 2762 5555	*Your Ref.* ( ) *in*
Fax No. 2714 0113	*dated* *Fax No.* 2301 1277
Date 29 May 2013	*Total Pages* 2

DESPATCHED ON
29 MAY 2013
Fill Management Division

Public Fill Committee

PFC Paper No. 4/2013 (Rev. A)
Construction and Demolition Material Management Plan (C&DMMP) for the Trunk Road T2 and Infrastructure at South Apron

I refer to your submission of the proposed C&DMMP for the Trunk Road T2 and Infrastructure at South Apron.

2. Subsequent to the circulation of the C&DMMP via PFC Paper No. 4/2013 on 2 May 2013, comments were received from PFC Members. Your response to comments and the revised pages of the C&DMMP were circulated to PFC Members via PFC Paper No. 4/2013 (Rev. A) on 22 May 2013. PFC Members have no further comments and endorsed PFC paper No. 4/2013 (Rev. A), except P(WF) of EPD has further comments but endorsed the C&DMMP subject to conditions.

3. I am pleased to advise you that, in accordance with the Project Administration Handbook (PAH) Chapter 4 Section 4.1.3, the C&DMMP for the Trunk Road T2 and Infrastructure at South Apron attached in PFC Paper No. 4/2013 and the revised pages attached in PFC Paper No. 4/2013 (Rev. A) have been endorsed in principle by PFC on the conditions that the project proponent shall:

(a) liaise with concurrent projects, such as Shatin to Central Link, Central Kowloon Route, SENT Landfill Extension and Remaining Development in Tung Chung projects, on the feasibility to deliver surplus public fill to these projects for beneficial reuse;

(b) liaise with local quarries and other concurrent projects to reuse the good quality surplus rock as far as possible;

(c) explore alternative means to reduce, reuse and recycle the surplus public fill in lieu of disposal of the surplus public fill to Public Fill Reception Facilities in view of the shortage of fill bank capacity;

(d) explore ways to recycle/reuse the top soil generated and duly reflect in Tables 7.4.3 & 7.4.3 b of the C&DMMP the commitment that "excavated top soil, if suitable, will be reused for landscaping work and this will be investigated further in the detailed design phase of the project";

(e) liaise with the Fill Management Division on the arrangement of disposal of surplus public fill to Public Fill Reception Facilities;

(f) set up effective control procedures to ensure the traceability of disposal and reuse of the C&D materials;

(g) report the progress of the above works in the form of quarterly situation reports to be submitted to the Secretary of PFC; and

(h) review, in conjunction with other Kai Tak Development (KTD) projects, on whether the C&DMMP for the whole KTD approved in June 2009 should be updated in accordance with paragraph 4.1.3 in Chapter 4 of PAH.

(Peter P C MOK)
Secretary, Public Fill Committee
Civil Engineering and Development Department

c.c.

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Internal
E/S5

DSH/WPC/

土木工程拓展署
CEDD Civil Engineering and Development Department

Hyder MEINHARDT
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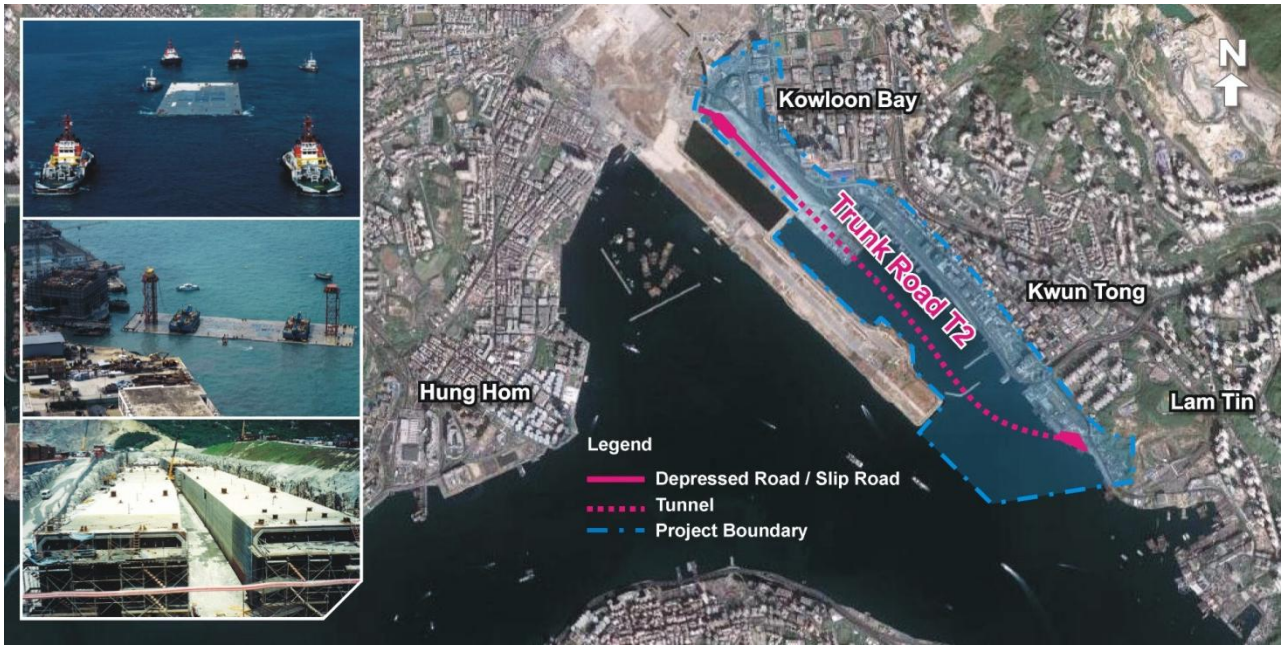

Agreement No. CE 38/2008 (HY)

Kai Tak Development - Trunk Road T2 and Infrastructure at South Apron Investigation, Design and Construction

Construction and Demolition Material Management Plan for Trunk Road T2 and Infrastructure at South Apron

April 2013

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Civil Engineering and Development Department

Agreement No. CE 38/2008 (HY)

Kai Tak Development - Trunk Road T2 and Infrastructure at South Apron Investigation, Design and Construction

Construction and Demolition Material Management Plan for Trunk Road T2 and Infrastructure at South Apron

Author	Sophie Wang	Sophie Wang
Checker	James Penny	
Approver	James Penny	

Report No	F0052-EB000560-HCL-HKR-02
Date	25 April 2013

CONTENTS

Appendices

1 PURPOSE OF THIS C&DMMP

1.1.1 This Construction and Demolition Material Management Plan (C&DMMP) has been prepared with reference to the guidelines and requirements given in Project Administration Handbook for Civil Engineering Works (PAH) – Chapter 4.1.3 Construction and Demolition Materials.

1.1.2 This report aims to:

- Fulfil the requirements in PAH Chapter 4.1.3 by formulising a C&DMMP during the preliminary design stage as required for projects that are expected to generate more than 50,000 m^3 of C&D materials including rock or requiring imported fill in excess of 50,000 m^3.
- Enable classification and estimate the quantities of C&D materials generated and their time of generation.
- Recommend ways to minimise the generation and to maximise the reuse of inert C&D materials;
- Enable the Vetting Committee to scrutinise and endorse the C&DMMP and monitor its implementation;
- Provide the Contractor with information to facilitate their preparation of a Waste Management Plan (WMP);
- Provide information for management of C&D materials in the EIA report for this "Designated Project" under the EIA Ordinance.

2 PROJECT BACKGROUND

2.1.1 On 31 July 2009, the Civil Engineering and Development Department (CEDD) of the Government of the Hong Kong Special Administrative Region appointed Hyder-Meinhardt JV (HMJV) under Agreement No. CE38/2008 (HY) (the Brief) to provide professional services in respect of Kai Tak Development – Trunk Road T2 and Infrastructure at South Apron – Investigation, Design and Construction.

2.1.2 As a part of the strategic road network within the South East Kowloon Development (SEKD), Route 6 forms an east west express link between West Kowloon and Tseung Kwan O. Route 6 comprises the Central Kowloon Route (CKR), Trunk Road T2 and Tseung Kwan O – Lam Tin Tunnel (TKO-LTT). This Assignment covers the provision of Trunk Road T2 and the associated infrastructure works at the South Apron. The main elements of the works include the construction of Trunk Road T2, connecting with the CKR at the South Apron of the former Kai Tak Airport area and the TKO-LTT in the south, at the Cha Kwo Ling

3 PROJECT DESCRIPTION

3.1 Scope of the Project

3.1.1 Trunk Road T2 is planned to be a dual 2-lane highway of about 3.0 km connecting CKR and TKO-LTT. According to the Kai Tak Development Engineering Study (KTDES), about 1.0km will be on the South Apron of the former Kai Tak airport and the remaining 2.0km will be a submarine tunnel passing under the Kwun Tong Typhoon Shelter (KTTS) and running towards the shoreline of Victoria Harbour at Cha Kwo Ling. 2.7 km of T2 will be in the form of tunnel comprising 0.7km of cut and cover tunnel on land and 2.0 km of the tunnel in the form of bored tunnels beneath existing seabed levels. The CKR and TKO-LTT are planned for completion in 2020. Trunk Road T2, being the middle section of Route 6 connecting the CKR and TKO-LTT is therefore also targeted for completion by 2020.

3.1.2 Further to the recommendations of the alignment option assessment, the preferred Trunk Road T2 is shown in **Figure 3.1** and will comprise:

(a) a dual two-lane trunk road of approximately 3.0 kilometre (km) long and about 2.7 km of the trunk road in the form of a tunnel;

(b) Electrical and mechanical services required by Trunk Road T2 in particular tunnel ventilation and lighting, power supply and distribution system, fire services system, etc.;

(c) Traffic control and surveillance system;

(d) Management, operation and maintenance facilities;

(e) Administration building, maintenance building, ventilation buildings/structures at both ends of the tunnel, kiosks, etc.;

(f) Modification of affected existing roads, structures, etc.;

(g) Drainage and sewerage works;

(h) Associated civil, structural, architectural, geotechnical and marine works;

(i) Environmental monitoring and mitigation measures.

3.1.3 Details of the various elements of the selected Trunk Road T2 alignment are given in the sections below. The general horizontal layout of the preferred alignment is shown in **Figure 3.1** while the vertical profile is shown in **Figure 3.2, 3.2a & 3.2b**.

3.2 South Apron

At-grade Road

3.2.1 The proposed Trunk Road T2 starts at an interface with the Central Kowloon Route (CKR) at chainage 5780m and is a dual 2-lane road. The trunk road continues at-grade for approximately 100m along the South Apron of the former Kai Tak airport until it passes over the existing Jordan Valley Box culvert (JVBC).

Depressed Road Section

3.2.2 After the road passes over the JVBC, it begins to descend within a depressed road section, typical section shown in **Figure 3.3** for approximately 170m from +4.3mPD to -3.3mPD where the road has achieved sufficient depth for construction of cut and cover tunnel.

Cut and Cover Tunnel Section

3.2.3 The Trunk Road T2 descends at a gradient of 5% from the depressed road section down within cut and cover tunnel section, typical section shown in **Figure 3.4** for approximately 570m until it reaches the southern seawall of the South Apron (Chainage 6631m) whereupon the road level has reached a depth of approximately -29.6mPD, which is deep enough to allow the marine tunnel to be constructed using Tunnel Boring Machine (TBM) under the seabed.

Ventilation Building and Administration Facilities (M&E)

3.2.4 Two ventilation buildings are located at both ends of Trunk Road T2 for tunnel ventilation. At the South Apron, the ventilation building is proposed to be located adjacent to the planned DSD desilting compound of Jordan Valley Box Culvert as shown in **Figure 3.5**. The ventilation building will be two storeys in height and tunnel air from the two tubes will be exhausted from the roof of the building. There will be no mid-tunnel exhaust for this project.

3.2.5 No administration buildings are located in the South Apron.

Sub-marine Tunnel Alignment

3.2.6 A deep level option alignment, namely "H1b – a Deep Level" has been selected as the preferred alignment for the project. The length of the submarine tunnel for this preferred option is approximately 2.08km. The, approximately, 14m diameter tunnel section is embedded a minimum of 14m below the seabed. The typical cross section of the TBM Tunnel is shown in **Figure 3.6**. The tunnel is proposed to be constructed using TBM method in order to avoid disturbance to the seabed and minimise the amount of dredged material to be removed, providing water quality, waste management, marine archaeology and ecology and fisheries benefits.

3.2.7 The tunnel goes straight south-east-wards from the South Apron, passing under the KTTS, and its associated breakwaters, passing out into the Victoria harbour until it turns further eastward towards the Cha Kwo Ling shoreline.

3.2.8 The TBM tunnel begins at a 60m x 40m launching shaft within the South Apron from chainage 6560 to 6620 and at an approximate road level of -29mPD, where the ground level will be approximately +6.0mPD. The sub-sea tunnel then runs southward under KTTS, where the lowest tunnel bottom level will reach approximately -42mPD, and then heads towards the Cha Kwo Ling shoreline where it ends at a receiving shaft within the Public Cargo Working Area (PCWA). The vertical alignment of the tunnel is shown in **Figures 3.2, 3.2a & 3.2b**. As shown in these figures, the tunnel rises up towards the shorelines but maintains a depth of cover above the tunnel as it passes under the existing seawalls at either end of the tunnel and, therefore, does not result in any seabed loss or disturbance. Construction of the TBM tunnel will commence at the South Apron launching shaft where an area of land is required for construction of the launching shaft for the TBM. The launching shaft will be constructed by open excavation method supported by diaphragm walls and will form part of the cut and cover tunnel section of the alignment within the South Apron. Excavated materials will be backfilled on the completed tunnel while excess excavated materials will be disposed off-site. The TBM will start boring from the launching shaft towards the Cha Kwo Ling where a TBM retrieval shaft will be constructed for the removal of the TBM.

3.2.9 The construction waste materials from the TBM will be removed via the launching shaft to the spoil treatment facilities next to launching shaft. The spoil will be removed from site via a conveyor to a barging point located at the Government Logistics Department Kowloon Bay Cargo Handling Area.

3.3 Cha Kwo Ling

Cut and Cover Tunnel

3.3.1 A section of cut and cover tunnel using a reinforced concrete box structure will function as both the receiving shaft for the two TBMs and as the cut and cover section connecting between the T2 and the TKO-LTT alignments. This section of receiving shaft/cut and cover tunnel, of approximately 35m length, will be constructed within the Cha Kwo Ling PCWA. The tunnel will then connect to the TKO-LTT at a road level of approximately -26.9mPD at the Cha Kwo Ling landfall (Chainage 8767m). The cut and cover tunnel will be constructed by open excavation method supported by diaphragm walls. Excavated materials will be backfilled on the completed tunnel while excess excavated materials will be disposed off-site.

Ventilation Building and Administration Facilities

3.3.2 The second of the Road T2's two tunnel ventilation buildings is located at the end of the connecting section of TKO-LTT contract and form the portal for the T2 tunnel opening out to the Lam Tin Interchange, as shown in **Figure 3.5**. The ventilation building will be three storeys in height with a top level of approximately +18mPD and tunnel air from the two tubes will be exhausted at the roof of the building, vertically upwards via a stack.

3.3.3 Administration rooms for the Road T2 tunnel will be located within the administration building designed and constructed under the TKO-LTT contract. The administration building will be located within the Lam Tin Interchange and on the Cha Kwo Ling side of Trunk Road T2 and would be composed of administration offices, training office, meeting areas, control rooms, TCSS room, and associated areas. Auxiliary areas such as parking spaces for maintenance and recovery vehicles will also be provided. This building is not part of the Road T2 works and is not assessed in this C&DMMP.

