

## **ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE**

### **HEAD 708 – CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT**

#### **Medical Subventions**

#### **58MM – Construction of a new infectious disease centre attached to Princess Margaret Hospital**

Members are invited to recommend to Finance Committee the upgrading of **58MM** to Category A at an estimated cost of \$538.3 million in money-of-the-day prices for the construction of a new infectious disease centre attached to the Princess Margaret Hospital.

### **PROBLEM**

The existing facilities in public hospitals, including isolation facilities, are insufficient to cope with possible major outbreak of infectious diseases in the future.

### **PROPOSAL**

2. The Director of Architectural Services (D Arch S), with the support of the Secretary for Health, Welfare and Food, proposes to upgrade **58MM** to Category A at an estimated cost of \$538.3 million in money-of-the-day (MOD) prices for the construction of an infectious disease centre attached to Princess Margaret Hospital (PMH).

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**PROJECT SCOPE AND NATURE**

3. The scope of **58MM** comprises –
- (a) the construction of an infectious disease centre attached to PMH to provide –
    - (i) 108 isolation beds in wards with a capacity of ten to 14 beds each. The wards will accommodate single-bed and double-bed rooms with en-suite toilet/shower facilities and ante-rooms where appropriate. We will designate 14 out of the 108 isolation beds as intensive care unit (ICU) beds which will be separately accommodated;
    - (ii) a procedure room with associated facilities;
    - (iii) radio-diagnostic imaging facilities, including a computer tomography scanner suite;
    - (iv) a clinical laboratory for the handling, collection and distribution of highly infectious specimens;
    - (v) staff infection control facilities, including gowning/de-gowning areas, changing rooms, shower facilities and emergency showers;
    - (vi) an Office of the Infection Control Branch of the Centre for Health Protection (CHP); and
    - (vii) other supporting and ancillary facilities;
  - (b) the upgrading of the facilities of the existing mortuary in the Main Block of PMH to meet current safety standards in the management of infectious diseases; and
  - (c) the construction of a bridge linking the infectious disease centre with the existing Blocks E and F, and a connection linking the centre with the existing Block G.

4. A site plan and views of the proposed infectious disease centre (artist's impression) are at Enclosures 1 and 2 respectively. We plan to commence the construction works in November 2004 for completion in June 2007.

## JUSTIFICATION

5. The Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 exposed the need for designated isolation units and related facilities in public hospitals to cope with possible outbreak of infectious diseases. To address this need, we have put in place a comprehensive plan to build up the surge capacity for designated isolation units. After careful consideration of the need of patients and with the experience gained in the SARS outbreak, we have adopted the approach of developing infectious disease units attached to selected acute hospitals.

6. We have considered the alternative approach of constructing a dedicated infectious disease hospital. We have not adopted this approach as this would contract, rather than expand, expertise in infection management and control throughout the Hospital Authority (HA), exacerbate problems of transporting infectious patients and would mean that patients would not have easy access to the diagnostic and treatment facilities of other specialties they might require. Providing isolation facilities attached to selected acute hospitals, rather than building a single stand-alone infectious disease hospital, provides flexibility in terms of operation, logistic support and mobilisation of resources, and allows patients with infectious disease access to the multi-specialty support that is available in acute hospitals.

7. This approach of developing infectious disease units attached to selected acute hospitals has the endorsement of the SARS Expert Committee<sup>1</sup>. We have also sought the views of the World Health Organization experts. They advised that a more effective approach of dealing with infectious disease outbreaks was to equip frontline acute hospitals with such capacity, including the provision of isolation facilities. The world trend is moving away from constructing stand-alone infectious disease hospitals which are distant from where the patients reside, and from other multi-specialty acute hospitals.

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<sup>1</sup> The SARS Expert Committee was set up in May 2003 to examine and review the capabilities and structure of the health care system in Hong Kong in the prevention and management of infectious diseases such as SARS. In October 2003, the Committee submitted to the Chief Executive a report and proposed recommendations on areas of improvements to the health care system in Hong Kong.

8. Our plan to develop infectious disease units attached to selected acute hospitals involves –

- (a) the designation of 14 acute hospitals for receiving patients in an infectious disease outbreak and providing these acute hospitals with about 1 400 isolation beds by converting existing hospital space into isolation wards; and
- (b) the provision of about 200 other isolation beds and other necessary facilities in newly constructed infectious disease centres attached to existing hospitals.

