For discussion
on 16 May 2025

Legislative Council Panel on Transport

Replacement and Renewal of
Traffic Control and Surveillance Systems at Strategic Roads

PURPOSE

This paper seeks Members' views on the replacement of traffic control and surveillance systems ("TCSS") of two tunnels and the renewal of TCSS of three major trunk roads, as well as their support for submitting five funding proposals for approval by the Finance Committee ("FC") of the Legislative Council.

BACKGROUND

2. To ensure the safe and effective operation of strategic roads in Hong Kong, all government tunnels and major trunk roads have been equipped with the TCSS which operate round-the-clock, including lane control signals, variable message signs, closed circuit televisions ("CCTVs") and automatic incident detection systems, etc., to facilitate traffic management and monitoring. Government departments rely on the effective operation of the TCSS for 24-hour monitoring of the road traffic at the government tunnels and major trunk roads, so that swift actions can be taken to notify tunnel staff and the police to attend the scene in case of traffic incidents. At the same time, the lane control signals and variable message signs are used to direct motorists to reduce speed and opt for other roads to safeguard the safety of road users and mitigate the impact of traffic incidents on the overall traffic situation.

3. The Transport Department ("TD") and the Electrical and Mechanical Services Department ("EMSD") are responsible for the day-to-day management, repair and maintenance of the TCSS. According to the professional assessments of the departments concerned, some of the systems have been in operation for many years and have exceeded their serviceable life with undesirable deterioration from wear and tear causing occasional breakdowns[1]. Among which, there is an

[1] According to the records of the TD and EMSD, over the past five years, there were on average 25 to 73 cases of TCSS-related breakdowns per year at the tunnel/strategic road systems. When a breakdown occurred, the central control system generally could still maintain its normal operation though some of its individual computer equipment was affected and suspended from operation for a short period of time. In some particular cases, road

increasing trend of breakdowns of the TCSS at the Western Harbour Crossing ("WHC") and Cross-Harbour Tunnel ("CHT"), while the TCSS of the Hong Kong-Shenzhen Western Corridor ("HK-SWC"), Hong Kong-Zhuhai-Macao Bridge (Hong Kong Link Road) ("HKZMB-HKLR") and Tolo Highway are also experiencing major/minor breakdowns, thereby undermining the effectiveness of the TCSS for safeguarding road safety. In addition, the ageing systems and the obsolete critical components have made it difficult for departments to procure spare parts for repair and maintenance. It is also difficult to update the systems to meet the latest information security requirements of the Government, thus further increasing the risk of system malfunction. Failure of the systems in maintaining normal monitoring and co-ordination of the traffic in tunnels/strategic roads may pose a safety hazard and make it difficult to send out appropriate signals for diverting the traffic in case of incidents, which may lead to traffic congestion affecting other road users. To reduce the frequencies and risk of malfunction, the Government considers it necessary to replace the TCSS of the above two tunnels and renew the TCSS of the above three major trunk roads in a timely manner, and to take the opportunity to promote smart tunnel management through the use of new technology.

4. In addition, critical infrastructures such as tunnels and strategic roads, which are the lifelines of the community and the economy and are crucial to the normal operation of the society, have to be safeguarded to ensure their computer systems can continue to operate in a safe and effective manner. The settings of all newly established TCSS are required to meet the latest information security requirements of the Government while the systems of the existing TCSS also need to be timely renewed to meet those requirements. The TD and EMSD will adopt the most cost-effective approach to renew the systems to meet the information security requirements of the Government and cope with security threats, in accordance with the policy and relevant guidelines formulated by the Digital Police Office.

5. Cost-effectiveness is also a very important consideration. As the systems and equipment of WHC and CHT have reached the end of their serviceable life and further patching would be uneconomical, thus resulting in increase in risk of system breakdowns, it is recommended that the TCSS be replaced; for HK-SWC, HKZMB-HKLR and Tolo Highway, it is recommended that only part of the systems and equipment be renewed according to the operational conditions and needs, having regard to their extendable serviceable life and cost-effectiveness[2].

users were affected as the lanes of the affected tunnels/strategic roads had to be temporarily closed for inspection and repair.

[2] The Government is also reviewing the need to renew/replace the TCSS in Tsing Sha Control Area and Tai Lam Tunnel, and will consult the Legislative Council Panel on Transport in due course.

PROPOSALS

6. Taking into account the importance of strategic roads to Hong Kong's development and the significance of their operational efficiency and safety, the Commissioner for Transport proposes to create:

(a) a new commitment of $277,240,000 for replacing the TCSS of the WHC, including the central control system, traffic control system and traffic surveillance system;
(b) a new commitment of $183,580,000 for replacing the TCSS of the CHT, including the central control system, traffic control system and traffic surveillance system;
(c) a new commitment of $45,675,000 for renewing the central system and part of the associated equipment under the TCSS of the HK-SWC;
(d) a new commitment of $34,791,000 for renewing the central system under the TCSS of the HKZMB-HKLR; and
(e) a new commitment of $27,176,000 for renewing the central system and part of the associated equipment under the TCSS of the Tolo Highway.

Details of the five proposals for replacement or renewal of the TCSS at strategic roads, including the justifications, the financial and traffic implications as well as the implementation plans, are at **Annexes 1 to 5** respectively.

