

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 – DRAINAGE

Civil Engineering – Drainage and erosion protection

59CD - West Kowloon drainage improvement, stage 2 phase 2 and stage 3

Members are invited to recommend to Finance Committee –

- (a) the upgrading of part of **59CD**, entitled “West Kowloon drainage improvement, stage 2 phase 2 and stage 3 phase 1 works” to Category A at an estimated cost of \$1,767.2 million in money-of-the-day prices; and
- (b) the retention of the remainder of **59CD**, retitled “West Kowloon drainage improvement, stage 3 phase 2”, in Category B.

PROBLEM

West Kowloon is susceptible to frequent flooding due to the inadequate capacity of the existing drainage system.

PROPOSAL

2. The Director of Drainage Services, with the support of the Secretary

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for Works, proposes to upgrade part of **59CD** to Category A at an estimated cost of \$1,767.2 million in money-of-the-day (MOD) prices for the West Kowloon drainage improvement, stage 2 phase 2 and stage 3 phase 1 works.

PROJECT SCOPE AND NATURE

3. The scope of works under **59CD** comprises drainage improvement works in West Kowloon as follows –

(a) Under Stage 2 Phase 2

(i) Tai Hang Tung Storage Scheme

- construction of a 100 000 cubic metres underground storage tank at the Tai Hang Tung Recreation Ground, with associated inlet and outlet culverts, pumping station, pumping facilities and electrical and mechanical works;

(ii) Kai Tak Transfer Scheme

- construction of about 1.5 kilometres of drain pipes of 4 000 millimetres in diameter with access shafts and interception structures, and about 0.5 kilometre of single-cell or two-cell box culverts of cell size up to 4 000 millimetres x 3 000 millimetres.

(b) Under Stage 3 Phase 1

- construction of about six kilometres of drain pipes of diameters ranging from 300 millimeters to 2 100 millimeters and about 3.1 kilometers of single-cell or two-cell box culverts of cell size up to 4 800 millimetres x 2 500 millimeters in Yau Ma Tei and Sham Shui Po.

(c) Under Stage 3 Phase 2

- construction of about 16 kilometers of drain pipes and box culverts in Yau Yat Tsuen, Ho Man Tin and Kowloon Tong.

A location plan illustrating the drainage improvement works under **59CD** is at Enclosure 1.

4. The part of the project **59CD** we now propose to upgrade to Category A is the stage 2 phase 2 and stage 3 phase 1 drainage improvement works as mentioned in paragraphs 3(a) and 3(b) above. A location plan for the proposed works is shown at Enclosure 2.

5. The remainder of **59CD**, comprising stage 3 phase 2 improvement works as mentioned in paragraph 3(c) above, will remain in Category B.

JUSTIFICATION

6. The West Kowloon area covers major residential and commercial districts comprising Sham Shui Po, Mong Kok, Yau Ma Tei, part of Tsim Sha Tsui, Yau Yat Chuen, Kowloon Tong and Ho Man Tin. The drainage catchment is large and includes the natural hillsides behind the urban area as indicated in the plan at Enclosure 3. We developed the existing drainage system some 30 years ago to meet the flow requirements at that time.

7. Owing to rapid developments and changes in land use in West Kowloon over the years, some natural ground and slopes have been paved over and have become impermeable. Rainwater which would previously dissipate naturally through ground filtration can no longer do so. This has resulted in increased surface runoffs which have in turn overloaded the drainage system. As a result, many areas of West Kowloon are prone to frequent flooding during heavy rainstorms.

8. Mong Kok has been particularly susceptible to serious flooding during heavy rainstorms in recent years. The main cause is the overloading of the existing drainage system by a large quantity of stormwater runoffs within a short period of time. These arise not only within the local areas but also from areas further upstream including Tai Hang Tung, Kowloon Tong and the hillsides behind. During the peak period of heavy rainstorms, the cumulative runoffs cause stormwater overflows at the under-sized drains resulting in extensive flooding in Mong Kok. We have therefore formulated the Tai Hang Tung Storage Scheme and the Kai Tak Transfer Scheme as an integral part of the overall flood control strategy to resolve the flooding problem in Mong Kok.