In July 2003, the Finance Committee approved the upgrading of **56MM** “Enhancement of infection control facilities in the public hospital system (Batch A)” and **57MM** “Enhancement of infection control facilities in the public hospital system (Batch B)” to Category A at estimated costs of \$287.2 million and \$122.4 million respectively in MOD prices for the Architectural Services Department (ArchSD) and the HA to carry out conversion works in nine major acute hospitals<sup>2</sup>. In January 2004, the Finance Committee approved an increase in the approved project estimate for **56MM** from \$287.2 million by \$68.1 million to \$355.3 million to meet additional funding requirements for this project. The conversion works under both **56MM** and **57MM** have been completed in January 2004 and there are now 1 262 isolation beds in the nine hospitals. In addition, the HA has also redeployed resources to provide for 153 isolation beds in five other hospitals<sup>3</sup>. 88% of the works in these five hospitals has been completed and 135 isolation beds are ready for use. In sum, under this part of the plan, we will provide a total of 1 415 isolation beds in 14 acute hospitals, out of which 1 397 are now ready for use.

9. The second part of the plan involves construction of new infectious disease centres for existing hospitals. We propose PMH to be the first hospital provided with a new infectious disease centre. The hospital has been a designated infectious disease hospital in Hong Kong equipped with dedicated facilities for handling patients with all types of infectious diseases since 1975. Its staff have the expertise to handle infectious disease patients and the hospital is therefore in the best position to house the largest number of isolation beds.

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<sup>2</sup> These nine hospitals are the Princess Margaret Hospital, Tuen Mun Hospital, Pamela Youde Nethersole Eastern Hospital, Prince of Wales Hospital, Queen Elizabeth Hospital, Queen Mary Hospital, Alice Ho Miu Ling Nethersole Hospital, Kwong Wah Hospital and United Christian Hospital.

<sup>3</sup> These five hospitals are the Caritas Medical Centre, Ruttonjee Hospital, North District Hospital, Tseung Kwan O Hospital and Yan Chai Hospital.

10. The infectious disease centre in PMH will function in a self-sufficient and independent manner, but will be linked to the rest of the hospital for expertise support, and other additional support of diagnostic and treatment equipment and facilities, without affecting the normal operation of the other services of the hospital. We will incorporate appropriate infection control provisions in the design of the infectious disease centre, including ample and readily accessible staff amenities to provide a safe environment for staff handling highly infectious patients, and ventilation systems capable of controlling the spread of air-borne infectious diseases.

11. We will provide the isolation wards in the infectious disease centre with unidirectional air flow from “clean” zones (e.g. ward corridors) to “dirty” zones (e.g. patient rooms) under a negative pressure gradient, and 100% fresh air supply at no less than 12 air changes per hour for dilution of contaminants. The procedure room will be suitably equipped for emergency surgical operations under general anaesthesia; delivery of babies of infected mothers including Caesarean section; as well as other invasive diagnostic and/or therapeutic procedures, such as chest tapping for diagnosis and drainage of pleural effusion, bronchoscopy for chest conditions, and endoscopy for gut conditions. The radio-diagnostic imaging facilities will enable expeditious screening and/or diagnosis of infectious diseases to be carried out, with additional support provided by the existing facilities of PMH if the conditions of individual patients require other technologically sophisticated examinations, such as angiography or magnetic resonance imaging (MRI), to be performed. Other supporting and ancillary facilities include administration offices, storage accommodation for personal protective equipment (PPE), as well as tele-visit booths for relatives and friends of infected patients, etc. We will also upgrade the existing mortuary of PMH to provide additional capacity for body storage, and autopsy facilities meeting the most stringent bio-safety requirements for handling high-risk infectious cases.

