For information

Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Funding Arrangement of the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

Supplementary Information on the Increase in Costs of the Railway and Non-railway Works

Purpose

The Administration consulted the Subcommittee on Matters Relating to Railways on the draft submissions to the Public Works Subcommittee of Finance Committee (PWSC) (PWSC(2009-10)68 and PWSC(2009-10)69) on 16 and 17 November 2009. During the meeting, the Administration agreed to provide more detailed information to facilitate Members' scrutiny of the costs of the railway and non-railway works of the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) project. The information is now set out below. We have also formally submitted the above two funding applications to the PWSC on 24 November 2009.

Railway Works

2. The costs of the railway works are set out in paragraph 30 of the PWSC Paper PWSC(2009-10)68 and are reproduced below for Members' ease of reference –

			$ million	
(a) construction of railway works			43,615	
(I) civil works		31,596		
- Terminus	9,454			
- Tunnel and associated structures	18,985			
- Emergency rescue station and stabling sidings	3,157			
(II) architectural works		1,900		
(III) building services		2,500		
(IV) railway electrical and mechanical works		5,714		
(V) rolling stock		1,905		
(b) project management costs payable to the MTRCL for planning, management and supervision of the project, covering overheads and management expenses of the MTRCL			3,261	
(c) fees for consultants appointed by the Government for monitoring and vetting the MTRCL's work including cost of the project			95	
(d) contingencies			4,445.5	
		Sub-total	51,416.5	(in September 2009 prices)

(e) provision for price adjustment	3,601.0	
Total	55,017.5	(in MOD prices)

3. Paragraphs 20 to 24 of the paper provide a broad explanation of the reasons for the rise in cost estimate for the railway works (from the estimate of $35.4 billion announced in April 2008 to $53.7 billion announced in September 2009). **Annex A** sets out in detail the reasons for the scope of enhancement for the railway works. These enhancement works were not included in the estimate announced in April 2008 as various design parameters (including site investigation, environmental impact assessment and public consultation) were only confirmed during the detailed design stage.

Non-railway Works

4. The costs of the non-railway works are set out in paragraph 20 of the draft PWSC paper (PWSC(2009-10)69) and are reproduced below for Members' ease of reference –

	$ million	
(a) construction of essential public infrastructure works		1,808.8
(I) seven footbridges at the West Kowloon Terminus (WKT)	280.0	
(II) two subways at WKT	138.8	

(III) depressed roads at part of Austin Road West and Lin Cheung Road, re-construction of Wui Man Road and construction of Road D1A, and associated noise barriers/ enclosures	1,390.0	
(b) construction of reprovisioning, remedial and improvement works		1,200.0
(c) enabling works		3,519.0
(I) enabling works for Site A	1,880.0	
(II) enabling works for West Kowloon Cultural District	1,604.0	
(III) enabling works for footbridges at Sham Mong Road	35.0	
(d) construction of boundary control facilities		2,609.0
(e) project management cost payable to the MTRCL for planning, management and supervision of the project, covering overheads and management expenses of the MTRCL		699.0
(f) fees for consultants appointed by the Government for monitoring and vetting MTRCL's work including cost		38.0

(g) provision of Government facilities / equipment including fire fighting equipment, and other furniture and equipment[1]		200.0	
(h) contingencies		953.8	
	Sub-total	11,027.6	(in September 2009 prices)
(i) provision for price adjustment		772.4	
	Total	11,800.0	(in MOD prices)

5. Paragraphs 11 to 15 of the paper provide a broad explanation of the reasons for the rise in cost estimate for the non-railway works (from the estimate of $4.1 billion announced in April 2008 to $11.5 billion announced in September 2009). **Annex B** sets out in detail the reasons for the scope of enhancement for the non-railway works. These enhancement works were not included in the estimate announced in April 2008 as various design parameters (including traffic study, environmental impact assessment and interface with other projects) were only confirmed during the detailed design stage.

Vetting by independent engineering consultants

6. As reported in the two PWSC discussion papers (paragraphs 27 to 29 of Paper PWSC(2009-10)68 and paragraphs 17 to 19 of Paper PWSC(2009-10)69 refer), the Highways Department employed two independent engineering consultants to conduct assessments to ascertain whether the construction cost and project management cost of the Hong Kong section of the XRL are reasonable. The results of the two

[1] Based on an indicative list of furniture and equipment items required, including furniture and equipment in BCF.

checking exercises confirmed respectively that estimates for both costs are reasonable. As regards the recommendations of the consultants in respect of the estimates for specific items, the Administration has correspondingly made suitable adjustments to the costs of the railway works and non-railway works of the Hong Kong section of the XRL as set out in paragraphs 2 and 4 above. The executive summaries of the two review reports are now attached at **Annex C** and **Annex D** respectively for Members' reference.

Transport and Housing Bureau
November 2009

Annex A

53TR - Railway Works of XRL - Comparison of 2008 and 2009 Estimates

(to be read in conjunction with Paper PWSC(2009-10)68)

Items	Estimated announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($Million)	Escalation in costs in the construction industry ($Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
Railway Works	**24,278**	**43,615**	**19,337**	**8,611**	**10,726**	
(A) Civil Works (Terminus)	4,282	9,454	5,172	1,867	3,308	(1) To increase the total underground floor area (by 112 000 sq.m.) and footprint area of the West Kowloon Terminus (WKT) so as to avoid building a large podium structure and to create more at-grade public open space ($1,200M) [Please refer to Appendixes I and II] ● In the detailed design stage, we have examined in detail the planning of the terminus. To enable the provision of more ground area for public use, the underground station area has been optimized to house some facilities originally planned for at-grade or above ground, and to achieve better integration with the topside development. Moreover, the station underground space has been revised to enhance safety and level of services. As a result, the total underground floor area of the terminus has increased, in return for which, inter alia, 8 000 sq.m. of ground level area can be provided for use by the public. WKT will also have a greening

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						area of 17 000 sq.m. Moreover, the current design includes an extension of the concourse area near the pedestrian subway linking to Austin Station to serve as a meeting area and focal point for passengers, similar to the arrangement in the airport. (2) Provision of entrance hall structure ($660M) • In the preliminary design stage, as a podium above the WKT was assumed to be implemented by the developer of the topside development, only a simple glass enclosure was proposed to delineate the terminus entrance. With the removal of the large podium to provide more open space for the public, a terminus entrance hall with a greenery roof, which will be a much smaller structure than the original podium, is now proposed. The hall structure will not only fulfill the functionality of a terminus building, but also provide leisure open space with greenery provisions for general public enjoyment. This will add value to the terminus.

Items	Estimated announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($Million)	Escalation in costs in the construction industry ($Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						(3) Amenity piazza in the vicinity of the entrance hall ($200M) ● To blend well with the West Kowloon Cultural District (WKCD), the area in the vicinity of the entrance hall will be transformed into a piazza with leisure circulating areas. The size of this amenity area is about 7 000 sq.m. Planter structures will also be incorporated to tie in with the green accessible roof top. (4) Internal facilities inside the entrance hall ($170M) ● Circulation facilities and corridors are provided within the entrance hall, which will not only provide an all-weather environment to such circulation but also serve to stitch together the station and development activities, fostering continuous and natural flows of circulation between the two activity areas. Taking the entrance hall as the centre, apart from being the focal point of circulation, the daylight collection glazing will allow sunlight to filter down to the underground levels of the terminus, thus creating the most desirable sense of orientation descending from above ground.

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						(5) Additional steel H-tension piles for terminus ($860M) • With a larger underground volume and the programme for the structure of the topside development being different from that of the terminus, it is necessary to install steel tension piles to stabilize the terminus structure before the topside development is in place. (6) Additional excavation in rock of 150 000 cubic metres ($80M) • Part of the rock head profile is found to be higher than that expected at the preliminary design stage. Hence, more rock excavation is necessary than the previous estimate. (7) Increase in diaphragm wall quantity by 16 000 cubic metres ($130M) • Thicker diaphragm walls are adopted in the current design to meet more stringent settlement and movement control criteria for the structures, as these diaphragm walls would serve as part of the permanent works of the WKT.

Annex A

Items	Estimated announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($Million)	Escalation in costs in the construction industry ($Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
(B) Civil Works (Tunnel and Approach Tracks)	10,724	18,985	8,261	3,748	4,513	I. Change of alignment ($1,320M) [See Appendix III] (1) Removal of abandoned foundations and old sea wall • At the detailed design stage, further site investigation results revealed the problems of the presence of fault, poor soil quality and high water table along the original alignment in Sham Shui Po area. All these would pose substantial construction risks. Moreover, the alignment would affect the strata of about 200 private buildings in the urban area. As for the current alignment in the urban area, it will mainly run beneath roads and will affect only some 20 private buildings. However, the alignment will be in conflict with the foundations of the ex-ferry piers and seawalls along Sham Mong Road. We need to remove these abandoned old foundations before construction of the XRL tunnels.

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						(2) MTR Tsuen Wan Line protection works • Owing to site constraints, the new alignment will run very close to the existing MTR Tsuen Wan Line. Therefore, protection works are required to safeguard the integrity of the Tsuen Wan Line and passenger safety. (3) Additional grouting works to protect Drainage Services Department Lai Chi Kok Transfer tunnel • The XRL tunnel will be very close to the Transfer Tunnel of the Drainage Services Department in Lai Chi Kok area. In order to protect the transfer tunnel and the XRL tunnel, grouting is required before tunnel construction or else the structural safety of the transfer tunnel will be affected. (4) Ground treatment works along Hoi Wang Road • To minimize disturbance to the public, tunnelling for the section along Hoi Wang Road will be carried out by tunnel boring machine (TBM) instead of construction by open cut method. Additional ground treatment is required before drilling.

