For discussion on
18 April 2000

Panel on Planning, Lands & Works of the Legislative Council

North and South Kowloon sewerage, stage I, phase II

Purpose

In discussing paper PWSC (2000 – 01)8 on 199DS 'North and South Kowloon sewerage, stage I, phase II' on 12 April 2000, members of the Public Works Subcommittee requested the Administration to provide further details to panel members on the problems encountered, the reasons giving rise to the problems, and what have been done to avoid recurrence. A member also requested for details of consultation with the relevant District Board Council during construction stage of the project. This paper aims to provide the information requested with a view to obtaining support for the request to increase the approved project estimate.

Background

2. The North and South Kowloon Sewerage, Stage I, Phase II project comprises works for improving the sewage conveyance and treatment systems in Tsim Sha Tsui, Hung Hom, To Kwa Wan and Wong Tai Sin. The locations of the proposed works are marked in the drawing attached at Enclosure 1. The works were approved by Finance Committee in July 1995 at an estimated cost of $481 million. The main works were implemented under two civil contracts and one electrical & mechanical contract. These contracts commenced in stages in end 1995 and early 1996 respectively. Works were originally scheduled for completion in mid 1997. The works were substantially completed in March 1999.

3. In March 2000, with a view to reducing the amount of interest payment, the Secretary for the Treasury exercised her delegated authority and approved an increase of the approved project estimate from $481 million by $15 million to $496 million to cover part payment for the arbitration award.

4. The Director of Drainage Services, with the support of Secretary for the Environment and Food, proposes to increase the approved project estimate of 199DS from $496 million by $148 million to $644 million. The proposed increase aims at covering additional project expenditure arising from the two following items-

(a) costs arising from prolongation and additional works which resulted from utility problems encountered (estimated amounting in total to $96 million); and

(b) remeasurement payments under general site clearance items as required under an arbitration ruling and the interest payments accrued over the quantum in dispute (estimated amounting in total to $89 million).

The total additional project expenditure arising from the above two items is therefore $185 million. However as $15 million of the additional costs have been met by the recent increase of the APE from $481 million to $496 million and $22 million can be covered from unused project contingencies, the net increase required is therefore $148 million.

Associated Utility Diversion

5. The North and South Kowloon Sewerage, Stage I, Phase II project involved the replacement or laying of 8.1 km of sewers in built-up areas where there are extensive underground utilities, other buried obstructions and heavy pedestrian and vehicular traffic.

Utility records

6. During design stage, we obtained utility records from utility companies so as to identify the positions of their buried utilities which were in the vicinity of our proposed sewers. As diversions of utilities were known to be costly and time consuming, the proposed sewers were designed, based on the utility records available, to avoid the need for any extensive diversions.

7. To ascertain the accuracy of utility records, we arranged to excavate

investigation pits prior to the commencement of the main contracts. But as these investigation pits had to be located in carriageways along the new sewer alignment, to avoid causing disproportionate inconvenience and disruption to the public, only limited numbers of investigation pits could be arranged. Other than investigation pits, we had also carried out survey of the buried utilities by using one of the more reliable non-destructive survey methods available at the time, i.e. by Impulse Radar. However, during construction, when the contractors excavated the roads for the sewerage works, the locations of most of the buried utilities were found to deviate from those shown on record drawings and also from the results of non-destructive surveys. Many were identified to be causing obstruction to the new gravity sewerage works.

Complications in diverting utilities

8. Diverting these obstructing utilities involved very complex procedures. To arrange a complete diversion of utilities at each location usually involved a series of temporary traffic schemes and additional excavation. Although utility companies are responsible for diverting their own utility installations, our contractors were still required to arrange for these additional temporary traffic schemes and excavation to ensure that these utility diversions could be carried out promptly to mitigate further excessive delays to the works. At some locations, the original design of the works had to be revised due to the impracticability of or excessive time required for utility diversion. As carrying out these additional works by our contractors for facilitating utility diversions or for implementing the revised design was time-consuming, the project was not substantially completed until March 1999. Since these works could not have been allowed for when we tendered out the works, the costs arising from prolongation and additional works, which amount to some $68 million, have to be borne by the Government. In addition, the site staff costs have also been increased by $28 million to cover the supervision works required for the extended contract periods.

