

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND

HEAD 708 – CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT

Transport Department

New Subhead “Replacement of Traffic Control and Surveillance System of the Lion Rock Tunnel”

Members are invited to approve a new commitment of \$139 million for the replacement of traffic control and surveillance system of the Lion Rock Tunnel.

PROBLEM

To ensure safe and effective operation of the Lion Rock Tunnel (LRT), the Transport Department needs to replace its traffic control and surveillance system (TCSS).

PROPOSAL

2. The Commissioner for Transport, on the advice of the Director of Electrical and Mechanical Services, proposes to replace the TCSS of LRT at an estimated total cost of \$139,000,000. The Secretary for Transport and Housing supports the proposal.

JUSTIFICATIONS

3. Of a total length of 1.4 kilometres, LRT connects Sha Tin and Kowloon Tong and is one of the major traffic links between the New Territories and Kowloon. The TCSS of LRT, consisting of three sub-systems and used mainly for traffic management and monitoring, serves to ensure the safe and effective operation of the tunnel.

4. The existing TCSS of LRT came into use in 2008 and has been operating round-the-clock for over 12 years. According to the assessment of the Electrical and Mechanical Services Trading Fund (EMSTF), the serviceable life of a TCSS is generally 12 to 15 years. The central control system and the other two sub-systems of this TCSS are approaching the end of their economical serviceable life, thus increasing the risk of system malfunction. In fact, over the past four years, this TCSS had 77 faults due to defective components, and another 64 faults mainly owing to minor breakdown in the communication between the central control system and other sub-systems on average in a year. In case the TCSS fails to effectively monitor and co-ordinate traffic within the tunnel area of LRT, it may lead to unnecessary traffic congestion at LRT as well as on the trunk roads between Kowloon and Sha Tin. 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 systems. As such, we consider it necessary to replace the aforesaid sub-systems to ensure the continued operation of the tunnel in a safe and effective manner.

5. We propose to replace three sub-systems of the TCSS of LRT, namely the central control system, the traffic control system and the traffic surveillance system. Key features of the replaced sub-systems are as follows –

- (a) the new central control system will continue to be a fully computerised system which integrates the functions of other sub-systems of the TCSS on a single platform. The new system will enhance the capability for implementing pre-programmed traffic management schemes in a more effective manner, having due regard to the prevailing tunnel operation or traffic conditions on the roads in the vicinity of the tunnel, thereby improving operational efficiency;
- (b) the new traffic control system will enhance the capability for controlling remote traffic message signs, traffic signs and other field equipment to better cope with the prevailing traffic conditions. For example, new variable message signs and lane control signals will have enhanced efficacy given the use of 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 over-height vehicle detection system of the new traffic control system will adopt the dual infra-red beams technology to detect over-height vehicles more accurately and alert the tunnel operator to intercept such vehicles before they enter the tunnel tubes; and
- (c) the closed-circuit television (CCTV) and automatic incident detection systems under the new traffic surveillance system will replace the existing ones which adopt the analog mode. Equipped with digital

/cameras

cameras and computer monitors, they will provide clearer images for more effective traffic monitoring. Currently, there are 44 CCTV cameras which cover the majority of the tunnel area (except for certain locations on the approach roads to the tunnel)¹. To enhance traffic monitoring and management efficiency, the new traffic surveillance system will have more digital cameras installed on the open sections of approach roads to the tunnel so as to provide full coverage. In addition, the new system will adopt image-processing technology to detect vehicles which have stopped inside the tunnel tube due to traffic incidents and alert the control room, thereby facilitating early detection and handling to prevent any possible serious congestion. The new system will enhance the capability for identifying prevailing traffic situations or incidents (including detection of trespassers, slow vehicle movement and fallen objects).

FINANCIAL IMPLICATIONS

Capital Expenditure

6. With reference to the actual expenditure incurred for replacement of the TCSS in other tunnels in recent years, and taking into account the conditions of the existing structural and building services facilities as well as the road design of LRT, we estimate that the capital cost of the project is \$139,000,000, with breakdown as follows –

		\$'000
(a)	Supply and installation of hardware and software of the TCSS of LRT and works-related expenditures	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 works (including ducting and structural installation)	20,000
(vi)	associated building services works	6,000
(vii)	procurement of cables and accessories	7,320
		/(viii)

¹ Although certain locations on the approach roads are not covered by the existing CCTV system, the tunnel operator is required to patrol the whole tunnel area (including the aforementioned locations) regularly for better traffic monitoring.