4 IMPLEMENTATION PROGRAMME

4.1.1 Appendix B depicts the tentative implementation programme for Trunk Road T2. The tentative commencement date for the main construction activities is by end 2015 with a view to completion by end 2020.

4.1.2 The critical path for the construction of the project passes through the construction of the cut and cover sections of the tunnels within the South Apron to the road finishes and installation, testing and commissioning of the TCSS.

5 DEVELOPMENT CONSTRAINTS

5.1.1 The proposed Trunk Road T2 alignment falls within the former Kai Tak Airport South Apron, passes under the KTTS and cuts through the Cha Kwo Ling Village (CKLV) as it interfaces with the TKO-LTT project.

5.1.2 The main development constraints include:

(a) Traffic impact;

(b) Existing buildings, structures and other land constraints such as the Public Works Central Laboratory (PWCL), the Kerry Dangerous Goods Godown (Kowloon Bay), the Public Cargo Working Area (PCWA) handling facilities and the Hospital Site Developments identified on the South Apron;

(c) Utilities and services including the Sewage Submarine Outfall in Kwun Tong Typhoon Shelter (twin 2100mm diameter), the breakwaters of Kwun Tong Typhoon Shelter and the nearby East Harbour Crossing;

(d) Environmental considerations including air pollution impact, noise pollution impact, visual impact and cultural heritage; and

(e) Possible interfacing with other Projects including:

i. Central Kowloon Route (CKR) – Construction starting 2015 for completion by end 2020

ii. Kai Tak Development (KTD) – Construction starting 2009 for completion by end 2021

iii. Tseung Kwan O – Lam Tin Tunnel – Construction starting 2015 for completion by end 2020

5.1.3 It is considered that the above constraints can be overcome. Regarding the possible interfacing with the Projects listed in (e) above, close liaison with concerned authorities including the relevant District Councils, utility companies and Highways Department should be maintained.

5.1.4 Moreover, cut-and-cover and bored tunnelling will involve excavation of soil materials, therefore, generation of considerable amounts of excavated soils and filling materials will result. Inert excavated materials will be properly segregated and if not reused on site will either be delivered to a quarry and reused for concrete aggregate or disposed of at designated public filling areas in accordance with guidance from the Public Fill Committee (PFC) and Fill Management Division (FMD) as appropriate.

5.1.5 A potential barging point which can serve Trunk Road T2 throughout all construction stages is proposed near the Government Logistic Department Kowloon Bay Cargo Handling Area. **(Appendix C).**

5.1.6 Solutions to development constraints regarding traffic impact and existing buildings and public facilities leading to the development of the preferred alignment and construction method are discussed in detail in the separate assessment reports and working papers. A summary of the development is given below.

6 DEVELOPMENT OPTIONS

6.1 Background of Kai Tak Development

6.1.1 Planning proposals for the Kai Tak (North) Outline Zoning Plan (OZP) and Kai Tak (South) OZP were gazetted in August 2001. Following subsequent reviews and consultation processes, the OZP were re-gazetted and approved by the Chief Executive in Council (CE in C) in November 2007. A further revised version was approved by the CE in C in September 2012.

6.1.2 The OZP provided the statutory planning framework for the area. As a part of the strategic road network within the South East Kowloon Development,

Route 6 forms an east west express link between West Kowloon and Tseung Kwan O. Route 6 comprises the Central Kowloon Route (CKR), Trunk Road T2 and Tseung Kwan O – Lam Tin Tunnel (TKO-LTT).

6.1.3 Details of the development of the Road T2 alignment and the options considered are presented below.

Previous Development of T2 Alignment

6.1.4 Under the South East Kowloon Development Comprehensive Feasibility Study (SEKD CFS) in 1999, Trunk Road T2 was proposed to link up the Central Kowloon Route and Trunk Road T1 (no longer being considered) at the western end and the Western Coast Road (WCR) (now renamed as the Tseung Kwan O - Lam Tin Tunnel) at the eastern end. The western portion of Trunk Road T2 was proposed to be an at-grade road which descended with a gentle gradient into the tunnel section. Elevated viaduct was proposed at the eastern portion of Trunk Road T2 near the existing Kwun Tong Ferry Pier to allow the road to pass over other proposed roads. The alignment then crossed over Tsui Ping Nullah and turned down to join with the proposed WCR (TKO-LTT).

6.1.5 The study proposed extensive reclamation in the Harbour, resulting in strong criticism from the public and then a re-study for the South East Kowloon Development. This SEKD CFS alignment option was, therefore, not further considered.

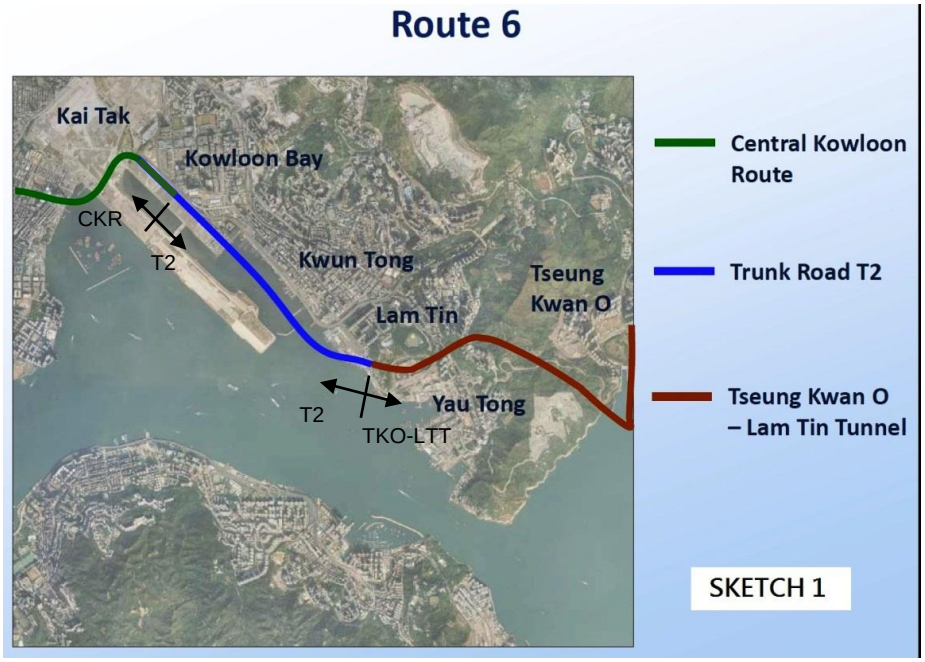
6.1.6 Following the SEKD CFS, the Kai Tak Planning Review (KTPR) was conducted in January 2004 with the objective of reviewing the planning basis of SEKD CFS and formulating a Preliminary Outline Development Plan (PODP), starting on the basis of no reclamation. The PODP developed under KTPR proposed the Road T2 to be in form of tunnel that would be fully embedded into the seabed of Kwun Tong Typhoon Shelter (KTTS) and the Harbour in order to avoid reclamation. This tunnel option of Road T2 and the PODP was generally accepted by the public during the public consultations undertaken at that time.

6.1.7 Subsequently, the Kai Tak Development Engineering Study (KTDES) was undertaken in 2007 and this study reviewed the PODP and undertook detailed engineering feasibility studies, including the proposed Road T2 alignment. Based on the alignment constraints arising from the necessary connections with CKR and TKO-LTT, the layout of Road T2 was developed.

6.1.8 In the KTDES scheme, about 2.6 km of Road T2 would be in the form of tunnel and about 2.0 km of the tunnel was to be in the form of an immersed tube tunnel placed under the seabed. After its connection with CKR, the Road T2 alignment runs mostly at-grade along the South Apron, starting from the mouth of the Kai Tak Nullah. After crossing the Jordan Valley Box Culvert (JVBC), Road T2 starts to depress and then descends into tunnel under the Road D4 towards the seabed in KTTS. Within the KTTS, the Road T2 scheme comprised a fully embedded tunnel in the seabed that passed through and

under the KTTS, breakwaters and sewage submarine outfall at the Kwun Tong Preliminary Treatment Works (KTPTW) at a gentle gradient before making landfall at CKL. At CKL the Road T2 comprised a depressed open section to allow connection with the TKO-LTT.

6.1.9 The alignment of Road T2 developed by the KTDES was the scheme to be taken forward for further investigation under this Assignment and is illustrated in Sketch 1 below



6.1.10 During the period from the development of the KTDES alignment in 2009 and the date of this review, a number of key items have changed and these have influenced the selection of the T2 alignment options, specifically;

- The alignment at the Cha Kwo Ling end of the T2 which interfaces with the TKO-LTT, has been lowered from approximately -21.3mPD to -26.9mPD as a result of the preliminary design and public consultation under the TKO-LTT assignment. The developments in the interface with TKO-LTT are more fully described in paragraphs below.

- New techniques in tunnel construction have reduced the risks associated with TBM works within the soft and mixed ground conditions anticipated for the T2 alignment.

- Similar Hong Kong highway projects have now adopted TBM tunnelling for similar ground conditions to those encountered in the T2 alignment, significantly increasing the knowledge and experience in handling this form of construction.

- The timing of the construction of the T2 has been moved from commencement of 2012 to end of 2015 resulting in a different set of project interfaces to those anticipated at the time of the KTDES.

6.1.11 Based on these items the T2 alignment and construction method has been developed to fit between the two key interfaces of CKR and TKO-LTT.

CKR-T2 interface of alignment

6.1.12 The eastern portion of the alignment for the CKR at the interface with T2 was established in the investigation stage for the CKR finalised in 2009. This has been subject to adjustment in the detailed design assignment for the CKR (under the assignment CE43/2010(HY)). Through alignment studies under this assignment the interface between CKR / T2 has been fixed.

T2-TKO-LTT interface of alignment

6.1.13 Commencing in September 2009, the Investigation Assignment for the TKO-LTT (under the assignment CE42/2008(CE)) issued a series of working papers and studies which investigated options for the TKO-LTT alignment. Included these alignment options were options for the Lam Tin Interchange (LTI) including the interface between T2 / TKO-LTT.

6.1.14 The final selected option of a tunnel section passing under Cha Kwo Ling Village and interfacing with T2 at the Public Cargo Working Area has been taken as a fixed point for the consideration of T2 option.

T2 alignment

6.1.15 The T2 assignment has reviewed alignment options connecting these two fixed interfaces and has given due regard to the key constraints and design requirements of the tunnel including:

(a) minimising dredging of the seabed

(b) the geological profile and its ability to cater for the various alignment options

(c) the existing / proposed development at the South Apron landfall including the existing Public Works Central Laboratory (PWCL), Hospital Sites identified for development and the existing Kerry Dangerous Goods Godown;

(d) the Sewage Submarine outfall in Kwun Tong Typhoon Shelter (KTTS);

(e) the breakwaters within the KTTS;

(f) the Public Cargo Working Area (PCWA);

(g) the East Harbour Crossing (EHC);

(h) the views of relevant government departments; and

(i) the environmental aspects.

6.1.16 Each of the initial alignment options is technically feasible and has its own advantages and disadvantages in terms of financial, environmental and public aspects.

6.1.17 Following a review of the details for the project, eight potential horizontal alignments were identified and these are illustrated in Figure 6.1. These eight alignments are briefly described in Table 6.1 below while the summary of the estimated quantities of C&D materials generated for each development option is presented in Table 7.4.4.

Table 6.1

Horizontal Alignment	Description
H1b - a	This is the KTDES horizontal alignment but incorporating the developments in the alignment at Cha Kwo Ling defined under the TKO-LTT assignment. Tying in with CKR at the Kowloon Bay interchange, passing through the South Apron and KTTS to tie in with the TKO-LTT at Lam Tin Interchange.
H1b – b	Tying in with the CKR in Kowloon Bay Interchange, turning south through the South Apron to reach the former runway, running along the runway to the end of the KTTS and then turning east to cross over from the end of the runway to Cha Kwo Ling to tie in with the TKO-LTT at Lam Tin Interchange.
H1b – c	Similar to H1b-a, this horizontal alignment ties in with CKR at the Kowloon Bay interchange, passing through the South Apron and KTTS to tie in with the TKO-LTT at Lam Tin Interchange. An increased curvature of the alignment is used in the KTTS to change the portion of the KTTS breakwaters that may be affected during construction.
H1b – d	This horizontal alignment ties in with CKR at the Kowloon Bay interchange, then takes an inland route passing through the Kwun Tong district to tie-in with the TKO-LTT at Lam Tin Interchange.
H1b – e	Similar to H1b-d, this horizontal alignment is also an inland route which ties in with CKR at the Kowloon Bay interchange, but then follows a route alongside the existing Kwun Tong Bypass to tie in with the TKO-LTT at Lam Tin Interchange.
H1b – f	Tying in with CKR at Kowloon Bay Typhoon Shelter , and turning southeast to run along the runway to the end of the KTTS and then turning east to cross over from the end of the runway to Cha Kwo ling to tie in with the TKO-LTT at Lam Tin Interchange.
H1b – g	This horizontal alignment ties in with the CKR at Kowloon Bay Interchange and then runs along to about the midway of South Apron and then turns south to run along the runway, followed by the similar alignment to H1b-b to tie in with the TKO-LTT at Lam Tin Interchange.
H1b - h	Similar to H1b-b, this horizontal alignment ties in with the CKR at the Kowloon Bay Interchange, running along the end of the south Apron before turning south to reach the near end of the former runway, and then cross over the KTTS to tie in with the TKO-LTT at Lam Tin Interchange.

6.1.18 For each of these horizontal alignments, potential vertical alignments were established considering the feasible methods of construction predominating along the alignments, i.e.

- High Level – adopting predominantly viaduct structures to support the alignment with at-grade or embankment works at the ends to tie-in with the adjacent CKR and TKO-LTT alignments.

- Low Level – adopting combinations of at-grade, open trough, cut and cover or immersed tube tunnel forms of construction as suited to the site constraints

- Deep Level – adopting soft ground or rock tunnelling methods such as drill and blast, drill and break or TBM depending on the particular ground conditions prevalent in the section of alignment.

6.1.19 In general the high level options were considered not to be feasible due to either the direct conflict with existing, or future development of the area, the very significant visual impact of the elevated structures and/or the need for permanent reclamation within the harbour. The need for permanent reclamation within the harbour would not have satisfied the requirements of the Protection of the Harbour Ordinance as it was established in the T2 alignment study that other feasible alternatives were available that did not require reclamation.

6.1.20 The low level options were also not preferred due to either the direct conflict with existing or future development of the area or the need for temporary reclamation within the harbour. Again, the need for temporary reclamation within the harbour would not have satisfied the requirements of the Protection of the Harbour Ordinance as it was established in the T2 alignment study that other feasible alternatives were available that did not require reclamation. Further, the adoption of cut and cover methods or Immersed tube tunnel methods for the construction of the tunnel would have generated large quantities of excavated materials (including contaminated mud) that would have required disposal at sea. This large quantity of excavated material could be significantly reduced by the adoption of deeper tunnel methods.

6.1.21 Therefore, the preferred option was identified as deep tunnel alignment using the mixed ground tunnel Boring Machine (TBM) method with a direct alignment passing through the South Apron, under the KTTS and connecting with the TKO-LTT alignment at the PWCA in CKL i.e. alignment H1b – a – Deep Level.

