

**For discussion
on 19 March 2021**

Legislative Council Panel on Transport

**Replacement of Traffic Control and Surveillance Systems
in the Lion Rock Tunnel**

PURPOSE

This paper seeks Members' views on the proposed replacement of the traffic control and surveillance systems ("TCSS") in the Lion Rock Tunnel ("LRT"), with a view to making a funding application to the Legislative Council Finance Committee.

BACKGROUND

2. TCSS in LRT serves to ensure the safe and effective operation of the tunnel. TCSS consists of a number of sub-systems and is mainly used for traffic management and monitoring. We propose replacing certain sub-systems of TCSS in LRT, including the central control system, lane control signals and variable message signs under the traffic control system, as well as the closed circuit television ("CCTV") system and automatic incident detection system under the traffic surveillance system.

PROPOSAL

3. We propose the creation of a new commitment \$139,000,000 for replacement of the above three sub-systems in LRT.

JUSTIFICATIONS

4. Of a total length of 1.4 km, LRT connects Sha Tin and

Kowloon Tong and is one of the major traffic links between the New Territories and Kowloon. The daily management, operation as well as repair and maintenance of LRT is undertaken by an operator engaged by the Government through open tender. The Electrical and Mechanical Services Trading Fund (“EMSTF”) is responsible for supervising the repair and maintenance of the tunnel systems. The Transport Department, in consultation with EMSTF, is responsible for the timely replacement of tunnel systems to ensure the safe, reliable and effective operation of the tunnel.

5. The existing TCSS in LRT commenced operation in 2008 and has been operating round-the-clock for over 12 years. According to EMSTF’s assessment, the central control system and some other sub-systems of TCSS are ageing, increasing the risk of system malfunction. In case TCSS fails to monitor and co-ordinate traffic within the tunnel area effectively, it may lead to unnecessary traffic congestion on the trunk roads in Sha Tin and Kowloon. In addition, since the equipment and critical components of the systems have become obsolete, it is increasingly difficult to procure the required spare parts in the market for maintaining and repairing the ageing system. As such, we consider it necessary to replace the relevant sub-systems of TCSS in LRT to ensure the continued operation of the tunnel in a safe and effective manner.

6. We propose replacing the three sub-systems of TCSS in LRT, namely the central control system, traffic control system and traffic surveillance system. Key features of the new systems are as follows –

- (a) While the new central control system will continue to be a fully computerised system which integrates functions of other sub-systems of TCSS into a single platform, it will be equipped with the capability to implement more programmed traffic management schemes more effectively with due regard to the tunnel operation or the prevailing traffic conditions on the roads in the vicinity of the tunnel, thereby enhancing operational efficiency;

- (b) the new traffic control system will provide enhanced capability in controlling remote traffic message signs, traffic signs and other field equipment to cope with the prevailing traffic conditions. For example, the performance of the new variable message signs and lane control signals will be enhanced by adopting Light Emitting Diode technology with higher light intensity and smaller pixel pitch, which enables the display of more traffic information with greater clarity for motorists. In addition, the new over-height vehicle detection system will adopt the dual infra-red beams technology to detect over-height vehicles more accurately and alert the operator for intercepting the vehicles concerned from entering the tunnel tubes; and

- (c) the new CCTV and automatic incident detection systems under the traffic surveillance system will adopt digital cameras and monitors to provide clearer images for more effective traffic monitoring. In addition, with more cameras to be installed on the approach roads within the tunnel area, the new traffic surveillance system will provide full coverage of the tunnel area, including both open road sections and tunnel tubes, with a view to enhancing traffic monitoring and management efficiency in the tunnel area. The new system will use image-processing technology to detect vehicles which have stopped inside the tunnel tube due to traffic incidents and alert the control room correspondingly. It will also enhance capability in identifying prevailing traffic situations (e.g. detection of trespassers).

FINANCIAL IMPLICATIONS

Capital Expenditure

7. We estimate that the replacement of TCSS in LRT will incur a total capital expenditure of \$139,000,000, with breakdown as

follows -

	\$'000
(a) Replacement of TCSS in LRT	110,320
(i) central control system	14,000
(ii) traffic control system	16,000
(iii) traffic surveillance system	12,000
(iv) data communication network	8,000
(v) associated civil engineering and building services works, engaging relevant engineering consultants, cables and accessories	60,320
(b) EMSTF project management charges	17,650
(c) Contingency (about 10% of item (a) above)	11,030
Total	<u><u>139,000</u></u>

8. On paragraph 7(a) above, the estimated expenditure of \$110,320,000 is for the supply and installation of the new TCSS, including -

- (a) traffic management computers under the central control system;
- (b) traffic control system (covering replacement of lane control signals and remote-controlled traffic signs, variable message signs, traffic lights, various field equipment such as over-height vehicle detectors);
- (c) traffic surveillance system (covering upgrading of CCTV system and automatic incident detection system);
- (d) installation and procurement of data communication network, and the associated cables and accessories;
- (e) undertaking the building services works for traffic control room and replacement works for associated control facilities, together with the dismantling and removal of old equipment; and
- (f) removal and reinstatement of tunnel wall panels.

9. On paragraph 7(b) above, the estimated expenditure of \$17,650,000 is for meeting the charges of EMSTF’s management of the project, which includes carrying out feasibility study on different proposals; preparing system specifications, system design and project programme; engaging relevant engineering consultants; preparing tender documents; tendering and selecting a contractor; 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.

10. On paragraph 7(c) above, the estimated expenditure of \$11,030,000 represents about 10% of the expenditure under paragraph 7(a) above.

11. The estimated cash flow is as follows -

Financial Year	\$’000
2021-22	1,070
2022-23	2,570
2023-24	6,360
2024-25	64,000
2025-26	65,000
Total	139,000

Recurrent Expenditure

12. The annual recurrent expenditure of the proposed system replacement will constitute about \$5,000,000 of the overall management fee payable annually to the operator for the management, operation and maintenance of LRT. The said amount of the recurrent expenditure is broadly the same as that for the existing system. No additional recurrent expenditure will be incurred by the replacement of the system.

IMPLEMENTATION PLAN

13. Subject to the Finance Committee's funding approval in the second quarter of 2021, we plan to implement the proposal according to the following timetable -

	Task	Target Completion Date
(a)	Tendering and selection of consultants	November 2021
(b)	Site investigation (such as conducting cable duct survey and underground utilities investigation; studying and modifying the number and location of field equipment)	September 2022
(c)	Preparation of tender documents	March 2023
(d)	Tendering and selection of contractor	October 2023
(e)	System design by contractor	April 2024
(f)	Procurement and installation of associated equipment	July 2025
(g)	Testing, commissioning and changeover of system	November 2025

14. To minimise the impact on traffic as far as possible, all the installation work will be carried out during non-peak hours such that the tunnel operation will not be affected.

ADVICE SOUGHT

15. Members are invited to advise on the proposal.

Transport and Housing Bureau
Transport Department
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