Liability of utility companies

9. Since most utility records were prepared a long time ago when the utilities were first laid, understandably utility companies had difficulties in ensuring the accuracy of these records. They had therefore issued utility record drawings under a general disclaimer, i.e. the utility locations shown on

the drawings provided were indicative only and must be confirmed on site by actual excavation. In this regard, we have obtained legal advice on whether we could hold utility companies liable for the lack of accuracy in their drawings and records. The legal advice is that since the utility records supplied were not meant to be taken as accurate locations of utility services, it is not possible for Government to recover its loss against the utility companies for not giving accurate information to Government.

Contractual arrangement on risk apportionment

10. The present contractual arrangement for utility diversion has been used in the industry for decades. If diversion of utility is required, the contractor would only be compensated for the time required by utility companies to carry out their diversions. If diversion causes delays to the contract, no compensation would be given to the contractor for associated costs incurred. This is considered to be an appropriate "risk-sharing" arrangement and in fact most of the risks for utility diversion already rests with the contractor. To require contractors to take up more risks, say by not compensating for the time required for utility diversion, would only unduly push up the tender prices or alternatively lead to liquidation of contractors if they find during construction that they are unable to meet the added contractual obligation.

11. It is worth noting though that the additional costs resulted from utility problem is not directly related to the "risk-sharing" arrangement currently adopted in public works contracts. The additional costs are mainly associated with the additional works required for arranging additional temporary traffic arrangement and excavation to ensure that these utility diversions could be carried out promptly to mitigate further excessive delays to the works. In addition, as arranging diversion is a very time consuming process, additional temporary arrangement and excavation are also required to investigate alternative route for the proposed sewers or alternative method of construction so as to minimize the extent of diversion required. At some locations, alternatives were finally instructed in order to minimise the extent of delay caused by the utility obstruction problem.

Situation on new contracts

12. From experience gained on carrying out major drainage works in urban areas, Government is now more equipped to cope with the problems caused by inaccurate utility records. Through various utility undertaker co-ordination groups organised by Government, utility undertakers have been reminded to more accurately document newly laid utilities on completion of their works. Although we will not be able to completely eradicate utility problems until such time when all buried utilities are accurately recorded and updated promptly, we are seeing gradual improvement to the situation as more and more aged utilities are being replaced and properly documented. Furthermore, the level of accuracy of non destructive detection techniques now available in the market has also improved. This allows a more accurate detection of positions of buried utilities prior to construction. In addition, we have more widely adopted the use of "no-dig" (micro-tunnelling) technology for laying pipes where applicable. This has also helped in reducing the need for open trench excavation and hence diversion of obstructing utilities. More importantly, we have allowed more time for carrying out utility diversions.

13. As a result of the above effort, we are pleased to note that delays and associated additional costs to contracts which were awarded in recent years for carrying out drainage works in urban areas have generally been contained within a more reasonable level. This can be illustrated in the two tables given in Enclosure 2. Table 1 shows the time and cost overrun for urban drainage contracts which were commenced in the period from 1991 to 1996; whereas Table 2 provides similar information for contracts which were commenced in 1998 (and most of which are still on-going). Although the costs and time overrun experienced for contracts in Table 1 were due to a variety of reasons such as utility problems, inclement weather, traffic constraints and additional measures for expediting progress, utility problem was known by far to be the major contributing factor. It can be seen that the extent of cost and time overrun has significantly reduced for those contracts which were let in 1998 when compared to those which were let earlier.

Electronic system on utility records

14. The Highways Department has recently completed a consultancy study with a view to exploring the feasibility of establishing an electronic system for

the expeditious circulation of utility records. Five utility operators, the DSD and the WSD partook in the study. The proposed system is intended to reduce the time for acquiring utility records from several weeks to a few days. The recommendation of the consultancy study has been discussed in the Joint Utility Policy Group (JUPG) consisting of senior representatives of the utility operators in February 2000. The JUPG has decided to establish a computerized extranet to link up participants to effect the system. A working committee under the JUPG has been set up to finalise the implementation plan in 2000. The electronic system would help to speed up the retrieval of utility records to facilitate more efficient planning of works proposed by utility undertakers. The accuracy of records of utilities will hopefully improve over time as more and more aged buried utilities are being replaced and more accurately documented.