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						(5) Strengthening of Nam Cheong shaft to accommodate future public housing development • Site 6 at Cheung Sha Wan is currently planned for public housing development. Before the housing development, the site will be used as a works site for the XRL project. During its design, the Nam Cheong tunnel shaft will be strengthened to allow for the future housing development. (6) Demolish existing equipment room of China Light and Power (CLP) in Sham Mong Road • The tunnel will be in conflict with the piled foundations of the existing CLP equipment room at Sham Mong Road. Therefore, the building and the piled foundations are required to be removed to allow for the passage of TBM. (7) Removal of existing piles within Nam Cheong Property Development site • The tunnels will be in conflict with the piled foundations of the Nam Cheong Station Property Development. Some of the piles

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						need to be removed and some replacement bored piles will need to be re-provided at the side of the tunnel before allowing the passage of TBM . (8) To construct additional adit at Mei Lai Road site for the partial enlargement of the main tunnel for the retrieval of TBM (9) To facilitate safe operation of the railway and to cope with the amended alignment, longer or deeper ventilation shafts/ launching shafts (for TBM) are necessary at Nam Cheong, Shing Mun and Ngau Tam Mei. An additional shaft is also required at Tse Uk Tsuen for the dismantling and removal of TBM
						II. Precautionary works in the light of more site investigation information ($720M) (1) To provide for additional grouting to deal with a major fault zone - the Tolo Channel Fault - of a width of more than 300m encountered at north of Mei Lai Road site, so as to strengthen the underground conditions and minimize the risk of ingress of ground water into the tunnel. The tunnel lining will also have to be strengthened.

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						(2) To prevent excessive ground settlement of sediment above the rock formation in Kwai Chung during tunnelling, additional underground grouting at Kwai Chung is required (3) The rock in the vicinity of the very deep ventilation shaft at Shing Mun ventilation building is much fractured, and additional grouting is required to limit underground water inflow into the excavation during construction and the completed tunnel to avoid impact on adjacent water level. (4) As marble caverns are identified during site investigation near Mai Po, additional grouting is necessary to ensure safety during the construction and operation (5) Additional grouting treatment works and soil stabilization at the TBM launching shafts and cross passages
						III. Mainland interface to ensure smooth cross-boundary train operations ($630M) (1) For compliance with Hong Kong's safety requirement, it is necessary to adjust the interface of the tunnel configuration of the two sides

Annex A

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						(2) With the upgrading of the Mainland standard on passenger aural comfort in 2008, we need to increase the tunnel diameter to provide the same degree of passenger comfort level as the Mainland section when the train is travelling at high speed
						IV. Increase of approach track area near the WKT to meet operation and safety requirements ($600M) (1) To allow for more flexibility in train operation by increasing the approach track area through optimising the fan-shape configuration, thus enabling more flexible train deployment (2) An additional ventilation building is required because the originally planned ventilation building at Mong Kok West is not capable of handling the enlarged approach track area
						V. Additional facilities to meet rescue operation requirements of Fire Services Department (FSD) ($500M) (1) Upgrading of ventilation adits to allow access by fire engines • On the basis of the requirements of the FSD,

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						we need to improve the ventilation adits at ventilation buildings No. 4 and 6 to allow access by fire engines for expedient access to the main tunnels in case of emergencies. This will enhance the speed of emergency rescue to the long tunnel under Tai Mo Shan. (2) Provision of pressurized lobby and under-track access passage for ventilation building No. 6 • For coordination with the rescue operation set out under item V(1) above, FSD has requested an under-track access passage to the southbound track for unrestricted evacuation of passengers, and the additional provision of a pressurized lobby adjacent to the tracks as a smoke-free fire fighting and rescue operation staging area to allow efficient emergency handling by FSD and efficient evacuation of passengers. (3) To construct two additional ventilation adits of 1.1km in length at the two ends of the Tai Mo Shan tunnel section, in order to comply with the rescue operational requirement of FSD

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						(4) To enhance the protection to trains and passenger safety, polypropylene fibres are specified in tunnel linings to strengthen their properties in withstanding high temperature
						VI. Better handling of excavated materials to minimize impact onto local communities ($100M) (1) To avoid overloading of the road network in Tuen Mun (including Tuen Mun Road and Castle Peak Road), some excavated materials are to be redistributed to a new barging point at Tsing Chau Wan in Lantau, resulting in more setting up cost and transportation cost (2) To suit the construction operation and to meet the tight construction programme, tunnel sections to be formed by boring and drill-and-blast methods will work round the clock and excavation materials generated will have to be disposed to the Mainland by sea. To cater for possible effect on the disposal due to inclement weather, it is necessary to allow for 7-day stockpiling of excavated materials, resulting in more setting up cost and double handling cost

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						VII. Miscellaneous ($600M) (1) An additional TBM • To acquire an additional TBM to sustain the timetable of the whole project. (2) Control of moisture content of spoil to be disposed • Additional treatment to the spoil from TBM excavation is required to meet the maximum moisture content of 25% for disposal to the Tai Shan landfill in Mainland.
(C)Civil Works (ERS/SSS)	1,485	3,157	1,672	623	1,049	(1) More stabling and maintenance tracks for efficient railway operation ($960M) [See Appendixes IV and V] • We originally intended to use the Mainland sidings for stabling the majority of the Hong Kong trains. However, following the completion of an operation and maintenance study by the MTRCL and the subsequent discussions with the Mainland counterparts, it we consider that either side should provide its own stabling and minor maintenance facilities

Annex A

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						to meet the respective operational needs, which will enable the operation to be more efficient. As a result, more stabling and maintenance areas are provided in Hong Kong.
(D) Architectural Works	1,267	1,900	633	375	258	(1) Increase in terminus floor area (including public area) and upgrading the finish quality of the WKT • As a result of the increase in floor area of the terminus, more architectural works such as wall/ceiling finishes and flooring are required. In addition, the internal finishes (especially for the public area) are now upgraded with acoustic treatment to provide a more pleasant environment for passengers.
(E) Building Services	1,717	2,500	782	494	289	(1) Additional building services systems are required as a result of the increase in terminus floor area (including the public area) ($230M) (2) Additional cables and busbar trunkings and facilities for underground transformers ($60M) • To provide more open space at ground level to meet the latest planning requirement, the transformers, originally to be located at ground level and uniformly spaced within the terminus,

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						will now be located underground at the two ends of the terminus. Therefore, additional cables and busbar trunkings to the transformers are required in the current design. The requirements of the transformers are also enhanced.
(F) E&M Works	3,120	5,714	2,594	1,128	1,466	(1) Mainland depots need to be expanded to take up heavy maintenance and overhaul of the Hong Kong train fleet, and hence we need to share the necessary costs ($500M) (2) Increase in the quantities of lifts, escalators and moving walkways due to the increase in, the number of levels and floor areas, so as to improve passenger circulation and passenger service level, and to provide convenience to passengers going to areas in the vicinity of the terminus ($350M) (3) Provision of personal mobile communication systems (including mobile phone and wireless Internet access coverage) in WKT and tunnels, to meet public expectation of being able to use mobile phones and internet devices in the station and on the trains ($190M)

Annex A

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						(4) We will introduce various enhancements to the ticketing system for the Hong Kong section so as to allow for integration with the national high-speed rail ticketing system, and to increase the number of ticket gates to enhance the management of passenger flow. We will also increase the quantities of Ticket Vending Machines, Point-of-Sale Terminals and Ticket Gates (1st tier) to enhance the level of service. ($180M) (5) Provision of isolated slab tracks for vibration mitigation at locations as required by the EIA study findings so as to reduce noise/vibration and the impact on the surrounding environment. ($160M) (6) Various enhancements to the system (e.g. interoperability requirements, and enhanced safety and operation performances) ($80M)
(G) Rolling Stock	1,683	1,905	222	376	(154)	On the basis of the latest information on train prices
Contingencies	4,474	4,446	(28)	878	(906)	
Design Cost	1,611	2,291	680	452	228	Cost increase to cope enhancement of works

