ANNEX A: PLANNING AND ENGINEERING CONSIDERATIONS

1. Introduction and Scope

1.1 The estimation of costs and revenues was one of the key tasks undertaken to provide input to the FA's financial model and analysis. The level of detail adopted in their estimation is appropriate to a financial assessment undertaken at this stage in the project cycle i.e. prior to master planning of the site and based on the broad recommendations of MAG and PATAG, the development parameters/requirements set under the October 2005 Package and the Invitation for Proposals (IFP). The level of detail is also appropriate given that the FA assignment was tasked with considering alternative PPP arrangements, financial viability and funding arrangements for the proposed statutory body; the purpose of which was to assist the government in the preparation of the institutional and funding arrangements for the WKCD.

1.2 It is important to appreciate, particularly for the estimation of capital and operation, maintenance and management (OMM) costs, that this FA assignment is not a feasibility study on individual facilities which would have involved detailed site and technical surveys, preliminary design, layout plans, etc. This assignment is not based on a master plan or design of engineering works or facilities; consultations with utility companies, site and technical surveys were not undertaken. Similarly, for the estimation of revenues, it is important to appreciate that demand for facilities is based on the recommendations of PATAG and MAG (high levels of demand and a target of 2.5 million visitors a year for M+). Independent market demand assessments were not undertaken as part of this assignment.

1.3 In consultation with relevant Government bureaux / departments, the FA developed a set of assumptions for a WKCD 'Base Case' in the level of detail required for the estimation of capital and OMM costs and revenues on an annual basis, based on the broad recommendations of PATAG and MAG and the development parameters/requirements of the October 2005 Package and the IFP, and making use of local and international experience and benchmarks where appropriate. This included the construction phasing and development programme of the facilities to be provided, their size[1], overhaul and maintenance requirements, collection acquisition costs, programming budget, annual attendance, number of performances, utilisation rates, admission charges, ticket price, hire charges, merchandise sales, rental income from resident company space, shops, restaurants and other uses, sponsorship and fundraising amongst others.

2. Study Area

2.1 The study area boundary as set by the IFP, is shown in Figure A-1.

[1] The construction floor area (CFA) was estimated by the FA based on assumed gross floor area (GFA) and industry standards. GFA for M+ and the Exhibition Centre (EC) was provided by MAG. GFA for PA Venues was estimated by the FA based on the number of seats, provided by PATAG