Arbitration Award on General Site Clearance

Dispute on re-measurement of general site clearance

15. It is common for construction contracts that contractors are reimbursed for the general site clearance works by means of re-measuring the site areas cleared in accordance with the items provided in the contract documents. Under one of the civil engineering contracts, Contract No. DC/94/08, there was a dispute between Government and the contractor on the extent of the site area which should be re-measured for payment under the relevant general site clearance items. The original intention was to arrange site clearance for a small part of the whole site and hence only small quantities were allowed under the general site clearance items. However, the contractor contended that Government's intention had not been clearly spelt out under the Contract and hence considered that the whole of the site should be re-measured for payment. As the contractor had not physically carried out any general site clearance works for most parts of the Site, we therefore considered as a matter of principle that he should not be paid for general site clearance of these areas. The dispute was referred to arbitration in accordance with the terms of the Contract. On 28 February 2000, the arbitrator ruled in favour of the contractor. Government would hence need to make additional payments to the contractor to cover re-measurement of the previously unmeasured parts of the site together with interest payments accrued.

Accuracy of contract documents

16. In order to implement the large amount of new sewerage works under the public works programme without substantial increase in manpower within Government, consulting engineers are employed to carry out the design, contract documents preparation and construction stage supervision of most of these works. The works constructed under Contract No. DC/94/08 are managed by consultants. In the process of preparing the contract documents, Government would carry out checking of the documents prepared by the consultants to ensure that all the required works are adequately covered and are specified to be completed within the required programme. Particular attention would be paid to those parts of the documents which covered the contractual arrangements for carrying our works of non-routine nature. In this case, as the estimated value of the Contract exceeded $100 million, the contract document was also sent for legal vetting prior to invitation of tender, mainly to consider the Form of Tender, special conditions of tender, special conditions of contract to avoid any conflict with the conditions of contract and to address any special requirements or issues raised by us. The consultants are responsible for the detailed checking on the accuracy of the contract documents.

17. The problem of not having spelt out sufficiently clearly in the contract documents the consultants' intention of requiring site clearance only for a small part of the site is a special case which could not be easily identified without a comprehensive item by item checking of the design parameters and measurement items. Until the contractor raised a dispute on the matter, we could not know before hand the consultants had made such a mistake in the preparation of contract documents and hence it had not been identified during the general checking of the documents.

Seeking indemnity from Consulting Engineers

18. As the contract documents were prepared by the consultants, we consider that the consultants should be accountable for the mistake of not clearly spelling out the original intention on the extent of site clearance required under the contract. We are seeking legal advice on whether there is any negligence on the part of the consultants in the preparation of the contract documents with a view to seeking indemnity from the consultants.

Avoidance of similar problem on future contracts

19. In the light of the dispute on re-measurement of general site clearance encountered, Government has revised the HKSARG Standard Method of Measurement to ensure that a similar dispute would not happen on other contracts. Furthermore, the dispute has also reinforced the need for thorough checking of the contract documents prior to calling for tenders to ensure that the design intention has been accurately and fully reflected in the documents. Parties who are responsible for the preparation of the technical aspects of the contract documents, whether they be consultants or in-house staff, are now instructed to be particularly vigilant in this regard. In addition, guidelines have now been issued to remind those who are responsible for the assessment of tenders to pay particular attention to any item which has been priced unreasonably high or low in tenders offered. Sensitivity analysis is now carried out to identify the likely impact on the tenders should there be substantial changes to those quantities of items with unreasonable prices. The attention of the relevant tender board would be drawn and recommendation would accordingly be made to re-tender so as to avoid future dispute on re-measurement. In view of the above effort, we can now more confidently say that the chance of being confronted by similar problem in future will be very much minimised.

Public Consultation during Construction

20. We have consulted, inter alia, the former Kowloon City Provisional District Board (KCPDB) prior to commencement of works construction. Consultation with the KCPDB had also been carried out on the following two occasions during the construction stage to brief Members of the Board on issues which were of general public concern:

- On 9 July 1998, we presented to the Environmental Improvement Committee of the KCPDB regarding a flooding incident related to Contract No. DC/94/08. In May 1998, flooding occurred in Mok Cheong Street and Sung Wong Toi Road during a heavy rainstorm. It was later discovered that the contractor’s construction activities had contributed to the flooding incident. We attended the district board meeting to account for the incident.

- On 3 December 1998, we attended the KCPDB meeting to address Members' concerns about impact and disruption caused by our works. In particular, Members were concerned about the reduced width of the footpath outside Wing On Department Store in Whampoa Garden resulted from the implementation of the temporary traffic arrangement for carrying out the sewerage works. They considered that the reduced footpath should be widened to allow better access and the situation might be aggravated during the Christmas and Chinese New Year's time. They therefore requested us to widen the footpath before Christmas of 1998. The temporary traffic arrangement had subsequently been modified to address Members' concern.