6.2 Construction Methodologies

6.2.1 Site-specific construction methodologies have been developed for construction of Trunk Road T2.

South Apron Cut-and-Cover Tunnel and Depressed Road

6.2.2 The proposed Trunk Road T2 starts at the South Apron in the west at the connection with Central Kowloon Route (Chainage 5759m). The Trunk Road T2 is to be a dual 2-lane road which consists of approximately 100m at grade

road, 200m of depressed road and 500m of cut and cover tunnel, until the seawall at the south end of South Apron (Chainage 6559m) when the road level reaches a depth of approximately -29.6mPD, which is deep enough to allow the marine tunnel to be constructed using Tunnel Boring Machine (TBM) under the seabed.

6.2.3 The planned programme of works is such that the cut and cover sections for the T2 will commence first with the excavated materials being stockpiled on site or removed to Public Fill Reception Facilities. The planned stockpile area Works Area 4 has an anticipated capacity of 50,000m3 as shown in Figure 3.7. Once this capacity is reached further material will be exported off site for disposal at Public Fill Reception Facilities. Throughout the duration of the construction works the materials within the stockpile will be used for backfilling over the completed sections of cut and cover tunnel and so provide a source of material to be managed by the Contract to avoid importing fill materials for the project and minimise export of excavated materials from site.

6.2.4 During excavation for the South Apron and Cha Kwo Ling cut and cover sections of tunnel it is anticipated that quantities of old marine muds will be excavated. As these materials are not suited for disposal at the Public Fill Reception Facilities these materials will have to be disposed to East Sha Chau Contaminated Mud pits. The alternative is that the marine mud is treated on site by mixing with sand and cement such that it can be used as fill materials for non-critical areas such as future at-grade roads(such as under D4) or landscaped areas such as in the promenade areas at the former PCWA.

6.2.5 For the majority of the cut and cover sections between chainage 6400 to 6620, it is anticipated that diaphragm walling will be used to support the excavation. However, for the section of tunnel in front of the PWCL it is anticipated that contiguous large diameter bored will be used to support the excavation and further limit ground movement adjacent to the PWCL.

6.2.6 For the remaining section of cut and cover tunnel either tubular steel or sheet pile walling will be used to support the excavation, depending on the depth of excavation and numbers of layers of propping to be adopted for the excavation.

6.2.7 In the depressed road section the steel or sheet pile walling will be used to support the excavation, depending on the depth of excavation and numbers of layers of propping to be adopted for the excavation

6.2.8 From the at-grade section small quantities of excavated materials are anticipated for the construction of the drainage network for the roads and foundations for sign gantries.

Ventilation and Administration Building

6.2.9 Two ventilation buildings (Western and Eastern) are proposed in total, one located at each end of Trunk Road T2. At the South Apron the ventilation building is proposed to be located adjacent to the planned DSD desilting

compound of Jordan Valley Box Culvert. The western ventilation building will be two storeys in height and tunnel air will be exhausted vertically upwards from the roof of the building. The ventilation building is constructed with bored piles down to rock. The foundation and basement floor will be constructed in open excavation using sheet piling to support the excavation. For the eastern ventilation building the site formation and foundations will be constructed under the TKO-LTT project and thus are not considered here. Both the buildings will be constructed of reinforced concrete. No mid-tunnel exhaust is anticipated for this project.

6.2.10 The single administration building is proposed to be located at the Cha Kwo Ling side of Trunk Road T2 and is constructed within the project boundary of the TKO-LTT at Lam Tin Interchange (LTI). The site formation is rock slope excavation will be carried out as part of the formation works for the LTI and is assessed under those works. The excavated materials from these works will be stockpiled on site for reuse, or transported to the project barging point for disposal to the appropriate location.

Tunnel Boring Method (TBM)

6.2.11 The TBM has been selected as the feasible option for the construction of the Road T2 submarine tunnel. Using the TBM to construct the marine tunnel would enable the T2 construction without unnecessary disruption to the KTTS and reduced excavated materials for disposal.

6.2.12 In general, all the equipment to facilitate TBM tunneling shall be placed at the South Apron from where the TBM is launched. The equipment includes slurry treatment plant, grouting plant, water storage tanks, compressed air plant, temporary ventilation facility, gantry cranes, precast segment storage yard etc. which will be considered in more details. The TBM will start boring from the launching shaft at the South Apron towards Cha Kwo Ling where a TBM retrieval shaft will be constructed for the removal of the TBM. The excavated materials from the TBM will be removed to a spoil processing plant located next to the launching shaft.

6.2.13 The mixed material excavated from the TBM will be dried and pressed to remove excess water and to recycle the bentonite (drilling fluid). The cleaned drilling fluid will be returned to the TBM system for re-use. The excavated material will be placed via a conveyor to a temporary stockpile area adjacent to the launching shaft. As the TBM works will progress 24 hours per day, 7 days per week, the temporary stockpile area will be used to temporarily store the TBM excavated materials until normal working hours and removal by barge from the barging point.

6.2.14 The excavated materials would be moved from the temporary stockpile area to the barging point via a fully enclosed conveyor system to minimise dust and noise emissions. In the event that the small structure at the planned barging point has not been removed as part of the Kai Tak development, this single

storey building, which we understand to be a steel frame structure with corrugated sheet cladding, will be demolished at the commencement of the T2 contract, generating very small quantities of non-inert waste to be disposed to landfill facilities for recycling.

6.2.15 It is anticipated that the temporary stockpile area would be maintained to minimise ducts and noise emissions.

Cha Kwo Ling Cut and Cover Tunnel Section

6.2.16 To allow for the interface between the T2 and TKO-LTT works a cut and cover tunnel will be constructed. This section of cut and cover tunnel will also function as the receiving shaft for the TBM works.

6.2.17 This section of tunnel will be constructed using diaphragm walls for the, approximately, 30m deep excavation. The excavated materials from this section will be transported to the stockpile area on the South Apron for removal from site via the barge point.

6.2.18 Following removal of the TBM via the receiving shaft the top slab of the cut and cover tunnel section will be completed and the remaining portion of shaft backfilled up to ground level using material from the South Apron stockpile.

Other Works Items

6.2.19 Other works items to be carried under the T2 contract are anticipated to be; the construction of Footbridge FB-02, Footbridge FB-03 extension, Footbridge FB-06, at-grade roads L10 and L18, and improvement works of some existing road junctions. Small quantities of excavated materials would be generated from the roads and drainage works and piled foundations involved.

7 MANAGEMENT OF C&D MATERIALS

7.1 Types of C&D Materials

7.1.1 C&D materials comprise rejected structures and materials from demolition of buildings and surplus materials arising from excavations as well as solid wastes that are generated from the works or the workforce on-site. It can be broadly divided into two types; inert and non-inert.

7.1.2 The inert portion, usually termed as “inert C&D material”, comprises excavated rock, rubble, boulder, earth, soil, sand, concrete, asphalt, brick, tile, masonry or used bentonite that can be used for reclamation and earth filling projects.

7.1.3 The Public Fill Committee (PFC) and the Fill Management Division (FMD) of CEDD should be kept informed of the programme and forecast amount of C&D materials generated by this Project to facilitate the matching of surplus fill materials with deficits in other projects in Hong Kong.

7.1.4 The non-inert portion of construction waste, usually termed as "non-inert C&D material", comprises timber, metal, glass, steel, packaging waste, organic materials, plastics, and land-based contaminated materials. Some non-inert C&D materials can be reused or recycled by landfill facilities prior to disposal. Recyclables include metals, paper/cardboard packaging and plastic (plastic bottles/ containers, plastic sheets/foam from packaging materials). Non-recyclable materials are treated as general refuse requiring disposal at a landfill.

7.2 The Waste Management Hierarchy

7.2.1 A widely accepted waste management hierarchy is described below. It demonstrates the desirability of various waste management methods which should be implemented for this Project.

- Avoid – Complete avoidance of waste generation
- Minimise – The reduction of waste, generally within the confines of the project, through changes in processes or procedures. Also includes the reuse of materials without additional processing (other than cleaning, as necessary).
- Recycle – Recycling of wastes for use as other purposes, such as input materials or materials recovery. Target of waste recycling except for chemical wastes is at least 50% by weight as far as practicable.
- Treat – Destruction, detoxification, neutralisation, etc. of wastes into less harmful substances that are suitable for disposal.
- Dispose – The release of waste to air, water, or land in a properly controlled and staged manner so as to render them harmless; land disposal may involve volume reduction, encapsulation, leachate containment and monitoring techniques.

7.2.2 Opportunities for reducing waste generation have been evaluated in the course of the assessment to:

- Avoid or minimise the generation of waste where possible during the planning/design phase stage;
- Adopt better site management practices in materials control and promote on-site sorting of C&D materials, where practicable, during the construction stage; and
- Explore the potential for reuse / recycling of materials, e.g. consideration will be given to the possible re-use of excavated mud for use as fill material.

Further efforts will be made during the progress of the works to identify opportunities within concurrent projects to reuse the surplus materials as far as possible in lieu of disposal of at fill banks, such as:

i) Shatin to Central Link;

ii) Central Kowloon Route;

iii) SENT Landfill Extension;

iv) Remaining Development in Tung Chung.

7.2.3 This management hierarchy shall be adopted as far as possible to allow maximum sustainability. Waste reduction management shall be introduced at the planning and detailed design stage and carried through the construction activities.

7.3 Proper Waste Management

7.3.1 Public filling areas, public filling barging points, public fill stockpiling areas, fill banks and C&D materials recycling facilities would accept public fill:

- Public Filling Area – A designated part of a development project that accepts public fill for reclamation purposes.
- Public Filling Barging Point – A strategically located public fill reception facility that utilises barge transportation to transfer public fill from road vehicles to marine based public filling areas/fill banks.
- Public Fill Stockpiling Area – A newly reclaimed land where public fill is stockpiled as surcharging materials to accelerate the settlement process. After they have achieved the required settlement, the public fill will be removed and deposited in other reclamations.
- Fill Bank – An area allocated for temporary stockpile of public fill for later use.

7.3.2 In addition to Public Fill Reception Facilities, other facilities are also available:

- Sorting Facilities – C&D wastes containing more than 50% by weight of public fill can be delivered to the sorting facilities. This arrangement helps waste producers, particularly small construction sites that do not have enough space to carry out on-site sorting.
- Landfills – C&D wastes containing not more than 50% by weight of public fill can be disposed of at the three strategic landfills, viz. the West New Territories (WENT) Landfill, the South East New Territories (SENT) – Landfill and the North East New Territories (NENT) Landfill which are managed by the Environmental Protection Department (EPD).

7.3.3 Sorting is important to recover reusable and recyclable wastes. To facilitate sorting a specific area will be allocated for on-site sorting waste, while suitable containers will be provided to temporarily store the sorted materials such as concrete, excavated spoil, etc. In case of limited space in the locality of works area that limits comprehensive sorting, waste materials will at least be separated into public fill and C&D wastes.

7.3.4 Reuse and recycling can divert C&D materials from waste streams back into the construction cycle. This can be achieved through balancing cut and fill, reusing items such as hoardings, formwork and scaffolding and recycling materials such as metals, concrete and bentonite.

7.3.5 Prior to disposal of surplus materials, all materials should be sorted and reused on-site or off-site while recyclable materials should be collected for recycler's reuse. Disposal of surplus materials to Public Fill Reception Facilities will be only considered as a last resort after exhausting all alternative means.

7.3.6 Surplus inert C&D materials which are not re-usable on site or able to be absorbed by other projects should be taken to Public Fill Reception facilities whilst non-inert C&D materials should be disposed of at landfill. To avoid fly tipping, contractors should follow Government's practice under the Trip-Ticket System (DEVB TC(W) No. 6/2010) to ensure that truck drivers dispose of construction waste at the appropriate facilities.

7.4 C&D Materials from the Project

7.4.1 Based on the latest available information and design of the project, C&D materials are expected to be generated from the following:

1. Site clearance for the Project;
2. Excavation for at-grade, depressed roads, cut and cover tunnel works;
3. Construction of at-grade, depressed roads, cut and cover tunnel and buildings; and
4. TBM construction.

7.4.2 The summary of the quantities of the excavated materials generated from the Project arising from different construction activities to be re-used and disposed off site are shown in Table 7.4.2 and Table 7.4.2b without bulk factor and with bulk factor, respectively.

7.4.3 Construction of temporary works by the contractor i.e. diaphragm walls concrete paved work areas, temporary barging points, temporary roads for traffic diversion, temporary haul road, temporary reclamation, precast concrete blocks supporting formwork, etc. will also generate C&D materials. In order to minimize the generation of C&D materials from the demolition works of the

concrete pavement for the temporary haul road, reuse of broken asphalt from the fill banks will be considered for the construction of the haul road.

7.4.4 The construction programme indicates the timing for generation of the above-mentioned C&D material sources is shown in Appendix B.

7.4.5 A breakdown of C&D materials by type and volume expected from construction of Trunk Road T2 is discussed in the following paragraphs.

a) C&D Materials Generated from Site Clearance:

Cleared vegetation derived from the ground preparatory works should be segregated from any soil materials, where practical, and sent to a suitable disposal site identified and agreed by EPD. The landfills will generally only accept a maximum of 50% by weight of inert construction waste. It is therefore important that soil / vegetation are kept segregated. Inert materials generally include soil, rock and concrete, while non-inert materials involve timber, paper, vegetation and plastic, etc. These inert and non-inert wastes will be classified clearly in contract documents. As the existing area is mainly concrete pavement of about 11,846m3 inert C&D materials, it would be reused and recycled as much as possible before disposal off site. It is expected that the top soil to be removed for the Project would have a small amount of non-inert materials of 2,000m3 during site clearance and another small amount of 1,000 m3 of general refuse. It is envisaged that excavated top soil, if suitable, will be reused for landscaping work and this would be investigated further in the detailed design phase of this Agreement.

b) C&D Materials Generated from Excavation for at-grade, depressed roads, cut and cover tunnel and buildings:

In the preliminary design stage, the following efforts have been given to minimize excavation for the cut and cover tunnel, depressed road, and building construction.

1. Adoption of a tunnel section with ventilation ducts on top of the carriageway rather than the original tunnel section design with ventilation ducts at both sides of the carriageway.

2. Adoption of permanent diaphragm wall design for a section of cut and cover tunnel at South Apron rather than open excavation.

3. Minimising the width of the highway to minimum acceptable limits and hence minimising tunnel section width.

The excavated materials will be reused as much as possible to minimize the amount of materials for disposal off site. In the T2 Project, there are cut and cover construction works. The Contractor for the Project could programme his works such that the excavated materials from the 1st cell of the cut and cover works can be placed at the proposed nearby stockpiling area. The excavated

materials from the 2nd cell of cut and cover works will be reused if applicable for backfilling to the 1st cell of the cut and cover section. The excavated material in the stockpiling area will then be reused for the filling material in the section of 2nd cell cut and cover works. This can minimize the surplus excavated materials for the disposed off site.

It is expected that the excavated materials of 588,367m^3 [1]under T2 project could be reused as much as possible. There will be surplus of about 356,925m^3 C&D materials. (588,367m^3 excavated minus 231,442m^3 reuse).

Similarly the excavated materials from the depressed road, the launching shaft and the receiving shaft will be placed at the proposed stockpiling area before reusing the excavated materials for the backfilling works on site.

As mentioned in Section 6.1.4, during excavation for the cut and cover tunnels it is anticipated that quantities of old marine mud will be excavated. The intention is to treat all marine deposits by mixing with sand and cement on site, and for the treated materials to be re-used on site as backfill above the cut and cover tunnel. The two stockpiling areas are WA4 and WA2 (shown in Figure 3.7) which provide a stockpiling area of approximately 2.2Ha for stockpiling and treatment of marine deposits. The two stockpiling areas would be provided under the contract.

c) C&D Materials Generated from Construction of at-grade, depressed roads, cut and cover tunnel and buildings:

In accordance with WBTC No. 19/2001 (metallic Site Hoarding and Signboards), re-usable metal hoardings and signboards should be utilized on site to reduce the volumes of inert C&D materials.