Annex A

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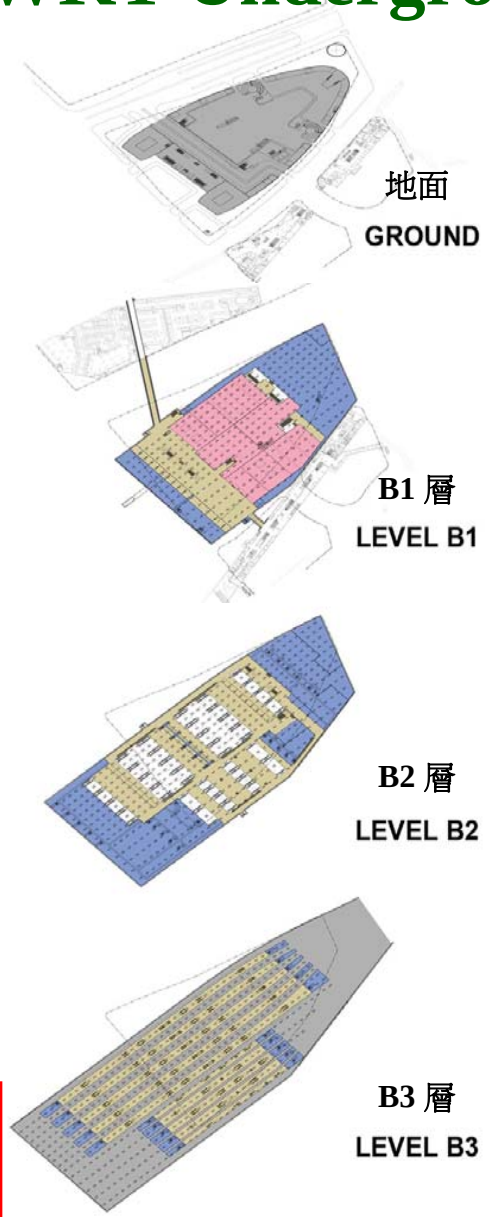
Project Management Cost	3,984	3,261	(723)	644	(1,367)	The original project management cost (PMC) allowed was around 15% of the project cost. The PMC was reduced after the review by an independent engineering consultant. Please refer to the executive summary of the consultant's review.
Land Cost	1,036		(1,036)	-	(1,036)	Provided under separate vote
Other Government Cost	10	95	85	19	66	The Government will employ consultants to monitor MTRCL's work.
Total ($Million)	**35,393**	**53,708**	**18,315**	**10,604**	**7,711**	
Total ($Billion)	**354**	**537**	**183**	**106**	**77**	

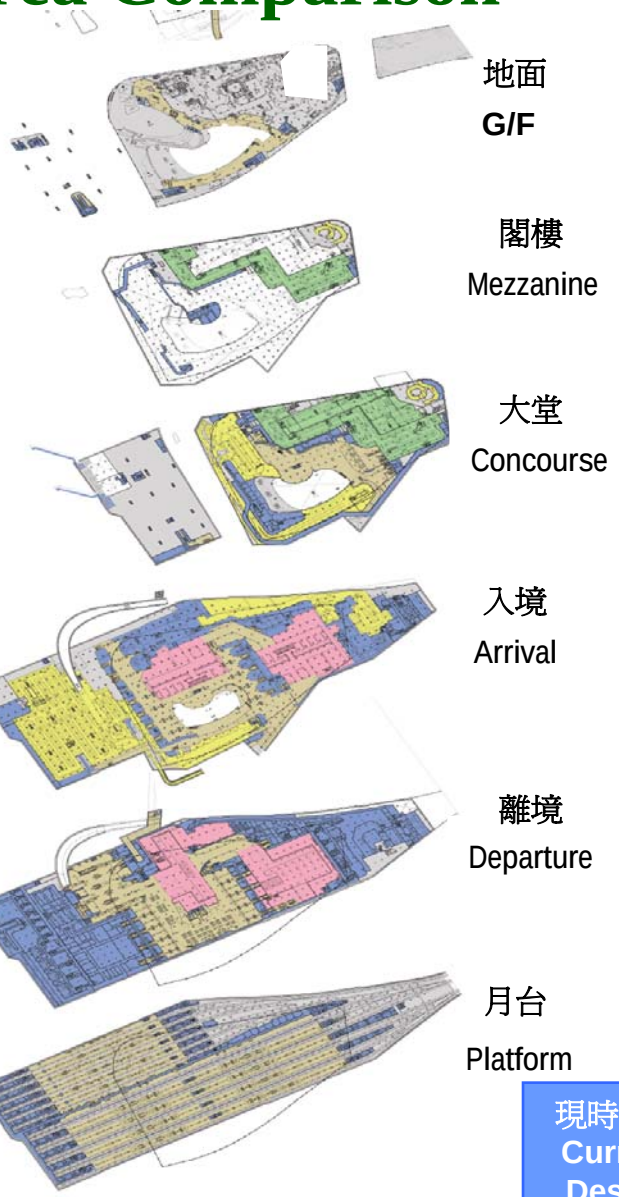
圖號: R-1
Plan No: R-1

西九龍總站地下樓面比較
WKT Underground Floor Area Comparison

附件A的附錄I
Appendix I to Annex A



初步設計
Preliminary Design

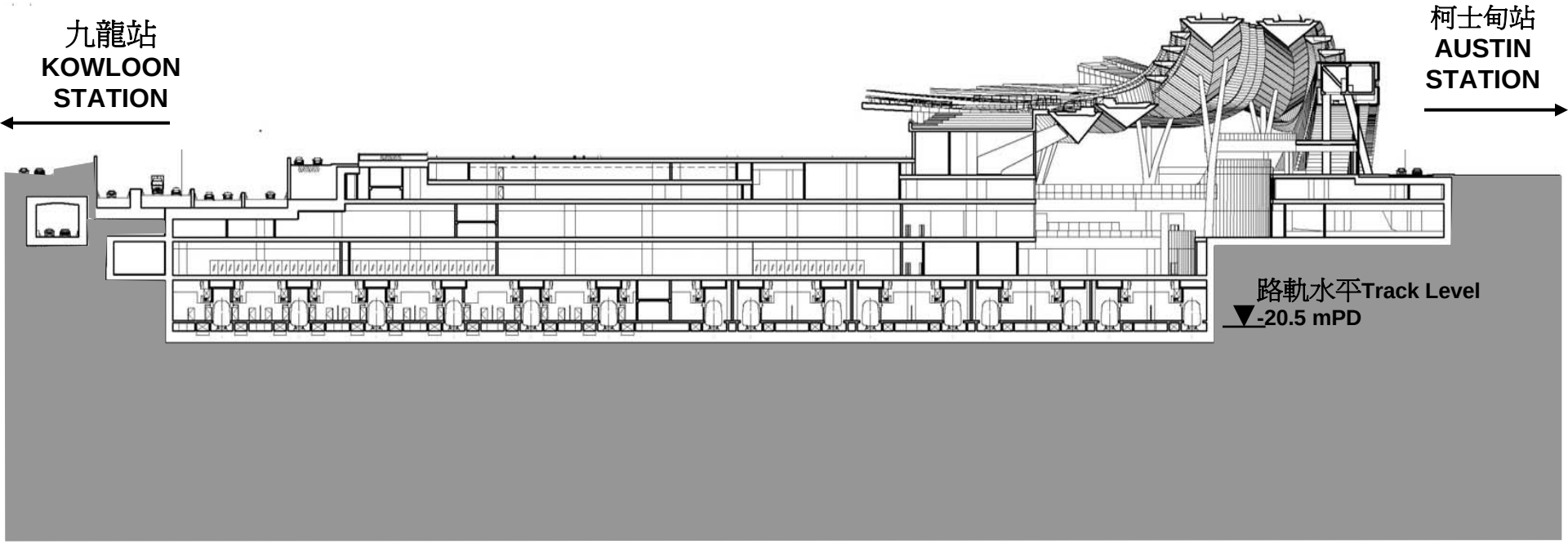


現時設計
Current Design

圖號: R-2
Plan No: R-2

附件A的附錄II
Appendix II to Annex A

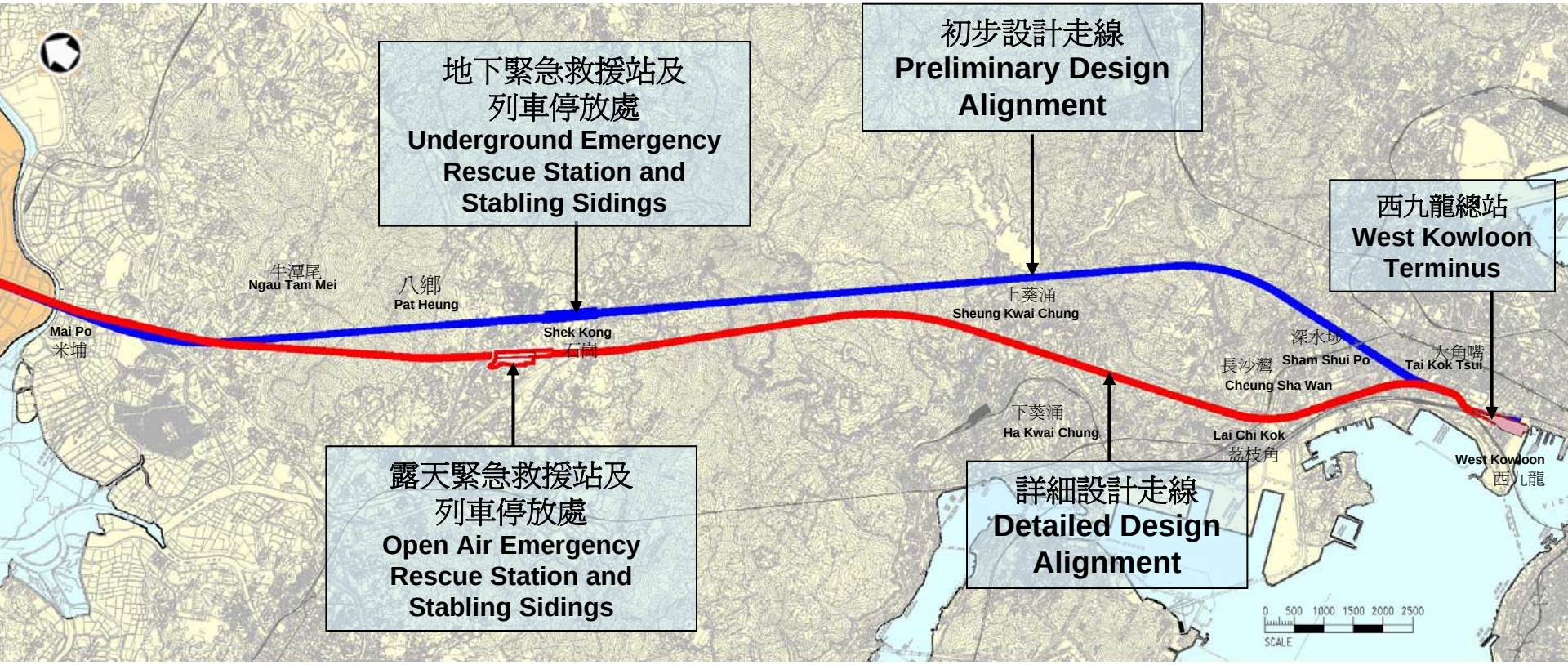
西九龍總站切面圖
Cross Section of West Kowloon Terminus