9. The Tai Hang Tung Storage Scheme is designed to intercept and temporarily store the stormwater collected in the Tai Hang Tung area and the natural hillsides behind in an underground storage tank at the Tai Hang Tung

Recreation Ground. This will reduce the surface runoffs discharged into the drainage system in the downstream Mong Kok and Tai Hang Tung areas during heavy rainstorms. When the water level in the downstream drains has receded, the water stored will be pumped back into the drainage system.

10. The Kai Tak Transfer Scheme is designed to intercept and transfer part of the stormwater collected in the Kowloon Tong area and the natural hillsides behind to the Kai Tak Nullah in San Po Kong. This will reduce the peak stormwater flow entering the under-capacity box culverts in the downstream Waterloo Road, Boundary Street and Mong Kok areas. To minimize traffic disruptions and maintain road access during the construction period, we will use the trenchless method¹ of constructing the proposed large diameter drain pipes under this scheme. This method is more costly than the traditional “open cut” method but will greatly reduce road opening and thus minimize disruption to traffic and underground utilities.

11. The existing drains in Yau Ma Tei and Sham Shui Po are also critically inadequate in capacity, resulting in frequent flooding during heavy rainstorms. We therefore propose to replace them with larger drain pipes or box culverts to provide the required capacity to resolve the flooding problems in that area.

FINANCIAL IMPLICATIONS

12. We estimate the capital cost of the proposed works to be \$1,767.2 million in MOD prices (see paragraph 13 below), made up as follows –

\$ million

(a) Construction of drainage works	1,086.4	
<u>Stage 2 Phase 2</u>		
(i) Tai Hang Tung Storage Scheme	275.8	
- storage tank	239.0	
- pumping station	18.0	/electrical

¹ The trenchless method involves the use of pipe-jacking or boring techniques.

	\$ million
- electrical & mechanical works	18.8
(ii) Kai Tak Transfer Scheme	288.3
- trenchless construction	210.2
- box culverts	72.4
- interception structure	5.7
<u>Stage 3 Phase 1</u>	
(in Yau Ma Tei and Sham Shui Po)	
- pipes	192.3
- box culverts	330.0
(b) Consultants' fees for –	203.3
(i) Construction stage	42.0
(ii) Resident site staff cost	161.3
(c) Environmental mitigation measures	15.5
(d) Contingencies	130.5
Sub-total	1,435.7 (in December 1999 prices)
(e) Provision for price adjustment	331.5
Total	1,767.2 (in MOD prices)

A breakdown by man months of the estimate for consultants' fee is at Enclosure 4.
/13.

13. Subject to approval, we will phase the expenditure as follows –

Year	\$ million (Dec 1999)	Price adjustment factor	\$ million (MOD)
2000 - 2001	22.4	1.00000	22.4
2001 - 2002	161.8	1.04500	169.1
2002 - 2003	222.6	1.10770	246.6
2003 - 2004	299.8	1.17416	352.0
2004 - 2005	243.4	1.24461	302.9
2005 - 2006	231.2	1.31929	305.0
2006 - 2007	137.1	1.39845	191.7
2007 - 2008	78.5	1.48235	116.4
2008 - 2009	38.9	1.57129	61.1
	1,435.7		1,767.2

14. We have derived the MOD estimate on the basis of the Government's latest forecast of trend labour and construction prices for the period 2000 to 2009. We will tender the works under the Kai Tak Transfer Scheme as a lump sum design-and-build contract with clearly defined scope of works. We will tender the works under the Tai Hang Tung Storage Scheme and stage 3 phase 1 using standard remeasurement contracts because we are uncertain about the existence and exact locations of underground utilities such as electric cables, telephone lines and water mains. To lessen the uncertainty arising from the obstructing utilities, we have carried out a comprehensive review of utility record drawings. In addition, we have conducted extensive utility surveys including investigation pits/trenches and non-destructive utility surveys to identify the possible conflicting utilities with a view to determining the most practical alignment of the proposed drains during the planning and design stage. We will also require contractors to carry out trial pits/trenches to confirm the actual locations of utilities prior to the commencement of the works. The contracts will allow for price adjustments as the contract periods will exceed 21 months.