Where foundation, diaphragm and contiguous pile wall construction utilizes bentonite slurry, disposal of the slurry should be reduced. Bentonite slurry should be reused as far as possible and final residues disposed of in accordance with the Practice Notes For Professional Persons ProPECC PN 1/94. Slurry may either be disposed of at the marine disposal grounds (subject to obtaining a license from EPD) or to the public drainage system following treatment to satisfy relevant effluent discharge standards (as set out in the WPCO Technical Memorandum on Effluent Standards).

d) C&D Materials Generated from TBM Construction:

The total volume of excavated material generated from the TBM is estimated to be approximately 619,055m^3.

The excavated surplus inert C&D materials generated from the TBM construction will be properly segregated and good quality rock can be delivered to local quarries for reuse.

[1] Total estimated volume excavated of the T2 project (1,207,422 cubic metres) minus the total volume of excavated material generated from the TBM (619,055 cubic metres). Table 7.4.2b refers.

7.5 Minimising C&D Material Generation from this Project

7.5.1 Practice of avoiding and minimising waste generation and recycling will be adopted as the first priority. There are several ways to minimise the generation of C&D materials on site. These include:

7.5.2 Good site practice and management – On-site environmental co-ordinators would be employed by the Contractor and identified at the outset of the works. They are responsible to prepare a Waste Management Plan (WMP) in accordance with the requirements set out in ETWB TC(W) No. 19/2005. The WMP may include monthly and yearly Waste Flow Tables with waste generation, disposal and recycling records. Those tables will be kept up to date and should minimise over ordering. Considering Trunk Road T2's large scope of works, more than one co-ordinator may be needed. Good coordination and communication should be maintained to ensure the waste record is regularly updated and reviewed.

- Better programming of works – a robust design work schedule and/or construction programme is essential to projects of a longer duration to minimise over ordering, minimise stockpiling duration and maximise reuse opportunity. Tentative programme provided in Appendix B should be followed.

- On-site sorting – waste materials should be sorted into inert, non-inert and recyclable/reusable materials. Sorting should be carried out either on site or in designated sorting areas. Use of excavated soft materials for landscaping works should be considered where appropriate.

- Reuse / recycling – the contractor shall be responsible for identifying what materials can be recycled / reused. On-site reuse / recycling of materials such as steel formwork, reinforcement bards, steel mesh, etc. should be investigated and exhausted as far as possible before treatment / disposal off-site. Excavated soft C&D materials should be reused in the backfilling works of the cut and cover tunnel within own site as far as possible. Future reuse of surplus materials in concurrent projects, including the reuse of good quality rock in local quarries, should be actively considered. Disposal of surplus materials to Public Fill Reception Facilities would be only considered as a last resort after exhausting all alternative means. Non-inert waste should be collected and disposed of to the appropriate facilitates.

7.5.3 Under the contract, the contractor will be required to minimise the generation of C&D materials and maximise on-site reuse by complying with the following technical circulars and practice notes:

- DEVB TCW No. 8/2010, Enhanced Specification for Site Cleanliness and Tidiness;

- ETWB TC(W) No. 22/2003A, Additional Measures to Improve Site Cleanliness and Control Mosquito Breeding on Construction Sites;
- Project Administration Handbook for Civil Engineering Works, 2012 Edition;
- ETWB TC(W) No. 31/2004, Trip Ticket System for Disposal of Construction & Demolition Materials;
- ETWB TC(W) No. 19/2005, Environment Management on Construction Sites; and
- Practice Note for Authorised Persons and Registered Structural Engineers 243: Construction and Demolition Waste.

7.5.4 The Contractor should also make efforts in the design and construction stages to minimise the generation of C&D materials and to incorporate a Waste Management System into the WMP for effective management and control of C&D materials to avoid / reduce / minimise the generation of C&D materials during construction. It is anticipated that the tunnel section would be procured through a D&B contract, based on an Engineer's conforming design. The procurement approach is subject to confirmation in due course.

8 CONCLUSION AND RECOMMENDATIONS

8.1.1 Based on the latest construction design of the Project, C&D materials from the following sources will be generated:

- Site clearance for the Project;
- Excavation for at-grade, depressed roads, cut and cover tunnel works;
- Construction of at-grade and depressed roads, cut and cover tunnel and buildings; and
- TBM construction.

8.1.2 It is expected that a total of 1.21M m3 of C&D materials will be generated under Trunk Road T2, of which the majority will be inert C&D materials.

8.1.3 Of this total generation of 1.21M m3 it is anticipated that some 0.23M m3 can be reused within the project.

8.1.4 Every effort has been made to maximise the available stockpiling area for reuse of materials generated under Trunk Road T2.

8.1.5 The Table 7.4.2 and Table 7.4.2b for respectively without bulk factor and with bulk factor in Appendix A briefly summarises the material generation and proposed reuse / disposal outlets.

8.1.6 The summary of C&D materials generated, reused and surplus materials arising from the project are shown in Table 7.4.3 and Table 7.4.3b for respectively without bulk factor and with bulk factor in **Appendix A**.

Appendix A – Figures & Tables

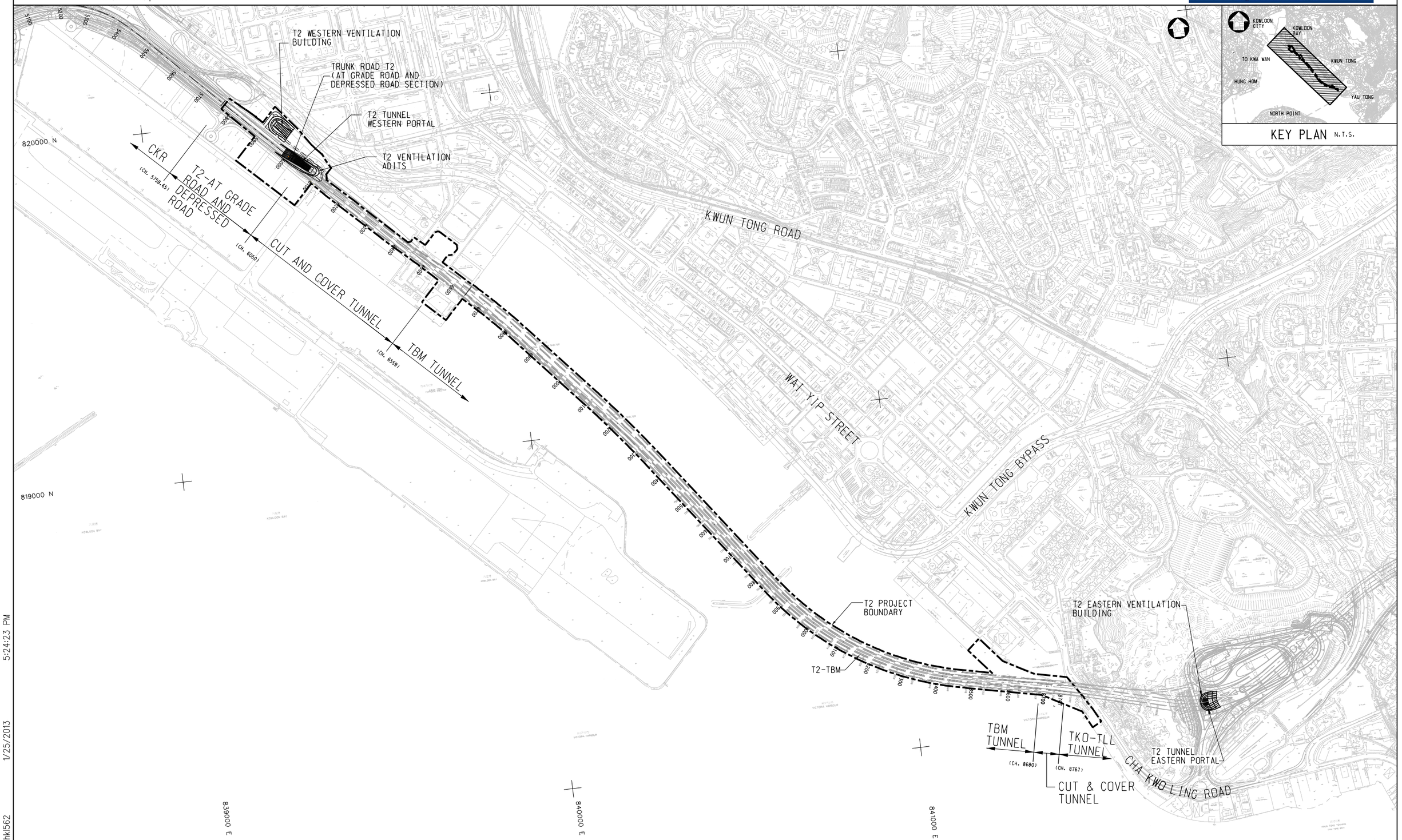
List of Figures

List of Tables

土木工程拓展署
Civil Engineering and Development Department
九龍拓展處
Kowloon Development Office

AGREEMENT NO. CE 38/2008(HY)
KAI TAK DEVELOPMENT - TRUNK ROAD T2 AND INFRASTRUCTURE AT SOUTH APRON - INVESTIGATION, DESIGN AND CONSTRUCTION

Hyder-Meinhardt JV



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GENERAL LAYOUT PLAN - T2 WORKS

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Drawing No.: FIGURE 3.1

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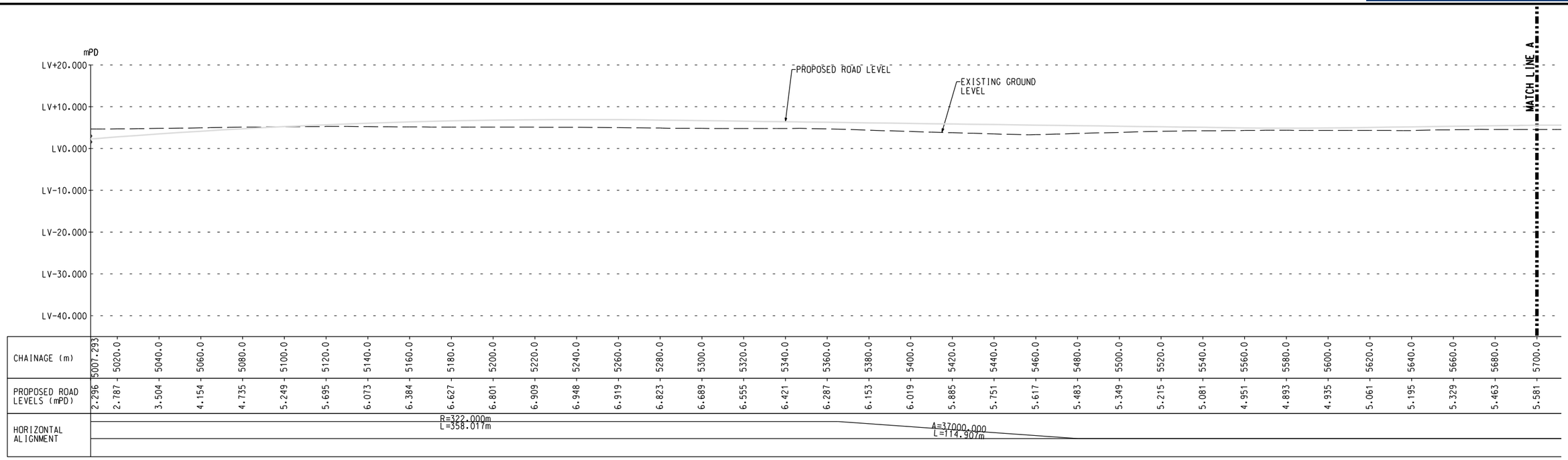

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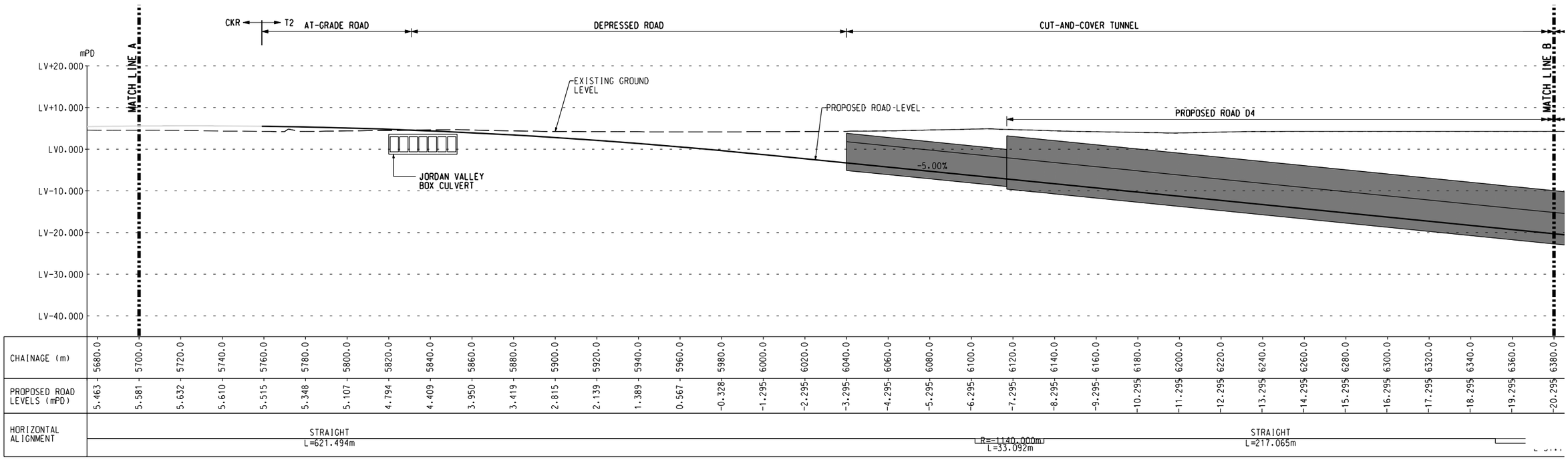

