

## **ITEM FOR FINANCE COMMITTEE**

### **HEAD 140 – GOVERNMENT SECRETARIAT:**

#### **FOOD AND HEALTH BUREAU (HEALTH BRANCH)**

#### **New Subhead “Replacement of central air-conditioning system for the Prince Philip Dental Hospital”**

Members are invited to approve a new commitment of \$26.1 million for replacing the central air-conditioning system for the Prince Philip Dental Hospital.

### **PROBLEM**

The bursting of two underground water pipes, which supply and discharge sea water for heat dissipation of the central air-conditioning system at the Prince Philip Dental Hospital (the Dental Hospital), has become more frequent, causing inconvenience to local residents and the Dental Hospital.

### **PROPOSAL**

2. The Secretary for Food and Health proposes to create a new commitment of \$26.1 million for the installation of fresh water cooled chillers to replace the sea water cooled chillers and the installation of the associated cooling towers for the Dental Hospital.

### **JUSTIFICATION**

3. The two sea water pipes of the sea water cooled chillers of the Dental Hospital have been in service for 30 years. They are approximately two kilometers in length and made of asbestos cement, running from a sea water pump house located near the waterfront of Sheung Wan along Connaught Road West, and passing through busy roads such as Des Voeux Road West and Queen’s Road West before reaching the Dental Hospital (please see Enclosure 1).

4. Bursts and leakages of the sea water pipes have become more frequent in recent years. On each occasion, repair took six to seven days on average to complete. Suspension of air-conditioning affected the normal operation of the Dental Hospital as well as the learning and work efficiency of its clinical teaching staff and students. The excavation works arising from the pipe bursts also affected traffic and caused inconvenience to the shops and residents nearby. The repair expenditure amounts to about \$485,000 a year on average in the past three years, and is estimated to rise to \$970,000 per annum if the Dental Hospital continues to rely on these pipes. As the planned construction of the MTR West Island Line will soon commence in the vicinity of these sea water pipes, the pipe burst problem may further worsen.

5. We and the Dental Hospital have since 2007 explored different options with the relevant government departments and other stakeholders in order to identify a long-term solution. The proposed replacement of sea water cooled chillers with fresh water cooled chillers is considered environmentally sound, economically viable and operationally feasible. Works will only be carried out within the area of the Dental Hospital without affecting the shops and residents nearby, and will only take two winter seasons to complete. About 99% of the fresh water from the tap used by fresh water cooled chillers and cooling towers can be recirculated for use under normal operation, while only around 1% of the fresh water will be evaporated. Using fresh water as the cooling agent is one of the most energy efficient ways for central air-conditioning supply. This method also meets the requirements set by the Government regarding the use of energy efficient facilities in Government works projects and installation works. The present replacement proposal will also achieve savings in the maintenance and repair costs of the sea water pipes.

### **Options considered**

Encl. 2 6. We have considered four other options in consultation with the Director of Electrical and Mechanical Services (details at Enclosure 2). We consider the present proposal the most desirable. On the grounds of energy efficiency and savings in operational expenditure, the Hong Kong Productivity Council also agrees that the present proposal is the best option.

## **FINANCIAL IMPLICATIONS**

### **Non-recurrent Expenditure**

7. We estimate that the capital cost of the proposed replacement project will be \$26.1 million, with breakdown as follows –

/(a) .....

	<b>\$ million</b>
(a) Air-conditioning equipment	15.43
(b) Electrical works	1.30
(c) Builder's works	4.70
(d) Contingency	1.07
(e) Management fee	3.60
<b>Total</b>	<b>26.10</b>

8. Regarding paragraph 7(a), 7(b) and 7(c) above, the estimated cost of \$21.43 million will cover the supply and installation of air-conditioning equipment (including chillers, cooling towers and water pumps) and testing and commissioning of the central air-conditioning system.

9. Regarding paragraph 7(d) above, the estimate of \$1.07 million represents about 5% contingency on the items set out in paragraphs 7(a) to (c) above.

10. Regarding paragraph 7(e) above, the estimated cost of \$3.6 million is for meeting the charges of Electrical and Mechanical Services Trading Fund for preparing the specifications, design and project programme, overseeing the tendering process; undertaking site inspection; supervising the installation, testing and commissioning of the system; as well as monitoring the operation of the system and rectification work during the defects liability period.

11. We intend to phase the expenditure as follows –

<b>Year</b>	<b>\$ million</b>
2010-11	15.00
2011-12	11.10
<b>Total</b>	<b>26.10</b>

/Recurrent .....

