

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 706 – HIGHWAYS

Transport - Traffic Control

25TC - Replacement of Conventional Traffic Signals with Light Emitting Diode (LED) Traffic Signals in Hong Kong

Members are invited to recommend to Finance Committee the upgrading of **25TC** to Category A at an estimated cost of \$140.3 million in money-of-the-day prices for the replacement of conventional traffic signals with LED traffic signals in Hong Kong.

PROBLEM

We need to replace incandescent lamp traffic signals by light emitting diode (LED) traffic signals for cost saving and environmental reasons.

PROPOSAL

2. The Commissioner for Transport, with the support of the Secretary for Transport and Housing, proposes to upgrade **25TC** to Category A at an estimated cost of \$140.3 million in money-of-the-day (MOD) prices for the replacement of conventional traffic signals with LED traffic signals in Hong Kong.

/PROJECT

PROJECT SCOPE AND NATURE

3. There are currently about 1 750 signalised road junctions in the territory of Hong Kong. Taking account of the anticipated growth and nominal wastage (e.g. due to traffic accidents), we propose to procure and install about 80 000 LED modules¹ at about 1 900² junctions.

4. The scope of the project comprises –

(a) replacement of incandescent lamps of the traffic signals at –

(i) Phase 1 – about 400 junctions on Hong Kong Island;

(ii) Phase 2 – about 670 junctions in Kowloon;

(iii) Phase 3 – about 830 junctions in the New Territories; and

(b) associated circuit board modification works required at existing traffic signal controllers which are originally designed to operate with the conventional signal lamps at each phase.

5. We plan to commence the three phases of replacement works in September 2008, August 2009 and August 2010 for completion by October 2009, January 2011 and July 2012 respectively.

6. The replacement works will cover the supply, installation, commissioning and a mandatory five-year defects liability period (DLP) for the LED signals. The mandatory five-year DLP is required to safeguard government interest in respect of the high capital investment. The practice of imposing a long DLP for similar LED projects is not uncommon overseas.

/JUSTIFICATION.....

¹ Three LED modules are needed for one set of traffic signals and two LED modules for one set of traffic signals for pedestrians.

² This number has taken account of the anticipated growth of signalised junctions in Hong Kong.

JUSTIFICATION

7. Conventional traffic signals employ incandescent lamps. They are not energy-efficient, and the on-going energy charge contributes a high proportion of the operation cost. Comparing with the conventional traffic signals employing incandescent lamps, LED traffic signals consume less electrical energy³ and have longer design life⁴. LED signals will generate savings of their recurrent operational and maintenance costs within their design life, offsetting their higher capital costs⁵ as compared with the conventional traffic signals. These savings are expected to increase with the decreasing trend of their capital cost resulting from the advancing LED technology. The adoption of LED traffic signals is also beneficial from an environmental point of view since it obviates the need for frequent disposal of incandescent lamp bulbs during preventive and corrective maintenance activities. The replacement project is scheduled to be undertaken in three phases for the following reasons –

- (a) LED technology and reliability are improving gradually;
- (b) prices of electronics products including LED are on a downward trend; and
- (c) more LED signal products are expected to be developed/improved to meet the Transport Department's requirements in the next few years rendering the phase two and three tender prices more competitive.

The above implementation plan seeks to strike a balance between achieving recurrent cost savings and environmental benefits at an early stage, and avoiding a higher capital cost for the initial phase.

FINANCIAL IMPLICATIONS

8. We estimate the capital cost of the project to be \$140.3 million in MOD prices (see paragraph 9 below), made up as follows –

	\$ million
(a) Supply and Installation Services	100.8
(i) LED traffic signals for Hong Kong Island (Phase 1)	22.5
	/\$ million.....

³ LED traffic signals generally consume only about 1/3 or less electrical energy compared with conventional traffic signals.

⁴ LED traffic signals generally have lifetime over ten years compared with one year lifetime for conventional traffic signal lamp bulbs.

⁵ On average, LED traffic signals cost about 2 to 3 times of that of conventional traffic signals. However, recurrent savings in electricity and maintenance costs can offset their capital cost within their design life.