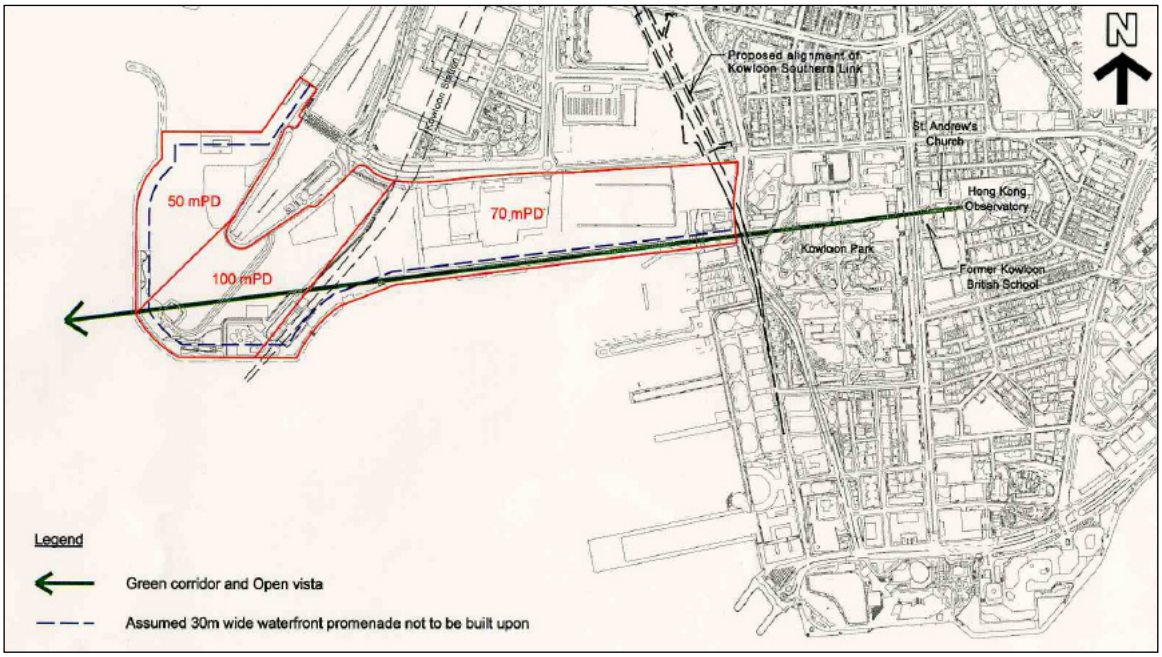
Figure A-1: Study Area

3. Site Development and Planning Parameters

3.1 A number of overall site development and planning parameters have been used as the basis of the financial analysis. The key parameters (and their source/basis shown in brackets) include:

- Site Area of 40.09 hectares (as per IFP)
- Site zoned "Other Specified Uses" annotated "Arts, Cultural, Commercial and Entertainment Uses" (existing zoning)
- Plot Ratio of 1.81 (as per October 2005 Package), giving a total GFA of 726,285 sq.m.
- Residential development limited to 20% of total GFA (as per October 2005 Package), i.e. 145,257 sq.m. GFA based on a plot ratio of 1.81
- 3 hectares of piazzas (as advised by PATAG) including a small canopy as part of piazza development
- 20 hectares of public open space excl. piazzas (as per IFP) on or above ground
- International architectural design competition for M+ only (as advised by MAG)
- NOFA to GFA ratios:
  - 1:1.67 for M+ (as advised by MAG)
  - 1:1.5 for PA venues (FA assumption)
  - 1:1.25 for Exhibition Centre (as per IFP)
- Maximum building heights ranging from 50mPD to 100mPD (as proposed by the Planning Department) – See Figure A-2.

Figure A-2: Height Restrictions



Source: Planning Department (provided to the FA for the purpose of this assignment)

4. Development Mix

4.1 The development mix is shown as Table A-1. Key assumptions (and their source/basis shown in brackets) include:

- GFAs for M+ and EC (as advised by MAG). FA assumed 16,000 sq.m. NOFA / 19,200 sq.m. GFA storage and conservation laboratory facilities would be provided off site
- GFAs for communal facilities (as per IFP)
- GFAs for performing arts venues (FA assumption based on PATAG recommended number of seats - see Annex D.1)
- GFAs of cultural facilities are inclusive of ancillary commercial uses (FA assumption)
- carparks and loading / unloading facilities are provided as ancillary uses to meet the needs of arts, cultural, residential, commercial and other uses and as such are exempted from the GFA calculation (FA assumption)
- APM stations and depots are exempted from GFA calculation (FA assumption) - like some floor spaces constructed for use solely as public transport / railway station development exempted from GFA calculation under the provision of Outline Zoning Plans. In the IFP, the GFA of the proposed APM, including its stations/stops, was also not included in the overall plot ratio of 1.81