ANTICIPATED BENEFITS

7. We will keep pace with the relevant new technology available on the market for use in the TCSS of major trunk roads with a view to strengthening and enhancing the overall effectiveness and efficiency of traffic monitoring and management through the use of safe, reliable, durable and the most suitable technology, as well as equipping the systems with better functions to prepare for the future compatibility with and enhancement of other road management facilities.

8. The initial recommendations of the Traffic and Transport Strategy Study published in December 2023 have recommended the further implementation of smart motorway management. We will take advantage of the replacement/renewal of the TCSS of tunnels and major trunk roads to promote smart motorway management by configuring the relevant equipment without involving new construction or major structural alterations (e.g. overhead gantry).

9. With the use of technology, the renewed and replaced TCSS will be equipped with new functions, including (a) active warning system ("AWS") (installed at the WHC and CHT); (b) CCTVs and automatic incident detection

systems with higher resolution digital cameras for early detection of irregularities inside tunnel tubes and handling of incidents; and (c) Building Information Modelling ("BIM") data repository. The above new functions are conducive to enhancing the overall efficiency of traffic monitoring and management, as well as pushing forward the innovative development of smart motorway management. The AWS will be equipped with devices such as sensors and data network to collect, transmit and process various data to monitor and analyse the traffic flow and identify the vehicle types in real time, and to proactively detect potential conditions (e.g. pedestrians intruding into the tunnel tubes and driving against the traffic lanes, etc.). Under normal circumstances, the AWS will be able to alert tunnel control room staff within 10 seconds when abnormal conditions occur inside the tunnel tubes, so as to assist them to deploy staff to handle the scene as soon as possible and carry out the traffic management solutions, thereby minimising the impact of the incidents on the traffic. At the same time, the new TCSS will automatically transmit information on the temporary traffic management solutions being executed to the Emergency Transport Co-ordination Centre of the TD, thus enhancing TD's efficiency in co-ordinating traffic incidents and disseminating real-time traffic information to the public. The BIM data repository allows the maintenance staff to grasp the configurations of various new equipment and systems in a faster and more comprehensive manner with the support of computer. By facilitating the tracing of the causes of damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened and the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions.

WAY FORWARD

10. Subject to Members' endorsement, we plan to seek funding approval from the FC as soon as practicable for early commencement of the relevant replacement and renewal works.

ADVICE SOUGHT

11. Members are invited to offer views on this paper.

Transport and Logistics Bureau
Transport Department
May 2025

Annex 1

Replacement of Traffic Control and Surveillance System of the Western Harbour Crossing

PROJECT SCOPE AND NATURE

We propose replacing the traffic control and surveillance systems ("TCSS") of the Western Harbour Crossing ("WHC")[1], including the central control system, traffic control system and traffic surveillance system.

JUSTIFICATIONS

2. The existing TCSS of the WHC commenced operation in 1997 and has since been operating round-the-clock for over 27 years[2]. According to the assessment by the Electrical and Mechanical Services Department, the TCSS of the WHC is ageing over time and the system breakdown is on the rise, thus undermining its ability to cope with traffic incidents. When the system breaks down and is unable to effectively monitor and co-ordinate the traffic within the tunnel area, any occurrence of traffic incidents will probably lead to traffic congestion along road sections such as Route 3 in West Kowloon and Connaught Road West in Sai Ying Pun, causing inconvenience to members of the public. In addition, since the equipment and spare parts of the system have become obsolete, it has become increasingly difficult for departments to procure the necessary spare parts from the market for maintaining and repairing the ageing system. Therefore, we consider it necessary to replace the TCSS of the WHC to ensure the continued operation of the tunnel in a safe and effective manner.

3. Key features of the new systems are as follows:

(a) The new central control system is a fully computerised system which integrates various functions of other sub-systems of the TCSS on the same platform. Its processing power will be enhanced to implement more pre-programmed traffic management solutions in response to the prevailing tunnel operation or traffic situations of nearby roads, thereby enhancing the efficiency of traffic management. In addition, we will set up a Building Information Modelling data repository, which enables the

---

1 The WHC is one of the major traffic links between Kowloon and Hong Kong Island, connecting Sai Ying Pun (Central and Western District) and West Kowloon (Yau Tsim Mong District) with a total length of 2 km.

2 We note that the former franchisee of the tunnel had carried out some repairs and upgrades to its TCSS to extend its serviceable life.

operation and maintenance staff to grasp the configurations of various new equipment and systems in a faster and more holistic manner with the automated computer support. By facilitating the tracing of the causes of damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened while the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions;

(b) The new system also lays an essential technical foundation for promoting smart tunnel management at the WHC. The new active warning system ("AWS") will be equipped with devices such as sensors and data network to collect, transmit and process various data to monitor and analyse the traffic flow and identify the vehicle types in real time, and to proactively detect potential conditions[3], as well as issue safety alerts accordingly. This will help controllers in implementing pre-programmed traffic management solutions and enhance the provision of real-time traffic information to drivers, further improving the operational efficiency and safety of the tunnel;

(c) The closed circuit televisions ("CCTVs") and automatic incident detection systems under the new traffic surveillance system are equipped with digital cameras that provide higher resolution images. Apart from improving the efficiency of traffic surveillance, the new system will make use of image-processing technology to enhance its effectiveness to differentiate different traffic situations/incidents at the scene by automatically detecting vehicles that have stopped inside the tunnel tubes due to traffic incidents, and alerting the control room accordingly for early detection and handling of incidents to avoid severe congestion. In addition, we will also increase the number of digital cameras at appropriate locations to cover the approach roads to the WHC and nearby road sections, so as to enhance the overall efficiency of traffic surveillance and management;