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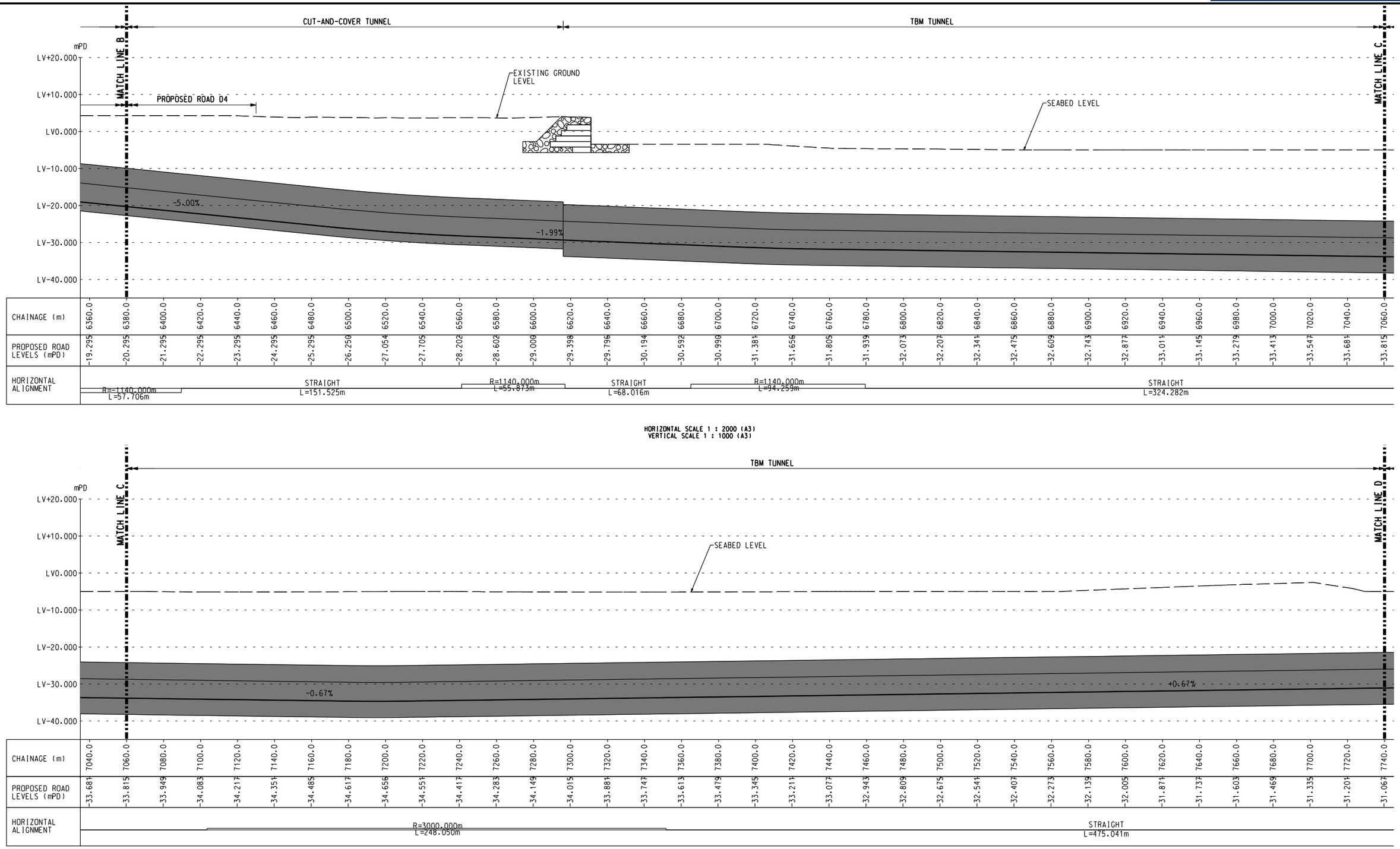

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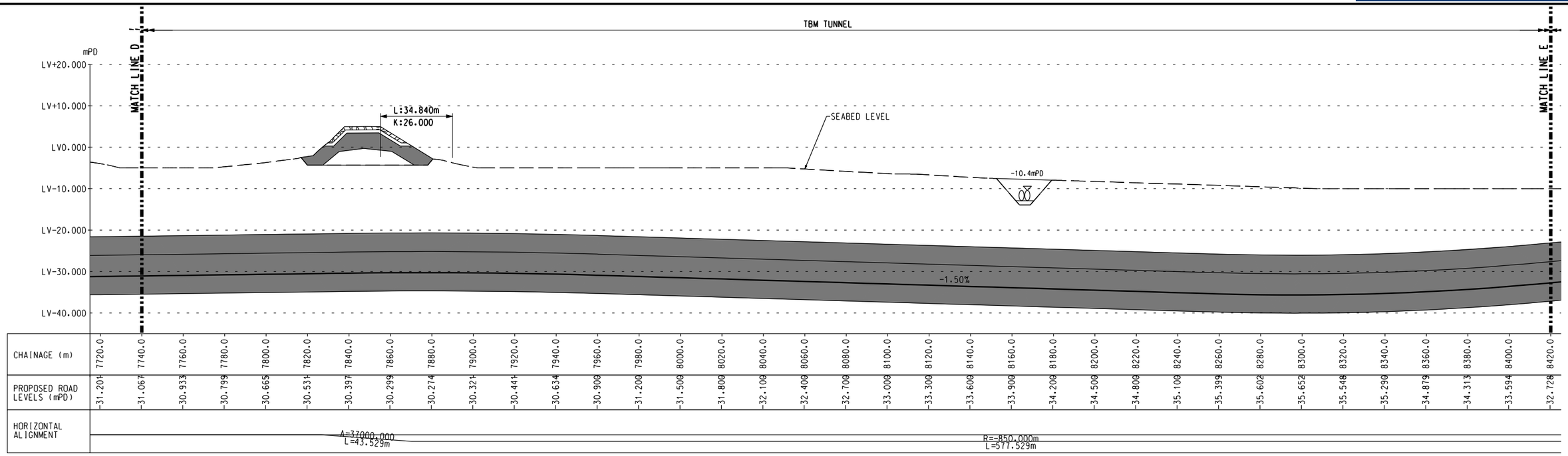

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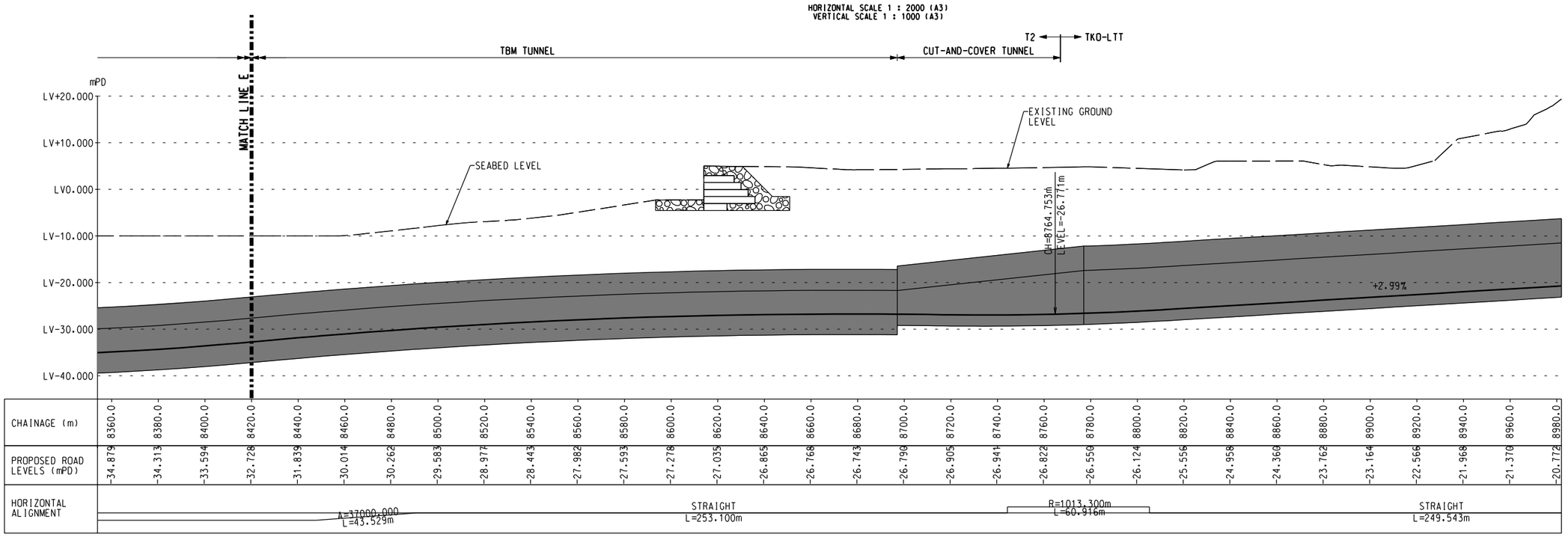

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		Drawing No. FIGURE 3.2b	Rev. -

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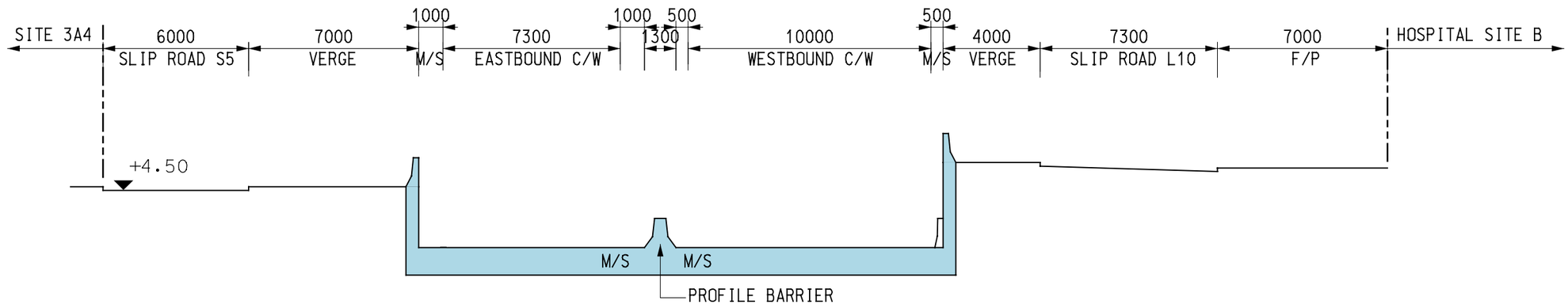

TYPICAL SECTION (TBM OPTION)

Rev.	Description	Date

Drawing title

TYPICAL SECTION OF DEPRESSED ROAD

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Scale 1 : 200 | Date DEC. 2012

File name FIGURE 3.3.dgn

Drawing No. FIGURE 3.3 | Rev. –

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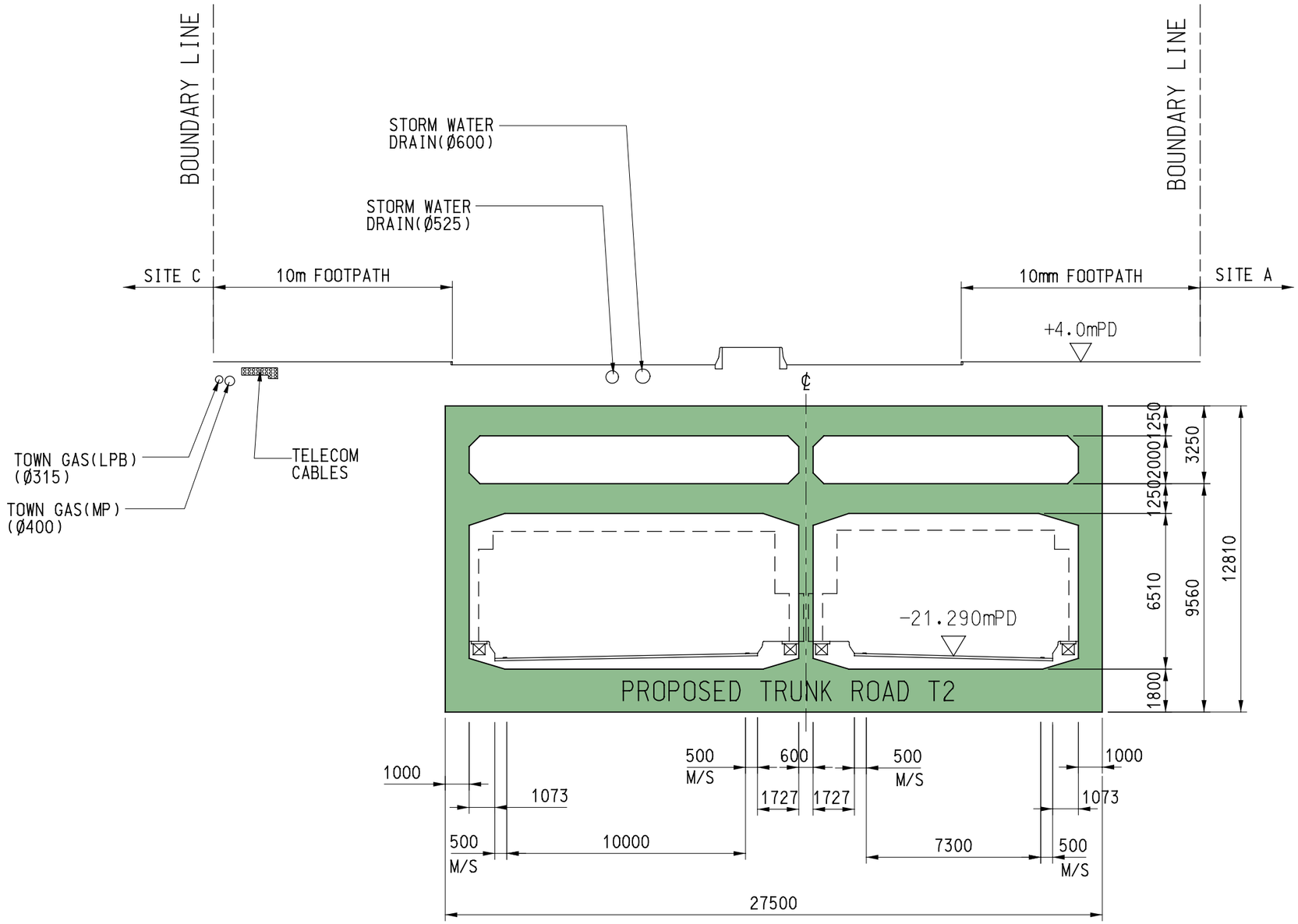
CAD FILE : K:\EB000560 Trunk Road T2 and Infrastructure at South Apron\F-Reports\Hyder input for EIA Text\TBM option\Figure\DGN\3.3-3.6\FIGURE 3.3.dgn