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15. We estimate the annually recurrent cost for operation and maintenance of the proposed works to be \$1.2 million.

PUBLIC CONSULTATION

16. In December 1995, we completed a study under **65CD** "West Kowloon stormwater drainage improvement study - consultants' fees and investigation" to examine the deficiencies of the existing drainage system in West Kowloon and to develop a drainage master plan for improving the system. We presented the findings and recommendations of the study to Sham Shui Po and Kowloon City District Boards on 9 November 1995 and to Yau Tsim Mong District Board on 16 November 1995. The District Boards supported the implementation of the entire West Kowloon drainage improvement project.

17. On completion of the detailed investigation and design of the relevant stages/phases of works, we consulted the Traffic and Transport Committee of Yau Tsim Mong Provisional District Board on 26 November 1998, the Sham Shui Po Provisional District Board on 11 February 1999, the Works and Development Committee of Kowloon City Provisional District Board on 4 March 1999, the Traffic and Transport Committee of Wong Tai Sin Provisional District Board on 16 March 1999 and the Recreation Select Committee of Provisional Urban Council on 12 May 1999. Both the Provisional District Boards and the relevant committees supported the implementation of the proposed works.

18. We consulted the LegCo Panel on Planning, Lands and Works on 13 May 1999. The Panel supported the proposed West Kowloon drainage improvement works. We will also consult District Councils on temporary road diversion schemes prior to the commencement of the works.

ENVIRONMENTAL IMPLICATIONS

19. In August 1995, the Director of Environmental Protection completed Environmental Reviews for the stage 3 phase 1 works. In March 2000, the Director of Drainage Services completed two Preliminary Environmental Reviews (PERs) for the stage 2 phase 2 works. The reviews concluded that none of the works would have long term environmental impacts. According to the PER, the Director of Drainage Services will conduct a detailed construction noise impact assessment for the Kai Tak Transfer Scheme in May 2000 for completion prior to its construction. For other short term impacts during construction, we will control noise, dust and site run-off impacts to within established standards
/and

and guidelines through the implementation of standard pollution control measures² in the works contracts. We have included in the project estimate the cost to implement these measures (\$15.5 million in December 1999 prices).

20. We have considered during the planning and design stages ways to minimize the generation of construction and demolition material (C&DM). We have optimised the size and shape of the proposed underground drainage structures. We will minimise the unbraced open excavation by considering appropriate forms of structures and construction methods to avoid possible over-excavation. We will recycle the construction waste as far as possible.

21. Under the contracts we will require the contractors to submit a waste management plan to the Director of Drainage Services for approval. This will contain appropriate mitigation measures, including the allocation of an area for waste segregation. We will reuse the fill generated from the project either on site or in other construction sites as far as possible. We estimate that about 252 000 cubic meters (m³) of fill will be delivered to public filling areas after allowing for reuse and about 40 000m³ of construction and demolition waste (C&DW) will be delivered to landfills for disposal. We will encourage the contractors to use steel instead of timber in formwork and temporary works to reduce the generation of waste. We will require the contractors to implement necessary measures to minimise the generation of C&DM and to reuse and recycle C&DM.

22. We will ensure that the day-to-day operations on site comply with the waste management plans submitted. We will require the contractors to separate fill from C&DW for disposal at appropriate locations and to sort the C&DW by category on site to facilitate reuse in order to reduce the generation of such waste. We will require the contractors to break down any over-sized fill/C&DM to less than 250mm in size so as to facilitate its reuse by other reclamation or earth-filling projects. The disposal, reuse and recycling of C&DM will be recorded for monitoring purposes. We will control the disposal of fill and C&DW to designated public filling facility and landfill respectively through a trip-ticket system.

