

**For Discussion  
on 15 April 2016**

**Legislative Council on Transport**

**Replacement of Fire Alarm System and Manual Toll Collection  
System in the Aberdeen Tunnel,  
and Traffic and Control Surveillance Systems in the Eastern  
Harbour Crossing and the Kai Tak Tunnel**

**PURPOSE**

This paper seeks Members' support for seeking funding from the Finance Committee ("FC") of the Legislative Council on the proposals to replace the fire alarm system ("FAS") and the manual toll collection system ("TCS") in the Aberdeen Tunnel (ABT), and the traffic and control surveillance systems ("TCSSs") in the Eastern Harbour Crossing ("EHC") and the Kai Tak Tunnel ("KTT").

**BACKGROUND**

2. The FAS in ABT gives fire alerts and warning of fire incidents happened inside the tunnel tubes. When the fire alarm is triggered, the alarm signal will be automatically sent to the tunnel control room and Fire Services Department ("FSD"). The TCS in ABT serves the function of toll collecting. The system consists of a Central Data Processor System and its peripheral equipment such as those for traffic management, vehicle detection and vehicle classification, as well as equipment inside toll booths.

3. The TCSSs in EHC and KTT ensure the safe and effective tunnel operations. The systems are mainly used for the monitoring and management of traffic. They consist of lane control signals, variable message signs, closed circuit television ("CCTV") system and environmental monitoring system, etc.

4. All the above systems have been in use for a long time and shown signs of ageing. In addition, the components of the above systems have become obsolete, making the maintenance of the systems difficult and not economical. Replacement is thus considered necessary.

## **PROPOSAL**

5. We propose to create a commitment of \$292,718,000 to replace the FAS and TCS in ABT and the TCSSs in the EHC and KTT.

## **JUSTIFICATION**

6. The existing FAS in ABT have been operating for 34 years since the commissioning of the tunnel in 1982. The Electrical and Mechanical Services Trading Fund (“EMSTF”) advised that the system was ageing and it has become increasingly difficult to procure the required spare parts in the market for maintaining the system. In case of any system malfunction and that the fire alerts and warnings could not be sent to the tunnel control room and FSD, firefighting and rescue operations would be delayed. Besides, in case the ageing of the system causes a false alarm, the operation of ABT will be affected, which may lead to traffic congestion on the roads linking Aberdeen and other areas of Hong Kong Island. Therefore, we consider the replacement of the FAS in ABT necessary to ensure safe and effective tunnel operations.

7. The existing TCS in ABT and TCSS in KTT were replaced in 2001 and 2000 respectively. Both systems have been in use for more than 15 years. EMSTF advised that the two systems had shown signs of ageing. Since the equipment and components of the systems have become obsolete, it is increasingly difficult to procure the required spare parts in the market to maintain the systems. As a result, we consider the replacement of the TCS in ABT and TCSS in KTT necessary to ensure their effective operations.

8. EHC commissioned in 1989. The Government will take over and appoint a contractor to manage EHC on 7 August 2016. EMSTF advised that the existing TCSS in EHC is ageing and the risk of system malfunction has increased, leading to the possibility of causing traffic congestion on Hong Kong Island and in East Kowloon. Therefore, we consider it necessary to replace these systems so as to ensure their effective operations.

9. The replacement of the aforementioned systems not only ensures the smooth operations of the concerned tunnels, but also brings in additional benefits. For example, in replacing the TCS in ABT, apart from upgrading the system computer hardware, software and its associated toll collection facilities, the new system will also be improved by strengthening vehicle classification and counting capability so that the effectiveness of toll collection and verification will be improved. Regarding the TCSSs to be replaced in KTT and EHC, the new TCSSs are fully computerised systems under which various tunnel traffic control and monitoring functions are integrated under a single platform. They are also capable of implementing pre-programmed traffic management schemes for improving operation efficiency. The systems' capability of controlling remote traffic message signs, signals and other field equipment will be enhanced to cope with different traffic situations. In addition, the system will be installed with high definition cameras and monitors for providing clearer images for more effective traffic monitoring. Furthermore, more cameras will be erected on the approach roads to enhance traffic monitoring and management capacities.

## **FINANCIAL IMPLICATIONS**

### ***Non-recurrent Expenditure***

10. We estimate the capital cost of the four projects to be \$292,718,000 with relevant breakdowns in the following paragraphs.