		\$ million	
(ii)	LED traffic signals for Kowloon (Phase 2)	36.0	
(iii)	LED traffic signals for New Territories (Phase 3)	42.3	
(b)	Associated electrical modification works for existing traffic signal controllers	19.2	
(c)	Contingencies	15.6	
	Sub-total	135.6	(in September 2007 prices)
(d)	Provision for Price Adjustment	4.7	
	Total	140.3	(in MOD prices)

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

Year⁶	\$ million (Sept 2007)	Price Adjustment Factor	\$ million (MOD)
2008-09	14.2	1.00750	14.3
2009-10	28.2	1.01758	28.7
2010-11	43.0	1.02775	44.2
2011-12	29.7	1.03803	30.8
2012-13	14.6	1.05619	15.4
			/Year.....

⁶ No expenditure is expected in the financial year 2013-14 and 2015-16. Expenditures during 2014-15 to 2017-18 are mainly for release of retention monies upon completion of the five-year defects liability period.

Year⁶	\$ million (Sept 2007)	Price Adjustment Factor	\$ million (MOD)
2013-14	0.0	1.07732	0.0
2014-15	0.9	1.09886	1.0
2015-16	0.0	1.12084	0.0
2016-17	2.5	1.14326	2.9
2017-18	<u>2.5</u>	1.18327	<u>3.0</u>
Total	<u>135.6</u>		<u>140.3</u>

10. 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 2008 to 2018. We intend to award the contract on a fixed-price lump-sum basis because we can clearly define the scope of the works in advance. There is no additional annual recurrent expenditure arising from the project. We anticipate the savings of energy charge per annum is about \$7.6 million.

PUBLIC CONSULTATION

11. We consulted the Legislative Council Panel on Transport on 18 December 2007. Members supported the project.

12. LED signals, under a pilot scheme, have been gradually introduced to 150 road junctions since 2004. They are well received by the public and we have not received any negative comment. In view of the positive feedback on the pilot scheme, we have no plan to carry out any further public consultation for this replacement project.

ENVIRONMENTAL IMPLICATIONS

13. The project is not a designated project under the Environmental Impact Assessment Ordinance (Cap. 499). The project will not cause long-term environmental impact. During the replacement period, we will control noise, dust and other nuisances to ensure compliance with the established guidelines and standards as recommended by the Director of Environmental Protection.

/14.

14. We have considered in the planning and design stages to reduce the generation of construction waste where possible. In particular, we have proposed to keep and reuse the existing traffic signal housings. The main construction waste generated from the project will be the displaced optical components of the conventional traffic signals, namely the plastic lenses, metallic optical reflectors and halogen light bulbs. Apart from the faulty halogen light bulbs, which have to be disposed, the displaced plastic lenses, metallic optical reflectors and workable light bulbs are with re-sale value, and hence we shall auction them for re-use and/or recycling. As such, the project will generate very small amount of non-inert construction waste.

15. We will require the contractor to submit for approval a plan setting out the waste management measures. We will ensure that the day-to-day operations on site comply with the approved plan. We will also control the disposal of non-inert construction waste to landfills through a trip-ticket system.

HERITAGE IMPLICATIONS

16. This project will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interests and Government historic sites identified by the Antiquities and Monuments Office.

LAND ACQUISITION

17. The project does not require any land acquisition.

BACKGROUND INFORMATION

18. We upgraded the project to Category B in September 2007. Transport Department (TD) has been monitoring the technological development of LED traffic signals since 2000. The quality of early LED products was unsatisfactory. Nevertheless, with gradual advancement in LED technology and intensive product development, there has been significant improvement in the quality of LED signals in recent years. Some LED products in the market have proven to be compatible with our existing traffic signal equipment. Since 2004, TD has installed LED signals at about 150 junctions on a trial basis. All installed LED signals are operating satisfactorily.

19. TD has now identified a few types of LED signal products suitable for use in Hong Kong. With the continued development in LED technology and increasing interest of suppliers, TD anticipates that more LED products may be identified suitable for use in Hong Kong in the next few years, resulting in an even more competitive market and lower prices.

20. The proposed project will not involve any tree removal or planting proposals.

21. We estimate that the project will create about 58 jobs (8 for professional/technical staff and 50 for labourers) providing a total employment of 950 man-months.

Transport and Housing Bureau
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