(d) The new traffic control system will provide enhanced effectiveness for controlling remote traffic message signs, variable traffic signs and other field equipment to cope with the prevailing situations. For example, the performance of the new variable message signs and lane control signals will be enhanced by adopting light emitting diode technology that provides higher illuminance to display more detailed and clearer traffic messages. In addition, the over-height vehicle detection system under the new traffic control system will adopt the dual infra-red beams technology to detect over-height vehicles more accurately and alert the

[3] For example, pedestrians intruding into the tunnel tubes and driving against the traffic lanes, etc.

tunnel operator for intercepting those vehicles before they enter the tunnel tubes; and

(e) All new TCSS are required to meet the latest information security requirements of the Government, such as the configuration of "endpoint detection and response" and "network detection and response" security measures to detect and respond to anomalies identified at device endpoints and networks respectively, to prevent cyberattacks. The existing TCSS also need to be timely renewed to meet those requirements.

FINANCIAL IMPLICATIONS

Capital Expenditure

4. We estimate that the capital expenditure for the proposed project is $277,240,000, with the breakdown as follows –

		$ million	
(a)	Replacement of the TCSS at the WHC		235.040
(i)	central control system	24.700	
(ii)	traffic control system	41.000	
(iii)	traffic surveillance system	30.600	
(iv)	data communication network	19.300	
(v)	associated civil engineering works (including ducting and structural installation)	30.300	
(vi)	associated building services works	11.000	
(vii)	procurement of cables and accessories	16.500	
(viii)	temporary traffic arrangements, tunnel wall panel removal and installation	16.100	
(ix)	system testing and commissioning	8.200	
(x)	engagement of engineering consultant team	18.700	
(xi)	contract administration and site supervision	11.690	
(xii)	others (e.g. measures related	6.950	

	$ million
to site safety, third-party insurance, etc.)	
(b) EMSTF project management charges	18.700
(c) Contingency (about 10% of item (a) above)	23.500
Total	**277.240**

5. On paragraph 4(a) above, the estimated expenditure is mainly for the works related to the project, including project design, equipment procurement, installation, testing, engineering consultant team fees, temporary traffic arrangements, etc. Site supervision and management of the project is for supervising the works and managing site matters at each stage of the construction, ranging from design, procurement, installation to site testing, so as to enhance the quality of site supervision, ensure temporary traffic arrangements are planned ahead for the installation works, and improve the efficiency of the acceptance test following completion of the works.

6. On paragraph 4(b) above, the estimated expenditure is mainly for meeting the management charges from the Electrical and Mechanical Services Trading Fund ("EMSTF"), which includes carrying out feasibility study on different proposals with regard to the project details; preparing project schedule; tendering and selecting engineering consultant team; preparing tender documents; tendering and selecting contractors; supervising the engineering consultant team; inspection, installation, testing and commissioning of the system, as well as monitoring the operation of the system's facilities and the rectification works within the defects liability period.

7. On paragraph 4(c) above, the estimated expenditure is mainly for contingency fee, which represents 10% of the expenditure under paragraph 4(a) above.

8. The estimated cash flow required for the proposed project from 2025-26 to 2030-31 is as follows -

Financial Year	$ million
2025-26	8.220
2026-27	29.020
2027-28	49.460
2028-29	108.870
2029-30	55.410
2030-31	26.260
Total	**277.240**

Recurrent Expenditure and Savings

9. Out of the overall management fee payable annually to the tunnel operator for the management, operation and maintenance of the WHC, the annual recurrent expenditure for the maintenance and repairing of the new system (including the procurement of equipment and spare parts, routine maintenance cost, etc.) is about $8,000,000. The recurrent expenditure to be incurred in the initial years of the new system will be lower as a result of the reduced need for repairing. The estimated recurrent savings is about $240,000 per year within the five-year period after the replacement. Overall, no additional recurrent expenditure will be incurred by the replacement of the system. The recurrent expenditure will be absorbed by the existing resources of the Transport Department.

TRAFFIC IMPLICATIONS

10. During the implementation of the project, we will minimise the impact on the traffic as far as possible. Arrangements will be made to carry out all installation works during off-peak hours and the closure of tunnel tubes at night in order not to affect the normal operation of the tunnel.

IMPLEMENTATION PLAN

11. Subject to Members' endorsement, we plan to submit the funding application to the Finance Committee of the Legislative Council as soon as practicable. The new TCSS is expected to commence full operation in the second quarter of 2029. The proposed implementation schedule is as follows –

	Activity	**Expected Completion Date**
(a)	Selection and engagement of engineering consultant team	Third quarter of 2025
(b)	Site investigation (conducting cable duct survey and underground utilities investigation, studying and modifying the number and location of field equipment, etc.)	First quarter of 2026
(c)	Preparation of tender documents	Third quarter of 2026
(d)	Tendering and selection of contractor	Second quarter of 2027
(e)	System design by contractor	Fourth quarter of 2027

	Activity	Expected Completion Date
(f)	Procurement and installation of associated equipment	First quarter of 2029
(g)	Testing, commissioning and changeover of systems	Second quarter of 2029
(h)	Full operation of the new system	Second quarter of 2029

* * * * * * * * * *

Annex 2

Replacement of Traffic Control and Surveillance System of the Cross-Harbour Tunnel

PROJECT SCOPE AND NATURE

We propose replacing the traffic control and surveillance systems ("TCSS") of the Cross-Harbour Tunnel ("CHT")[1], including the central control system, traffic control system and traffic surveillance system.