12. After the completion of the infectious disease centre, PMH will have 321 isolation beds in total.

13. In May 2003, the Government identified a need for strengthening public health protection functions as revealed by the SARS outbreak. Consequently, it began considering establishing an organisation similar to the Centre for Disease Control and Prevention in Hong Kong to guard against communicable diseases. The initiative was endorsed by the SARS Expert Committee Report released in October 2003, which recommended the HKSAR Government to establish a Centre for Health Protection (CHP) to strengthen its capacity to prevent and control communicable

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diseases. The Government has since then been planning the establishment of the CHP. One of the functional branches of the CHP is the Infection Control Branch. Its responsibilities are to develop, promulgate, and evaluate best practices on infection control in healthcare and non-healthcare settings, support epidemiological investigations of communicable disease outbreaks in hospitals and support training in infection control for all levels of health staff. As a major part of this Branch's work relates to infectious disease control in the hospital setting, it is therefore planned that the Branch should have an office physically located within a hospital to facilitate its work.

14. We are also planning for the construction of a second infectious disease center, to be attached to an acute hospital in the New Territories East Cluster in view of the high demand for isolation facilities in this cluster. On completion of these two infectious disease centers, there will be a total of about 1 600 isolation beds in public hospitals. We will monitor the demand and usage rate of isolation facilities closely before planning for further addition of beds to ensure that there will not be any over-supply of these facilities.

## FINANCIAL IMPLICATIONS

15. We estimate the cost of **58MM** to be \$538.3 million in MOD prices, made up as follows –

	\$ Million
(a) Site works and demolition	2.9
(b) Site formation, geotechnical and substructure works	12.1
(c) Building	190.5
(d) Building services	192.4
(e) Drainage and external works	5.9

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	<b>\$ Million</b>	
(f) link bridge and connection	6.7	
(g) Upgrading of existing mortuary	7.0	
(h) Furniture and equipment (F&E) <sup>4</sup>	100.0	
(i) Contingencies	41.7	
Sub-total	559.2	(in September 2003 prices)
(j) Provisions for price adjustment	(20.9)	
<b>Total</b>	538.3	(in MOD prices)

Item (c) above is for builder's works in connection with the construction of the proposed infectious disease centre. The works involve superstructure construction, provision of finishes, fittings and fixtures, landscaping and other associated works (including all necessary temporary works). Item (d) is for building services works in connection with the construction of the proposed infectious disease centre, including provision of electrical installations, air-conditioning and mechanical ventilation systems, fire services installations, emergency generator sets, plumbing and drainage installations, hot water supply systems, automatic toilet waste disinfection system, lifts, medical gas installations and other associated works.

16. The construction floor area (CFA) of **58MM** is 21 600 square metres (m<sup>2</sup>). The net operational floor area (NOFA) is 7 368 m<sup>2</sup> and the ratio of NOFA to CFA is 34%. The relatively low NOFA to CFA ratio for this project, in comparison with those of other hospital projects, is mainly due to-

- (a) a high circulation floor space required due to provision of air-locks in the corridors and lift lobbies, and provision of clean and dirty cores for vertical circulation to prevent cross-contamination; and

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Based on indicative list of F&E items and their estimated prices.

- (b) a high plant/equipment floor area required in order to achieve the required number of air-changes per hour in the isolation rooms, to intake sufficient outdoor air in the mechanical floor so as to provide 100% treated outdoor air supply to the isolation rooms, to maintain pressure differentials between isolation wards and anterooms as well as between anterooms and corridors, and to segregate the air conditioning plants from the infectious disease wards so that maintenance staff do not have to enter infectious disease wards during the course of normal maintenance.

———— A breakdown of the CFA vis-à-vis the construction unit cost is at Enclosure 3.

17. The estimated construction unit cost, represented by the building and building services costs, is \$17,727 per m<sup>2</sup> of CFA in September 2003 prices and the capital cost per bed is about \$5 million. The unit cost is higher than those of other hospitals due to the air-tight construction, and the very high standard of building services works such as special air conditioning system with air pressure control equipment required of the proposed infectious disease centre. To ensure that this project is cost-effective, the ArchSD and HA have critically reviewed the necessity and the design of the facilities for the proposed infectious disease centre, and have come to the conclusion that the very stringent infection control measures and the very high standard of works adopted for this project cannot be lowered without compromising the acceptable overall standard and efficiency of the proposed facilities.