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² The standard pollution control measures include wheel washing facilities, de-silting traps, the use of silenced plant, noise enclosure and other procedures as recommended in Environmental Protection Department's recommended pollution control clauses.

LAND ACQUISITION

23. The project does not require land acquisition.

BACKGROUND INFORMATION

24. We upgraded **59CD** “West Kowloon stormwater drainage improvement” to Category B in December 1993. In June 1994, we upgraded part of **59CD** to Category A as **65CD** “West Kowloon stormwater drainage improvement study – consultants’ fees and investigation” with an approved project estimate of \$15.9 million to engage consultants to examine the deficiencies of the drainage system in West Kowloon and to develop a drainage master plan for future improvements. We completed the study in December 1995.

Stage 1

25. In April 1996, we engaged consultants to carry out site investigations and detailed design for the West Kowloon drainage improvement stage 1 works under a Category D project **84CD** “West Kowloon stormwater drainage improvement, stage 1 - site investigation and detailed design” with an approved project estimate of \$7.4 million. We completed the detailed design work in May 1997.

26. In June 1997, we upgraded part of **59CD** to Category A as **89CD** “West Kowloon drainage improvement, stage 1 works” with an approved project estimate of \$464 million for the construction of about 5.4 kilometres of drain pipes and about 3.8 kilometers of box culverts in West Kowloon. We commenced the construction of the stage 1 drainage improvement works in conjunction with the sewerage improvement works under **290DS** “North West Kowloon sewerage stage 3 phase 2” in April 1998 for completion in January 2003.

Stage 2

27. In April 1997, we upgraded part of **59CD** to Category A as **88CD** “West Kowloon drainage improvement, stage 2 – consultants’ fees and investigations” with an approved project estimate of \$68 million for engaging consultants to carry out site investigations and detailed design for the stage 2 drainage improvement works. The consultancy started in June 1997. As it progressed, we revised our drainage improvement strategy and decided to implement stage 2 works in 2 phases.

28. In June 1999, we upgraded part of **59CD** to Category A as **99CD** “West Kowloon drainage improvement, stage 2 phase 1 works” with an approved project estimate of \$1,762.9 million for the construction of about 22 kilometers of drain pipes and about 0.7 kilometers of box culverts. We commenced the construction works in December 1999 for substantial completion in 2004.

29. We plan to start the construction works for stage 2 phase 2 in January 2001 for completion in April 2004.

Stage 3

30. As the stage 3 phase 1 works involve the construction of large box culverts in busy streets in Yau Ma Tei and Sham Shui Po, we need to carry out the proposed works in short sections in line with the traffic arrangements there. We plan to commence the construction of box culverts and the related upstream drain pipes under stage 3 phase 1 in March 2001 for completion in June 2007. The remaining works under stage 3 phase 1 are scheduled for completion in June 2006.

31. We plan to start the construction of the stage 3 phase 2 works in 2003 with a view to substantially completing all the drainage improvement works in West Kowloon in 2007.