	\$'000
(viii) temporary traffic arrangements, tunnel wall panel removal and installation	4,000
(ix) system testing and commissioning	4,000
(x) engagement of engineering consultants	15,000
(xi) others (such as incentive schemes on provision of safety measures, third-party insurance, etc.)	4,000
(b) EMSTF project management charges	17,650
(c) Contingency (about 10% of item (a) above)	11,030
Total	<u>139,000</u>

7. On paragraph 6(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) building services works for the traffic control room and replacement works for associated control facilities, together with the dismantling and removal of old equipment;
- (f) removal and reinstatement of tunnel wall panels;
- (g) system testing and commissioning;
- (h) engagement of engineering consultants²; and

/(i)

² The engineering consultants are responsible for conducting a wide range of tasks pertaining to multi-disciplinary aspects of the TCSS, including traffic and transport, civil and structural engineering, etc. Such tasks include, but not limited to, site investigation, design of system functions and performance requirements, as well as review of site conditions and traffic plans. The work of the consultants will serve as essential inputs for EMSTF to take forward the replacement project, for instance the technical requirements to be specified in the tender documents. The consultants will also support EMSTF in supervising the installation as well as the testing and commissioning of the new TCSS.

- (i) other expenses, including incentive schemes on provision for safety measures such as “Pay for Safety Scheme”³ as well as third-party insurance.

8. On paragraph 6(b) above, the estimated expenditure of \$17,650,000 is for meeting the charges for EMSTF’s management of the project, which includes different tasks performed by EMSTF before, during and after the replacement works. EMSTF is responsible for carrying out feasibility study on different proposals; engaging and supervising the engineering consultants² who will assist EMSTF in taking forward the replacement project; preparing tender documents covering system specifications, system design and project programme; as well as tendering and selecting a contractor. Upon engagement of the contractor, EMSTF will, with the assistance of the engineering consultants, monitor the performance of the contractor and works progress, including supervising site inspection, installation, testing and commissioning of the system. After the replacement works are completed, EMSTF will be responsible for monitoring the operation of the system and the rectification work within the defects liability period (i.e. one year after the commissioning of the system).

9. On paragraph 6(c) above, the estimated contingency of \$11,030,000 represents about 10% of the expenditure under paragraph 6(a).

10. 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

11. Out of the overall management fee payable annually to the tunnel operator for the management, operation and maintenance of LRT, the annual recurrent expenditure for the maintenance and repairing of the new

/TCSS

³ “Pay for Safety Scheme” aims to offer financial incentives to contractors for providing different safety measures (such as formulation of safety plan, engagement of safety officers, provision of safety training and workshops to workers).

TCSS (including the procurement of equipment and spare parts, and costs of routine maintenance, etc.) is about \$5,000,000. Although the new TCSS will have an enhanced coverage, the recurrent expenditure for its maintenance and repair will be broadly at the same level as that for the existing system.

IMPLEMENTATION PLAN

12. Subject to Finance Committee's funding approval in the second quarter of 2021, we plan to implement the proposal according to the following schedule –

Activity	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 for engaging contractor	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

13. To minimise the impact on tunnel operation and traffic as far as possible, a majority of the system replacement works will have to be carried out during the few hours after midnight when one of the tunnel tubes is closed for maintenance and repair, meaning that only a limited amount of work can be completed every night. Relevant departments will continue to identify room to compact the programme schedule, for instance by extending the period where works can be carried out and compressing the time required for certain tasks. Parallel tendering and selection of consultants are being conducted to further expedite the programme.

/PUBLIC

PUBLIC CONSULTATION

14. We consulted the Legislative Council Panel on Transport on the proposal on 19 March 2021. Members in general had no objection to the Government's submission of this funding proposal to the Finance Committee for consideration. In response to the enquiries from some Panel Members, we have provided supplementary information to the Panel for Members' reference on 27 May 2021.

BACKGROUND

15. LRT is a government tolled tunnel. The daily management, operation as well as repair and maintenance of LRT is undertaken by an operator engaged by the Government through open tender. 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.

Transport and Housing Bureau
May 2021