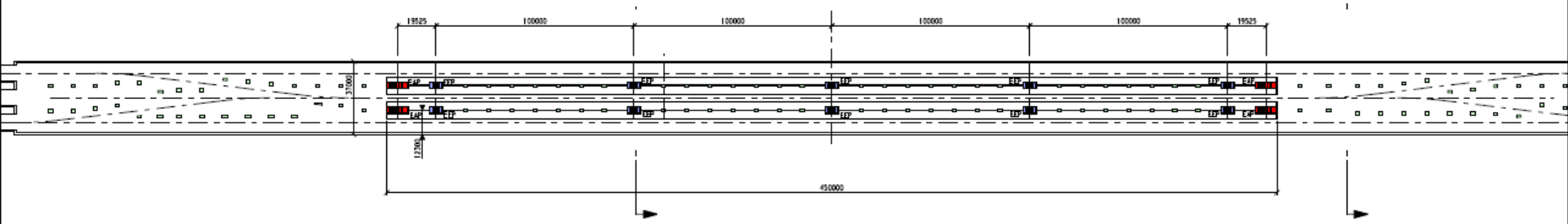
圖號: R- 4
PLAN NO: R- 4

附件A的附錄III
Appendix III to Annex A

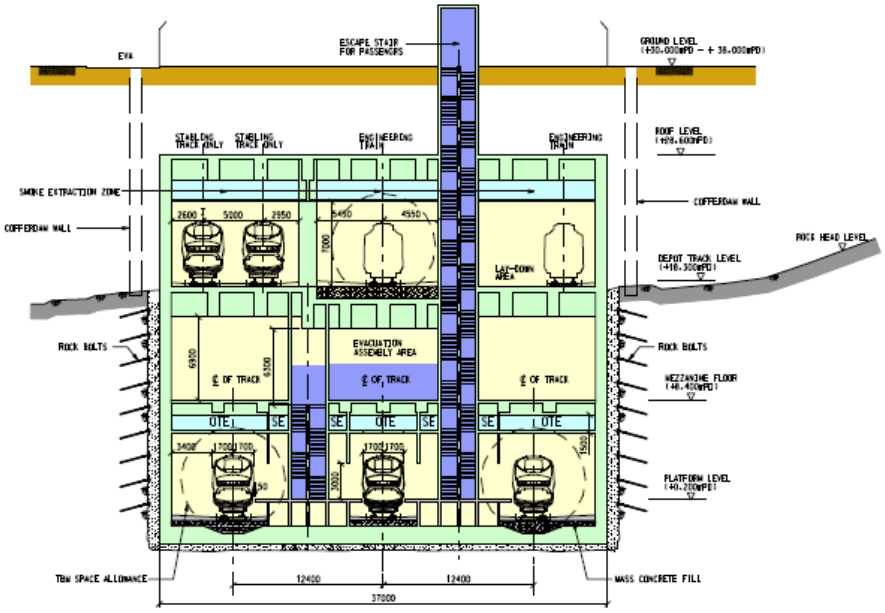
高鐵香港段走線
Alignment of the Hong Kong Section of the XRL



緊急救援站及列車停放處 – 初步設計
Emergency Rescue Station (ERS) and Stabling Sidings (SSS) – Preliminary Design



總體佈置 General Layout



切面圖Section

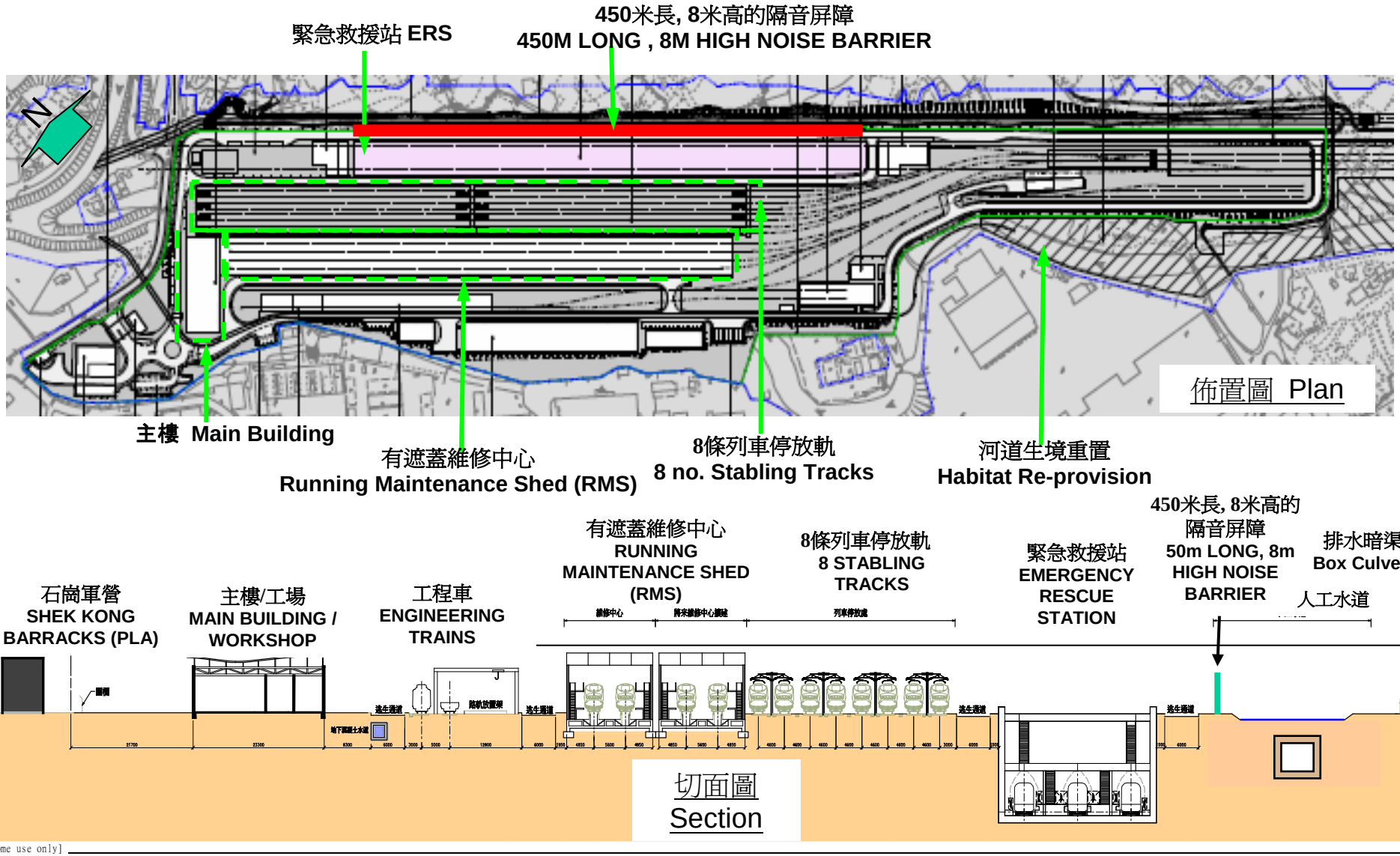
-Underground ERS and SS
地下緊急救援站及列車停放處

-Only 2 stabling tracks
只設置2條列車停放軌

圖號: R- 6
PLAN NO: R- 6

緊急救援站及列車停放處 – 詳細設計
Emergency Rescue Station (ERS) and Stabling Sidings (SSS) Detailed Design

附件A的附錄V
Appendix V to Annex A



Annex B

57TR - Non-railway Works of XRL - Comparison of 2008 and 2009 Estimates

(to be read in conjunction with Paper PWSC(2009-10)69)