**Recurrent Expenditure**

12. The increase in utility cost and maintenance cost of the new central air-conditioning system of \$750,000 per annum can be fully offset by the savings in the maintenance and repair of the sea water pipes, which is estimated to rise to \$970,000 per annum.

**IMPLEMENTATION PLAN**

Encl. 3 13. Works will be undertaken within the premises of the Dental Hospital (please see Enclosure 3). It is anticipated that the replacement works will start in February 2011 for completion in December 2011. The tentative timetable is at  
Encl. 4 Enclosure 4.

**PUBLIC CONSULTATION**

14. We consulted the Food, Environment, Hygiene and Works Committee of the Central and Western District Council on 25 March and 20 May 2010. The Committee supported the proposed project.

15. We also consulted the Legislative Council Panel on Health Services on 14 June 2010. The Panel raised no objection to the proposal.

**ENVIRONMENTAL IMPLICATIONS**

16. This is not a designated project under the Environmental Impact Assessment Ordinance (Chapter 499). It belongs to one of the categories listed in Environment, Transport and Works Bureau Technical Circular (Works) No. 13/2003 that have limited potential for giving rise to adverse environmental impacts. We undertake to implement the standard pollution control measures during construction, as promulgated by the Director of Environmental Protection.

17. We will incorporate measures in the detailed design stage to reduce the generation of construction waste as far as possible (e.g. using recyclable metal hoardings and signboards).

18. We will also require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation measures to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We will require the contractor to separate inert portion from non-inert construction waste<sup>Note</sup> on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste to public filling areas and landfills respectively through a trip-ticket system.

19. We estimate that the project will generate construction waste of not more than one tonne in weight as most of the works involve brand new installations except replacement of the existing three chillers and the associated accessories, which will be handled as recyclable metallic materials.

## **BACKGROUND**

20. The Dental Hospital is a statutory body established in 1981 under the Prince Philip Dental Hospital Ordinance (Chapter 1081) and receives subvention from the Food and Health Bureau. It is a purpose-built teaching hospital to provide clinical training facilities for undergraduate and postgraduate students of the Faculty of Dentistry of the University of Hong Kong. It also runs courses for dental ancillary personnel at diploma/certificate level. The Dental Hospital provides day treatment dental services to patients suitable for teaching purposes and private fee paying patients.

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Food and Health Bureau  
June 2010

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<sup>Note</sup> Construction waste is generally divided into inert construction waste and non-inert construction waste. Non-inert construction waste generally includes bamboo, timber, vegetation, packaging waste and other organic materials. Some of such waste is recyclable while the rest will be disposed of at landfills. Inert construction waste is generally known as public fill and includes debris, rubble, earth, asphalt and concrete, which are suitable for site formation. Among such waste, concrete and asphalt can be recycled for use in construction while the rest will be disposed of at public filling areas.

Alignment of the Sea Water Cooling Pipes



-  sea water discharge pipe
-  sea water supply pipe

## Enclosure 2 to FCR(2010-11)36

### Options considered for solving the pipe burst problem

To solve the pipe burst problem, the Electrical and Mechanical Services Department put forward the following five options for consideration –

<b>Option</b>	<b>Estimated capital cost \$ million</b>	<b>Estimated annual utility cost \$ million</b>	<b>Energy efficiency*</b>
(1) Replacement of underground sea water cooling pipes	50	2.6	1
(2) Supply and installation of cooling towers and fresh water cooled chillers	26.1	3	2
(3) Supply and installation of air cooled chillers	36.6	3.7	3
(4) Supply and installation of standalone air-conditioning units and fresh water cooled chillers	22.5	4.26	4
(5) Supply and installation of standalone air-conditioning units and air cooled chillers	27.8	4.85	5