JUSTIFICATIONS

2. The existing TCSS of the CHT commenced operation in 2011 and has since been operating round-the-clock for over 13 years. According to the assessment by the Electrical and Mechanical Services Department, the TCSS of the CHT is ageing over time and the system breakdown is on the rise, thus undermining its ability to cope with traffic incidents. When the system breaks down and is unable to effectively monitor and co-ordinate the traffic within the tunnel area, any occurrence of traffic incidents will probably lead to traffic congestion along road sections in Hung Hom and Causeway Bay, causing inconvenience to members of the public. In addition, since the equipment and spare parts of the system have become obsolete, it has become increasingly difficult for departments to procure the necessary spare parts from the market for maintaining and repairing the ageing system. Therefore, we consider it necessary to replace the TCSS of the CHT to ensure the continued operation of the tunnel in a safe and effective manner.

3. Key features of the new systems are as follows:

(a) The new central control system is a fully computerised system which integrates various functions of other sub-systems of the TCSS on the same platform. Its processing power will be enhanced to implement more pre-programmed traffic management solutions in response to the prevailing tunnel operation or traffic situations of nearby roads, thereby enhancing the efficiency of traffic management. In addition, we will set up a Building Information Modelling data repository, which enables the operation and maintenance staff to grasp the configurations of various new equipment and systems in a faster and more holistic manner with the automated computer support. By facilitating the tracing of the causes of

[1] The CHT is one of the major traffic links between Kowloon and Hong Kong Island, connecting Hung Hom (Yau Tsim Mong District) and Causeway Bay (Wan Chai District) with a total length of 1.9 km.

damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened while the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions;

(b) The new system also lays an essential technical foundation for promoting smart tunnel management at the CHT. The new active warning system ("AWS") will be equipped with devices such as sensors and data network to collect, transmit and process various data to monitor and analyse the traffic flow and identify the vehicle types in real time, and to proactively detect potential conditions[2], as well as issue safety alerts accordingly. This will help controllers in implementing pre-programmed traffic management solutions and enhance the provision of real-time traffic information to drivers, further improving the operational efficiency and safety of the tunnel;

(c) The automatic incident detection system under the new traffic surveillance system is equipped with digital cameras that provide higher resolution images. Apart from improving the efficiency of traffic surveillance, the new system will make use of image-processing technology to enhance its effectiveness to differentiate different traffic situations/incidents at the scene by automatically detecting vehicles that have stopped inside the tunnel tubes due to traffic incidents, and alerting the control room accordingly for early detection and handling of incidents to avoid severe congestion;

(d) The new traffic control system will provide enhanced effectiveness for controlling remote traffic message signs, variable traffic signs and other field equipment to cope with the prevailing situations. For example, the performance of the new variable message signs and lane control signals will be enhanced by adopting light emitting diode technology that provides higher illuminance to display more detailed and clearer traffic messages. In addition, the over-height vehicle detection system under 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 for intercepting those vehicles before they enter the tunnel tubes; and

(e) All new TCSS are required to meet the latest information security requirements of the Government, such as the configuration of "endpoint detection and response" and "network detection and response" security measures to detect and respond to anomalies identified at device endpoints

[2] For example, pedestrians intruding into the tunnel tubes and driving against the traffic lanes, etc.

and networks respectively, to prevent cyberattacks. The existing TCSS also need to be timely renewed to meet those requirements.

FINANCIAL IMPLICATIONS

Capital Expenditure

4. We estimate that the capital expenditure for the proposed project is $183,580,000, with the breakdown as follows –

			$ million
(a) Replacement of the TCSS at the CHT			155.620
(i)	central control system	18.500	
(ii)	traffic control system	26.100	
(iii)	traffic surveillance system	18.610	
(iv)	data communication network	13.000	
(v)	associated civil engineering works (including ducting and structural installation)	20.400	
(vi)	associated building services works	7.400	
(vii)	procurement of cables and accessories	11.100	
(viii)	temporary traffic arrangements, tunnel wall panel removal and installation	10.200	
(ix)	system testing and commissioning	5.600	
(x)	engagement of engineering consultant team	12.400	
(xi)	contract administration and site supervision	7.730	
(xii)	others (e.g. measures related to site safety, third-party insurance, etc.)	4.580	
(b) EMSTF project management charges			12.400
(c) Contingency (about 10% of item (a) above)			15.560
	Total		**183.580**

5. On paragraph 4(a) above, the estimated expenditure is mainly for the works related to the project, including project design, equipment procurement, installation, testing, engineering consultant team fees, temporary traffic arrangements, etc. Site supervision and management of the project is for supervising the works and managing site matters at each stage of the construction, ranging from design, procurement, installation to site testing, so as to enhance the quality of site supervision, ensure temporary traffic arrangements are planned ahead for the installation works, and improve the efficiency of the acceptance test following completion of the works.

