For discussion **FCR(2008-09)30**
on 13 June 2008

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND
HEAD 708 – CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT
Transport Department
New Subhead "Replacement of the Traffic Control and Surveillance System in the Shing Mun Tunnels"

Members are invited to approve a new commitment of $140 million to replace the traffic control and surveillance system in the Shing Mun Tunnels.

PROBLEM

The existing traffic control and surveillance system (TCSS) in the Shing Mun Tunnels (SMT) is approaching the end of its economic serviceable life after having been in use for over 17 years.

PROPOSAL

2. The Commissioner for Transport, with the support of the Secretary for Transport and Housing, proposes to replace the TCSS in the SMT at an estimated cost of $140 million.

JUSTIFICATION

3. The existing TCSS in the SMT has been in use since the tunnel was opened in 1990. According to the Electrical and Mechanical Services Department, it has become increasingly difficult to purchase spare parts in the market to maintain the obsolete TCSS equipment. The cost of maintaining the system is expected to increase substantially as more and more replacement components will need to be specially sourced. It is considered that the existing TCSS should be replaced to ensure the reliability, effectiveness and efficiency of the traffic control and surveillance in SMT.

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4. The new TCSS will be fully computerised adopting state-of-the-art technology and designed as a single integrated system. A comparison of the major facilities of the existing and the new TCSS in SMT is at Enclosure 1. The main features of the new system are set out in the ensuing paragraphs.

Encl. 1

Traffic Management Computer

5. The traffic management computer of the existing TCSS in the SMT can only operate on a limited number of pre-programmed traffic management schemes, the implementation of which relies on an outdated control panel. The traffic management computer of the proposed TCSS will enable the implementation of more pre-programmed traffic management schemes through a more advanced and effective control panel. Its capability of controlling the change of traffic message signs, signals and other field equipment in response to traffic situation will also be enhanced. In addition, the new traffic management computer will be able to support a more extensive coverage of road network in the tunnel area.

Variable Message Signs

6. Full variable message signs (FVMS) will be erected on gantries across major approach roads where all traffic lanes are leading to the tunnel to provide real-time tunnel traffic information to motorists so that they can take alternative routes in case of congestion or tunnel closure. Given the total width of several traffic lanes, FVMS can display bilingual messages about traffic situation, journey time, alternate route, and graphical information. Limited variable message signs (LVMS) are mounted over the kerb-side lanes or fast lanes of secondary approach roads where only one traffic lane is leading to the tunnel. LVMS can display essential traffic information, such as "Tunnel Closed" or "Congested" signs, as well as advisory, warning and regulatory signals to effect traffic management schemes. The proposed locations of the FVMS and LVMS are shown at Enclosure 2.

Encl. 2

Automatic Incident Detection System

7. The automatic incident detection system will adopt the latest imaging and computer technology to monitor the traffic flow and help detect incidents that happen within the tunnel area. Under the new system when an incident is detected, the camera of the nearby closed circuit television (CCTV) cameras will automatically pan to the incident site. It will also trigger the alarm which will in turn speed up the response of the traffic control system, help reduce the risk of consequential incidents, speed up mobilisation of recovery and rescue vehicles and improve the overall traffic flow.

/**CCTV** .....

CCTV System

8. The cameras and monitors of the existing CCTV system in SMT can only provide black and white images. The system will be replaced with colour cameras and monitors to provide clearer images to improve traffic monitoring efficiency. Also, additional cameras will be erected on the approach roads to improve the coverage of the system.