\*1 – the most energy efficient

5 – the least energy efficient

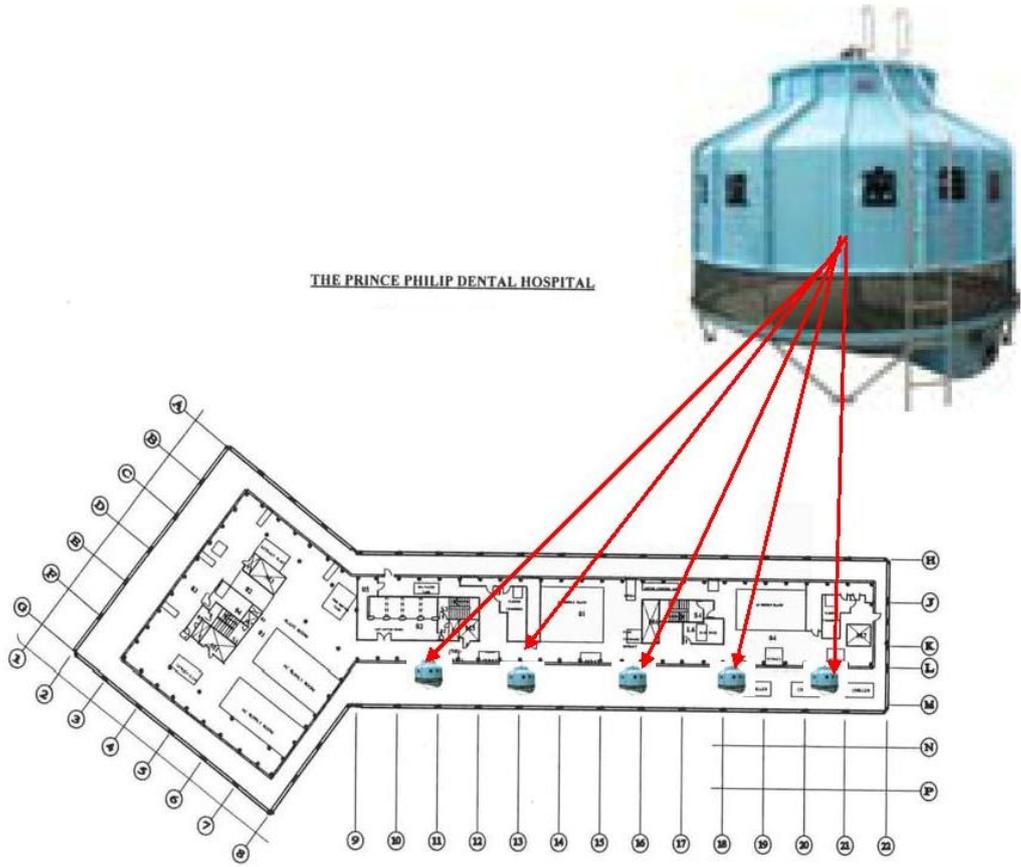
2. Among the five options, option (1), i.e. replacement of underground sea water cooling pipes, is the most energy efficient. However, in view of the high capital cost, long completion time and possible nuisances caused to the nearby shops and residents when the replacement works are carried out, we consider the option infeasible. In gist, option (1) has the following shortcomings –

- (a) It is estimated that the works will take at least five years to complete, and the risk of sudden bursting of the existing cooling pipes still exists.
- (b) The pipe replacement works have to be carried out by phases and traffic diversion will be involved. The existing pipes are laid along Connaught Road West, Eastern Street, Queen's Road West, Des Voeux Road West and near the portal of the Western Harbour Tunnel. As the traffic in these areas is heavy, traffic diversion will obviously further affect the traffic condition in the vicinity.
- (c) Much coordination will be involved when the replacement works are carried out and consultation with various government departments and utility companies will be required. Besides, the works schedule will be subject to various unknown factors and difficult to control.
- (d) Suspension of the whole central air-conditioning system of the Dental Hospital is necessary when the works are carried out. The normal operation of the Dental Hospital will inevitably be affected.

3. According to estimation by the Director of Electrical and Mechanical Services, while the expenses on water and electricity will increase by about \$400,000 under option (2) as compared with option (1), they are still lower than the existing annual repair costs of the pipes. As for options (3) and (5), both the estimated project cost and expenses on water and electricity are higher than those under option (2). Although the estimated project cost under option (4) is the lowest, the expenses on water and electricity of this option are higher than those under option (2), and hence option (4) is not economical for long-term operation. Overall, we consider option (2) the most desirable.

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**Proposed Locations for Installation of Cooling Towers on Top Floor**



**Implementation Plan for  
Replacement of Central Air-conditioning System**

<b>Work item</b>	<b>Duration</b>
(a) Tender invitation	Mid July to mid August 2010 (1 month)
(b) Evaluation and approval of tender	Mid August to end September 2010 (1.5 months)
(c) Submission of equipment/ installation methodology, authority approval and subsequent equipment/material delivery	October 2010 to end January 2011 (4 months)
(d) Installation, testing and commissioning of the chillers (Phase I)*	February to end May 2011 (4 months)
(e) Installation, testing and commissioning of the chillers (Phase II)*	November to end December 2011 (2 months)

\* There are three chillers in the Dental Hospital. During spring and summer time, all chillers must be in operation to provide the required cooling load of the Dental Hospital but in winter time, only one chiller will suffice. As some of the chillers have to be turned off when the replacement works are carried out, the works will only be undertaken in winter so as to minimise the impact on the daily operation of the Dental Hospital.

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