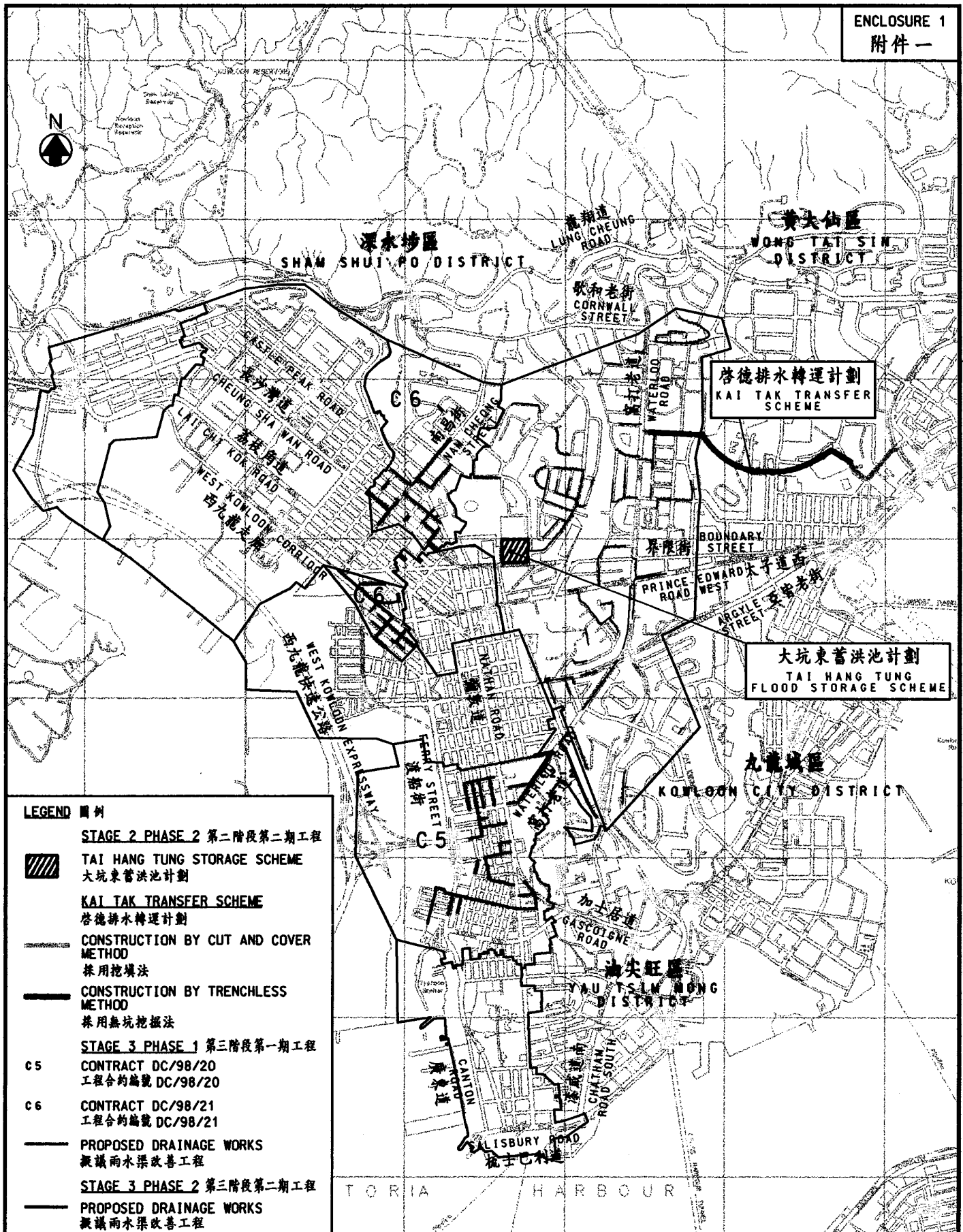
32. We have carried out traffic impact assessments for the implementation of the proposed works (stage 2 phase 2 and stage 3 phase 1), with a view to minimising traffic impacts during construction and to meet the programmed completion dates. We have discussed and obtained in principle agreements with the Hong Kong Police Force and the Transport Department on traffic arrangements required for the execution of the works. These arrangements include minor local traffic diversions, works to be carried out in short sections and works to be carried out in non-peak hours. We will obtain the approval of the Traffic Management Liaison Group with members from relevant Government departments, public transport operators and utility companies on the proposed traffic arrangements before we commence the works.