Table A-1: Development Mix

Uses	GFA		% of Total GFA
M+	98,530	sq.m.	14%
Exhibition Centre	12,500	sq.m.	2%
Performing Arts Venues	202,389	sq.m.	28%
Mega Performance Venue	55,065	sq.m.	
Great Theatre 1	22,200	sq.m.	
Concert Hall / Chamber Music Hall	25,200	sq.m.	
Xiqu Centre	22,433	sq.m.	
Medium Sized Theatre 1	10,125	sq.m.	
Medium Sized Theatre 2 and Black Box Theatre 1	14,220	sq.m.	
Black Box Theatres 2 and 3	7,793	sq.m.	
Black Box Theatre 4	4,740	sq.m.	
Great Theatre 2 and Medium Sized Theatre 3	30,488	sq.m.	
Medium Sized Theatre 4	10,125	sq.m.	
Subtotal CACF	**313,419**	**sq.m.**	**43%**
Other Arts and Cultural Uses	15,000	sq.m.	2%
Communal facilities	20,000	sq.m.	3%
Fire Station Complex	13,240	sq.m.	
Salt Water Pumping Station	800	sq.m.	
Electricity Sub-Station	500	sq.m.	
Police Post	350	sq.m.	
Public Toilets	1,200	sq.m.	
Refuse Collection Points	570	sq.m.	
Contingency Space	3,340	sq.m.	
Subtotal OACF and Communal Uses	**35,000**	**sq.m.**	**5%**
Villa houses	10,000	sq.m.	1%
Apartments	135,257	sq.m.	19%
Hotels	84,000	sq.m.	12%
Retail / Dining / Entertainment Uses	148,609	sq.m.	20%
Subtotal Residential and Commercial Uses	**377,866**	**sq.m.**	**52%**
Total	**726,285**	**sq.m.**	**100%**

Note: (1) All numbers are rounded to 0 decimal places for presentational ease.

(2) M+ GFA excl. off-site storage and conservation laboratories (16,000 sq.m. NOFA / 19,200 GFA)

(3) Phase 1: 161,776 sq.m. GFA of performing arts venues, 81,830 sq.m. GFA of M+ and 12,500 sq.m. GFA of EC

(4) Phase 2: 40,613 sq.m. GFA of performing arts venues and 16,700 sq.m. GFA of M+

(5) The list of CACF specified in the IFP is provided below for reference:

CACF	Seating Capacity	GFA (sq.m.)
Theatre Complex		
Theatre A	At least 2,000	34,319
Theatre B	At least 800	13,650
Theatre C	At least 400	4,519
Performance Venue	At least 10,000	54,775
Museum Cluster and Art Exhibition Centre		
Museum of the Moving Image	Around 500 (IMAX Theatre)	25,000
Museum of Modern Art Museum of Ink Museum of Design	- - -	69,187
Sub-total (Museum Cluster)		94,187
Art Exhibition Centre	-	12,500
Total		**213,950**

5. Geotechnical Issues

5.1 Key geotechnical issues include:

- Existing ground level of the site is +5mPD
- The site is located on reclaimed land and the rockhead varies from –35 mPD to –60mPD. It is generally not financially viable to build low-rise developments on end-bearing foundation systems. Possible piling options with loading capacity are summarized as follows:

Bored Pile

- For large diameter bored piles, the pile length is about 65m commencing from the existing ground level. Bearing capacity can be determined using 5,000kPa times the base area of bell-out. The capacities are summarised as follows:
  - 2.0m shaft, 3.0m bell-out, 35MN
  - 2.5m shaft, 3.8m bell-out, 55MN
  - 2.8m shaft, 4.2m bell-out, 69MN
  - 3.0m shaft, 4.5m bell-out, 79MN

Driven H-pile

- For driven steel H-piles, the pile length is about 50m commencing from the existing ground level. Bearing capacity is derived from 0.3x yield stress. Provided that the wind load is not very high and the steel section can cope with the combined stress under wind shear, D+L and NSF. The typical pile capacities are summarised as follows:
  - 305x305x180kg/m UBP, 2.5MN
  - 305x305x223kg/m UBP, 2.9MN
- By taking the following assumptions into consideration, the assumed piling options for different building structures under each column at 12mx12m grid are summarised in Table A-2.