6. On paragraph 4(b) above, the estimated expenditure is mainly for meeting the management charges from the Electrical and Mechanical Services Trading Fund ("EMSTF"), which includes carrying out feasibility study on different proposals with regard to the project details; preparing project schedule; tendering and selecting engineering consultant team; preparing tender documents; tendering and selecting contractors; supervising the engineering consultant team; inspection, installation, testing and commissioning of the system, as well as monitoring the operation of the system's facilities and the rectification works within the defects liability period.

7. On paragraph 4(c) above, the estimated expenditure is mainly for contingency fee, which represents 10% of the expenditure under paragraph 4(a) above.

8. The estimated cash flow required for the proposed project from 2025-26 to 2030-31 is as follows -

Financial Year	**$ million**
2025-26	6.048
2026-27	21.432
2027-28	32.380
2028-29	57.360
2029-30	46.140
2030-31	20.220
Total	**183.580**

Recurrent Expenditure and Savings

9. Out of the overall management fee payable annually to the tunnel operator for the management, operation and maintenance of the CHT, the annual recurrent expenditure for the maintenance and repairing of the new system (including the procurement of equipment and spare parts, routine maintenance cost, etc.) is about $5,500,000. The recurrent expenditure to be incurred in the initial years of the new

system will be lower as a result of the reduced need for repairing. The estimated recurrent savings is about $100,000 per year within the five-year period after the commissioning of the new system. Overall, no additional recurrent expenditure will be incurred by the replacement of the system. The recurrent expenditure will be absorbed by the existing resources of the Transport Department.

TRAFFIC IMPLICATIONS

10. During the implementation of the project, we will minimise the impact on the traffic as far as possible. Arrangements will be made to carry out all installation works during off-peak hours and the closure of tunnel tubes at night in order not to affect the normal operation of the tunnel.

IMPLEMENTATION PLAN

11. Subject to Members' endorsement, we plan to submit the funding application to the Finance Committee of the Legislative Council as soon as practicable. The new TCSS is expected to commence full operation in the fourth quarter of 2029. The proposed implementation schedule is as follows –

	Activity	**Expected Completion Date**
(a)	Selection and engagement of engineering consultant team	Third quarter of 2025
(b)	Site investigation (conducting cable duct survey and underground utilities investigation, studying and modifying the number and location of field equipment, etc.)	First quarter of 2026
(c)	Preparation of tender documents	Third quarter of 2026
(d)	Tendering and selection of contractor	Second quarter of 2027
(e)	System design by contractor	Fourth quarter of 2027
(f)	Procurement and installation of associated equipment	Third quarter of 2029
(g)	Testing, commissioning and changeover of systems	Fourth quarter of 2029
(h)	Full operation of the new system	Fourth quarter of 2029

* * * * * * * * *

Annex 3

Renewal of the Central System and Part of the Associated Equipment under the Traffic Control and Surveillance System of the Hong Kong - Shenzhen Western Corridor

PROJECT SCOPE AND NATURE

We propose renewing the central system and part of the associated equipment under the traffic control and surveillance system ("TCSS") of the Hong Kong - Shenzhen Western Corridor[1]("HK-SWC").

JUSTIFICATIONS

2. The existing TCSS of the HK-SWC commenced operation in 2007 and has since been operating round-the-clock for over 17 years. According to the assessment by the Electrical and Mechanical Services Department, the supplier has ceased to support some of the software for the central system and will gradually cease to support other software as well. Coupled with the fact that certain equipment and spare parts of the system have become obsolete, it is increasingly difficult for departments to procure the required spare parts from the market for maintaining and repairing the ageing system, and to renew the system to meet the latest information security requirements of the Government. Also, provided that the central system and part of the associated equipment under the TCSS of the HK-SWC are ageing over time, this has undermined their effectiveness to respond to traffic incidents. Given the remaining serviceable life of certain equipment of the system and the cost-effectiveness involved, we consider it necessary to renew the central system and replace part of the associated equipment under the TCSS of the HK-SWC to ensure the continued operation of the major trunk road in a safe and effective manner. In case of system breakdown and failure to effectively monitor and co-ordinate the traffic, any occurrence of traffic incidents will probably lead to traffic congestion at the HK-SWC. This will affect cross-boundary traffic and cause inconvenience to members of the public.

3. Key features of the renewed TCSS are as follows:

(a) The renewed central system will be equipped with enhanced processing capability and settings that meet the latest information security

[1] The HK-SWC is a vehicular boundary crossing connecting Shenzhen and Hong Kong, mainly via Shenzhen Bay Bridge and Kong Sham Western Highway, serving as one of the major trunk roads connecting Hong Kong and the Mainland.

requirements of the Government, including the addition of endpoint detection and response measures that provide continuous real-time monitoring of individual computer devices to detect and respond to security vulnerabilities and cyberattacks. In addition, the system will be able to implement more pre-programmed traffic management solutions in response to the prevailing operation of the HK-SWC or traffic situations of nearby roads, thereby enhancing the operational efficiency. Moreover, we will establish a Building Information Modelling data repository which will allow the maintenance staff to grasp the configurations of various new equipment and systems in a faster and more comprehensive manner with the support of computer. By facilitating the tracing of the causes of damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened and the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions. We will also keep pace with the relevant new technology available on the market for use in the TCSS of major trunk roads, with a view to enhancing the overall capability and efficiency of traffic monitoring and management through the use of safe, reliable, durable and the most suitable technology, as well as laying the essential technical foundation for smart motorway management in the future;

(b) The performance of the traffic surveillance equipment will be improved after replacement. The automatic incident detection system will be equipped with digital cameras that provide higher resolution images to improve the efficiency of traffic surveillance. The renewed system will make use of more advanced and accurate image-processing technology to enhance its effectiveness to differentiate the on-site traffic conditions or incidents (including detection of slow-moving vehicles and fallen objects) by automatically detecting vehicles that have stopped on the roads due to traffic incidents, and alerting the control room accordingly for early detection and handling of incidents to avoid severe congestion; and

(c) The traffic control equipment will achieve better efficiency after replacement. For example, the new lane control signals and variable speed limit signs will have better performance owing to the use of light emitting diode technology that provides higher illuminance to giver a clearer display of traffic information.

