For discussion **PWSC(2001-02)107**
on 27 February 2002

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 708 - CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT
Universities
The Chinese University of Hong Kong
43EF - A purpose-designed building for centralised science laboratories

Members are invited to recommend to Finance Committee the upgrading of **43EF** to Category A at an estimated cost of $289.46 million in money-of-the-day prices for the construction of a purpose-designed building for centralised science laboratories for the Chinese University of Hong Kong.

PROBLEM

The Chinese University of Hong Kong (CUHK) needs additional science laboratories and facilities of modern safety standards for teaching and research.

PROPOSAL

2. The Secretary-General, University Grants Committee (SG, UGC), on the advice of the University Grants Committee (UGC) and the Director of Architectural Services (D Arch S) as UGC's Technical Adviser, and with the support of the Secretary for Education and Manpower, proposes to upgrade **43EF** to Category A at an estimated cost of $289.46 million in money-of-the-day (MOD) prices for the construction of a purpose-designed building for centralised science laboratories for CUHK.

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PROJECT SCOPE AND NATURE

3. The scope of project **43EF** comprises the following -

(a) construction of a new six-storey laboratory building near the University Science Centre of CUHK;

(b) construction of a pedestrian footbridge linking the new building with the University Science Centre and a vehicular access ramp;

(c) provision of underground utilities and 22 underground carparking spaces; and

(d) consequential works in the University Science Centre.

4. The development will provide a net operational floor area[1] (NOFA) of about 6 443 square metres to meet the current space shortfall in teaching and research laboratories. The development, when completed, will provide about 70 laboratories (with specially designed facilities and systems such as chemical fume exhaust systems, air quality control and bio-safety devices, and dangerous goods stores) for all science-related disciplines including biochemistry, biology, chemistry, etc. A site plan is at Enclosure 1. CUHK plans to commence the construction works in July 2002 for completion in November 2004.

JUSTIFICATION

5. According to a study on space and accommodation at UGC-funded institutions completed in February 2000, CUHK has a 22% shortfall in accommodation provision equivalent to 36 937 square metres in NOFA. **38EF** "Engineering Building Complex, phase 2" (upgraded to Category A in May 2001 for completion in August 2004) will reduce the shortfall to 31 937 square metres in NOFA and **37EF** "Extension facilities for the clinical departments of the Faculty of Medicine at Prince of Wales Hospital" (pending resubmission for upgrading to Category A in the second half of this legislative session) will reduce the shortfall further to 25 387 square metres in NOFA. About 19 500 square metres of this residual shortfall fall into the category of teaching and research laboratories.

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[1] For the purpose of this submission, we define NOFA as the net floor area of all rooms and spaces provided for the primary function and purpose of the building and excluding any structure and partitions, circulation, staircase, staircase halls, lift landings, space occupied by toilet and shower facilities, mechanical and electrical services such as lifts and air-conditioning systems.

6. At present, many of the science and science-related disciplines have their laboratory teaching and experiment work undertaken in the University Science Centre. Designed in the late sixties and built in the early seventies, the existing laboratories inside the Centre were developed to support basic laboratory teaching and research activities.

7. With the advancement in science and technology, increased research and teaching activities are now being undertaken by the science departments and other science-related disciplines in a wide spectrum of new areas such as environmental science, food and nutritional science, and molecular biotechnology. Such activities require laboratories with specially fitted facilities and stringent safety standards. The existing laboratories in the University Science Centre are grossly inadequate. Constrained by the physical layout, simple conversion to the existing premises would not be able to meet the current standards for modern laboratories, which require tighter control over the experimental environment and safety measures for the prevention of toxicity, explosion, infection, radiation and risks of spread to the community.

8. Universities are relied upon to take a leading role in conducting both basic and applied researches. CUHK and its Faculty of Science are expanding their academic activities to cover both. All these tasks could not be satisfactorily accomplished without the provision of up-to-date and well-equipped laboratory facilities meeting modern safety standards. In view of the above, the UGC supports the construction of a specially designed and fitted-out building for the purpose.