Table A-2: Piling Options

Building Type	Equivalent Bearing Stress	Piling option
Retail, Commercial and G/IC Uses	140kPa (5 levels + 1.5m thick cap)	1 nos of 2.0m shaft, 3.0m bell-out, 35MN 8 nos of 305x305x223kg/m UBP, 2.9MN
Residential	18 levels (70mPD, 3.5m typical storey height) 400kPa (18 levels + 2.5m thick cap)	1 nos of 2.8m shaft, 4.2m bell-out, 69MN
Hotel / OACF	26 levels (100mPD, 5m on entrance, 3.5m typical storey height) 520kPa (26 levels + 2.5m thick cap)	1 nos of 3m shaft, 4.5m bell out, 79MN
Performing arts venues and Museums	240kPa (4 levels on top of podium + 2m thick cap)	1 nos of 2.0m shaft, 3.0m bell-out, 35MN 12 nos of 305x305x223kg/m UBP, 2.9MN
Facilities at grade	N/A	N/A

Note: The estimation of foundation requirements are based on the Code of Practice for Foundation Published by the Buildings Department of HKSAR

Building Types

- The building types and likely structural system for construction are summarised in Table A-3.

Table A-3: Building Types

Building Type	Building Shell	Building Envelope
Podium (Retail and Commercial)	Reinforced and Pre-stressed concrete	Glass wall, Granite
Residential	Reinforced concrete	Window wall
Performing arts venues	Reinforced and Pre-stressed concrete	Steel Roof
Museums	Reinforced and Pre-stressed concrete	Steel Roof/Curtain Wall

6. Site Constraints

6.1 The conceptual engineering assumptions to accommodate site constraints of the WKCD specified in the original Invitation for Proposals (IFP) are outlined in the following sections. These assumptions will be revisited at the master planning stage of the project cycle when technical surveys and design will be undertaken

6.2 The site constraints and engineering assumptions are presented in Table A-4.

Table A-4: Site Constraints and Engineering Assumptions

Owner	Ref. No.	Description	Engineering Assumptions
Government (WSD)	G1	G1a Existing Kowloon south no.2 salt water pumping station (SWPS) of 20m(W) x 53m(L) x 6.5m(H) within a site of 70m(W) x 40m(L) for delivering flushing water to Kowloon south district.	▪ The seawater pump house is proposed to be decked over by a single level podium deck. ▪ The hydrogen gas chimney on the seawater pump house should be diverted. ▪ Additional lighting and ventilation should be provided after the deck over. ▪ Co-ordination with future developments to maintain access road with utilities underneath and the waterworks reserve.
		G1b Existing seawater intake culvert of about 4.7m(W) x 4.7m(D) within a 23.5m wide waterworks reserve and existing 600mm diameter salt water mains and 200mm diameter fresh water mains within a 11m wide waterworks reserve.	
	G2	G2a A proposed 1200mm diameter cross-harbour fresh water main to be laid within 2 waterwork reserve.	▪ Co-ordination with future developments to maintain the cross-harbour fresh water mains.
		G2b A proposed 800mm diameter salt water main to be laid within the 11m wide joint waterworks reserve.	
Government (DSD)	G3	An existing twin-cell box culvert of 10.8m(W) x 4.2m(H) and associated drainage connections (including a 700mm x 950mm culvert, a 2100mm diameter and a 600mm diameter storm water drain) for discharging storm water from the hinterland outside WKCD to the harbour.	▪ The box culvert to be diverted if necessary. ▪ Co-ordination with future developments to access the box culvert. ▪ The pipes to be relocated if necessary.
	G4	An existing 2550mm diameter storm water drain receiving water from ref: M3 and W3 for discharging to the harbour.	▪ The pipe to be relocated if necessary.
	G5	A system of existing storm water drains of 1350 to 1800mm diameter for discharging storm water in the hinterland outside WKCD to the harbour.	▪ The storm water drains to be relocated if necessary.
	G6	An existing terminal foul sewer manhole discharging into a 450mm diameter foul sewer connecting to areas outside WKCD.	▪ The foul sewerage manhole to be modified if necessary.