Recommendation

21. The arbitration award has become due since it was issued on 28 February 2000. We are therefore required to effect payment to the contractor as soon as possible to reduce the amount of interest payments that may accrue. We estimate that the amount of interest payment is about $400,000 per month of further delay in making payment of the outstanding balance of the arbitration award. Members are recommended to support the Administration's proposal to increase the approved project estimate of 199DS as outlined in paragraph 3 above.

Works Bureau
April 2000

Table 1 - For contracts substantially completed (contract commenced in 1991-1996) **Enclosure 2**

Contract No.	Contract title	Contract commencement date	Original contract completion date	Actual contract completion date	Original duration (month)	Actual duration (month)	Delay (month)	Original contract sum ($M)	Estimated/ actual final contract sum ($M)	Increase in contract sum ($M)
DC/91/04	East Kowloon Sewerage Improvements & Pollution Control, Stage I, Phase I-Kwun Tong and Yau Tong Areas	03.92	11.93	12.94	20	32	12	170	163	0
DC/91/06	East Kowloon Sewerage Improvements & Pollution Control, Stage I, Phase I-San Po Kong & Kowloon Bay Areas	04.92	09.93	12.95	18	45	27	101	130	29
DC/94/08	North and South Kowloon Sewerage Stage I - Sewers and Pumping Stations	12.95	04.97	02.99	15	37	22	207	261	54
DC/94/12	North West Kowloon Sewerage Stage II & Stage III Phase I	05.95	03.97	04.99	22	48	26	258	296	38
DC/95/05	Central, Western and Wanchai West Trunk Sewers	09.96	08.99	04.2000	35	43	8	521	597	76
UA 7/90	Hinterland Drainage Works Package 1	12.91	10.93	10.96	22	58	36	70	150	80
UA 19/93	Hinderland Drainage Works Package 2 (N Portion)	09.93	03.96	07.97	30	46	16	188	261	73
UA 20/93	Hinderland Drainage Works Package 2 (S Portion)	10.93	04.96	03.98	30	54	24	139	230	91
				Average	24	45	21	207	261	54

(i) Extent of average delay = 21/24 x 100% = 88%

ii cost overrun = 54/207 x 100% = 26%

Table 2 - For contracts in progress (All commenced in 1998) - as at March 2000

Enclosure 2

Contract No.	Contract title	Contract commencement date	Original contract completion date	Anticipated contract completion date	Original duration (month)	Time elaspsed as at 3.2000 (month)	Anticipated contract duration (month)	Delay (month)	Original contract sum ($M)	Estimated final contract sum ($M)	Estimated cost overrun ($M)	Expenditure up to end 3/2000 ($M)
DC/97/06	North West Kowloon Sewerage Stage III Phase II & West Kowloon Stormwater Drainage Improvement Stage I - Kowloon Tong & Yau Ma Tei Areas	04.98	04.2001	09.2000	36	23	29	-	122	89	-33	52
DC/97/07	North West Kowloon Sewerage Stage III Phase II & West Kowloon Stormwater Drainage Improvement Stage I - Lai Chi Kok, Cheung Sha Wan & Sham Shui Po Areas	07.98	07.2002	09.2002	48	20	50	*2	284	230	-54	65
DC/97/08	North West Kowloon Sewerage Stage III Phase II & West Kowloon Stormwater Drainage Improvement Stage I - Tai Hang Tung, Mong Kok and Tai Kok Tsui Areas	10.98	01.2003	02.2003	51	18	53	*2	452	421	-31	111
DC/95/07	Central and Western Interceptor and Reticulation Sewers - Upper Catchment	03.98	09.2001	09.2001	42	24	42	0	214	214	0	79
DC/95/08	Wan Chai West Interceptor and Reticulation Sewers - Upper Catchment	09.98	03.2002	03.2002	42	19	42	0	233	233	0	60
DC/96/13	Wan Chai East and North Point Sewerage - Upstream Works	04.98	04.2000	09.2000	24	23	29	*5	52	45	-7	38
				Average	40	21	-	2	226	205	-21	-

(i) Extent of average delay = 2/40 x 100% = 5%

cost overrun = -21/226 x 100% = -9% (saving anticipated at this stage)

* About half of the delays encountered are due to inclement weather.