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
Non-Railway Works	**2,750**	**9,137**	**6,387**	**1,908**	**4,479**	
(A) Essential Public Infrastructure Works (EPIW) (footbridges & subways)	70	419	349	88	261	(1) Addition of two footbridges (from 5 to 7) with enhancement of aesthetic appearance ($150M) [Please refer to Appendix I] • Having considered the results of the 2009 West Kowloon Reclamation Development Traffic Study of the Transport Department, we recommend the provision of two additional footbridges (one across Jordan Road linking the West Kowloon Terminus (WKT) and the future Jordan Road Public Transport Interchange (PTI) and another one above the new Road D1A near Man Cheong Street) are recommended to enhance pedestrian connectivity. Covers will be installed for the proposed footbridges and moving travelators will also be provided where necessary. After completion of the footbridges, it will only take about 10 minutes and 15 minutes to walk from WKT to the future Jordan Road PTI and the

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						buildings near Man Cheong Street respectively. ● Moreover, for better integration with the West Kowloon Cultural District in the vicinity, the aesthetic appearance of all the footbridges would be enhanced, including provision of glass canopy and greening.
						(2) One additional subway linking WKT to Lin Cheung Road western footpath ($110M) [Please refer to Appendix I] ● In the preliminary design stage, only one subway linking WKT and Austin Station was proposed. In the West Kowloon Reclamation Development Traffic Study, another subway linking WKT and Kowloon Station has also been recommended. The XRL project therefore includes the subway works by linking WKT with the western footpath of Lin Cheung Road. The additional subway will enhance the pedestrian connectivity of the WKT with the surrounding area.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
(B) EPIW (depressed roads)		1,390	1,390	290	1,100	(1) Construction of depressed roads at part of Austin Road West and Lin Cheung Road, construction of the new Road D1A and reconstruction of Wui Man Road [Please refer to Appendix I] • The West Kowloon Reclamation Development Traffic Study has also reviewed the traffic condition of West Kowloon in the longer term and proposed a number of road improvement schemes to cope with the future developments in the area (including WKT and the West Kowloon Cultural District). Such road schemes entrusted to the XRL project include those works mentioned above. • The depressed road system located at part of Austin Road West and Lin Cheung Road will separate the through traffic entering the West Kowloon area from the local traffic, and also enable provision of a pedestrian deck above the depressed roads. The new Road D1A and reconstruction of Wui Man Road will provide an alternative traffic route along the north-south direction.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						• Entrusting the roadwork package to the XRL project will minimize disruption to the public and at the same time ensure that the roadworks can be completed in tandem with the WKT.
(C) Reprovisioning, remedial and improvement works	257	1,200	943	251	692	(1) Re-provisioning of the existing temporary public transport interchange at Wui Cheung Road to the north-east of Lin Cheung Road and Jordan Road ($250M) [Please refer to Appendix II] • The existing Wui Cheung Road temporary public transport interchange and the associated coach and motorcycle parking spaces will fall within the construction footprint of the WKT. To facilitate construction of the WKT, a permanent public transport interchange at the north-east of Lin Cheung Road and Jordan Road will be constructed to replace the Wui Cheung Road temporary public transport interchange, in line with the recommendation of the West Kowloon Reclamation Development Traffic Study. This permanent public transport interchange will thus be constructed under the XRL project.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						• A noise mitigation landscape deck will be constructed above the proposed permanent public transport interchange. The landscape deck will become open space for public use.
						(2) Re-provisioning of existing flyovers D1 and T, which link Ngo Cheung Road and Hoi Wang Road to the Western Harbour Crossing and the West Kowloon Expressway ($40M) [Please refer to Appendix II] • In the detailed design stage, the approach tracks and platform arrangement have been revised to optimize train operation. As a result, the tunnel alignment will be in conflict with the foundations of these flyover foundations which will need to be removed for tunnel construction. To maintain the existing traffic flow to the Western Harbour Crossing and West Kowloon Highway, a replacement bridge will need to be erected before demolition of these flyovers.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						(3) Re-provisioning of the existing footbridge along Jordan Road ($80M) [Please refer to Appendix II] • In the detailed design stage, the whole approach track area has been revised to suit the WKT platform layout, resulting in a conflict with the foundations of this footbridge. Thus, this footbridge will need to be demolished temporarily. To maintain smooth pedestrian flow, a temporary footbridge will be erected before demolition of this footbridge.
						(4) Culvert Diversions along Sham Mong Road ($150M)
						(5) Reprovisioning of two footbridges along Sham Mong Road ($90M) • The railway alignment has been changed from Sham Shui Po to Tai Kok Tsui in the detailed design stage. The XRL tunnel will thus be in conflict with the piled foundations of four box culverts and two footbridges along Sham Mong Road. These piles are

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						thus required to be removed and footbridges to be demolished for the passage of tunnel boring machines. Reprovisioning of the footbridges is also required after removal.
(D) Enabling works at Site A		1,880	1,880	393	1,487	(1) Additional foundation and structural works ($770M) [Please refer to Appendix III] • Site A locates on top of the WKT. In the preliminary design stage, the cost estimates did not include enabling works for the topside development. In April 2008, the Government decided not to grant the development rights of Site A to the MTR Corporation Limited (MTRCL). • Site A will in future be dealt by public market auction in accordance with the land policy. It will not be possible to carry out the construction works of Site A in future without suspending the railway operation. Therefore, enabling works for the future topside development (including strengthening of the terminus foundation and structures) are required to be carried out in conjunction with the construction of the terminus. The division of costs between the

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						enabling works for the topside development and the terminus will be based on load apportionment principle.
						(2) Apportionment of terminus excavation, diaphragm wall and structure works for underground car park ($580M) [Please refer to Appendix III] • Provision of an underground car park for the topside development is in line with the current planning guideline. For the same reason as that for the enabling works on strengthening of the terminus foundation and structures (see item (1) above), enabling works for the future underground car park slab should also be carried out in conjunction of the XRL project. On the cost apportionment of the terminus excavation and diaphragm wall to the underground car park, it will be based on the ratio of the construction floor principle.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						(3) Civil works for sea water cooling mains ($130M) [Please refer to Appendix III] • With the inclusion of the new roads around WKT in the XRL project, it is considered more appropriate for the civil works of the sea water cooling mains to be carried out in conjunction with the XRL project. Otherwise, the newly completed roads would need to be opened up when the civil works of the sea water cooling mains at a later stage is carried out which will cause unnecessary disturbance to the public.
(E) Enabling works for WKCD	1,211	1,604	393	335	58	[Please refer to Appendix III] • Under the current planning assumption, the WKT will encroach into the WKCD area, occupying 3.3 ha of underground strata. Medium-rise structures up to 70 metres above Principal Datum (i.e. about 15-20 storeys) will be built in this 3.3-ha area. Enabling works, which include those for the foundation, noise and vibration mitigation (including isolated slab track) and the transfer plate, will be carried out in the strata of the extension area under the Hong Kong

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						section of the XRL. The enhancement works arise from the refinement of the detailed design of the enabling works.
(F) Enabling works for footbridges at Sham Mong Road		35	35	7	28	Piling works for footbridges planned by the Civil Engineering and Development Department (CEDD) • The foundations of three proposed footbridges along Sham Mong Road which are currently under planning by the CEDD will be very close to the XRL tunnel. We therefore need to carry out enabling works to protect the XRL tunnels to avoid any undesirable risk when piling works for the footbridges are carried out in future in close proximity to the XRL tunnels.
(G) Government facilities	1,212	2,609	1,397	544	852	(1) Increase in terminus floor area by 28 000 sq.m ($750M) • In the preliminary design stage, we have considered the possibility of a co-location scenario with Mainland's boundary control facilities (BCF) to be located in WKT, but we envisaged then that the arrival and departure halls would be housed on the same floor.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						According to the current patronage forecast review, when comparing with the original estimates (on the basis of which the preliminary design was conducted), the estimated number of non-HKID holder XRL passengers (who will require longer immigration processing time) in 2016 will increase by 20%, while the overall daily passengers using the BCF will also increase by 20% in 2031. Therefore, facilities and estimated floor area of the BCF need to be increased accordingly. • Moreover, having considered the need to provide better boundary crossing services to passengers, after consulting concerned government departments, the departure and arrival halls of the BCF are now housed in two separate floors in the current design. It would allow better set up for the Custom-Immigration-Quarantine (CIQ) functions and also facilitate better passenger circulation. This is also in line with the arrangements at the Hong Kong International Airport and the Lok Ma Chau Terminus.