TYPICAL SECTION

Rev.	Description	Date

Drawing title

TYPICAL SECTION OF CUT AND COVER TUNNEL

Original Size: A3

Scale: 1 : 200 | Date: JAN. 2013

File name: FIGURE 3.4.dgn

Drawing No.: FIGURE 3.4

Rev.: –

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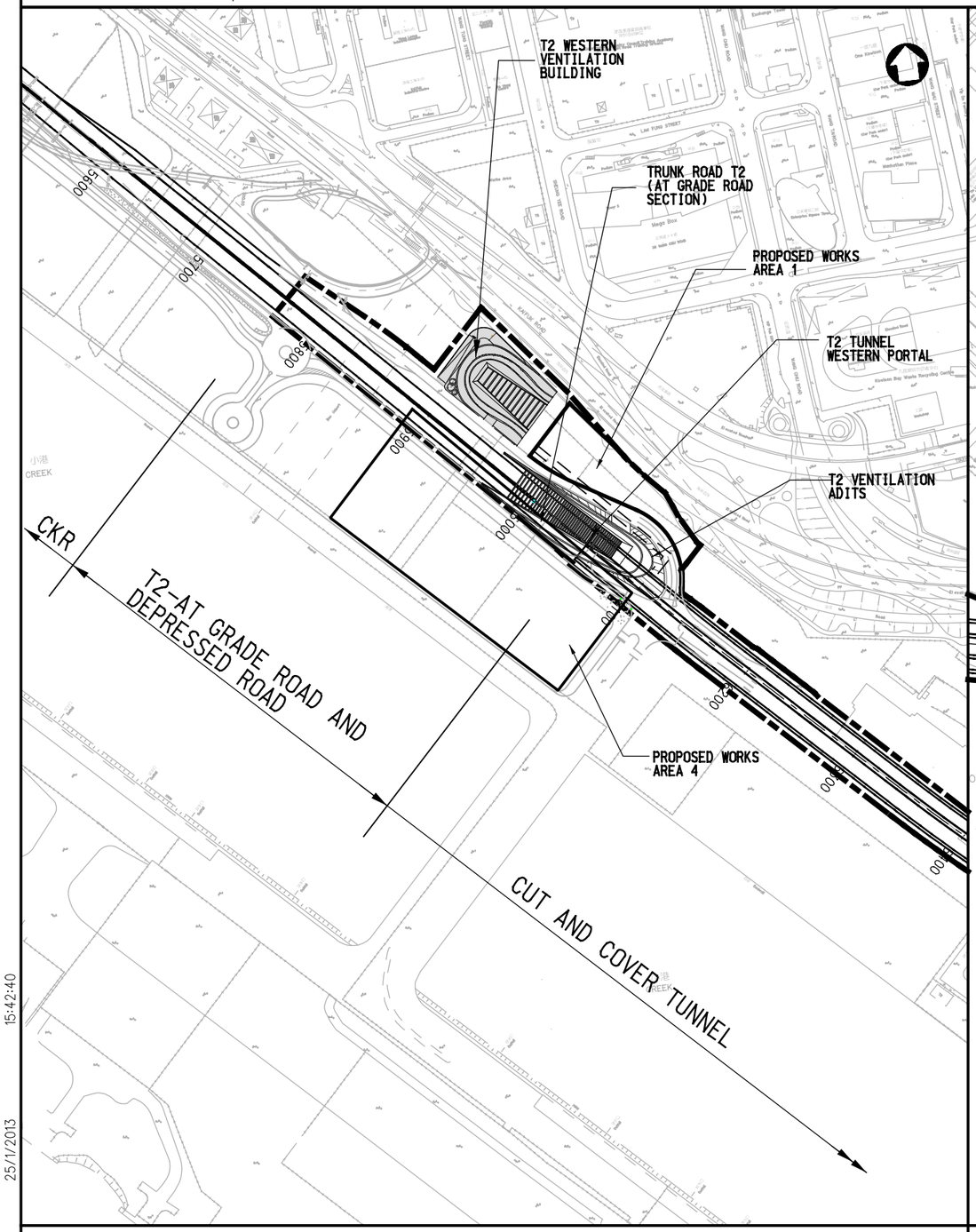
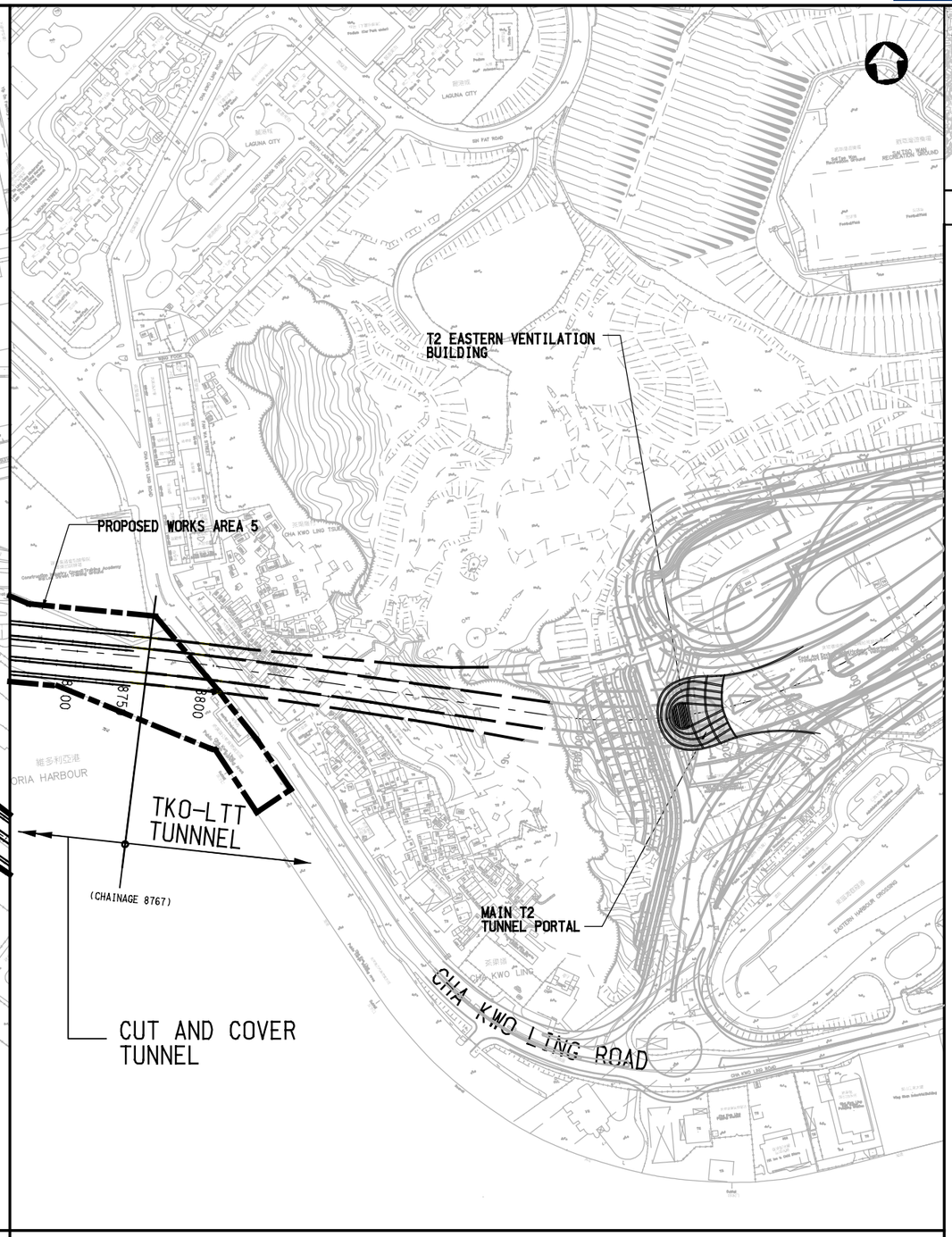
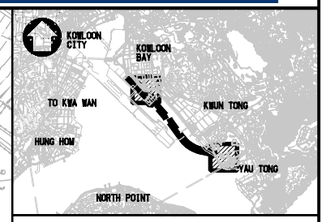
Civil Engineering and Development Department
九龍拓展處
Kowloon Development Office

AGREEMENT NO. CE 38/2008(HY)
KAI TAK DEVELOPMENT - TRUNK ROAD T2 AND INFRASTRUCTURE AT SOUTH APRON - INVESTIGATION, DESIGN AND CONSTRUCTION

Hyder-Meinhardt JV







KEY PLAN N.T.S.

T2 WESTERN VENTILATION BUILDING

T2 EASTERN VENTILATION BUILDING

Rev.	Description	Date

Drawing title

T2 WESTERN AND EASTERN VENTILATION BUILDINGS

Original Size	A3	Scale 1 : 4000	Date 17/JAN/2013
		File name	FIGURE 3.5.dgn
© Copyright reserved		Drawing No. FIGURE 3.5	Rev. –

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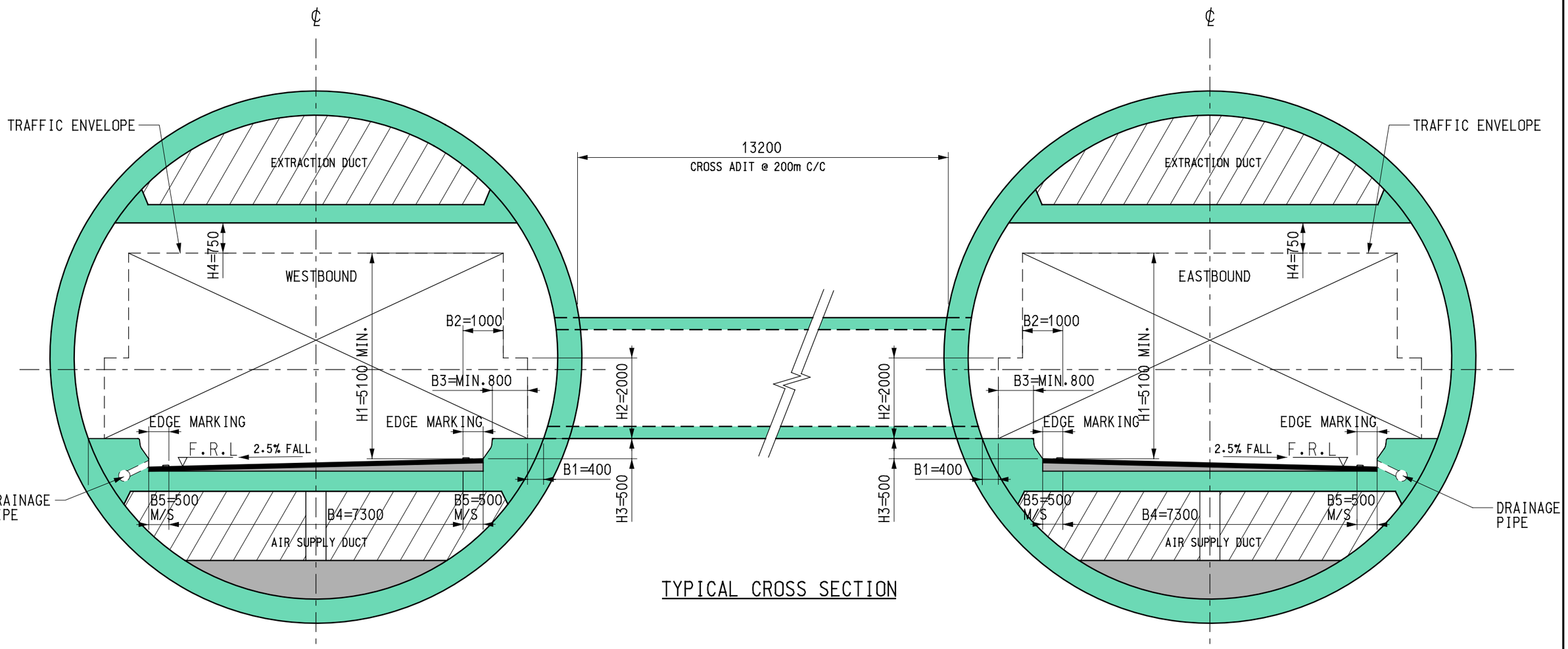
CAD FILE : K:\EB000560 Trunk Road T2 and Infrastructure at South Apron\F-Reports\Hyder input for EIA Text\TBM option\Figure\DGN\3.3-3.6\FIGURE 3.5.dgn



TYPICAL CROSS SECTION

DIMENSION	DESCRIPTION
H1	MIN. HEADROOM AS PER TPDM TABLE 3.5.1.1
H2	MIN. WALKWAY HEIGHT AS PER TPDM DIAGRAM 3.10.2.1
H3	MIN. PROFILE BARRIER AS PER TDPM CL 3.10.2.3
H4	E & M SIGNAGE ALLOWANCE AS PER TPDM DIAGRAM 3.10.2.1

DIMENSION	DESCRIPTION
B1	ALLOWANCE FOR HANDRAIL & SERVICES
B2	OFFSET AS PER TPDM CL 3.5.2.1
B3	MIN. WALKWAY DIMENSION AS PER TPDM TABLE 3.10.2.1
B4	MIN. CARRIAGEWAY AS PER TPDM CL 3.10.2.4
B5	MIN. MARGINAL STRIP AS PER TPDM CL 3.10.2.2

Rev.	Description	Date

Drawing title

TYPICAL CROSS SECTION OF THE SUBMARINE TUNNEL

Original Size A3

Scale 1:100 | Date 11/DEC/2009

File name FIGURE 3.6.dgn

Drawing No. FIGURE 3.6

Rev. –

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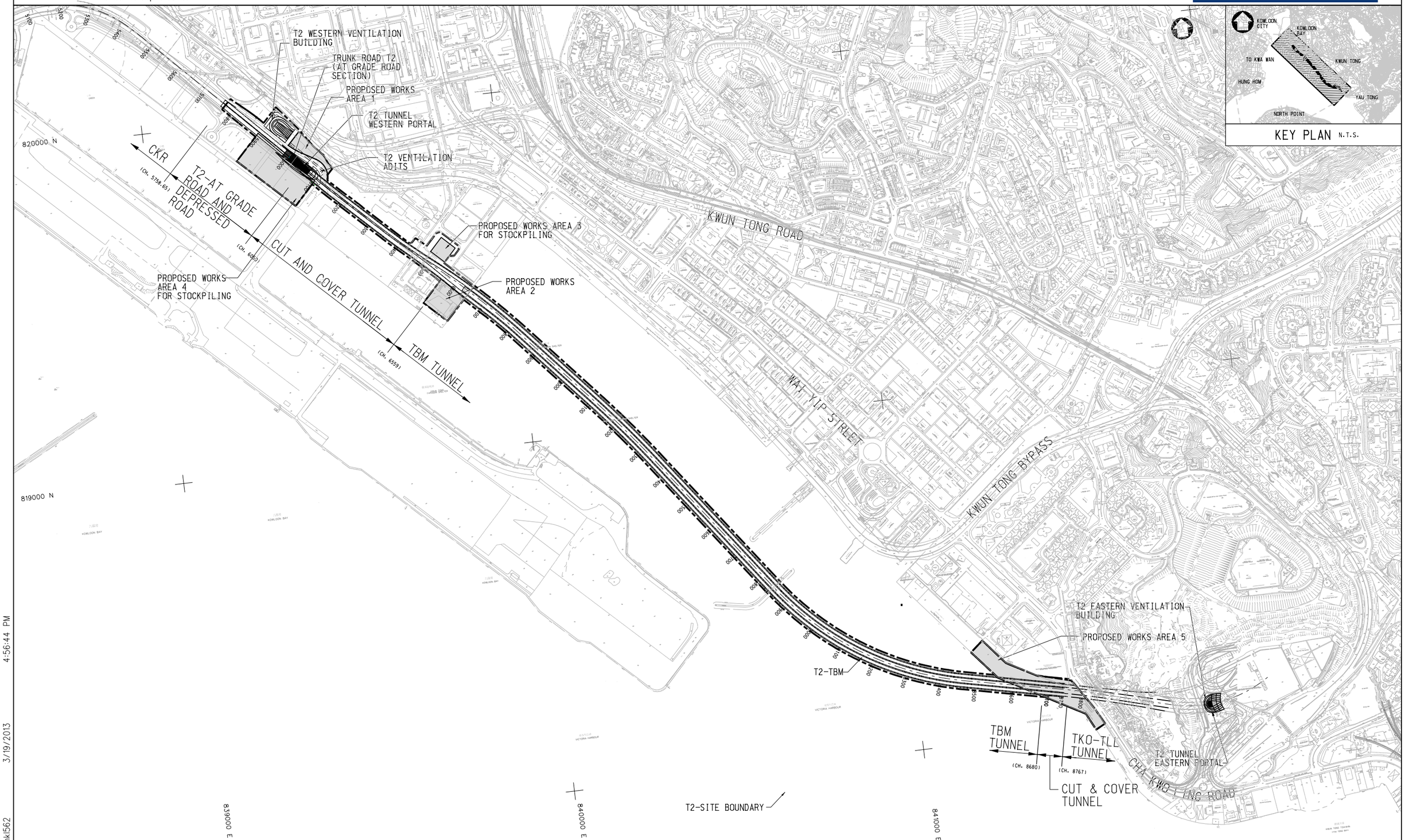

KEY PLAN N.T.S.