18. ArchSD considers that the unit cost is reasonable having regard to the very stringent infection control measures adopted for and the very high standard of building services works required of the proposed infectious disease centre, as explained below –

- (a) Special air conditioning system with air pressure control at an estimated cost of \$87.5 million (involves an additional cost of about \$33.0 million)

A special air conditioning system is designed for the proposed infectious disease centre to meet the very stringent infection control requirements including 100% non-recirculating fresh air supply, 12 air changes per hour of ventilation, design indoor air temperature of 20-22°C, and special pressure control equipment to maintain

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pressure differentials between isolation wards and anterooms, as well as between anterooms and corridors. Furthermore, the system will be equipped with facilities to allow re-circulating air when the isolation wards are used for patients with non-air borne infectious diseases. Owing to these special features, the proposed air conditioning system costs approximately 60% more and the plant/equipment floor area required is 112% more than that of an ordinary hospital.

- (b) Provision of anteroom and toilet and shower facilities for each isolation room, gowning/degowning facilities for each isolation ward, and provision of clean and dirty lifts, lift shafts and lift lobbies at an estimated cost of \$42.1 million (involves an additional cost of about \$9.7 million)

To prevent cross contamination, anterooms and toilet and shower facilities are provided for each isolation room, gowning/degowning facilities for each isolation ward, and clean and dirty lift systems have to be provided. The cost of these features is 30% more and area required is 232% more than those of an ordinary hospital.

- (c) Installation of automatic air-tight doors at an estimated cost of \$26.5 million (involves an additional cost of about \$18.9 million)

To prevent cross contamination, the anterooms to isolation wards are all installed with automatic air-tight doors which cost approximately 250% more than ordinary ones.

- (d) Other special features for infection control at an estimated cost of \$22.3 million (involves an additional cost of about \$22.3 million)

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These include –

- (i) special provision to laboratory including ventilation and control system to meet the bio-safety requirements;
- (ii) an automatic toilet waste disinfection system to disinfect patients' excretions before they are discharged into public sewers;
- (iii) special disinfection and containment equipment, such as high efficiency particulate air filters, gas tight dampers, ultra-violet lights and air purifiers;
- (iv) special performance and smoke test on isolation facilities; and
- (v) higher reliability in essential power supply to maintain negative pressure.

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

<b>Year</b>	<b>\$ million (Sept 2003)</b>	<b>Price adjustment factor</b>	<b>\$ million (MOD)</b>
2004 – 05	10.0	0.97150	9.7
2005 – 06	150.0	0.95450	143.2
2006 – 07	200.0	0.95450	190.9
2007 – 08	120.0	0.96643	116.0
2008 – 09	50.0	0.98455	49.2
2009 – 10	29.2	1.00203	29.3
	<hr/> 559.2 <hr/>		<hr/> 538.3 <hr/>

20. We have derived the MOD estimates on the basis of the Government's latest forecast of trend rate of change in the prices of public sector building and construction output for the period 2004 to 2010. We will deliver the demolition, site formation, substructure and superstructure works of the project through two fixed-price lump-sum contracts, as all the contract periods involved will be less than 21 months and we can clearly define the scope of works in advance, leaving little room for uncertainty.

21. HA has assessed the requirements for F&E for this project, and estimates the F&E costs to be \$100 million. The proposed F&E provision, which represents 25.7% of the total construction cost<sup>5</sup> of the project, is broadly comparable to that for projects of similar nature and scope. A list of major F&E items (costing \$1 million or above per item) to be procured for the project is at Enclosure 4.

22. We estimate the annual recurrent expenditure arising from the project to be \$85 million.

## PUBLIC CONSULTATION

23. HA consulted the Community Affairs Committee of the Kwai Tsing District Council (DC) at its meeting on 24 February 2004. At the meeting, the Committee supported the construction of infectious disease centres but objected to building one at PMH for fear of potential health hazards to residents nearby. To address concerns of the local communities, HA arranged site visits to PMH for members of the Kwai Tsing DC on 17 March 2004 and 16 April 2004, and members of the Sham Shui Po DC on 8 April 2004. During the visits, the DC members were briefed on the proposed project and measures to be implemented to guard against the spread of infectious diseases from the hospital and the potential contamination to the environment. The DC members were generally satisfied that the measures to be put into place were sufficient. The Health, Welfare and Food Bureau also wrote to the Kwai Tsing DC on 5 May 2004 to recapitulate the measures that would be adopted to prevent the spread of infectious disease from PMH to the community nearby. The details of these measures are set out in Enclosure 5.

