For discussion
on 17 April 2002

PWSC(2002-03)12

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 703 – BUILDINGS
Education – Secondary
230ES – Secondary school in Area 36C, Sha Tin
246ES – Second secondary school in Area 14B, Sha Tin

Members are invited to recommend to Finance Committee the upgrading of **230ES** and **246ES** to Category A at an estimated cost of $106.8 million and $95.7 million respectively in money-of-the-day prices for the construction of two secondary schools in Sha Tin.

PROBLEM

We do not have enough secondary schools to meet the increase in demand for new school places by the school year 2004/05.

PROPOSAL

2. The Director of Architectural Services (D Arch S), with the support of the Secretary for Education and Manpower, proposes to upgrade the following projects to Category A at an estimated total cost of $202.5 million in money-of-the-day (MOD) prices –

/(a) …..

			Project estimate $ million (MOD)
(a)	**230ES –**	Secondary school in Area 36C, Sha Tin	106.8
(b)	**246ES –**	Second secondary school in Area 14B, Sha Tin	95.7
		Total	202.5

PROJECT SCOPE AND NATURE

3. The proposed projects are for the construction of two secondary schools. Each school will have the following facilities –

(a) 30 classrooms;

(b) 16 special rooms, including a computer-assisted learning room and a language room;

(c) three small group teaching rooms;

(d) a guidance activity room;

(e) two interview rooms;

(f) a staff room;

(g) a staff common room;

(h) a student activity centre;

(i) a conference room;

(j) a library;

(k) an assembly hall (which, together with the roof of the assembly hall block, can also be used for a wide range of physical activities such as badminton, gymnastics and table-tennis);

/(l) …..

(l) a multi-purpose area;

(m) three basketball courts (two on ground level and one on the rooftop of the assembly hall block);

(n) a green corner[1]; and

(o) ancillary accommodation including a lift and relevant facilities for the handicapped.

Both projects will meet the planning target of providing two square metres of open space per student. The site plans for **230ES** and **246ES** are at Enclosures 1 and 2 respectively. D Arch S plans to start construction works for **230ES** and **246ES** in September and November 2002 respectively for completion in July 2004.

JUSTIFICATION

4. The Director of Education (D of E) forecasts that 369 additional secondary school classes will be required in the territory by the school year 2004/05 to meet the increase in demand for new places. The proposed projects will provide a total of 60 classrooms, and together with another two projects **247ES** and **248ES** which will also be considered by Members at this meeting (see paper referenced PWSC(2002-02)13), the shortfall of secondary school classes will be reduced to 249 classrooms. We plan to meet the projected shortfall through further school construction projects.

FINANCIAL IMPLICATIONS

5. We estimate the capital cost of **230ES** and **246ES** to be $106.8 million and $95.7 million respectively in MOD prices (see paragraph 7 below), made up as follows –

/(a) …..

[1] The green corner is a designated area inside the campus to enable students to develop an interest in horticulture and natural environment. The green corner may include a green house, a weather station and planting beds.

		$ million		
		230ES	**246ES**	
(a)	Site formation	7.8	–	
(b)	Piling	13.0	12.0	
(c)	Building	50.2	50.2	
(d)	Building services	17.1	16.7	
(e)	Drainage and external works	10.5	9.5	
(f)	Contingencies	9.9	8.8	
	Sub-total	108.5	97.2	(in September 2001 prices)
(g)	Provision for price adjustment	(1.7)	(1.5)	
	Total	106.8	95.7	(in MOD prices)

6. The construction floor area (CFA) of both **230ES** and **246ES** is 12 238 square metres. The estimated construction unit costs of **230ES** and **246ES**, represented by building and building services costs, is $5,499 and $5,467 per square metre of CFA in September 2001 prices respectively. D Arch S considers these comparable to similar school projects built by the Government. A comparison of the reference cost for a secondary school based on an uncomplicated site with no unusual environmental or geotechnical constraints with the estimated costs for the two projects is at Enclosure 3.

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

Year	$ million (Sept 2001)		Price adjustment factor	$ million (MOD)	
	230ES	**246ES**		**230ES**	**246ES**
2002 – 03	16.0	6.0	0.98625	15.8	5.9
2003 – 04	42.0	42.0	0.98378	41.3	41.3
2004 – 05	41.0	40.0	0.98378	40.3	39.4
2005 – 06	7.0	7.0	0.98378	6.9	6.9
2006 – 07	2.5	2.2	0.98378	2.5	2.2
	108.5	97.2		106.8	95.7

8. We derived the MOD estimates on the basis of Government's latest forecast of trend labour and construction prices for the period 2002 to 2007. We will deliver the works through fixed-price lump-sum contracts because the contract period of both projects will be less than 21 months and we can clearly define the scope of works in advance, leaving little room for uncertainty.