Owner	Ref. No.	Description	Engineering Assumptions
Government (FSD)	G7	G7a Existing Tsim Sha Tsui fire station complex.	▪ The Fire Station Complex will be re-provided within WKCD. ▪ The staff quarter will be re-provided outside WKCD. ▪ The Fire Protection Regional Office, Workshop and Dangerous Goods Stores to be relocated to To Wah Road.
		G7b Existing fireboat station/pier and landing steps.	▪ The existing fireboat station/pier and landing steps to be re-provided within WKCD.
Government (GPA/LANDSD)	G8	Existing underground seawater cooling pump-houses of about 100m(L) x 9m(W) in total (with transformer/switch room above ground) and associated cooling mains providing cooling water to government offices outside the WKCD and also proposed to serve MTRCL (ref.M4).	▪ The existing seawater pump house to be maintained if a 1.5km Promenade to be maintained for public use. ▪ The Cooling water pipes to be diverted if necessary.
Government (MD and CEDD)	G9	Two sets of existing public landing steps.	▪ The existing landing steps could be retained if necessary.
Government (CEDD and others)	G10	Existing piling work (13 no. 2300mm diameter bore-piles partially complete) originally constructed for a planned footbridge. The piling work may be abandoned or re-used at the proponent's own risk.	▪ Assumed existing piling works to be abandoned.
	G11	Proposed submarine electricity cable connection comprising up to three high voltage cables in cable reserve with underground structures at the landing point.	▪ A possible cable trench for the submarine cable to be incorporated. Modification of the seawall is required.
KCRC	K1	Proposed railway tunnels (2005-2007 tentatively) for the KCRC Kowloon southern link (KSL).	▪ Development will be restricted within the KSL protective zone. Higher construction cost of the development in the vicinity due to special requirements.

Owner	Ref. No.	Description	Engineering Assumptions
	K2	Proposed underground pumphouses and seawater cooling mains (2005-2008 tentatively) to serve KSL railway stations.	▪ KSL does not need the seawater cooling pump house.
	K3	Proposed temporary barging facilities and associated construction access from Austin road west (2004 – end June 2006) for the dumping of excavated materials from construction sites of KSL.	▪ No impact as construction will not start until 2010.
MTRCL	M1	An existing airport railway and Tung Chung line alignment. Its tunnels and associated underground facilities and ventilation building with 2 sea water intake culverts for the air conditioning of airport railway Kowloon station.	▪ Future development will require an expensive long span structure to bridge over the Airport express and Tung Chung line tunnels. ▪ Steel Sleeves are required for the piling in the close vicinity of the tunnels. ▪ More stringent requirement for the construction in close vicinity of MTRC tunnels. ▪ The ventilation building could be decked over if necessary. ▪ The exhaust from the chimney at the top of the ventilation building to be ducted towards the sea.
	M2	An existing 6m wide vehicular emergency and maintenance access to the airport railway ventilation building.	▪ The vehicular emergency and maintenance access to be diverted if necessary. ▪ Additional lighting, ventilation and smoke extraction are required if the EVA is decked over.
	M3	An existing 600mm storm water drain collection water from the MTRCL Kowloon ventilation building and the access (ref. M1 and M2) for discharging into government storm water drain (ref. G4).	▪ The storm water drain to be diverted if necessary.