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<sup>5</sup> Represented by the building, building services, and drainage and external works costs for the infectious disease centre.

24. We consulted the Legislative Council Panel on Health Services at its meeting on 8 March 2004. Members generally supported the proposal but noted the concern of the Kwai Tsing DC. Members requested the Administration to allay the concerns of the Kwai Tsing DC by explaining to them the measures that would be adopted to prevent the spread of infectious diseases to the community nearby.

## **ENVIRONMENTAL IMPLICATIONS**

25. **58MM** is a non-designated project under the Environmental Impact Assessment Ordinance and will not have long-term adverse environmental impact. 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.

26. 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 the project design 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.

27. 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 site 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. D Arch S will require the contractors to separate public fill from C&D waste for disposal at appropriate facilities. D Arch S will record the disposal, reuse and recycling of C&D materials for monitoring purposes.

28. We estimate that the project will generate about 19 600 cubic metres (m<sup>3</sup>) of C&D materials. Of these, we will reuse about 600 m<sup>3</sup> (3.1%) on site, 16 500 m<sup>3</sup>(84.2%) as fill in public filling areas<sup>6</sup>, and dispose of 2 500 m<sup>3</sup> (12.7%) at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be \$312,500 for this project (based on a notional unit cost<sup>7</sup> of \$125/m<sup>3</sup> ).

## LAND ACQUISITION

29. The proposed project does not require land acquisition.

## BACKGROUND INFORMATION

30. We upgraded **58MM** to Category B in October 2003. We engaged consultants in November 2003 and December 2003 to undertake topographical survey and pre-contract structural engineering drafting service respectively. We employed term contractors in November 2003 to carry out site investigation and the related service diversion works to pave way for the construction of the infectious disease centre. The total cost for the above surveys and works is \$6.1 million. We charged these amounts to block allocation **Subhead 8100MX** “Hospital Authority – improvement works, feasibility studies, investigations and pre-contract consultancy services for building projects”. The consultants have completed the topographical surveys and the structural engineering drafting work, and the term contractors have completed the site investigation and service diversion works. D Arch S has completed the detailed design of the proposed infectious disease centre and is preparing the tender document with in-house staff resources.

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<sup>6</sup> 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.

<sup>7</sup> 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 per m<sup>3</sup>), 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.

31. **58MM** will involve removal of four trees. All trees to be removed are not important trees<sup>8</sup>. We will incorporate planting proposals as part of the project, including estimated quantities of 20 trees, 3 000 shrubs, 500 annuals and 400m<sup>2</sup> of grassed area.

32. We estimate that the proposed project will create about 520 jobs (485 for labourers and another 35 for professional/technical staff) providing a total employment of 9 300 man-months.