9. The cost of furniture and equipment[2], estimated to be $9.4 million for each project, will be borne by the school sponsors as the schools will meet increase in demand for school places. This is in line with existing policy.

10. We estimate the annual recurrent expenditure for each school to be $40.9 million.

PUBLIC CONSULTATION

11. We consulted the Sha Tin District Council on **230ES** in January 1999 and **246ES** in January 2002. Members of the Council supported the projects.

/ENVIRONMENTAL …..

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[2] Based on a standard furniture and equipment list prepared by Education Department for "Year 2000 design" school.

ENVIRONMENTAL IMPLICATIONS

12. We engaged consultants to conduct Preliminary Environmental Reviews (PERs) for **230ES** and **246ES** in January 2002 and July 2001 respectively. The PERs concluded that the schools would not be subject to adverse environmental impacts provided that we implement the following environmental mitigation measures to keep the road traffic noise impact within the limits recommended in the Hong Kong Planning Standards and Guidelines –

Project no.		Mitigation measures	Estimated cost $ million (in Sept 2001 prices)
230ES	(a)	Provision of insulated windows and air-conditioning to 30 classrooms and one small group teaching room from the 1/F to the 6/F at the northern façades of the classroom block	3.1
	(b)	Provision of insulated windows and air-conditioning to ten special rooms from the 2/F to the 6/F at the eastern and southern façades of the special room block	1.2
	(c)	Construction of a 3-metre high boundary wall at the northern and eastern sides of the school site	0.5
246ES	(d)	Provision of insulated windows and air-conditioning to 30 classrooms and one small group teaching room from the 1/F to the 6/F at the south-western façade of the classroom block	3.1
	(e)	Provision of insulated windows and air-conditioning to six special rooms from the 1/F to the 6/F at the south-eastern façade of the special room block	0.7
			/(f) …..
	(f)	Provision of insulated windows and	0.1

Project no.	Mitigation measures	Estimated cost $ million (in Sept 2001 prices)
	air-conditioning to one small group teaching room on the 1/F at the north-western façade of the assembly hall block	

We have included the costs of these mitigation measures as part of the building services works as well as drainage and external works in the respective project estimates.

13. During construction, we will control noise, dust and site run-off nuisances to within established standards and guidelines through the implementation of mitigation measures in the relevant contracts. These include the use of silencers, mufflers, acoustic lining or shields for noisy construction activities, frequent cleaning and watering of the sites, and the provision of wheel-washing facilities.

14. At the planning and design stages, we have considered measures to reduce the generation of construction and demolition (C&D) materials. D Arch S has introduced more prefabricated building elements into project designs to reduce temporary formwork and construction waste. These include dry-wall partitioning and proprietary fittings and fixtures. We will use suitable excavated materials for filling within the sites to minimise off-site disposal. In addition, we will require the contractors to use metal site hoardings and signboards so that these materials can be recycled or reused in other projects.

15. D Arch S will require the contractors to submit waste management plans (WMPs) for approval. The WMPs will include appropriate mitigation measures to avoid, reduce, reuse and recycle C&D materials. D Arch S will ensure that the day-to-day operations on sites comply with the approved WMPs. D Arch S will control the disposal of public fill and C&D waste to designated public filling facilities and landfills respectively through a trip-ticket system. The contractors will be required to separate public fill from C&D waste for disposal at appropriate facilities. We will record the disposal, reuse and recycling of C&D materials for monitoring purposes. We estimate that each project will generate

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about 3 250 cubic metres (m^3) of C&D materials. Of these, we will reuse about 2 100 m^3 (64.6%) on site and 650 m^3 (20.0%) as fill in public filling areas[3], and dispose of 500 m^3 (15.4%) at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be $62,500 for each project (based on a notional unit cost[4] of $125/$m^3$).

LAND ACQUISITION

16. Part of the school site of **230ES** was agriculture land held under private ownership. The land resumption has been completed. **246ES** does not require land resumption.