Owner	Ref. No.	Description	Engineering Assumptions
	M4	Proposed seawater cooling system (2003-2006 tentatively) to serve the airport railway Kowloon station and its associated developments comprising:- M4a Existing and proposed 800mm diameter cooling mains M4b proposed underground plant room of 28m(L) x 15m(W) x 7m(H) M4c proposed electricity transformer room with a dimension of 12m(L) x 9m(W) x 4m(H)	▪ The proposed seawater cooling system is currently under construction. Future development to be co-ordinated to minimise impacts.
	M5	Existing supports at Kowloon station development for 3 proposed 6-8m wide footbridges across Austin road west.	▪ To provide footbridges at the suggested location.
WHC	W1	An existing western harbour crossing (WHC) alignment. Its tunnels and associated underground facilities and ventilation building with a 375mm diameter storm water outfall.	▪ Future development will require an expensive long span structure to bridge over the WHC tunnel. ▪ Steel Sleeves are required for piling in close vicinity of the tunnels. ▪ More stringent requirement for construction in close vicinity of the tunnels. Assumed that the requirement of construction close to MTRC tunnels is followed. ▪ The existing water pipe to be diverted if necessary. ▪ The ventilation building to be enclosed by walls. ▪ The exhaust from the chimney at the top of the ventilation building to be ducted towards the sea.
	W2	An existing 6m wide emergency and maintenance vehicular access to the Western Harbour Crossing ventilation building.	▪ The vehicular emergency and maintenance access to be diverted if necessary. ▪ Additional lighting, ventilation and smoke extraction are required if the EVA is decked over.

Owner	Ref. No.	Description	Engineering Assumptions
	W3	An existing 1500mm diameter storm water drain discharging surface water from the southern half of the WHC toll plaza into government storm water drain (Ref.G4).	▪ The storm water drain to be diverted if necessary.
	W4	An existing 1200mm storm water drain for discharging surface water from the west quadrant of the northern half of the WHC toll plaza and the EHC service road into the harbour.	▪ The storm water drain to be diverted if necessary.
	W5	An existing 1050 storm water drain for discharging surface water from the northern half of the WHC toll plaza into the new Yau Ma Tei typhoon shelter.	▪ The storm water drain to be diverted if necessary.
Towngas	T1	A proposed 600mm diameter cross harbour gas pipeline (2004-2006 tentatively) with a landing point in WKCD and connected to a proposed nearby gas pigging station.	▪ Coordination with future development to overcome the constraint.

Note: Site constraints and engineering assumptions will be part of the master planning exercise to be undertaken in the next stage of the project cycle

7. Capital Cost of Engineering Works

Scope (Inclusions and Exclusions) of Broad Order Capital Construction Cost Estimates

7.1 Table A-5 sets out the estimated broad order capital construction cost estimates of engineering works based on the assumptions set out in this Annex. The cost estimates are in 2006 prices and reflect the anticipated bid price of a contract which is used as an input to the financial model.

7.2 The capital construction cost estimates in this Annex therefore do NOT include: contingencies, adjustment for risk, professional fees including management costs since these are calculated and included separately in the financial model. The cost estimates also do NOT include special insurance and compensation provision to WHC, MTRCL, KCRC or other related authorities for any temporary or permanent development within or near the WKCD area which cannot be estimated at this preliminary stage. These costs should be estimated at the master planning or detailed design stage with inputs from the concerned organisations.

7.3 The capital construction cost estimates in this Annex are assumed to include some allowance for inflation depending on how long the contract is expected to last and the bidder's expectation of inflation. Annex I – Financial Assumptions explains how the financial model enables the FA to adopt different inflation assumptions under sensitivity testing.

Unit Cost Equivalents

7.4 The broad order capital construction cost estimates presented in this Annex include a considerable number of detailed subcategories, further detail and assumptions. For the presentational purposes only, Table A-5 also shows the estimated construction floor area (CFA) and the calculated equivalent – unit capital cost per sq.m. Unit capital costs are thus derived from the detailed calculations in order to provide the reader with a simple figure which could be used for broad order comparison purposes. However, the reader should be reminded that comparisons need to be made like with like, in particular respecting the assumptions adopted and the exclusions and inclusions explained in the previous paragraph.

8. Major Repair and Overhaul Cost Estimates

8.1 Table A-6 sets out the major repair and overhaul cost estimates. Major repair and renovation is not required for facilities not included in Table A-6, assuming they will be returned to MTRCL, WHC or relevant Government departments upon completion. Decking was assumed to be part of podium development and maintained by the management of other facilities in the WKCD.

9. Operational Cost Engineering Works

9.1 The cost of engineering works that could potentially be the responsibility of the proposed statutory body: the deck over the Western Harbour Crossing is $2.4 million per annum (2006 prices). The cost estimate is the same under a PSC and a PSI scenario.