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Rev.	Description	Date

Drawing title

LAYOUT - WORKS AREAS

Original Size	A3	Scale 1 : 10000	Date 17/JAN/2013
		File name	FIGURE 3.7.dgn
© Copyright reserved		Drawing No. FIGURE 3.7	Rev. –

CAD FILE : K:\EB000560 Trunk Road T2 and Infrastructure at South Apron\F-Reports\F0052 Construction & Demolition Material Management Plan\Rev 04\Appendix drawing\DGN\FIGURE 3.7.dgn

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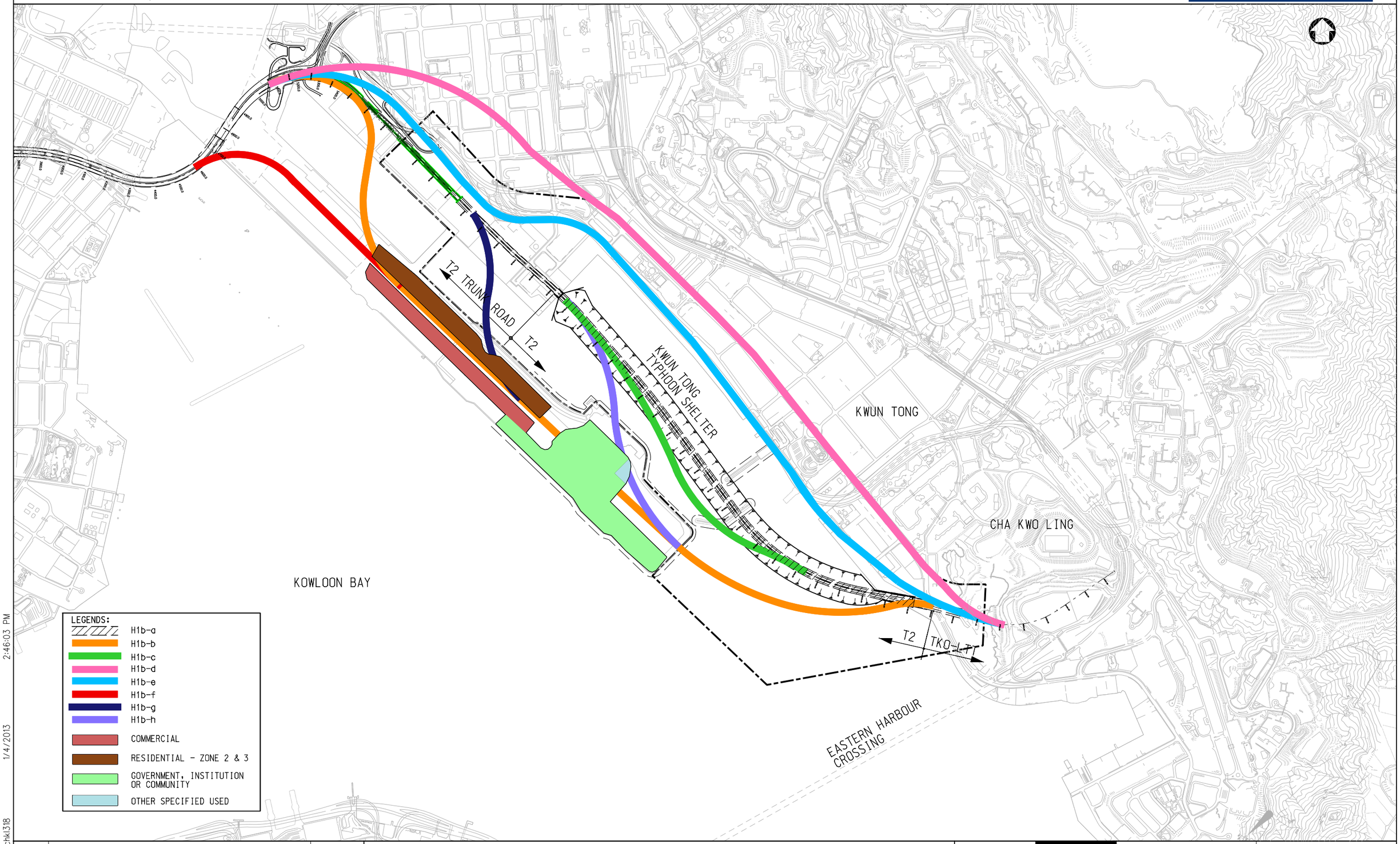
Hyder-Meinhardt JV



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Rev.	Description	Date

Drawing title

LAYOUT PLAN - ALIGNMRNT OPTIONS
(H1b - a TO h)

Original Size: A3
Scale: 1 : 15000
Date: JAN. 2013
File name: FIGURE 6-1.DGN
Drawing No.: FIGURE 6.1
Rev.: –

CAD FILE : K:\EB000560 Trunk Road T2 and Infrastructure at South Apron\F-Reports\F0052 Construction & Demolition Material Management Plan\Figure, table & appendix\Figure\DGN\FIGURE 6-1.dgn

Table 7.4.2 - The summary of the quantities of the excavated in-situ materials generated from the Project T2

Activity	Material Type	Total Estimated Volume Excavated (m^3)	At-grade works CH5758 to CH5880				Depressed Road Section CH5880 to CH6050				C&C works 2nd duct CH6050-CH6445				C&C works 1st Cell CH6050-CH6445				C&C works CH6445 to CH6559				C&C works CH6480 to CH6559			
			Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus	
					Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert
General Works	Broken Concrete	**10768**	1940		1940		2698		2698		1629		1629		1629		1629		289		289		1155		1155	
	Alluvium	**405422**									31245	25262	5983		31245	23170	8075		9114	1019	8095		21601	786	20815	
	Soft Material - Sand Fill	**282664**					12541		12541		25338	773	24565		25338	8593	16745		1660	2951	-1290		10458	15584	-5126	
	Exccavation Materials - Grade III or below rock	**361641**					17949		17949		36267	1107	35160		36267	12300	23967		2377	4223	-1847		14968	22306	-7338	
	Excavation Materials – Grade II or above rock	**32699**																								
	Total	**1093194**	**1940**	**0**	**1940**	**0**	**33188**	**0**	**33188**	**0**	**94479**	**27142**	**67337**	**0**	**94479**	**44063**	**50416**	**0**	**13440**	**8193**	**5247**	**0**	**48182**	**38676**	**9506**	**0**
Other forms of waste generated on site																										
Earthworks	Top Soil - Soil/Vegetation	**2000**	**360**			**360**	**501**			**501**	**302**			**302**	**302**			**302**	**54**			**54**	**215**			**215**
General Works	General refuse	**1000**	**180**			**180**	**251**			**251**	**151**			**151**	**151**			**151**	**27**			**27**	**107**			**107**
Other materials generaged on site																										
	Marine Deposits (1)	**115758**									**34039**	**44988**	**-10949**		**34039**	**28068**	**5971**		**6069**	**2000**	**4069**		**26150**	**4330**	**21820**	

Note: (1) This reuse volume has been post treatment of backfill material consisting of 70% marine mud + 10% cement + 20% granular material/marine sand
(2) Negative value means imported backfilling materials from other construction activities within the T2 project
(3) The type of rock is granite.

Table 7.4.2 (cont'd) - The summary of the quantities of the excavated in-situ materials generated from the Project T2

Activity	Material Type	Launching shaft CH6559-CH6629				TBM				Reception shaft CH8680-CH8767				SA ventilation Building Excavation			
		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus	
				Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert
General Works	Broken Concrete	946		946						483		483					
	Alluvium	81901	51030	30871		207900		207900		22415	21368	1047					
	Soft Material - Sand Fill	26276	8197	18079		130678		130678		20375		20375		30000		30000	
	Exccavation Materials - Grade III or below rock	37609	11732	25877		187042		187042		29162		29162					
	Excavation Materials – Grade II or above rock					32699		32699									
	Total	**162193**	**93895**	**68298**	**0**	**558319**	**0**	**558319**	**0**	**72435**	**34805**	**37630**	**0**	**30000**	**0**	**30000**	**0**
Other forms of waste generated on site																	
Earthworks	Top Soil - Soil/Vegetation	**176**			**176**	**0**			**0**	**90**			**90**				
General Works	General refuse	**88**			**88**	**0**			**0**	**45**			**45**				
Other materials generated on site																	
	Marine Deposits (1)	**15461**	**22935**	**-7474**						**0**	**13437**	**-13437**					

Note: (1) This reuse volume has been post treatment of backfill material consisting of 70% marine mud + 10% cement + 20% granular material/marine sand
(2) Negative value means imported backfilling materials from other construction activities within the T2 project
(3) The type of rock is granite.

Table 7.4.2b - The summary of the quantities of the excavated bulk volume materials generated from the Project T2

Activity	Material Type	Total Estimated Volume Excavated (m^3)(2)	At-grade works CH5758 to CH5880				Depressed Road Section CH5880 to CH6050				C&C works 2nd duct CH6050-CH6445				C&C works 1st Cell CH6050-CH6445				C&C works CH6445 to CH6480				C&C works CH6480 to CH6559			
			Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus	
					Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert
General Works	Broken Concrete	**11846**	2134		2134		2968		2968		1792		1792		1792		1792		318		318		1271		1271	
	Alluvium	**445965**									34371	27788	6582		34371	25487	8884		10025	1121	8905		23761	865	22897	
	Soft Material - Sand Fill	**310933**					13796		13795		27872	851	27022		27872	9452	18420		1827	3246	-1419		11504	17143	-5639	
	Excavated Materials - Grade III or below rock	**397804**					19743		19744		39894	1217	38676		39894	13529	26365		2614	4645	-2032		16465	24536	-8071	
	Excavation Materials – Grade II or above rock	**40874**																								
	Total	**1207422**	**2134**	**0**	**2134**	**0**	**36507**	**0**	**36507**	**0**	**103929**	**29856**	**74072**	**0**	**103929**	**48468**	**55461**	**0**	**14784**	**9012**	**5772**	**0**	**53001**	**42544**	**10458**	**0**
Other forms of C&D waste generated on site																										
Earthworks	Top Soil - Soil/Vegetation	**2000**	**360**			**360**	**501**			**501**	**302**			**302**	**302**			**302**	**54**			**54**	**215**			**215**
General Works	General refuse	**1000**	**180**			**180**	**251**			**251**	**151**			**151**	**151**			**151**	**27**			**27**	**107**			**107**
Other materials generated on site																										
	Marine Deposits (1)	**145415**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**42760**	**56514**	**-13754**	**0**	**42760**	**35259**	**7501**	**0**	**7624**	**2512**	**5111**	**0**	**32850**	**5439**	**27410**	**0**

Note: (1) This reuse volume has been post treatment of backfill material consisting of 70% marine mud + 10% cement + 20% granular material/marine sand
(2) Negative value means imported backfilling materials from other construction activities within the T2 project
(3) The type of rock is granite.
(4) The bulking factor for typical soil and marine deposits are 1.1 while 1.25 for rock
(5) For treated marine mud, the post-mixing expansion is 1.142 in addition to the bulking factor 1.1

Table 7.4.2b (cont'd) - The summary of the quantities of the excavated bulk volume materials generated from the Project T2

Activity	Material Type	Launching shaft CH6559-CH6629				TBM				Reception shaft CH8680-CH8767				SA ventilation Building Excavation			
		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus		Excavation	Re-use	Surplus	
				Inert	Non-inert			Inert	Non-inert			Inert	Non-inert			Inert	Non-inert
General Works	Broken Concrete	1041		1041						531		531					
	Alluvium	90091	56134	33957		228690		228690		24657	23505	1152					
	Soft Material - Sand Fill	28904	9017	19887		143746		143746		22412		22412		33000		33000	
	Excavated Materials - Grade III or below rock	41370	12906	28464		205745		205745		32079		32079		0		0	
	Excavation Materials – Grade II or above rock					40874		40874									
	Total	**161406**	**78057**	**83349**	**0**	**619055**	**0**	**619055**	**0**	**79679**	**23505**	**56174**	**0**	**33000**	**0**	**33000**	**0**
Other forms of C&D waste generated on site																	
Earthworks	Top Soil - Soil/Vegetation	**176**			**176**	**0**			**0**	**90**			**90**				
General Works	General refuse	**88**			**88**	**0**			**0**	**45**			**45**				
Other material generated on site																	
	Marine Deposits (1)	**19422**	**28811**	**-9389**	**0**	**0**	**0**	**0**	**0**	**0**	**16880**	**-16880**	**0**	**0**	**0**	**0**	**0**

Note: (1) This reuse volume has been post treatment of backfill material consisting of 70% marine mud + 10% cement + 20% granular material/marine sand
(2) Negative value means imported backfilling materials from other construction activities within the T2 project
(3) The type of rock is granite.
(4) The bulking factor for typical soil and marine deposits are 1.1 while 1.25 for rock
(5) For treated marine mud, the post-mixing expansion is 1.142 in addition to the bulking factor 1.1

Table 7.4.3 - The summary of C&D in-situ volume materials generated from Project T2

Fill Data

(i) Excavation (m^3)

Type of fill	2015	2016	2017	2018	2019	Total
Concrete Pavement	0	2886	1629	5868	385	10768
Alluvium	0	54935	73061	267140	10286	405422
Soft Material - Sand fill	0	19160	41788	200875	20843	282666
Excavated Materials - Grade III or below Rock(2)	0	27425	59811	244571	29832	361639
Excavation Materials - Grade II or above rock(2)	0	0	2336	30363	0	32699
Total	0	104406	178625	748817	61346	1093194

(ii) Backfill & Re-use (m^3)

Type of fill	2015	2016	2017	2018	2019	total
Concrete Pavement	0	0	0	0	0	0
Alluvium	0	0	48685	36630	37320	122635
Soft Material - Sand fill	0	0	8594	773	26732	36099
Excavated Materials - Grade III or below Rock(2)	0	0	12300	1107	38261	51668
Excavation Materials - Grade II or above rock(2)	0	0	0	0	0	0
Total	0	0	69579	38510	102313	210402

(iii) Change of Stockpiled Quantities in the year (m^3) (1)

Type of fill	2015	2016	2017	2018	2019	Total
Concrete Pavement	0	0	0	0	0	0
Alluvium	0	+26600	-22266	+22700	-27034	0
Soft Material - Sand fill	0	0	+5604	+863	-6467	0
Excavated Materials - Grade III or below Rock(2)	0	0	+8022	+1235	-9257	0
Excavation Materials - Grade II or above rock(2)	0	0	0	0	0	0
Total	0	+26600	-8640	+24798	-42758	0

Note:- +ve = Increase in stockpile through the year, -ve = Decrease in stockpile through the year.

(iv) Surplus fill generation (m^3) (i.e. total generation minus reuse within the project)

Type of fill	2015	2016	2017	2018	2019	Total	Disposal Arrangement
Concrete Pavement	0	2886	1629	5868	385	10768	Other Concurrent Porject & Fill Bank
Alluvium	0	28335	46642	207810	0	282787	Other Concurrent Porject & Fill Bank
Soft Material - Sand fill	0	19160	27590	199239	578	246567	Other Concurrent Porject & Fill Bank
Excavated Materials - Grade III or below Rock(2)	0	27425	39489	242229	828	309971	Other Concurrent Porject & Fill Bank
Excavation Materials - Grade II or above rock(2)	0	0	2336	30363	0	32699	Other Concurrent Project & Quarry
Total	0	77806	117686	685509	1791	882792	

(v) C&D waste generation (m^3)

Activity	Material Type	2015	2016	2017	2018	2019	Total	Disposal Arrangement
Earthworks	Top Soil - Soil/Vegetation (3)	0	535	303	1090	72	2000	Landfill
General Works	General refuse	0	267	152	545	36	1000	Landfill

Note: (1) The stockpile is to have a maximum capacity of 50,000m3 which will be drawn down and replenished throught the year.
(2) The type of rock is granite.
(3) Excavated top soil, if suitable, will be reused for landscaping work and this will be investigated further in the detailed design phase of the project.