FINANCIAL IMPLICATIONS

9. SG, UGC, on the advice of D Arch S, recommends approval of the project at a cost of $289.46 million in MOD prices (see paragraph 12 below), made up as follows -

		$ million
(a)	Site formation and slope stabilisation	6.79
(b)	Vehicular access ramp	1.20
(c)	Building	86.74
(d)	Building services	86.72
(e)	Drainage, external works and utilities	8.98

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			$ million	
(f)	Consultants' fees -		7.49	
	(i) Assessment of tenders	0.49		
	(ii) Contract administration	2.94		
	(iii) Site supervision	3.81		
	(iv) Out-of-pocket expenses	0.25		
(g)	Furniture and equipment[2]		49.88	
(h)	Consequential works		17.50	
(i)	Contingencies		21.22	
	Sub-total		286.52	(in September 2001 prices)
(j)	Provision for price adjustment		2.94	
	Total		289.46	(in MOD prices)

A NOFA of about 3 500 square metres in the University Science Centre will be vacated after reprovisioning of facilities to the proposed building under **43EF**. $17.50 million will be required to carry out consequential works to convert the space vacated into low/no-risk laboratories and classrooms. This cost is considered reasonable by D Arch S.

10. The construction floor area[3] (CFA) of this project is 13 572 square metres. The estimated construction unit cost, represented by building and building services costs, is $12,781 per square metres of CFA in September 2001 prices.

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[2] Based on 12.5% of the building and building services cost of the project estimate and a list of specialist equipment required. Examples of specialist equipment include fume cupboards, safety cabinets, and laboratory floor cabinets and benches.

[3] CFA is a technical term describing the amount of building works completed. It is the sum of all areas at all floor levels (including basements, mezzanine floors, balconies and enclosed rooftop structures), measured to the outer face of the external walls including external cladding (i.e. the main building line, and measured over all partitions, columns, internal or external structures and load-bearing walls, party walls, stair wells, lift wells, escalator openings, pipe and drain ducts, cable riser shafts and the like). The areas of bay windows are also included. Generally, decorative features which project beyond the outer face of external walls such as fins, architraves, solar shading devices and the like are excluded from the calculation of CFA. Also excluded are uncovered trafficable roof areas such as external playgrounds and landscaped areas.

D Arch S considers the estimated unit costs to be reasonable and comparable with those of similar projects, such as **45EG** "Development of Faculty of Medicine at the existing site of the Northcote Campus of the Hong Kong Institute of Education of the University of Hong Kong" (upgraded to Category A in February1997), the estimated construction unit cost of which was $12,756 per square metre of CFA in September 2001 prices.

11. A detailed breakdown of the estimate for consultants' fees by man-months is at Enclosure 2.

12. Subject to approval, CUHK will phase the expenditure as follows -

Year	$ million (Sept 2001)	Price adjustment factor	$ million (MOD)
2002 - 03	25.00	0.99700	24.93
2003 - 04	55.18	1.00398	55.40
2004 - 05	132.54	1.01101	134.00
2005 - 06	73.80	1.01808	75.13
	286.52		289.46

13. We derive the MOD estimates on the basis of the Government's latest forecast of trend labour and construction prices for the period 2002 to 2006. Subject to Members' approval, CUHK will tender the works through a fixed-price lump-sum contract because it can clearly define the scope of works in advance, leaving little room for uncertainty.

14. The project will have no impact on tuition fees. CUHK has confirmed that it will meet the additional recurrent costs associated with this project from its recurrent grants.

PUBLIC CONSULTATION

15. Public consultation is not necessary as the construction will be carried out within the campus of CUHK.

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ENVIRONMENTAL IMPLICATIONS

16. CUHK completed a Preliminary Environmental Review (PER) for the project in December 1999. The PER concluded that the project would have no long-term environmental impact. The Director of Environmental Protection vetted the PER and agreed that an Environmental Impact Assessment would not be required.

17. During construction, CUHK 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 site, and the provision of wheel-washing facilities.

18. At the planning and design stages, CUHK has considered measures to reduce the generation of construction and demolition (C&D) materials. CUHK will use suitable excavated materials for filling within the site to minimise off-site disposal. To further minimise the generation of C&D materials, CUHK will encourage the contractor to use non-timber formwork and recyclable materials for temporary works. In addition, CUHK will require the contractor to use metal site hoardings and signboards so that these materials can be recycled or reused in other projects.