33. We estimate that the proposed works will create some 430 new jobs during the construction stage. These will comprise 70 professional or technical

/staff

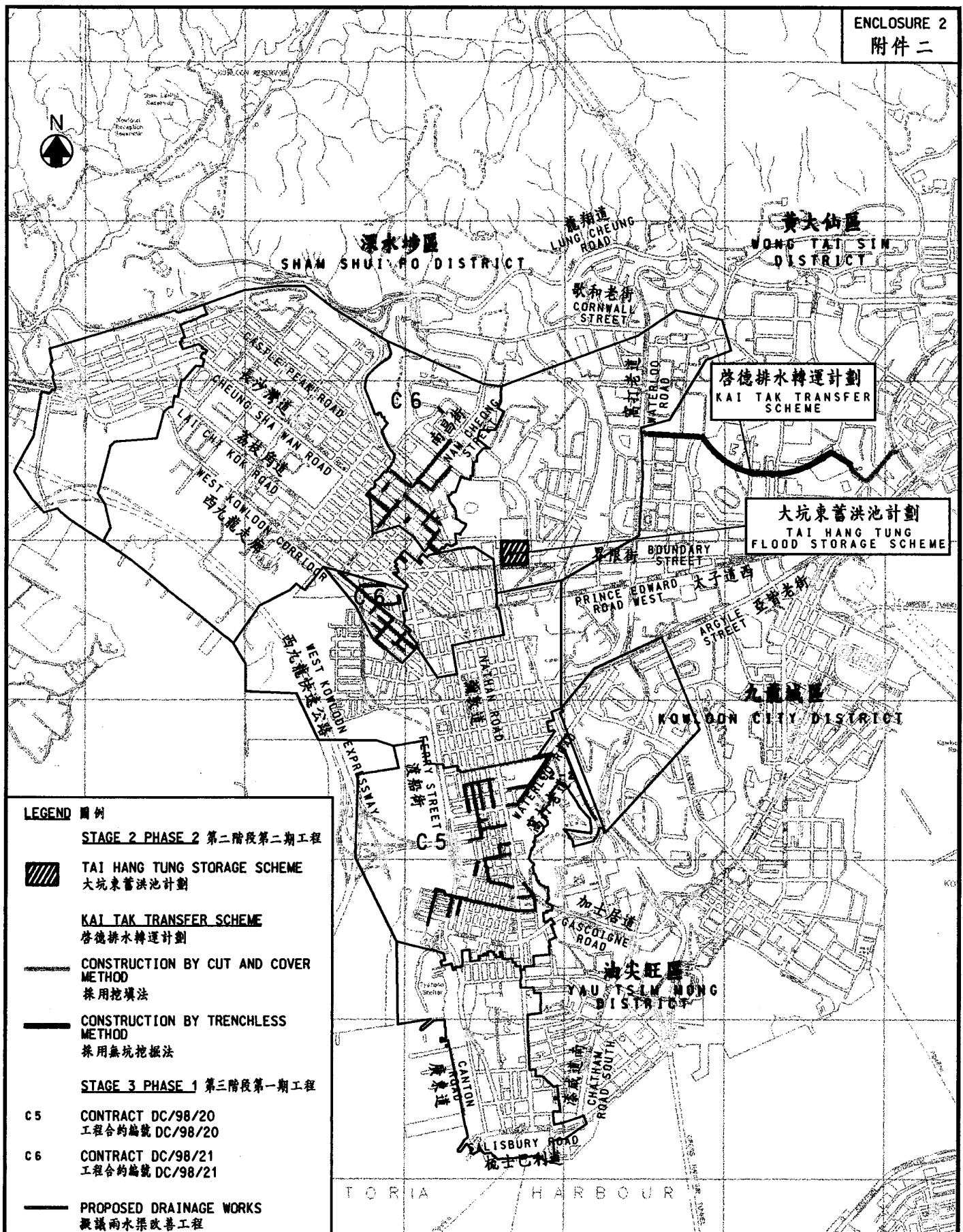
staff and 360 labourers during the construction period, totalling 25 000 man months.