11. The estimated cost breakdown for the replacement of the FAS in ABT is as follows –

	<b>\$ million</b>
(a) Replacement of fire alarm system in ABT	12.0
(i) break glass fire alarm and fire extinguishers	2.4
(ii) movement activation system and fire alarm control panel	4.2
(iii) cabling and wiring works	3.4
(iv) removal and reinstatement of tunnel wall panels	2.0
(d) EMSTF project management charges	1.92
(e) Contingency (10% of item (a) above)	<u>1.2</u>
<b>Total</b>	<b><u>15.12</u></b>

12. Regarding item (a) of paragraph 11 above, the estimated cost of \$12.0 million will cover the supply, installation, testing and commissioning of all fire alarm equipment, fire extinguishers and the associated movement activation system, and fire alarm control panel; associated electrical and signaling works such as cabling and wiring; dismantling and removal of existing equipment; and the removal and reinstatement of tunnel wall panels.

13. Regarding item (b) of paragraph 11 above, the estimated cost of \$1.92 million is for meeting the charges of EMSTF for management of the project which include the feasibility study; preparing the specifications, design and project programme; overseeing the tendering process; supervising site inspection, installation, testing and commissioning of the system; and monitoring the operation of the system and rectification work within the defects liability period.

14. The estimated cash flow is as follows –

<b>Year</b>	<b>\$ million</b>
2016-17	0.2
2017-18	1.0
2018-19	5.0
2019-20	5.0
2020-21	3.92
<b>Total</b>	<b>15.12</b>

15. The estimated cost breakdown for the replacement of the TCS in ABT is as follows-

	<b>\$ million</b>
(a) Replacement of the TCS in ABT	15.8
(i) toll booth equipment and toll lane equipment	7.5
(ii) Central Data Processor System and toll accounting system	3.75
(iii) associated cables and accessories	4.55
(b) EMSTF project management charges	2.528
(c) Contingency (10% of item (a) above)	1.58
<b>Total</b>	<b>19.908</b>

16. Regarding item (a) of paragraph 15 above, the total estimated cost of \$15.8 million will cover the new TCS and toll booth equipment, including the costs for toll lane processors for the control and monitoring of all field equipment, the toll collector terminal, card readers for access control and intercoms, etc.

17. Regarding item (b) of paragraph 15 above, the estimated cost of \$2.528 million is for meeting the charges of EMSTF for managing the project, which includes preparing the system specifications, designing and overseeing the tendering process of the TCS, electrical and mechanical facilities; supervising site inspection, installation, testing and commissioning of the system; and monitoring the operation of the system and rectification work within the defects liability period.

18. The estimated cash flow is as follows –

<b>Year</b>	<b>\$ million</b>
2016-17	1.0
2017-18	4.0
2018-19	6.0
2019-20	8.908
<b>Total</b>	<b>19.908</b>

19. The estimated cost breakdown for the replacement of the TCSS in KTT is as follows –

	<b>\$ million</b>
(a) Replacement of the TCSS in KTT	90.4
(i) traffic control system (e.g. traffic management computers, lane control signals, etc.)	22.4
(ii) traffic surveillance system (e.g. CCTV system, automatic incident detection system, etc.)	20.0
(iii) data communication network	13.0
(iv) associated civil engineering and building service work, cables and accessories	35.0
(b) EMSTF project management charges	12.6
(c) Contingency (10% of item (a) above)	9.04
<b>Total</b>	<b>112.04</b>

20. Regarding item (a) of paragraph 19 above, the estimated cost of \$90.4 million is for the supply and installation of new TCSS, including the costs of CCTV system, automatic incident detection system, lane control signals and remote control traffic signs, variable message signs, traffic lights, various field equipment (e.g. over-height vehicle detectors), computer hardware and software, data communication network as well as the associated cables and accessories; and building services work for traffic control room and replacement works for associated control facilities, together with the dismantling and removal of old equipment; and the removal and reinstatement of tunnel wall panels.

21. Regarding item (b) of paragraph 19 above, the estimated cost of 12.6 million is for meeting the charges of EMSTF for managing the project, which includes preparing the system specifications, designing and overseeing the tendering process of the TCSS and engaging civil and traffic engineering consultants; supervising site inspection, installation, testing and commissioning of the system; monitoring the operation of TCSS facilities and defect rectification work during defects liability period.

22. The estimated cash flow is as follows –

<b>Year</b>	<b>\$ million</b>
2016-17	2.0
2017-18	5.0
2018-19	24.0
2019-20	34.0
2020-21	47.04
<b>Total</b>	<b>112.04</b>

23. The estimated cost breakdown for the replacement of the TCSS in EHC is as follows –

	<b>\$ million</b>
(a) Replacement of the TCSS in EHC	111.75
(i) central control system	19.5
(ii) traffic control system (e.g. traffic management computer, lane control signals, etc.)	26.0
(iii) traffic surveillance system (e.g. CCTV system, automatic incident detection system, etc.)	24.0
(iv) data communication network	13.0
(v) associated civil engineering and building service work, cables and accessories	35.0
(b) EMSTF project management charges	16.4
(c) Contingency (10% of item (a) above)	<u>11.75</u>
<b>Total</b>	<b><u>145.65</u></b>

24. Regarding item (a) of paragraph 23 above, the estimated cost of \$117.5 million is for the supply and installation of the new TCSS, including the costs of central control system, CCTV system, automatic incident detection system, lane control signals and remote control traffic signs, variable message signs, traffic lights, various field equipment (e.g. over-height vehicle detectors), computer hardware and software, data communication network as well as the associated cables and accessories; and building services work for traffic control room and replacement works for associated control facilities, together with the dismantling and removal of old equipment; and the removal and reinstatement of tunnel wall panels.