19. CUHK will require the contractor to submit a waste management plan (WMP) for approval. The WMP will include appropriate mitigation measures to avoid, reduce, reuse and recycle C&D materials. CUHK will ensure that the day-to-day operations on site comply with the approved WMP. CUHK 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 contractor will be required to separate public fill from C&D waste for disposal at appropriate facilities. CUHK will record the disposal, reuse and recycling of C&D materials for monitoring purposes. CUHK estimate that the project will generate about 20 000 cubic metres (m^3) of C&D materials. Of these, CUHK will reuse about 5 000 m^3 (25%) on site, 12 000 m^3 (60%) as fill in public filling areas[4], and dispose of 3 000 m^3 (15%) at landfills. The notional cost of accommodating C&D waste at landfill sites is

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[4] 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.

estimated to be $375,000 for this project (based on a notional unit cost[5] of $125/m^3).

LAND ACQUISITION

20. The project does not require land acquisition.

BACKGROUND INFORMATION

21. Under existing procedures, UGC-funded institutions submit capital works proposals to the UGC annually. The UGC examines all these proposals carefully, with professional advice provided by D Arch S who acts as UGC's Technical Adviser. The UGC refers those proposals it supports to the Government. Having examined CUHK's proposal, SG, UGC has, in consultation with D Arch S, adjusted the project estimate proposed by CUHK to arrive at the project estimate set out in paragraph 2 above. A comparison of the project estimate proposed by CUHK and the revised estimate recommended by the UGC and agreed by CUHK is at Enclosure 3.

22. We upgraded **43EF** to Category B in July 2001. With an allocation of $6.92 million from block allocation **Subhead 8100EX** - "Alternations, additions, repairs and improvements to the campuses of the UGC-funded institutions", consultants engaged by the CUHK have completed the pre-tender consultancy including feasibility study, site investigation and detailed design. CUHK is finalising the tender documents for the project.

23. CUHK estimates that the proposed works under **43EF** will create some 210 jobs, with a total of 4 110 man-months, comprising five professional staff, ten technical/supervisory staff and some 195 labourers.