Works Bureau
April 2000
(PWSC0253/WIN10)



DRAINAGE SERVICES DEPARTMENT 渠務署 HONG KONG 香港	Project 項目名稱 WEST KOWLOON DRAINAGE IMPROVEMENT - STAGE 2 PHASE 2 & STAGE 3 PHASE 1 西九龍雨水排放系統改善工程第二階段第二期及第三階段第一期	Copyright Reserved 版權所有	Drawn By 繪圖 Y.L. LAU	
	PROJECT MANAGEMENT DIVISION 工程管理部	Site 圖名 PROJECT WORKS UNDER 59CD 59CD 項目之整體工程	Date 日期 01/00	Approved By 批核 Y.F. KAN
			Scale 比例 1 : 30000	Figure No. 圖名編號 DPM/59CD/1001

Plot Date = 13 APR 2005



LEGEND 圖例

STAGE 2 PHASE 2 第二階段第二期工程

TAI HANG TUNG STORAGE SCHEME
大坑東蓄洪池計劃

KAI TAK TRANSFER SCHEME
啓德排水轉運計劃

CONSTRUCTION BY CUT AND COVER METHOD
採用挖填法

CONSTRUCTION BY TRENCHLESS METHOD
採用無坑挖掘法

STAGE 3 PHASE 1 第三階段第一期工程

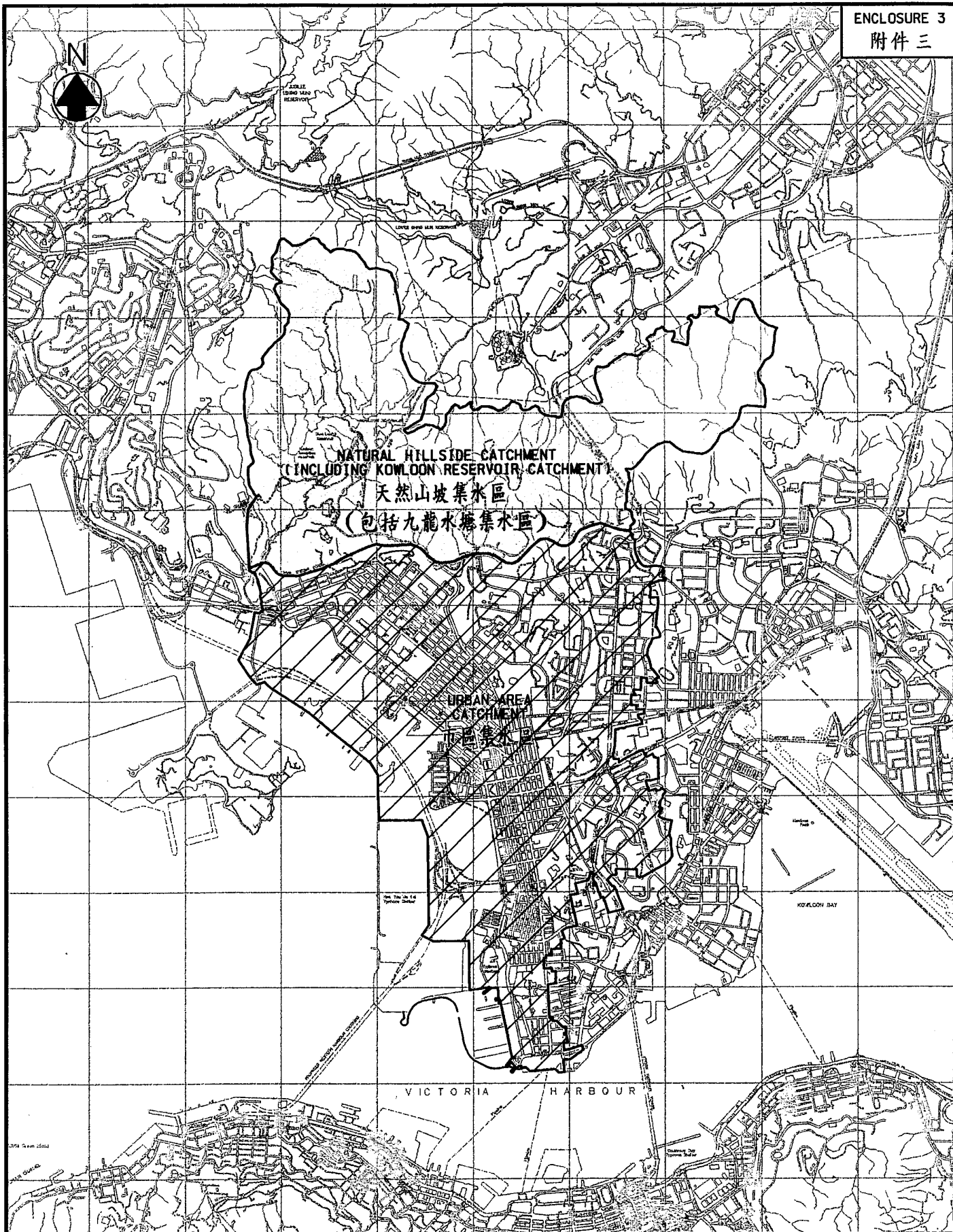
C5 CONTRACT DC/98/20
工程合約編號 DC/98/20

C6 CONTRACT DC/98/21
工程合約編號 DC/98/21

PROPOSED DRAINAGE WORKS
擬議雨水渠改善工程

<p>DRAINAGE SERVICES DEPARTMENT 渠務署 HONG KONG 香港</p>	<p>Project 項目名稱</p> <p>WEST KOWLOON DRAINAGE IMPROVEMENT - STAGE 2 PHASE 2 & STAGE 3 PHASE 1 西九龍雨水排放系統改善工程第二階段第二期及第三階段第一期</p>	<p>Copyright Reserved 版權所有</p> <p>Date 日期: 01/00</p> <p>Scale 比例: 1 : 30000</p>	<p>Drawn By 繪畫: Y.L. LAU</p> <p>Approved By 核核: Y.F. KAN</p> <p>Figure No. 圖表編號: DPM/59CD/1002</p>	
	<p>PROJECT MANAGEMENT DIVISION 工程管理部</p>	<p>PROJECT WORKS 整體工程</p>		
	<p>PROJECT MANAGEMENT DIVISION 工程管理部</p>			

Plot Date = 13 APR 2000



 DRAINAGE SERVICES DEPARTMENT 渠務署 HONG KONG 香港	Project 項目名稱 WEST KOWLOON DRAINAGE IMPROVEMENT - STAGE 2 PHASE 2 & STAGE 3 PHASE 1 西九龍雨水排放系統改善工程第二階段第二期及第三階段第一期	Copyright Reserved © 版權所有	Drawn By 繪圖 C.C. HO	