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
						• This arrangement can also provide a buffer zone of sufficient length and width between the HKSAR and Mainland BCF for the Administration to handle arrangements similar to the temperature screening and collection of health declaration forms at the BCF conducted during the fight against the swine flu earlier.
						(2) Installation of communication equipment/ facilities for user Government departments for the operation of BCF in WKT ($100M) • Installation of communication equipment/ facilities (including closed circuit television, public address and radio system etc.) in the WKT is required for the user government departments to operate the BCF. These facilities were not envisaged in the preliminary design stage.
Contingencies	522	954	432	199	233	Cost increase for the enhancement to works
Design Cost	188	491	303	103	200	Cost increase for the enhancement to works
Project Management Cost	465	699	234	146	88	Upward adjustment due to enhancements to non-railway works
Land Cost	121		(121)	-	(121)	

Annex B

Items	Estimate announced in April 2008 ($Million in 2009 Prices)	Estimate announced in September 2009 ($Million in 2009 Prices)	Difference ($ Million)	Escalation in costs in the construction industry ($ Million)	Costs of Enhancement of Works ($Million)	Reasons for the Scope of Enhancement
Other Government Cost	25	238	213	50	163	Cost for fire fighting equipment, equipment for user departments in WKT, facilities/equipment for the dedicated emergency pressurized team, etc.
Total ($Million)	**4,071**	**11,519**	**7,448**	**2,406**	**5,042**	
Total ($Billion)	**4.1**	**11.5**	**7.4**	**2.4**	**5.0**	

圖號：NR-1
PLAN NO : NR-1

重建部份柯士甸道西和連翔道，擬建D1A新道路，重建匯民路及擬建隔音屏障 / 隔音罩
RECONSTRUCTION OF PART OF AUSTIN ROAD WEST AND LIN CHEUNG ROAD, PROPOSED ROAD D1A AND RECONSTRUCTION OF WUI MAN ROAD AND PROPOSED NOISE BARRRIER / ENCLOSURE

近文昌街建造跨越行車路 D1A 的行人天橋
PROPOSED FOOTBRIDGE ABOVE ROAD D1A NEAR MAN CHEONG STREET

擬建行人天橋至佐敦道北公共運輸交滙處
PROPOSED FOOTBRIDGE LINKING TO PUBLIC TRANSPORT INTERCHANGE AT NORTH OF JORDAN ROAD

D1A路
ROAD D1A

擬建3條行人天橋至九龍站
PROPOSED 3 FOOTBRIDGES LINKING TO KOWLOON STATION

佐敦道

JORDAN ROAD

AUSTIN STATION

擬建2條行人天橋至柯士甸站
PROPOSED 2 FOOTBRIDGES LINKING TO AUSTIN STATION

九龍站
KOWLOON STATION

連翔道
LIN CHEUNG ROAD

擬建行人隧道至連翔道西面行人路
PROPOSED SUBWAY LINKING TO THE FOOTPATH AT WEST OF LIN CHEUNG ROAD

匯民路
WUI MAN ROAD

擬建的西九龍總站
PROPOSED WEST KOWLOON TERMINUS

柯士甸站

柯士甸道西　AUSTIN ROAD WEST

擬建行人隧道至柯士甸站
PROPOSED SUBWAY LINKING TO AUSTIN STATION

米 0 100 150 m
比例尺 1 : 4 000 SCALE BAR

圖例 LEGEND:

- 廣深港高速鐵路方案界線 BOUNDARY OF XRL SCHEME
- 擬建行人天橋 [項目(A)(1)] PROPOSED FOOTBRIDGE [ITEM (A)(1)]
- 擬建行人隧道 [項目(A)(2)] PROPOSED SUBWAY [ITEM (A)(2)]
- 擬建行車道 / 地下行車道 [項目(B)(1)] PROPOSED ROAD / DEPRESSED ROAD [ITEM (B)(1)]
- 擬建隔音屏障 / 隔音罩 PROPOSED NOISE BARRIER / ENCLOSURE

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圖號：NR-2

PLAN NO : NR-2

項目（C）（2）– 現有行車天橋將會改道及修改

ITEM (C)(2) - EXISTING FLYOVERS TO BE DIVERTED AND MODIFIED

廣深港高速鐵路方案界線

BOUNDARY OF XRL SCHEME

項目（C）（1）– 擬建公共運輸交滙處、旅遊車與電單車停車位、隔音綠化平台及公共空間

ITEM (C)(1) - PROPOSED PUBLIC TRANSPORT INTERCHANGE, PARKING SPACES FOR COACH AND MOTORCYCLE, NOISE MITIGATION LANDSCAPE DECK AND OPEN SPACE

項目（C）（3）– 現有行人天橋將拆卸及重置

ITEM (C)(3) - EXISTING FOOTBRIDGE TO BE DEMOLISHED AND REPROVIDED

佐敦道

JORDAN ROAD

米 0 50 100 150 m

比例尺 1 : 3 000 SCALE BAR

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圖號：NR-3
PLAN NO : NR-3

佐敦道
JORDAN ROAD
AUSTIN STATION
九龍站
KOWLOON STATION
連翔道
LIN CHEUNG ROAD
用地A／擬建的西九龍總站
SITE A /PROPOSED WEST KOWLOON TERMINUS
柯士甸站
柯士甸道西　AUSTIN ROAD WEST
西九文化區
WEST KOWLOON CULTURAL DISTRICT

米 0 50 100 150 m
比例尺 1 : 4 000 SCALE BAR

圖例 LEGEND:

- 廣深港高速鐵路方案界線
  BOUNDARY OF XRL SCHEME
- 項目(D)(1)&(2)— 用地A上蓋物業發展的備置工程範圍
  ITEM (D)(1)&(2) - EXTENT OF ENABLING WORKS FOR TOPSIDE PROPERTY DEVELOPMENT AT SITE A
- 項目(E)— 將來西九文化區發展的備置工程範圍
  ITEM (E) - EXTENT OF ENABLING WORKS FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT
- 項目(D)(3)— 用地A上蓋物業發展的冷卻喉管
  ITEM (D)(3)- COOLING MAINS FOR TOPSIDE PROPERTY DEVELOPMENT AT SITE A

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Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

Design and Site Investigation Phase – Review on Project Cost Estimate

1. INTRODUCTION

1.1 Purpose of the Report

This report covers the findings of the review of the cost estimate prepared by the MTR Corporation Limited (MTRCL) for the Hong Kong section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL).

1.2 Background

1.2.1 The XRL is a cross-boundary transport infrastructure project with a connection to the national high speed passenger rail network, which, after the commissioning of the network, will provide high speed rail services between Hong Kong and Guangzhou and serve major mainland cities outside Guangdong province. The national high speed rail network, about some 16,000 km in length, is now under active planning and construction and would largely be in operation before 2015. It is understood that the section from Guangzhou to Shenzhen (Longhua) will commence operation in 2010.

1.2.2 The Hong Kong section of the XRL, measuring about 26 km from the West Kowloon Terminus (WKT) in the West Kowloon Reclamation area to the HKSAR – Shenzhen boundary, will use a dedicated underground corridor to ensure that the maximum operating speed of 200 km per hour can be achieved. The scheme of the Hong Kong section of the XRL was gazetted under the Railways Ordinance (Chapter 519) in November 2008 and authorized in October 2009.

1.2.3 In November 2008, the Government entrusted the design and site investigation of the Hong Kong section of the XRL to the MTRCL.

1.2.4 In June 2009, the Highways Department/Railway Development Office (HyD/RDO) of the Government commissioned Jacobs China Ltd. (JCL) to carry out monitoring and verification on MTRCL's work for the design and site investigation of the project. Up to now, JCL has carried out monitoring work on the design activities and completed a series of verification audits on MTRCL's work including technical and financial issues as well as an independent review on the project cost estimate submitted by the MTRCL.

1.2.5 The review results indicated that the MTRCL's cost estimate work was carried out with due diligence and in a manner complying with the requirements of the Government's entrustment. The cost estimate is a reasonable estimate with the data therein being in line with the prevailing market conditions.

1.3 Objectives of the Assignment

1.3.1 The objective of the assignment is to conduct an independent assessment on the construction cost of the Hong Kong section of the XRL estimated by the MTRCL.

1.3.2 The review covered the following aspects:-

- Civil and structural works;
- Architectural, builders works and finishes (ABWF);
- Electrical and mechanical (E&M) services works;
- System-wide E&M works;
- Signalling and control works;
- Rolling stock; and
- An assessment on the Contingencies.

1.3.3 The review excluded the following aspects: -

- Project operation and maintenance costs;
- Project Management Cost;
- Fare and non-fare revenues;
- Financial & legal charges; and
- Land cost.

2. APPROACH TO THE ASSIGNMENT

2.1 General

2.1.1 Queries in the form of Request for Information (RFI) relating to the cost estimate were issued to the MTRCL via HyD/RDO and, where necessary, with follow-up queries raised to the MTRCL and their engaged design and cost consultants to clarify any identified queries and discrepancies.

2.1.2 To cater for the changes in design and associated cost estimates as the project continued to evolve, related documents issued in the previous phases were thoroughly examined in order to understand the project cost development, the basis of cost estimates and method of pricing and the other constraints including construction methods which would affect the cost. As necessary, further information was sought from the MTRCL and their design and/or cost consultants.

2.1.3 The project cost estimate for the Hong Kong section of the XRL is prepared at December 2007 price level. A review has thus been carried out against our in-house cost data to ascertain the reasonableness and applicability of the MTRCL's proposed rates.

2.2 Checking of Cost Estimates prepared by MTRCL

2.2.1 We have reviewed the August 2009 cost estimate for the construction cost (including contingencies) supplied by the MTRCL (hereinafter termed 'Project Cost Estimate in August 2009') and the MTRCL's updated Project Cost Estimate in September 2009 to identify major cost variances between the August and September 2009 figures. Queries were raised to the MTRCL for explanation on the cost variances item by item.

2.2.2 In the review process, a thorough review of the cost estimates and cost breakdowns of individual Works Contracts was carried out. Special attention was also placed on the cost breakdown provided by the MTRCL to identify any discrepancies such as duplication of costs under different sections of the cost estimates, over estimation and unreasonable estimation. Subsequent queries were raised to the MTRCL and their design and/or cost consultants to clarify all these identified discrepancies.

2.3 Checking of Estimated Costs for Civil / Structural / Architectural / Building Services Works for WKT

2.3.1 All relevant costing documents provided by the MTRCL and total of 9 relevant works contracts have been reviewed.

2.3.2 The checking covered the rates for the works with quantities already checked by the independent quantity surveyors employed by the MTRCL, but our checking would cover the quantity of those items with apparent anomalies or those subject to extremely price-sensitive variations.