BACKGROUND INFORMATION

17. We upgraded **230ES** and **246ES** to Category B in August 1998 and December 2001 respectively. We engaged consultants to carry out PERs and employed term contractors to carry out topographical surveys as well as site investigations for both projects at the following dates and costs –

Project no.	PER	Topographical survey	Site investigation	Total cost
230ES	January 2002	July 1997	November 2001	$1,020,000
246ES	July 2001	January 2002	December 2001	$837,000

We charged these amounts to block allocation **Subhead 3100GX** "Project feasibility studies, minor investigations and consultants' fees for items in Category D of the Public Works Programme". The consultants and the term contractors have completed the PERs, topographical surveys and site investigations respectively. D Arch S has completed detailed designs and tender documents of the projects with in-house staff resources.

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[3] A public filling area is a designated part of a development project that accepts public fill for reclamation purposes. Disposal of public fill in a public filling area requires a licence issued by the Director of Civil Engineering.

[4] This estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at $90/$m^3$), nor the cost to provide new landfills (which are likely to be more expensive) when the existing ones are filled. The notional cost estimate is for reference only and does not form part of this project estimate.

18. We estimate that the proposed works will create the following job opportunities during the construction period –

Project no.	Professional staff	Technical staff	Labourer	Total no. of staff	Total man-months
230ES	2	5	118	125	2 600
246ES	2	5	113	120	2 320

Education and Manpower Bureau
April 2002

A comparison of the reference cost of a secondary school project with the estimated costs of 230ES and 246ES

$ million (in Sept 2001 prices)

		Reference cost*	230ES	246ES	
(a)	Site formation	–	7.8	–	(See note A)
(b)	Piling	11.0	13.0	12.0	(See note B)
(c)	Building	54.9	50.2	50.2	(See note C)
(d)	Building services	14.3	17.1	16.7	(See note D)
(e)	Drainage and external works	10.5	10.5	9.5	(See note E)
(f)	Contingencies	9.0	9.9	8.8	
	Total	99.7	108.5	97.2	
(g)	Construction floor area	12 238 m^2	12 238 m^2	12 238 m^2	
(h)	Construction unit cost {[(c) + (d)] ÷ (g)}	\$5,655/m^2	\$5,499/m^2	\$5,467/m^2	

*** Assumptions for reference cost**

1. The estimation is based on the assumption that the school site is uncomplicated and without unusual environmental restrictions. No allowance is reserved for specific environmental restrictions such as the provision of insulated windows, air-conditioning and boundary walls to mitigate noise impacts on the school.

2. No site formation works/geotechnical works are required as they are normally carried out by other government departments under a separate engineering vote before handing over the project site for school construction.

3. Piling cost is based on the use of 138 numbers of steel H-piles at an average depth of 30 metres, on the assumption that percussive piling is permissible. It also includes costs for pile caps, strap beams and testing. No allowance is reserved for the effect of negative skin friction due to fill on reclaimed land.

4. Cost for drainage and external works is for a secondary school site area of 6 950 square metres built on an average level site without complicated geotechnical conditions, utility diversions, etc. (i.e. a "green-field" site).

5. No consultancy services are required.

6. Furniture and equipment costs are excluded as they are usually borne by the sponsoring bodies of new schools.

7. The reference cost for comparison purpose is subject to review regularly. D Arch S will review, and revise if necessary, the reference cost which should be adopted for future projects.

Note

A. For **230ES**, additional cost is required for carrying out site formation in order to provide raised platforms on this sloping site which is currently well below the level of the surrounding roads.

B. For **230ES**, the piling cost is higher because it is based on the use of 172 numbers of rock-socketed steel H-piles at an average depth of 30 metres instead of 138 numbers of steel H-piles at an average depth of 30 metres assumed for the reference cost. Additional piles are required as a result of the non-standard design which was developed to take up the various levels of the site. Lower tender returns for schools in the last two quarters have also been accounted for.

   For **246ES**, the piling cost is higher because it is based on the use of 26 numbers of large diameter bored piles at an average depth of 37 metres instead of 138 numbers of steel H-piles at an average depth of 30 metres assumed for the reference cost. The underlying rock strata and the presence of marine mud prevent the use of steel H-piles. Lower tender returns for schools in the last two quarters have also been accounted for.

C. For both **230ES** and **246ES**, the estimated building cost is lower taking into account lower tender returns for schools in the last two quarters.

D. For both **230ES** and **246ES**, the building services cost is higher because of the provision of air-conditioning as a noise mitigation measure. Lower tender returns for schools in the last two quarters have also been accounted for.

E. For **230ES**, the reduced site area (5 915 square metres) allows the extra cost for the construction of a 3-metre high boundary wall as a noise mitigation measure to be absorbed within the reference cost limit.

For **246ES**, the drainage and external works costs are lower because the site area (6 206 square metres) is smaller than that assumed for in the reference cost.