	PROJECT MANAGEMENT DIVISION 工程管理部	Title 圖表名稱 CATCHMENTS OF WEST KOWLOON DRAINAGE SYSTEM 西九龍雨水排放系統之集水區	Date 日期 3/99	Approved By 批核 Y.F. KAN
			Scale 比例 1 : 50000	Figure No. 圖表編號 DPM/59CD/1003

59CD - West Kowloon drainage improvement, stage 2 phase 2 and stage 3

Breakdown of estimates for consultants' fees

Consultants' staff costs			Estimated man months	Average MPS salary point	Multiplier factor	Estimated fee (\$ million)
(a)	Consultants' fee for construction stage	Professional	100	40	2.4	15.0
		Technical	535	16	2.4	27.0
(b)	Site supervision by resident site staff employed by the consultants	Professional	455	40	1.7	48.6
		Technical	3,155	16	1.7	112.7
Total consultants' staff costs						203.3

Notes:

1. A multiplier factor of 2.4 is applied to the average MPS point to arrive at the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices (At 1.4.1999, MPS pt. 40 = \$62,780 per month and MPS pt. 16 = \$21,010 per month). A multiplier factor of 1.7 is applied in case of site staff supplied by the consultants.
2. The consultants' fees for construction stage are based on the fee proposal from the consultants undertaking the investigations, design and construction supervision of the West Kowloon drainage improvement, stage 2 works. The costs of resident site staff are based on estimates prepared by the Director of Drainage Services. We will only know the actual man months and actual costs when construction works are completed.