FINANCIAL IMPLICATIONS

Capital Expenditure

4. We estimate that the capital expenditure for the proposed project is $45,675,000, with the breakdown as follows：

			$ million
(a)	Renewal of the central system and part of the associated equipment under the TCSS of the HK-SWC		36.250
	(i) central system	26.390	
	(ii) traffic control equipment	9.150	
	(iii) traffic surveillance equipment	0.710	
(b)	EMSTF project management charges		5.800
(c)	Contingency (about 10% of the expenditure in (a) above)		3.625
	Total		**45.675**

5. On paragraph 4(a) above, the estimated expenditure is mainly for the following items -

(i) Renewing the computer and network equipment of the central system and adopting the relevant information security measures;
(ii) Replacing part of the traffic control equipment (including lane control signals and variable speed limit signs, etc.); and
(iii) Replacing part of the traffic surveillance equipment (including automatic incident detection equipment, etc.).

6. On paragraph 4(b) above, the estimated expenditure is mainly for meeting the management charges from the Electrical and Mechanical Services Trading Fund ("EMSTF"), which includes exploring different options with regard to the project details; tendering and selecting consultant teams; preparing system specifications, system design and project schedule; preparing tender documents; tendering and selecting contractors; supervising and conducting site inspections for the installation, testing and commissioning of the system; and monitoring the operation of the system and rectification works within the defects liability period.

7. On paragraph 4(c) above, the estimated expenditure is for contingency fee,

which represents about 10% of the expenditure under paragraph 4(a) above.

8. The estimated cash flow required for the proposed project from 2025-26 to 2029-30 is as follows：

Financial Year	**$ million**
2025-26	0.600
2026-27	5.227
2027-28	8.032
2028-29	20.104
2029-30	11.712
Total	**45.675**

Recurrent Expenditure and Savings

9. The Government's annual recurrent expenditure for the maintenance and repairing (including the procurement of equipment and spare parts, routine maintenance cost, etc.) for the renewed part of the TCSS of the HK-SWC is about $5,900,000. The recurrent expenditure to be incurred for the system in the initial years after its renewal will be lower as a result of the reduced need for repairing. The estimated recurrent savings is about $50,000 per year within the five-year period after the renewal. Overall, no additional recurrent expenditure will be incurred by the renewal of the system. The recurrent expenditure will be absorbed by the existing resources of the Transport Department.

TRAFFIC IMPLICATIONS

10. During the implementation of the project, we will minimise the impact on the traffic as far as possible. Arrangements will be made to carry out all installation works during off-peak hours in order not to affect the normal operation of the HK-SWC.

IMPLEMENTATION PLAN

11. Subject to Members' endorsement, we plan to submit the funding application to the Finance Committee of the Legislative Council as soon as practicable. The renewed TCSS is expected to commence full operation in the second quarter of 2029. The proposed implementation schedule is as follows –

	Activity	Expected Completion Date
(a)	Selection and engagement of consultant team	Third quarter of 2025
(b)	Preparation of tender documents	Second quarter of 2026
(c)	Tendering and selection of contractor	Fourth quarter of 2026
(d)	System design by contractor	Second quarter of 2027
(e)	Procurement and installation of associated equipment	Second quarter of 2028
(f)	Testing and commissioning	Second quarter of 2029
(g)	Full operation of the renewed system	Second quarter of 2029

* * * * * * * * * *

Annex 4

Renewal of the Central System under the Traffic Control and Surveillance System of the Hong Kong-Zhuhai-Macao Bridge

PROJECT SCOPE AND NATURE

We propose renewing the central system under the traffic control and surveillance system ("TCSS") of the Hong Kong-Zhuhai-Macao Bridge (Hong Kong Link Road) ("HKZMB-HKLR")[1].

JUSTIFICATIONS

2. The existing TCSS of the HKZMB-HKLR has been tested and progressively operated since 2016, and has since been operating round-the-clock for over 8 years. According to the assessment by the Electrical and Mechanical Services Department, the supplier has ceased to support some of the software for the central system and will gradually cease to support other software as well. Coupled with the fact that certain equipment and spare parts of the system have become obsolete, it is increasingly difficult for departments to procure the required spare parts from the market for maintaining and repairing the ageing system, and to renew the system to meet the latest information security requirements of the Government, thereby undermining their effectiveness to respond to traffic incidents. Given the remaining serviceable life of certain equipment of the system and the cost-effectiveness involved, we consider it necessary to renew the central system under the TCSS of the HKZMB-HKLR to ensure the continued operation of the trunk road in a safe and effective manner. In case of system breakdown and failure to effectively monitor and co-ordinate the traffic, any occurrence of traffic incidents will probably lead to traffic congestion at the HKZMB-HKLR. This will affect cross-boundary traffic and cause inconvenience to members of the public.