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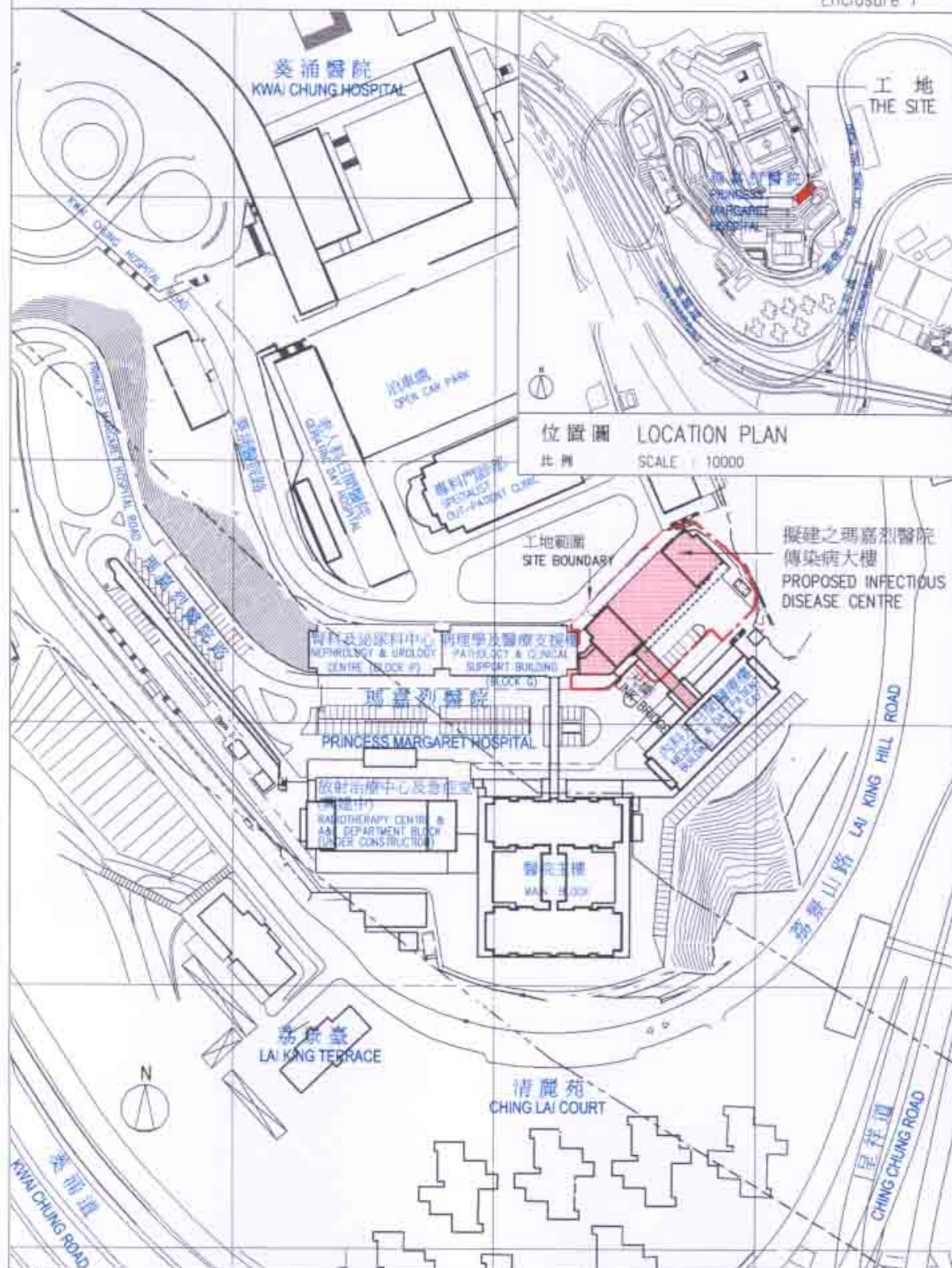
Health, Welfare and Food Bureau  
June

2004

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<sup>8</sup> Important trees include trees on the Register of Old and Valuable Trees, and any other trees which meet one or more of the following criteria –

- (a) trees over 100 years old;
- (b) trees of cultural, historical or memorable significance;
- (c) trees of precious or rare species;
- (d) trees of outstanding form; or
- (e) trees with trunk diameter exceeding one metre (measured at one metre above ground level).



8058MM

計劃興建之瑪嘉烈醫院  
傳染病大樓  
CONSTRUCTION OF A NEW  
INFECTIOUS DISEASE CENTRE  
ATTACHED TO THE  
PRINCESS MARGARET HOSPITAL

drawn by 繪圖

M.F. LEUNG

approved 審核

Y.D. CHAU

office 辦事處

ARCHITECTURAL BRANCH 建築設計處

date 日期

20-10-03

date 日期

20-10-03

drawing no. 圖號

6867-P01

scale 比例

1:2000



ARCHITECTURAL  
SERVICES  
DEPARTMENT 建築署






從南面望向傳染病大樓 (模擬圖)  
View of the New Infectious Disease Centre from South Direction (Artist's Impression)



從東面望向傳染病大樓 (模擬圖)  
View of the New Infectious Disease Centre from East Direction (Artist's Impression)

B058MM 計劃興建之瑪嘉烈醫院 傳染病大樓 CONSTRUCTION OF A NEW INFECTIOUS DISEASE CENTRE ATTACHED TO THE PRINCESS MARGARET HOSPITAL	drawn by 繪圖 M.F. LEUNG	date日期 20-10-03	drawing no. 圖號 6867-P02	scale比例 N.T.S.
	approved 覆核 Y.Q. CHAU	date日期 20-10-03	 ARCHITECTURAL SERVICES DEPARTMENT 建築署	
	office 辦事處 ARCHITECTURAL BRANCH 建築設計處			