9.2 Other facilities are assumed to be operated by MTRCL, WHC or relevant Government departments. WHC and MTRCL may be reimbursed for some operating costs for decking / building over their ventilation buildings and as such costs are covered by the cost estimates included for area planning and management (see Annex B). The FA assumed that the rental income of the utility tunnel would cover its operating costs.

Table A-5: Broad Order, Capital Construction Cost Estimates

	Engineering Works		Unit	Notes
1	**Deck Over Western Harbour Crossing (WHC) Tunnel Portal**			Assumes decking over half the size of tunnel portal
	(a)	Construction Cost	**$255** (million HK$)	2006 3Q estimate
	(b)	CFA	6,375 sq.m.	
	(c)	Equivalent unit cost	$40,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
2	**Deck Over MTR Ventilation Building**			
	(a)	Construction Cost	**$280** (million HK$)	2006 3Q estimate
	(b)	CFA	10,000 sq.m.	
	(c)	Equivalent unit cost	$28,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
3	**Divert Exhaust Air from Chimney (MTR)**			
	(a)	Construction Cost	**$4** (million HK$)	2006 3Q estimate
	(b)	CFA	600 sq.m.	
	(c)	Equivalent unit cost	$6,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
4	**Enclosure of WHC Ventilation Building**			
	(a)	Construction Cost	**$90** (million HK$)	2006 3Q estimate
	(b)	CFA	9,000 sq.m.	
	(c)	Equivalent unit cost	$10,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
5	**Divert Exhaust Air from Chimney (WHC)**			
	(a)	Construction Cost	**$16** (million HK$)	2006 3Q estimate
	(b)	CFA	2,700 sq.m.	
	(c)	Equivalent unit cost	$6,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
6	**Utility Tunnel and Pipeworks**			
	Utility Tunnel			
	(a)	CFA	10,800 sq.m.	Assumes a 2km underground tunnel x 5.4m width, subject to review at the project design stage
	(b)	Unit Cost	$13,000 per sq.m. CFA (HK$)	2006 3Q estimate
	(c)	Construction Cost	**$140** (million HK$)	(c) = (a) x (b)
	Water Pipes and Drains			
	(d)	Length	17,500 m.	Assumed 5km pipeworks for plumbing system, 5km pipeworks for sewage system and 7.5km pipeworks for rain water drainage, subject to review at the project design stage (incl. branches to buildings)
	(e)	Unit Cost	$10,000 per m.	2006 3Q estimate
	(f)	Construction Cost	**$175** (million HK$)	(f) = (d) x (e)
	Pipeworks for Sea Water Cooling System			
	(g)	Length	2,500 m.	Includes branches to buildings
	(h)	Unit Cost	$7,000 per m.	2006 3Q estimate
	(i)	Construction Cost	**$18** (million HK$)	(i) = (g) x (h)
	(j)	**Total Utility Tunnel and Pipeworks**	**$333** (million HK$)	(j) = (c) + (f) + (i)
7	**Divert Box Culvert and Drainage Pipes**			
	(a)	Construction Cost	**$25** (million HK$)	2006 3Q estimate
	(b)	CFA	2,100 sq.m.	
	(c)	Equivalent unit cost	$12,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
8	**Divert Cooling Water Pipes**			
	(a)	Construction Cost	**$6** (million HK$)	2006 3Q estimate
	(b)	CFA	2,000 sq.m.	
	(c)	Equivalent unit cost	$3,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
9	**Cable Trench for Submarine Cable Connection**			
	(a)	Construction Cost	**$8** (million HK$)	2006 3Q estimate
	(b)	CFA	1,100 sq.m.	
	(c)	Equivalent unit cost	$7,000 per sq.m. CFA (HK$)	(c) = (a) / (b)
10	**Bridge Over MTR Tunnel**			
	(a)	Construction Cost	**$284** (million HK$)	2006 3Q estimate
	(b)	CFA	14,200 sq.m.	
	(c)	Equivalent unit cost	$20,000 per sq.m. CFA (HK$)	(c) = (a) / (b)