3. The renewed central system will be equipped with enhanced processing capability and settings that meet the latest information security requirements of the Government, including the addition of endpoint detection and response measures that provide continuous real-time monitoring of individual computer devices to detect and respond to security vulnerabilities and cyberattacks. In addition, the system will be able to implement more pre-programmed traffic management solutions in response to the prevailing operation of the HKZMB-HKLR or traffic situations of nearby roads, thereby enhancing the operational efficiency. Moreover,

---

[1] The HKZMB-HKLR is a vehicular boundary crossing connecting Hong Kong with Macao and Zhuhai, serving as one of the major routes connecting Hong Kong and the Mainland.

we will establish a Building Information Modelling data repository which will allow the maintenance staff to grasp the configurations of various new equipment and systems in a faster and more comprehensive manner with the support of computer. By facilitating the tracing of the causes of damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened and the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions.

4. We will also keep pace with the relevant new technology available on the market for use in the TCSS of major trunk roads, with a view to enhancing the overall capability and efficiency of traffic monitoring and management through the use of safe, reliable, durable and the most suitable technology, as well as laying the essential technical foundation for smart motorway management in the future.

FINANCIAL IMPLICATIONS

Capital Expenditure

5. We estimate that the capital expenditure for the proposed project is $34,791,000, with the breakdown as follows：

		$ million
(a)	Renewal of the central system under the TCSS of the HKZMB-HKLR	27.591
(b)	EMSTF project management charges	4.441
(c)	Contingency (about 10% of the expenditure in (a) above)	2.759
	Total	**34.791**

6. On paragraph 5(a) above, the estimated expenditure is mainly for renewing the computer and network equipment of the central system and adopting the relevant information security measures.

7. On paragraph 5(b) above, the estimated expenditure is mainly for meeting the management charges from the Electrical and Mechanical Services Trading Fund ("EMSTF"), which includes exploring different options with regard to the project details; tendering and selecting consultant teams; preparing system specifications, system design and project schedule; preparing tender documents; tendering and selecting contractors; supervising and conducting site inspections for the installation, testing and commissioning of the system; and monitoring the operation of the system and rectification works within the defects liability period.

8. On paragraph 5(c) above, the estimated expenditure is for contingency fee, which represents about 10% of the expenditure under paragraph 5(a) above.

9. The estimated cash flow required for the proposed project from 2025-26 to 2029-30 is as follows：

Financial Year	**$ million**
2025-26	0.660
2026-27	5.397
2027-28	12.062
2028-29	12.876
2029-30	3.796
Total	**34.791**

Recurrent Expenditure and Savings

10. The Government's annual recurrent expenditure for the maintenance and repairing (including the procurement of equipment and spare parts, routine maintenance cost, etc.) for the renewed part of the TCSS of the HKZMB-HKLR is about $4,500,000. The recurrent expenditure to be incurred for the system in the initial years after its renewal will be lower as a result of the reduced need for repairing. The estimated recurrent savings is about $40,000 per year within the five-year period after the renewal. Overall, no additional recurrent expenditure will be incurred by the renewal of the system. The recurrent expenditure will be absorbed by the existing resources of the Transport Department.

TRAFFIC IMPLICATIONS

11. During the implementation of the project, we will minimise the impact on the traffic as far as possible. Arrangements will be made to carry out all installation works during off-peak hours in order not to affect the normal operation of the HKZMB-HKLR.

IMPLEMENTATION PLAN

12. Subject to Members' endorsement, we plan to submit the funding application to the Finance Committee of the Legislative Council as soon as practicable. The renewed TCSS is expected to commence full operation in the fourth quarter of 2028. The proposed implementation schedule is as follows –

	Activity	Expected Completion Date
(a)	Selection and engagement of consultant team	Third quarter of 2025
(b)	Preparation of tender documents	First quarter of 2026
(c)	Tendering and selection of contractor	Third quarter of 2026
(d)	System design by contractor	First quarter of 2027
(e)	Procurement and installation of associated equipment	Second quarter of 2028
(f)	Testing and commissioning	Fourth quarter of 2028
(g)	Full operation of the renewed system	Fourth quarter of 2028

* * * * * * * * * *

Annex 5

Renewal of the Central System and Part of the Associated Equipment under the Traffic Control and Surveillance System of the Tolo Highway

PROJECT SCOPE AND NATURE

We propose renewing the central system and part of the associated equipment under the traffic control and surveillance system ("TCSS") of the Tolo Highway[1].

JUSTIFICATIONS

2. The existing TCSS of the Tolo Highway commenced operation in 2016 and has since been operating round-the-clock for over 8 years. According to the assessment by the Electrical and Mechanical Services Department, the supplier has ceased to support some of the software for the central system and will gradually cease to support other software as well. Coupled with the fact that certain equipment and spare parts of the system have become obsolete, it is increasingly difficult for departments to procure the required spare parts from the market for maintaining and repairing the ageing system, and to renew the system to meet the latest information security requirements of the Government. Also, provided that the central system and part of the associated equipment under the TCSS of the Tolo Highway are ageing over time, this has undermined their effectiveness to respond to traffic incidents. Given the remaining serviceable life of certain equipment of the system and the cost-effectiveness involved, we consider it necessary to renew the central system and replace part of the associated equipment under the TCSS of the Tolo Highway to ensure the continued operation of the major trunk road in a safe and effective manner. In case of system breakdown and failure to effectively monitor and co-ordinate the traffic, any occurrence of traffic incidents will probably lead to traffic congestion at the Tolo Highway, thus affecting the effectiveness of the highway as a major trunk road in New Territories East and causing inconvenience to members of the public.