2.3.3 Any major cost variances were reviewed by requesting from MTRCL all relevant data including breakdowns and backup information, source and method of pricing, inflation factors etc..

2.4 Checking of Estimated Costs for Civil / Structural / Architectural Works for Alignment (Tunnel & Associated Structures)

2.4.1 Same approach and methodology as that for WKT as described in 2.3.2 and 2.3.3 above were adopted.

2.4.2 A total of 12 works contracts have been reviewed.

2.5 Checking of Estimated Costs for System-wide E&M / Signalling /Rolling Stock

2.5.1 Unlike WKT and alignment, the rates and prices adopted for system-wide E&M works were extracted from past similar projects/contracts with appropriate uplift adjustment plus quotations/ similar sales transaction where design information was available. Thus the focus of the cost review was on the approach and the methodology adopted. The quantities of the key components included in each system-wide E&M contract was also reviewed based on the scope of work.

2.5.2 Detailed reviews were made on MTRCL's information on assumptions and breakdown of the cost items as well as the rates build-up and back-up information from past similar projects/contracts. Further information was also requested from the MTRCL. These referenced projects include the Tseung Kwan O Extension (TKE) project, Tseung Kwan O South Station Extension project, the Disneyland Resort Line (DRL) and Kowloon Southern Link projects

2.5.3 We reviewed a total of 17 works contracts covering rolling stock, trackwork and overhead line, depot equipment, emergency and rescue trains.

2.6 Checking of Preliminaries

2.6.1 We requested information from the MTRCL for clarifying the global approach of allowing 20% for the preliminaries for all measured works. We also requested and reviewed MTRCL's clarifications on cost items and breakdown.

2.7 Checking of Contingencies

2.7.1 Permission was obtained from HyD/RDO for making reference to the information and data under the West Island Line (WIL) in order to speed up the process of checking the contingency provision by the MTRCL for the Hong Kong section of the XRL.

2.7.2 We requested the MTRCL for the clarification on the basis of the contingencies.

2.7.3 The MTRCL allowed the following contingency percentages in the Project Cost Estimate in August 2009:-

- WKT/Alignment/System-wide E&M 20%
- Rolling Stock 5%

2.7.4 The MTRCL then reduced the contingency percentages for WKT/Alignment/System-wide E&M to 15% in their updated Project Cost Estimate in September 2009.

2.8 Checking of Money of the Day (MOD) prices

We met with the MTRCL for clarification on the basis and method of calculation of the MOD prices.

2.9 Checking of MTRCL's Updated Project Cost Estimate in September 2009

As compared with the Project Cost Estimate in August 2009, the updated Project Cost Estimate in September 2009 is $179.7M (December 2007 prices) less. The major cost variances are due to refinements in the scope of works and the validation of the works details. Also, the MTRCL has made significant efforts in updating the quantities of works and the unit rates for calculating the final cost estimate.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 General

3.1.1 Apart from the comments below, we are of the opinion that the MTRCL has adopted a systematic approach in deriving the cost estimate for the construction cost for the Hong Kong section of the XRL project and we consider that the current project cost estimate prepared by the MTRCL is reasonable and generally in order.

3.1.2 The rates are considered to be reasonable and appropriate for preparing the project cost estimate of the Hong Kong section of the XRL as they are developed by the MTRCL from the tendered prices of MTRCL's historical railways projects and they are generally in line with our in-house cost data.

3.1.3 The Hong Kong section of the XRL is a mega project and it is inevitable and normal that some works packages are now in the very advanced stage with full bills of quantities ready for making very detailed cost estimates whereas some works packages are still in preliminary design stages where their cost estimates would have to rely on preliminary unit costs. Similarly, the cost estimation for the system-wide E&M works is based on the best available information at this stage bearing in mind the potential advancement in technology and use of material in the future. Having reviewed all the corresponding cost estimates developed by the MTRCL, we consider that they are based on the best information available at this stage and they have been checked to be generally in the right order of costs for funding application purposes. We are also satisfied that there has been proper mechanism within the MTRCL for cost review.

3.1.4 For WKT and alignment, the MTRCL has primarily based their pricing adopting the methodology mentioned in paragraph 3.1.2 above and where rates were not applicable, the rates from other sources and build-up rates have been used and after review, they are found to be generally reasonable and hence acceptable.

3.1.5 For system-wide E&M works, the MTRCL has based their cost estimates on reference projects of similar nature and scope. The build-up of the rates from the reference rates has been reviewed and found to be generally reasonable and acceptable. Based on the information received and having reviewed the design approaches, the design assumptions, the rates build-up and the quantities of the key components for all system-wide E&M systems were reviewed in detail. It is considered that the cost estimates for most of these contracts are, in general, of the right order of magnitude.

3.2 Civil / Structural / Architectural Works for WKT

3.2.1 The MTRCL has allowed a number of lump sum items within the cost estimates to cover general issues. We considered the approach fair and reasonable.

3.2.2 Despite the anomalies identified during our review on the duplication of sundry allowances in the sea water cooling system, inconsistent rates for socket H piles, and stanchions inside column for top down construction method, etc, we considered that the cost estimate on this section basically fair and reasonable.

3.3 Civil / Structural / Architectural Works for Alignment

3.3.1 The MTRCL has allowed a number of lump sum items and sundries items within the cost estimates which are considered reasonable at this stage.

3.3.2 A lump sum allowance for ground treatment for the Mai Po marble under a Works Contract is considered reasonable after reviewing MTRCL's build-up and the basis of allowance, which reflects the uncertainties involved in this kind of works.

3.3.3 MTRCL has allowed a provisional item for interfacing with the Mainland tunnel section. We understand that the scope is yet to be finalized, and therefore the cost allowed would need to be conservative. We consider that such approach is reasonable.

3.3.4 There is over-estimation on the cost for procurement of tunnel boring machines, additional grouting work for building in Tai Kok Tsui, temporary stockpiling, reinforcement for cut and cover tunnel, temporary footbridge for village and street lighting posts. Cost reduction for these items is proposed.

3.4 System-wide E&M / Signalling / Rolling Stock

3.4.1 For the rolling stock, the type and model should comply with the national high speed standard. As the standard adopted by the manufacturing industry in the Mainland for high speed trains has yet to be consolidated, we expect some price fluctuation will occur and we have asked the MTRCL to vigilantly check the cost more frequently. The cost estimate now allowed for is reasonable.

3.4.2 For lifts/escalators/travelators systems, the allowances for testing and commissioning are considered to be on the high side, and hence a 50% cost reduction is proposed.

3.4.3 For the radio communications, train-track radio communications, and fixed communications systems, the allowances for training, spares, special tools and test equipment were considered too high, and hence a cost reduction is proposed.

3.5 Contingencies

The MTRCL has reduced the global allowance from 20% in the Project Cost Estimate in August 2009 to 15% in the updated Project Cost Estimate in September 2009. We consider that the original percentage allowance is too high for a mega sized project and thus a downward revision is considered reasonable. Besides, there are also other allowances such as daywork, sundries and unmeasured items in MTRCL's cost estimates, which are essentially other forms of contingencies. Furthermore, the level of contingencies allowance for this project is still higher than that for other railway projects, for instance, WIL is 13.5%, whereas the percentages for TKE and DRL are 12.6% and 11.7% respectively. Taking into account the above together with tight control over procurement and contract strategies and with the economies of scale associated with this mega project, it is conceivable that the level of contingencies allowances would be further reduced to 10%.

3.6 Preliminaries

3.6.1 For WKT and alignment, the MTRCL has adopted 20% on all construction costs except those works contracts reaching tendering stage for which they are separately priced under respective Target Cost Estimate (TCE). This is in line with MTRCL's past practice.

3.6.2 For system-wide E&M works, as the preliminaries in each work contract include different degree of design and engineering works, the MTRCL has applied percentages of preliminaries based on the individual percentages from their historical data, which are considered to be reasonable after our inspection of the information provided by the MTRCL.

3.7 Adjustment of Price Levels and MOD

The construction cost information prepared by the MTRCL is priced as at December 2007 with further allowance for MOD to account for adjustment on price level during the period from 2008 to 2015 (which is the target date of operation of the Hong Kong section of the XRL). However, we opine that the prices at December 2007 should be adjusted to the current price level at September 2009 by making reference to relevant government construction works indices with further allowance for MOD thereafter.

3.8 Proposed Cost Reduction

3.8.1 The proposed overall reduction in the Project Cost Estimate in August 2009, in December 2007 prices, is as follows:-

(a)	Terminus	0.6%
(b)	Alignment	1.6%
(c)	System-wide E&M	1.4%
(d)	Rolling Stock	0.0%
(e)	Overall Reduction	1.2%

3.9 Recommendation

3.9.1 While the MTRCL has carried out the cost estimate in due diligence, and with the most updated costing information, we recommend the following measures to be adopted as more of the works packages would progressively reach tendering and construction stages:-

a) While the price index trend indicates downward trend for the last few months, we need to closely monitor the market situation so that on one hand we should be able to present a realistic cost estimate, but on the other hand, we should not be locking up huge resources which would otherwise be allocated to other public works projects.

b) In view of the substantial completion of the detailed design of the major elements of works and the presence of other forms of contingencies allowances (such as daywork, sundries and unmeasured items, etc.), it is conceivable that the level of contingencies allowances could be further reduced from 15% downwards. The overall contingency percentage for WIL is 13.5%, which relates to construction in urban areas; and thus involving higher risk level than that of the Hong Kong section of the XRL which is in semi-urban areas and besides, the Hong Kong section of the XRL should enjoy a greater degree of economy of scale due to its mega scale. Consequently, it is conceivable that the overall contingency percentage for the XRL could be reduced from 15% to 10%, as suitable procurement and contract strategies could be adopted to manage the risks properly, for instance, the adoption of dispute resolution advisory system during the construction stage to resolve all potential disputes on a regular basis without leading to large claims as well as adopting appropriate risk analysis technique in estimation.