25. Regarding item (b) of paragraph 23 above, the estimated cost of \$16.4 million is for meeting the charges of EMSTF for managing the project, which includes preparing the system specifications, designing and overseeing the tendering process of the TCSS and engaging civil and



traffic engineering consultants; supervising site inspection, installation, testing and commissioning of the system; and monitoring the operation of the TCSS facilities and rectification work within the defects liability period.

26. The estimated cash flow is as follows –

<b>Year</b>	<b>\$ million</b>
2016-17	4.3
2017-18	11.0
2018-19	22.0
2019-20	58.07
2020-21	50.28
<b>Total</b>	<b>145.65</b>

***Recurrent Expenditure***

27. The annual recurrent expenditure of the above systems (except the TCSS in EHC) takes up around \$5.7 million of the overall management fee payable to the operator of the two tunnels. The relevant breakdown is as follows –

<b>Item</b>	<b>\$ million</b>
(a) FAS in ABT	0.6
(b) TCS in ABT	0.8
(c) TCSS in KTT	4.3
<b>Total</b>	<b>5.7</b>

28. The relevant recurrent expenditure is similar to those for existing systems. No additional recurrent expenditure will be incurred by the replacement of the systems.

29. EHC will be taken over by the Government and become a Government tunnel on 7 August 2016. In accordance with the established practice of other government tunnels, EHC will be managed by a contractor appointed by the Government. The recurrent expenditure of the proposed replacement of TCSS will be included in the management fee payable to the contractor for the management, operation and maintenance of EHC. The relevant annual recurrent expenditure is around \$5.5 million<sup>1</sup>.

30. According to existing policy, the operating cost of Government tolled tunnels should be recovered through toll charges. Since the depreciation costs of the proposals are part of the operating costs of the tunnels, it will be taken into account when setting the toll charges in future.

## **IMPLEMENTATION PLAN**

31. If funding is approved by FC in the second quarter of 2016, we plan to proceed with the four replacement projects in June to September 2016 for completion by July 2019 to February 2021 respectively. The proposed programmes of the four projects are as follows –

### *FAS in ABT*

	<b>Work</b>	<b>Target Completion Date</b>
(a)	Site investigation and tender preparation	September 2017
(b)	Tendering and selection of contractor	March 2018
(c)	System design by contractor	June 2018
(d)	Procurement and installation of associated equipment	September 2020
(e)	Testing, commissioning and changeover of system	December 2020

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<sup>1</sup> We do not have the relevant information on the recurrent expenditure as the system is currently managed by the franchisee of EHC.

TCS in ABT

	<b>Work</b>	<b>Target Completion Date</b>
(a)	Site investigation and tender preparation	February 2017
(b)	Tendering and selection of contractor	October 2017
(c)	System design by contractor	March 2018
(d)	Procurement and installation of associated equipment	March 2019
(e)	Testing, commissioning and changeover of system	July 2019

TCSS in KTT

	<b>Work</b>	<b>Target Completion Date</b>
(a)	Site investigation and tender preparation	January 2018
(b)	Tendering exercise and selection of contractor	September 2018
(c)	System design by contractor	March 2019
(d)	Procurement and installation of associated equipment	July 2020
(e)	Testing, commissioning and changeover of system	November 2020

TCSS in EHC

	<b>Work</b>	<b>Target Completion Date</b>
(a)	Site investigation and tender preparation	April 2018
(b)	Tendering exercise and selection of contractor	December 2018

- |     |  |               |
|-----|--|---------------|
| (c) | System design by contractor                          | June 2019     |
| (d) | Procurement and installation of associated equipment | October 2020  |
| (e) | Testing, commissioning and changeover of system      | February 2021 |

32. During the implementation of the projects, we will minimise the impact on traffic as much as possible. All the installation work will be arranged to be carried out during non-peak hours such that the normal tunnel operations will not be affected.

### **WAY FORWARD**

33. Subject to Members' support, we plan to seek FC's funding approval as early as practicable with a view to commencing the relevant works as soon as possible.

### **ADVICE SOUGHT**

34. Members are invited to provide comments and support the proposals.

**Transport and Hosing Bureau**  
**April 2016**