3. Key features of the renewed TCSS are as follows:

(a) The renewed central system will be equipped with enhanced processing capability and settings that meet the latest information security

[1] The Tolo Highway is a major trunk road connecting the New Territories North East with the urban areas, and forms part of the New Territories Circular Road (Route 9).

requirements of the Government, including the addition of endpoint detection and response measures that provide continuous real-time monitoring of individual computer devices to detect and respond to security vulnerabilities and cyberattacks. Moreover, we will establish a Building Information Modelling data repository which will allow the maintenance staff to grasp the configurations of various new equipment and systems in a faster and more comprehensive manner with the support of computer. By facilitating the tracing of the causes of damage to the facilities and the locating of other potentially affected equipment, the repair time can be shortened and the maintenance programmes will be improved. It will also facilitate the study and implementation of future system extensions. We will also keep pace with the relevant new technology available on the market for use in the TCSS of major trunk roads, with a view to enhancing the overall capability and efficiency of traffic monitoring and management through the use of safe, reliable, durable and the most suitable technology, as well as laying the essential technical foundation for smart motorway management in the future; and

(b) The performance of the traffic surveillance equipment will be improved after replacement. The automatic incident detection system will be equipped with digital cameras that provide higher resolution images to improve the efficiency of traffic surveillance. The renewed system will make use of more advanced and accurate image-processing technology to enhance its effectiveness to differentiate the on-site traffic conditions or incidents (including detection of slow-moving vehicles and fallen objects) by automatically detecting vehicles that have stopped on the roads due to traffic incidents, and alerting the control room accordingly for early detection and handling of incidents to avoid severe congestion.

FINANCIAL IMPLICATIONS

Capital Expenditure

4. We estimate that the capital expenditure for the proposed project is $27,176,000, with the breakdown as follows：

			$ million
(a)	Renewal of the central system and part of the associated equipment under the TCSS of the Tolo Highway		21.560
	(i) central system	13.254	
	(ii) traffic surveillance	8.306	

	equipment	
(b)	EMSTF project management charges	3.460
(c)	Contingency (about 10% of the expenditure in (a) above)	2.156
	Total	**27.176**

5. On paragraph 4(a) above, the estimated expenditure is mainly for the following items -

(i) Renewing the computer and network equipment of the central system and adopting the relevant information security measures;
(ii) Replacing part of the traffic surveillance equipment (including CCTVs and automatic incident detection equipment, etc.).

6. On paragraph 4(b) above, the estimated expenditure is mainly for meeting the management charges from the Electrical and Mechanical Services Trading Fund ("EMSTF"), which includes exploring different options with regard to the project details; tendering and selecting consultant teams; preparing system specifications, system design and project schedule; preparing tender documents; tendering and selecting contractors; supervising and conducting site inspections for the installation, testing and commissioning of the system; and monitoring the operation of the system and rectification works within the defects liability period.

7. On paragraph 4(c) above, the estimated expenditure is for contingency fee, which represents about 10% of the expenditure under paragraph 4(a) above.

8. The estimated cash flow required for the proposed project from 2025-26 to 2029-30 is as follows：

Financial Year	**$ million**
2025-26	0.420
2026-27	11.538
2027-28	9.430
2028-29	3.632
2029-30	2.156
Total	**27.176**

Recurrent Expenditure and Savings

9. The Government's annual recurrent expenditure for the maintenance and

repairing (including the procurement of equipment and spare parts, routine maintenance cost, etc.) for the renewed part of the TCSS of the Tolo Highway is about $3,500,000. The recurrent expenditure to be incurred for the system in the initial years after its renewal will be lower as a result of the reduced need for repairing. The estimated recurrent savings is about $30,000 per year within the five-year period after the renewal. Overall, no additional recurrent expenditure will be incurred by the renewal of the system. The recurrent expenditure will be absorbed by the existing resources of the Transport Department.

TRAFFIC IMPLICATIONS

10. During the implementation of the project, we will minimise the impact on the traffic as far as possible. Arrangements will be made to carry out all installation works during off-peak hours in order not to affect the normal operation of the Tolo Highway.

IMPLEMENTATION PLAN

11. Subject to Members' endorsement, we plan to submit the funding application to the Finance Committee of the Legislative Council as soon as practicable. The renewed TCSS is expected to commence full operation in the third quarter of 2029. The proposed implementation schedule is as follows –

	Activity	**Expected Completion Date**
(a)	Selection and engagement of consultant team	Third quarter of 2025
(b)	Preparation of tender documents	Third quarter of 2026
(c)	Tendering and selection of contractor	Fourth quarter of 2026
(d)	System design by contractor	Second quarter of 2027
(e)	Procurement and installation of associated equipment	Third quarter of 2028
(f)	Testing and commissioning	Third quarter of 2029
(g)	Full operation of the renewed system	Third quarter of 2029

* * * * * * * * * *