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

Consultancy Report on the Checking of MTRCL's On-cost

1. INTRODUCTION

1.1 Background

1.1.1 The Hong Kong Special Administrative Region Government (the Government) has undertaken to build the Hong Kong section of the Guangzhou – Shenzhen – Hong Kong Express Rail Line (XRL), which will provide a rail link between Hong Kong and a number of mainland cities including Shenzhen, Guangzhou, Shanghai and Beijing. The Hong Kong section of the XRL will include 26km long rail tracks inside tunnel between the West Kowloon Terminus and the boundary at Huanggang. The project will also comprise associated works such as an underground emergency rescue station, stabling sidings, ventilation buildings and emergency access points.

1.1.2 The Government will entrust the entire design and construction of the Hong Kong section of the XRL to the MTRCL. Under this entrustment arrangement, the Government will pay the actual costs incurred by the MTRCL based on prices established from verifiable procurement processes. The MTRCL will provide management and supervision services which will be covered by the on-cost or Project Management Cost (PMC). Before seeking approval for the railway scheme from the Chief Executive-in-Council the Government has checked the estimated cost of the project including the MTRCL's PMC.

1.1.3 The Highways Department/Railway Development Office (HyD/RDO) of the Government has commissioned the Joint Venture of PYPUN Engineering Consultants Limited and PYPUN-KD & Associates Limited (PYPUN JV) to conduct an independent assessment on the MTRCL's PMC of the Hong Kong section of the XRL.

1.2 Objectives of the Assignment

1.2.1 An independent checking was conducted to assess the PMC of the Hong Kong section of the XRL estimated by the MTRCL.

1.2.2 The checking of the PMC of the Hong Kong section of the XRL covered the following service teams: -

i) Project Team – provides support for the design, project management, project planning, design management and construction supervision, and its cost is composed of staff monthly cost (with staff direct overheads) multiplied by the man-months of staff resources estimated to be deployed;

ii) Project Headquarters – provides support for the project control, planning and programming and procurement and contracts etc., and its cost is composed of staff monthly cost (with staff direct overheads) multiplied by the man-months of staff resources estimated to be deployed; and

iii) Other Support Services – cover human resources, legal, public relations, finance and information technology etc. This cost is charged on a % allocation basis for individual project team based on benchmarking with other projects.

2. APPROACH TO THE ASSIGNMENT

2.1 Checking of Estimated Project Team and Project Headquarters Cost

2.1.1 The manpower budget data given by the MTRCL was reviewed and analyzed with review of the MTRCL's internal documents.

2.1.2 The review of the manpower budget has taken into consideration the XRL Contract Tender Cascade Programme, the XRL Project Implementation Programme and the demarcation of work between Project Management teams.

2.1.3 The documents relating to the overall budget on Project Management Cost was also referenced when reviewing the PMC for the various project sub-teams.

2.2 Checking of Estimated Other Support Services Cost

2.2.1 The Other Support Services Cost can be categorized into 3 types in accordance with their Cost Allocation basis:-

i) % Allocation Basis - Human Resources & Administration Division, Finance Division, Legal & Procurement Division and other Headquarters Department;

ii) Staff Cost of Designated non-project Team - Safety & Quality, Infra-structure Maintenance-Railway Protection, Operations Planning, Engineering Planning, Property Development and Interface Works on Operating Railway; and

iii) Administrative Cost and Overheads - Rental of Project Team & Project Headquarters and the overheads of non-project related staff (including Testing & Commissioning) who are stationed at the MTRCL Headquarters, Kowloon Bay.

2.2.2 % Allocation Basis - The percentages allocated to Human Resources & Administration Division, Finance Division, Legal & Procurement Division and other Headquarters Department Costs were reviewed and compared with other projects including the West Island Line (WIL) and South Island Line.

2.2.3 Staff Cost of Designated non-project Team – As the relevant cost is based on the staff resource input (similar to that of the Project team), the approach for the checking of estimated Project Team was thus adopted in the review of the Staff Cost of Designated non-project Team.

2.2.4 For Administrative Cost and Overheads, the rental of accommodation for Project Team & Project Headquarters was checked against the market rent while other overheads were also reviewed.

3. PROPOSED REDUCTIONS

3.1 Project Team Cost

3.1.1 The buildup and the level of the resources for Project Team Cost are considered acceptable and in line with the contract tender programme and the project implementation programme except for the following manpower input, which could be reduced without adversely affecting the project administration:-

Department	***Reduction HK$ million (MoD)***
General Management	9.7
Mainland Liaison and Support	3.6
Design Management – E&M Design	4.5
Civil Construction – Tunnel 2	4.1
E&M Construction – Railway Systems	4.0
Testing and Commissioning	1.5
Total	**27.4**

3.2 Project Headquarters Cost

3.2.1 The buildup and the level of the resources for Project Headquarters Cost are considered acceptable and in line with the contract tender programme and the project implementation programme except for the following manpower input, which could be reduced without adversely affecting the project administration:-

Department	***Reduction HK$ million (MoD)***
Project Engineering General Management	2.8
E&M Engineering	2.5
Civil & Planning	3.1
Deputy Project Director Office	3.9
Total	**12.3**

3.3 Other Support Services Cost

3.3.1 The Other Support Services Cost was reviewed with the following comments:-

- The percentage allocation among projects were reviewed and considered reasonable;
- The buildup and the level of the resources for Designated non-project Team are considered acceptable and in line with the project programme; and
- The Rental of accommodation for Project Team & Project Headquarters are in line with the market rent.

No reduction is therefore proposed for the Other Support Services Cost.

4. CONCLUSION AND RECOMMENDATIONS

4.1 The following table sets out MTRCL's estimated and revised PMC:-

Revised PMC				
	Design and site investigation [$million (MOD)]	Construction		Total [$million (MOD)]
		Railway [$million (MOD)]	Non-railway [$million (MOD)]	
Project Team Cost	266.6	2652.7	568.6	3487.9 (reduced by 27.4 as compared with MTRCL's budget)
Project Headquarters Cost	35.5	353.0	75.7	464.2 (reduced by 12.3 as compared with MTRCL's budget)
Other Support Services Cost	48.7	485.2	104.0	637.9
TOTAL	**350.8**	**3490.9**	**748.3**	**4590.0** (reduced by 39.7 as compared with MTRCL's budget)

4.2 PMC Rate Comparison with other Projects

4.2.1 The XRL's PMC rate is compared with the other railway projects as follows:-

	XRL	WIL	Tseung Kwan O Extension (TKE)
PMC Rate	**7.38%**	9.8%	19.4%

4.2.2 The XRL PMC rate is lower than the other projects given:-

i) greater economy of scale, as the XRL project is much larger in scale than the WIL and TKE (Tseung Kwan O Extension/Quarry Bay Relief); and

ii) the construction cost increase since TKE's commissioning in 2002 is much higher than staff cost increase, but the staff cost is the main component of the PMC.

4.3 Conclusion

4.3.1 After considering the special nature and requirements of the project, as well as reviewing the buildup of the PMC and the associated rate, we consider the revised PMC of HK$4,590M reasonable.

4.4 Recommendations

4.4.1 It is noted that any subsequent change of the contract value (without any material change in duration and scope of works) will only have minimal impact on the PMC, it is therefore recommended that the determination of the PMC should not be based on the final contract value.

4.4.2 The Government should be aware that the PMC will vary in the event of substantial change in scope of works and project duration; however the additional/reduced PMC, depending on the magnitude of such changes, cannot be measured at this stage. It is recommended that any additional/reduced PMC due to the substantial change of scope of works or works duration shall be subject to further discussion between the Government and MTRCL.

4.4.3 Based on the above, the following ways are NOT recommended to determine the PMC:-

i) a fixed percentage with the value of the works; and

ii) a fixed portion plus a variable portion that would tie to the value of the works or works duration.

4.4.4 In view of the uncertainty of the global economy and the anticipated substantial demand of manpower in the forthcoming years, the Government's interests and expenses will be best

protected by acceptance of the MTRCL's offer that the PMC would be in a lump sum fee of HK$4,590 million.

4.4.5 The benefits of a Fixed Sum PMC are as follows:-

i) The Government bears no risk of inflation rate and change in salary level;

ii) The Government and the MTRCL can concentrate on implementation of the project rather than assessment and negotiation on variations to the PMC; and

iii) The Government and its Consultant(s) can concentrate on the cost control of construction works which represents over 90% of the overall project cost.

4.4.6 The agreed Fixed Sum shall be payable to the MTRCL in accordance with an agreed payment schedule.