**580MM Construction of a new infectious disease block  
attached to Princess Margaret Hospital**

**Breakdown of the construction floor area (CFA) vis-à-vis the construction unit cost**

(a) Breakdown of CFA

	<u>Estimated floor area (m<sup>2</sup>)</u>
Net operational floor area (NOFA)	7 368
Circulation floor areas	6 547
Plant/Equipment floor area	5 058
Structural elements, walls, partitions, etc	2 627
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Total CFA	21 600
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(b) NOFA/CFA ratio<sup>9</sup> 34%

(c) Estimated construction unit cost (represented by the building and building services costs) \$17,727 per m<sup>2</sup> of CFA (in September 2003 prices)

<sup>9</sup> For Members' information, the NOFA/CFA ratio for **45MM** "Establishment of a Radiotherapy Centre & Redevelopment of the Accident and Emergency Department at Princess Margaret Hospital" is 42%, and that for **48MM** "Redevelopment of Staff Quarters for the establishment of a Rehabilitation Block, Phase II – Rehabilitation Block" is 34%.

**Enclosure 4 to PWSC(2004-05)24**

**58MM – Construction of a new infectious disease block  
attached to Princess Margaret Hospital**

**Furniture and equipment items with unit cost of \$1 million or more**

<b>Item Description</b>	<b>Quantity</b>	<b>Unit cost (\$ million)</b>	<b>Total cost (\$ million)</b>
Central Monitoring System	1	5.600	5.600
Bedside Physiological Monitoring System	1	2.700	2.700
Autoclave	1	1.111	1.111
Body Store	1	1.048	1.048
Computed Tomography Scanner	1	9.000	9.000
General X-ray equipment	1	6.000	6.000
Mobile C-Arm with Digital Subtraction Angiography	1	3.000	3.000
Computed Radiography with Departmental Network	1	11.000	11.000
Video Bronchoscopy System	1	1.125	1.125
Genetic Analyser	1	1.300	1.300
Electronic Systems (Public Address, Closed Circuit Television, Intercom, Access Control, Tele-visit and Audio and Visual Systems)	1	9.079	9.079

**Measures to be Adopted to Prevent the Spread of Infectious Diseases from Princess Margaret Hospital**

The proposed infectious disease centre attached to PMH will be equipped with special devices for the implementation of infection control measures which are more stringent than those recommended by the Centre for Disease Control and Prevention (CDC) of the United States of America. According to CDC's current recommendation, air from contaminated areas such as isolation wards in hospitals can be exhausted directly to the outside. There is no requirement to "clean" the exhausted air before discharge, since any air-borne pathogens it carries will be rendered harmless through dilution in the atmosphere. Besides, CDC requires all exhaust outlets to be located more than 25 feet away from any air-intake systems. It may therefore be inferred that the air discharged from the exhaust outlets will be diluted down to harmless levels beyond a distance of 25 feet.

2. In the case of the proposed infectious disease centre attached to PMH, as an additional safeguard against potential health hazards to the community nearby, air to be exhausted will be "cleaned" by high efficiency particulate air (HEPA) filters before discharge. HEPA filters are tested to be at least 99.97% efficient for removing air-borne particles down to 0.3  $\mu\text{m}$  in diameter, whereas air-borne infectious diseases are commonly spread via droplet nuclei ranging in size from 1 – 5  $\mu\text{m}$ . HEPA filtration is a proven technology for cleaning large volume of air on the intake side of ventilation systems to achieve "sterile" quality. It has been universally used for decades in the supply of "sterile" air to special areas in hospitals, such as operating theatres and patient rooms for immuno-compromised patients, where an aseptic environment is vital for the health and safety of patients or hospital staff. The application of such technology on the exhaust side of the ventilation system for the proposed infectious disease centre is therefore analogous to supplying "sterile" air to the environment, and thus no issue related to health hazards to residents nearby should arise.

3. Furthermore, we will install an automatic toilet waste disinfection system as an adjunct to the sewage system of the proposed infectious disease center to disinfect patient excretions before they are discharged into the public sewers. Such a provision is also beyond the requirements of CDC and the World Health Organization, but considered appropriate in this particular instance as an additional precautionary measure to guard against potential contaminations to the environment.