Education and Manpower Bureau
February 2002

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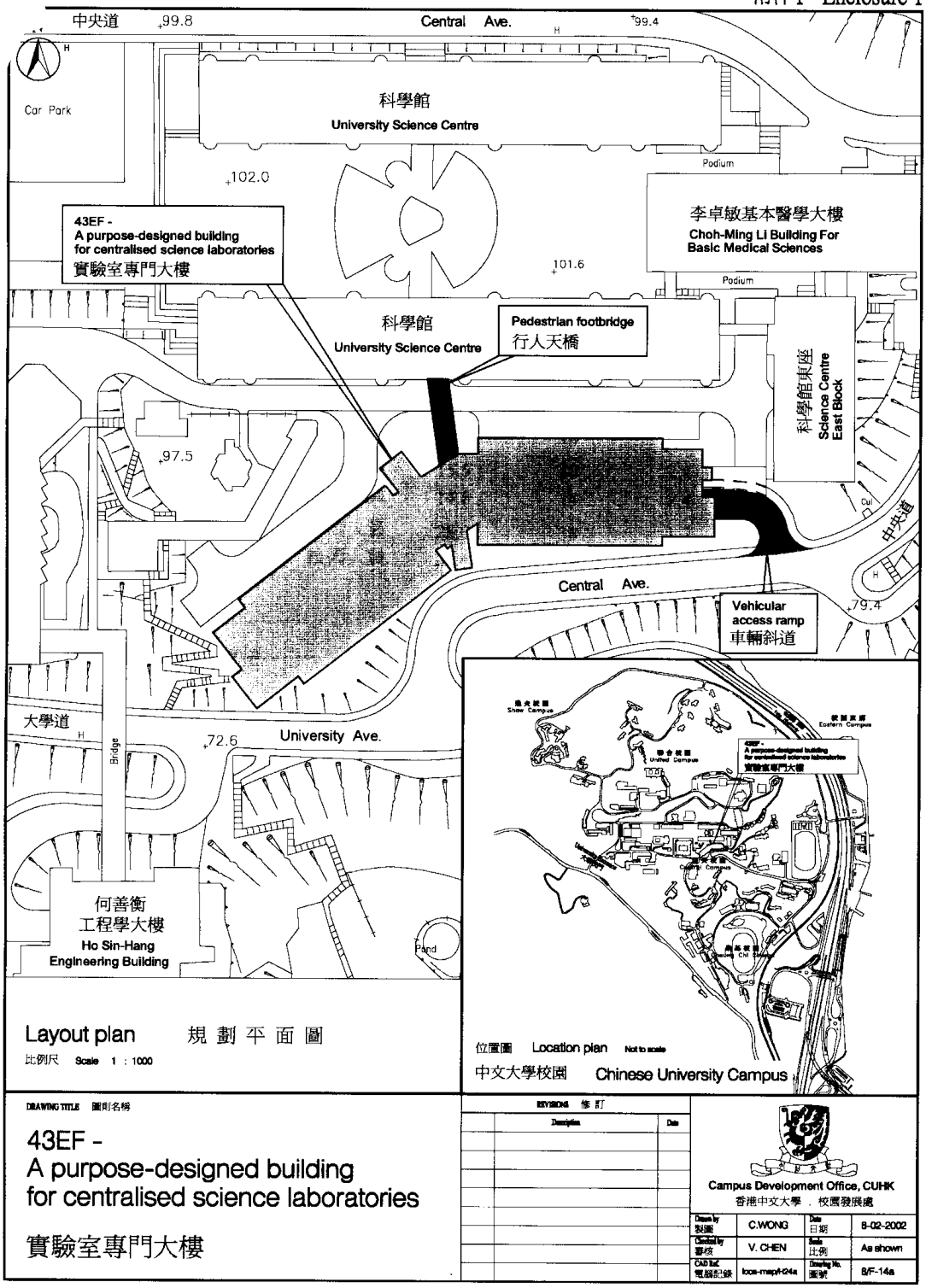
[5] This estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at $90/m^3), nor the cost to provide new landfills (which 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.

附件1 Enclosure 1



The Chinese University of Hong Kong
43EF - A purpose-designed building for centralised science laboratories

Breakdown of the estimate for consultants' fees

			Estimated man-months	Average MPS* salary point	Multiplier	Estimated fee ($ million)
(a)	**Consultants' staff costs**					
	(i) Assessment of tenders	Professional	2.6	38	2.4	0.38
		Technical	2.4	14	2.4	0.11
	(ii) Contract administration	Professional	15.5	38	2.4	2.25
		Technical	14.8	14	2.4	0.69
(b)	**Site supervision**	Professional	28.0	38	1.7	2.87
		Technical	28.4	14	1.7	0.94
					Sub-total	7.24
(c)	**Out-of-pocket expenses**					
	Lithography and other direct expenses					0.25
					Total	7.49

***** **MPS = Master Pay Scale**

Notes

1. A multiplier of 2.4 is applied to the average MPS point to estimate the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier of 1.7 is applied in the case of contract staff employed by CUHK direct on the project. (At 1 April 2001, MPS point 38 is $60,395 per month and MPS point 14 is $19,510 per month.)

2. Out-of-pocket expenses are the actual costs incurred. The consultants are not entitled to any additional payment for the overheads or profit in respect of these items.

3. The figures given above are based on estimates prepared by CUHK. D Arch S has examined the figures and considered them reasonable.

Enclosure 3 to PWSC(2001-02)107

A comparison of the project estimate proposed by CUHK with the estimate recommended by UGC

$ million (in Sept 2001 prices)

Project	Amount proposed by CUHK	Amount recommended by UGC	Amount of reduction
CUHK - **A purpose-designed building for centralised science laboratories**	289.07	286.52	2.55

Note

The net reduction of $2.55 million results from trimming the estimate on -

(a) construction cost by $2.35 million;

(b) consultants' fees by $10,000; and

(c) contingencies by $190,000.