Table 7.4.3b - The summary of C&D bulk volume materials generated from Project T2

Fill Data

(i) Excavation (m^3)

Type of fill	2015	2016	2017	2018	2019	Total
Concrete Pavement	0	3175	1792	6455	424	11846
Alluvium	0	60429	80367	293854	11315	445965
Soft Materials - Sand Fill	0	21077	45966	220963	22927	310933
Excavated Materials - Grade III or below rock(2)	0	30167	65793	269028	32816	397804
Excavation Materials - Grade II or above rock(2)	0	0	2920	37954	0	40874
Total	0	114848	196838	828254	67482	1207422

(ii) Backfill & Re-use (m^3)

Type of fill	2015	2016	2017	2018	2019	total
Concrete Pavement	0	0	0	0	0	0
Alluvium	0	0	53554	40293	41052	134899
Soft Materials - Sand Fill	0	0	9453	851	29405	39709
Excavated Materials - Grade III or below rock(2)	0	0	13530	1217	42087	56834
Excavation Materials - Grade II or above rock(2)	0	0	0	0	0	0
Total	0	0	76537	42361	112544	231442

(iii) Change of Stockpiled Quantities in the year (m^3) (1)

Type of fill	2015	2016	2017	2018	2019	Total
Concrete Pavement	0	0	0	0	0	0
Alluvium	0	+29260	-24493	+24970	-29737	0
Soft Materials - Sand Fill	0	0	+6165	+949	-7114	0
Excavated Materials - Grade III or below rock(2)	0	0	+8824	+1359	-10183	0
Excavation Materials - Grade II or above rock(2)	0	0	0	0	0	0
Total	0	+29260	-9504	+27278	-47034	0

Note:- +ve = Increase in stockpile through the year, -ve = Decrease in stockpile through the year.

(iv) Surplus fill generation (m^3) (i.e. total generation minus reuse within the project)

Type of fill	2015	2016	2017	2018	2019	Total	Disposal Arrangement
Concrete Pavement	0	3175	1792	6455	424	11846	Other Concurrent Project & Fill Bank
Alluvium	0	31169	51306	228591	0	311066	Other Concurrent Project & Fill Bank
Soft Materials - Sand Fill	0	21077	30348	219163	636	271224	Other Concurrent Project & Fill Bank
Excavated Materials - Grade III or below rock(2)	0	30167	43439	266452	912	340970	Other Concurrent Project & Fill Bank
Excavation Materials - Grade II or above rock(2)	0	0	2920	37954	0	40874	Other Concurrent Projects & Quarry
Total	0	85588	129805	758615	1972	975980	

(v) C&D waste generation (m^3)

Activity	Material Type	2015	2016	2017	2018	2019	Total	Disposal Arrangement
Earthworks	Top Soil - Soil/Vegetation(4)	0	535	303	1090	72	2000	Landfill
General Works	General refuse	0	267	152	545	36	1000	Landfill

Note: (1) The stockpile is to have a maximum capacity of 50,000m3 which will be drawn down and replenished throught the year.
(2) The type of rock is granite.
(3) The bulking factor for typical soil and marine deposits are 1.1 while 1.25 for rock
(4) Excavated top soil, if suitable, will be reused for landscaping work and this will be investigated further in the detailed design phase of the project.

Table 7.4.4 - The summary of the estimated quantities of the C&D bulk volume materials generated for each development option

Activity	Material Type	Total Estimated Volume Excavated (m^3) (5)							
		Option 1	Option 2	Option 3	Optione 4	Option 5	Option 6	Option 7	Option 8
		(H1b-a)	(H1b-b)	(H1b-c)	(H1b-d)	(H1b-e)	(H1b-f)	(H1b-g)	(H1b-h)
Geferal Works	Broken Concrete	11864	~12000	~12000	~12000	~12000	~12000	~12000	~12000
	Alluvium	445965	~446000	~446000	~446000	~617000	~446000	~450000	~470000
	Soft Material - Sanf Fill	310933	~310000	~310000	~311000	~311000	~310000	~310000	~325000
	Excavated Materials - Grade III or below rock(2)	397804	~398000	~398000	~398000	~530000	~398000	~398000	~414900
	Excavated Materials - Grade II or above rock(2)	40874	~41000	~41000	~41000	~50000	~40000	~42000	~52000
	Total	1207422	~1207000	~1207000	~1208000	~1520000	~1206000	~1212000	~1273900

Note:

(1) This reuse volumn has been post tratment of backfill material consisting of 70% marine mud + 10% cement + 20% granular material/marine sand

(2) The type of rock is granite.

(3) The bulking factor for typical soil and marine deposits are 1.1 while 1.25 for rock.

(4) For treated marine mud, the post-mixing expansion is 1.142 in addition to the bulking factor 1.1.

(5) Reference was made to Section 2 of draft EIA report for estimating the excavated volume for Options 2-8.

Appendix B
– Tentative Construction Programme

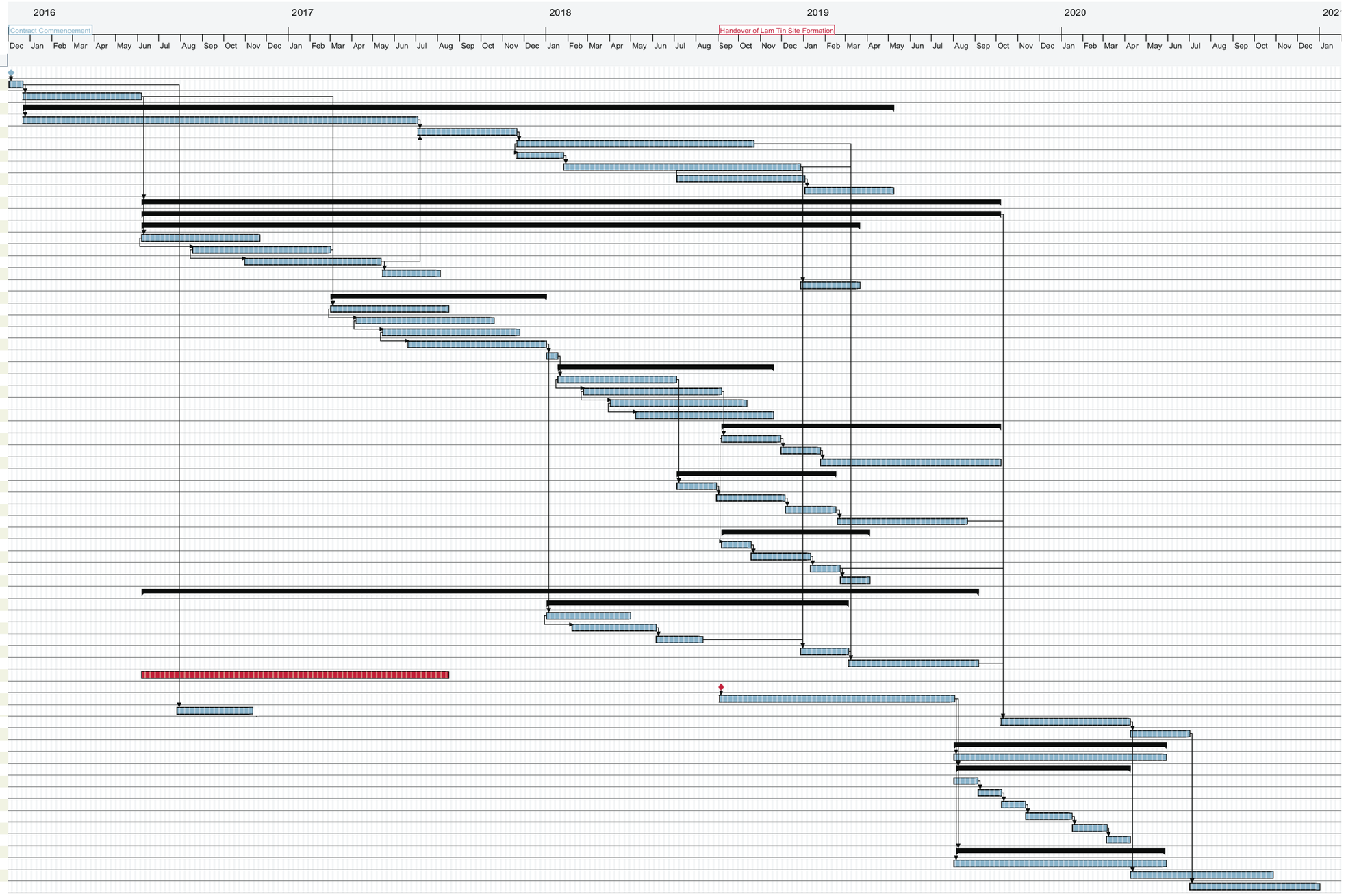
T2 Summary Construction programme using TBM

12-Dec-2012

Gantt Chart

Hyder-Meinhardt JV

Name
Contract Commencement
Mobilisation
Site Investigation
TBM Works
Design and Procurement
Mobilisation and first TBM Launching
Tunneling Works of Bore 1
Launch of second TDM
Tunneling Works of Bore 2
Cross passages
Fitting out
Landfall works
SA end
Launching shaft CH6559 - CH6629 summary
launching shaft - Diaphragm Wall works
Launching shaft excavation works
Launching shaft Structure works
Launching Shaft Partial fill works
Launching shaft finishing Fill works
C&C works 1st Cell CH6050 - CH6445 summary
1st cell Diaphragm wall works
1st cell excavation works
1st cell structure works
1st cell Filling works
Divert TD4
C&C works 2nd Cell CH6050-CH6445 Summary
2nd Cell Diaphragm Wall Works
2nd cell Excavation Works
2nd cell Structure works
2nd Cell Filling works
Western Ventilation Building Summary
SA Vent Building - Piling works
SA Vent Building - Excavation works
SA Vent Building - Structure Works
Depressed Road Section CH5880 to 6050 summary
DPR sheet Piling works
DPR Excavation works
DPR Structure Works
At-grade works to 5880
C&C works CH6445 - CH6559
CH5445-6559 Piling works
CH5445-6559 Excavation Works
CH5445-6559 Structure works
CH5445-6559 Filling works
CKL end
Reception Shaft CH8680-CH8767 Summary
Reception Shaft CH8680-CH8767 - Piling works
Reception Shaft CH8680-CH8767 - Excavation
Reception Shaft CH8680-CH8767 - structure works
Reception Shaft CH8680-CH8767 - Filling works
C&C works CH8680-CH8767 finishing works
TKO-LTT works at Cha Kwo Ling PCA
Handover of Lam Tin Site Formation
Eastern Ventilation Building
Construct Barge Point at South Apron
TCSS and finishes
Signs and signage
Infrastructure works for KTD
L10 and L18 roadworks
Footbridge FB06
Utilities diversion
Piling Works
Pilecaps
Abutments
Superstructure
Finishes
Footbridge Extension
Junction Improvements
Surfacing works
Testing and commissioning



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Rev.	Description	Date

Drawing title

T2 SUMMARY CONSTRUCTION PROGRAMME USING TBM

Original Size: A3

Scale: 1:100 | Date: 11/DEC/2009

File name: APPENDIX B

Drawing No.: APPENDIX B

Rev.: –

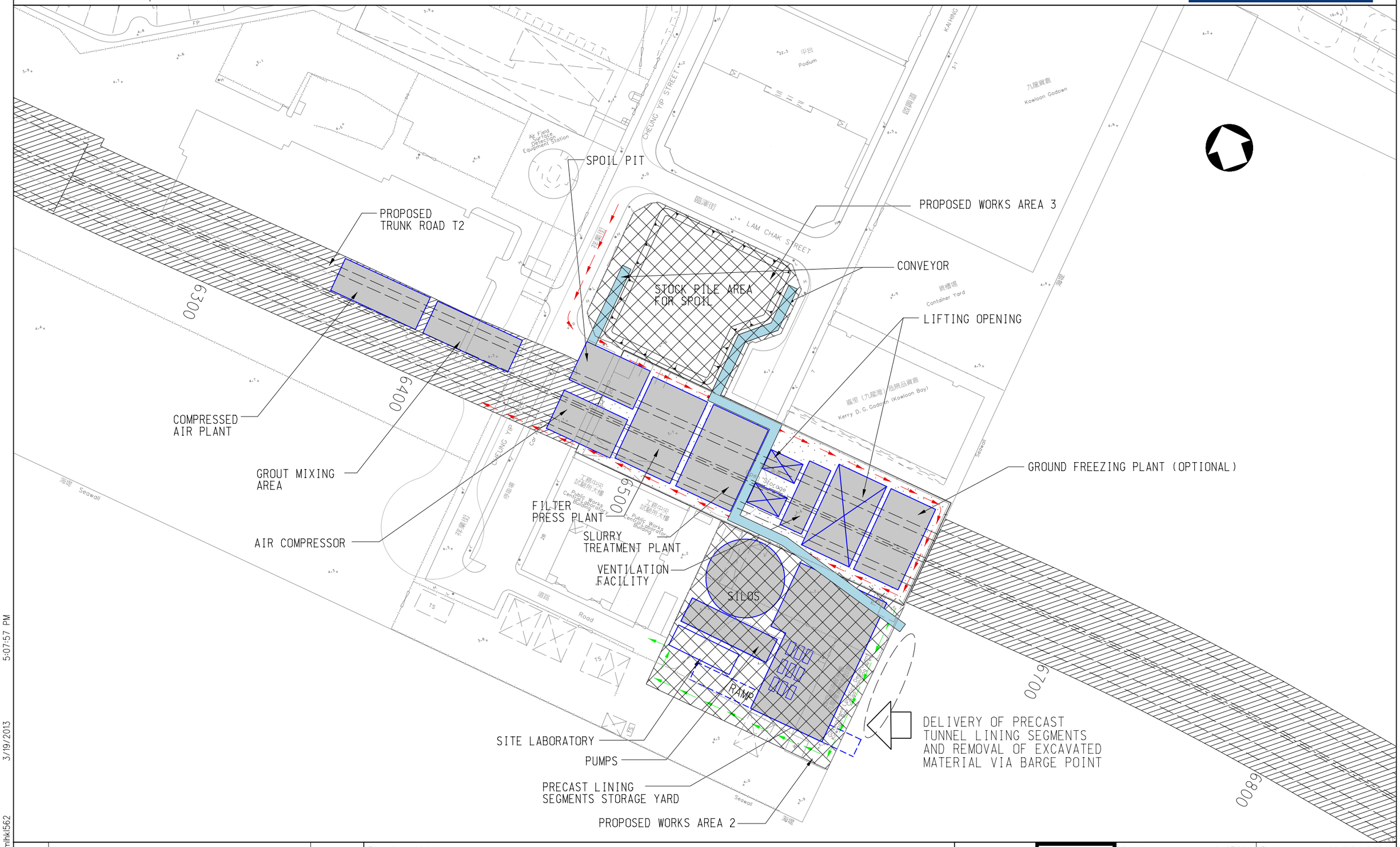
CAD FILE : K:\EB000560 Trunk Road T2 and Infrastructure at South Apron\F-Reports\F0052 Construction & Demolition Material Management Plan\Figure, table & appendix\Figure\DGN\APPENDIX B.dgn

Appendix C
– Temporary Barging Point and TBM Processing Facilities

土木工程拓展署
Civil Engineering and Development Department
九龍拓展處
Kowloon Development Office

AGREEMENT NO. CE 38/2008(HY)
KAI TAK DEVELOPMENT - TRUNK ROAD T2 AND INFRASTRUCTURE AT SOUTH APRON - INVESTIGATION, DESIGN AND CONSTRUCTION

Hyder-Meinhardt JV



Rev.	Description	Date

Drawing title

PROPOSED T2 TBM SUPPORT EQUIPMENT
SOUTH APRON – LAUNCHING SHAFT AREA

Original Size	A3	Scale	1:1500
		Date	16/NOV/2012
		File name	APPENDIX C.DGN
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		Rev.	1

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