Table A-5 (cont): Broad Order, Capital Construction Cost Estimates

Engineering Works			Unit		Notes
11		**Divert Vehicular Emergency Access (MTR)**			
	(a)	Construction Cost	**$10**	(million HK$)	2006 3Q estimate
	(b)	CFA	2,580	sq.m.	
	(c)	Equivalent unit cost	$4,000	per sq.m. FA (HK$)	(c) = (a) / (b)
12		**Bridge Over WHC Tunnel**			
	(a)	Construction Cost	**$245**	(million HK$)	2006 3Q estimate
	(b)	CFA	12,250	sq.m.	
	(c)	Equivalent unit cost	$20,000	per sq.m. CFA (HK$)	(c) = (a) / (b)
13		**Divert Vehicular Emergency Access (WHC)**			
	(a)	Construction Cost	**$3**	(million HK$)	2006 3Q estimate
	(b)	CFA	690	sq.m.	
	(c)	Equivalent unit cost	$4,000	per sq.m. FA (HK$)	(c) = (a) / (b)
14		**Deck Over Salt Water Pumping Station**			Including the diversion of hydrogen gas chimney
	(a)	Construction Cost	**$86**	(million HK$)	2006 3Q estimate
	(b)	CFA	3,200	sq.m.	
	(c)	Equivalent unit cost	$27,000	per sq.m. CFA (HK$)	(c) = (a) / (b)
15		**Sea Water Pump House**			Assumes 2 basement levels with a total construction floor area of 1,600 sq.m., builder work for culvert, 4 nos. of pump cells
		Pump Cell and Plant Room			
	(a)	CFA	3,200	sq.m.	2006 3Q estimate
	(b)	Unit Cost	$6,250	per sq.m. CFA (HK$)	
	(c)	Construction Cost	**$20**	(million HK$)	(c) = (a) x (b)
		Other			
	(d)	Sea Water Pump with Motor and Accessories	**$31.5**	(million HK$)	2006 3Q estimate, assumed 9 nos. of sea water pumps ($3.5 million each), subject to further review at the project design stage
	(e)	Pipeworks and Valves Inside Pump House, Penstock, Travelling Bandscreen, Blackwash Strainer	**$11.5**	(million HK$)	2006 3Q estimate, subject to further review at the project design stage
	(f)	Power Supply Equipment, Control Equipment and Building Services inside the Pump House	**$5**	(million HK$)	2006 3Q estimate, subject to further review at the project design stage
	(g)	Total	**$68**	(million HK$)	(g) = (c) + (d) + (e) + (f)
16		**Relocation of Storm Water Drains**			Including the relocation of existing storm water drain: from other drain pipes to the harbour (2,000sq.m.), from the hinterland of WKCD to the harbour (2,800 sq.m.), from MTRC ventilation building to government storm water drain (800 sq.m.), from WHC admin building to government storm water drain (2,000 sq.m.), from WHC toll plaza to the harbour (1,600 sq.m.), from WHC toll plaza to Yau Ma Tei typhoon shelter (800 sq.m.)
	(a)	Construction Cost	**$50**	(million HK$)	2006 3Q estimate
	(b)	CFA	10,000	sq.m.	
	(c)	Equivalent unit cost	$5,000	per sq.m. CFA (HK$)	(c) = (a) x (b)

Table A-6: Major Repair and Overhaul Cost Estimates

A.5 Major Repair and Renovation Cost Estimates

Engineering Works			Unit		Notes
	(a)	% of Water and Drinage Pipeworks of the Utility Tunnel to be Replaced	70%		carried out every 30 years
	(b)	Major Repair and Renovation Costs for Water and Drainage Pipeworks of the Utility Tunnel	$123	(million HK$)	(b) = (a) x item 6(f)