Integration of Environmental Monitoring and Emergency Systems with TCSS

9. The existing environmental monitoring system and emergency telephone system of SMT are independent from the TCSS. However, as they are also due for replacement, we would take this opportunity to include them in the TCSS replacement project so that the control of these systems will be integrated with the TCSS control to improve their efficiency.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

10. We estimate the capital cost of the project to be $140 million, with the breakdown as follows –

			$ million	
(a)	Electronic, electrical and mechanical equipment installation			95.0
	(i)	signs, signals and other field equipment	28.0	
	(ii)	computer hardware and software	15.0	
	(iii)	closed circuit television	9.0	
	(iv)	automatic incident detection system	7.0	
	(v)	data communication system	6.0	
	(vi)	environmental monitoring system	8.0	
	(vii)	emergency telephone system	4.0	
	(viii)	uninterruptible power supply	2.0	
	(ix)	cables, accessories and spares	6.0	
	(x)	testing, commissioning, training and documentation	7.5	
	(xi)	dismantlement and disposal of replaced equipment	2.5	

/(b) .....

			$ million
(b)	Related installation and works		17.0
	(i) cable ducts	2.0	
	(ii) mountings for gantry signs	2.0	
	(iii) mountings for roadside signs and signal	1.8	
	(iv) civil, builder and building service works and contract preliminaries	11.2	
(c)	Electrical and Mechanical Services Trading Fund (EMSTF) project management charges		16.8
(d)	Contingency [10% of (a) to (b)]		11.2
	Total		**140.0**

11. As regards paragraph 10(a) above, the estimated cost of $95 million is for the dismantling and disposal of the existing TCSS equipment and the supply, installation, testing and commissioning of the new system comprising variable message signs, traffic lights, lane signals, remote control signs, automatic incident detection system, new CCTV system, various field equipment (e.g. over-height detectors), computer hardware and software, a data communication network, the environmental monitoring system, the emergency telephone system, as well as the associated cables, accessories and spares.

12. As regards paragraph 10(b) above, the estimated cost of $17 million is for the related civil, builder and building services works including cable ducting, erecting gantries and mountings for signs and signals, building services in equipment room, engagement of civil and traffic engineering consultants, and contract preliminaries, etc.

13. As regards paragraph 10(c) above, the estimated cost of $16.8 million is for meeting the charges of EMSTF for managing the whole project which includes carrying out consultation and feasibility study; preparing the specifications of the requirements, design, project programme and estimates; arranging tendering; undertaking site inspection; supervising the installation; arranging for testing and commissioning of the system; and, monitoring the operation and defect rectification work during the defect liability period.

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14. We intend to phase the expenditure as follows –

Year	$ million
2008 – 2009	5.0
2009 – 2010	25.0
2010 – 2011	34.0
2011 – 2012	60.0
2012 – 2013	16.0
Total	**140.0**

Recurrent Expenditure

15. As this is a replacement project, no additional recurrent expenditure will be incurred.

16. We expect that the proposal will have no impact on the toll charges of the SMT.

IMPLEMENTATION PLAN

17. We plan to start the project in the fourth quarter of 2008 for completion in March 2013. The first 29 months are for preparation works including detailed investigation, system design, specification preparation and tendering. The remaining 25 months are for system installation, testing and commissioning. A work programme is set out at Enclosure 3.

Encl. 3

18. To minimise disruption to the tunnel operation, equipment installation and testing works within the tunnel tubes will only be carried out at night in the closed tubes when the tunnels are under the one-tube-two-way operation for normal maintenance.

PUBLIC CONSULTATION

19. We issued an information paper on the proposal to the Legislative Council Panel on Transport on 15 May 2008. Members have not raised any comment on the proposal.

/**BACKGROUND** .....

BACKGROUND

20. A TCSS is installed in a tunnel and along its approaches for real-time monitoring of tunnel traffic to ensure safe and efficient operation of the tunnel. A TCSS comprises two major facilities: the traffic control facilities to guide the motorists through the tunnel safely, and the traffic surveillance facilities to monitor the traffic condition in the tunnel area and facilitate timely response to incidents. The existing TCSS in the SMT has been in use for over 17 years. It is approaching the end of its economic serviceable life. About 19.7 million vehicles used SMT in 2007. The gross revenue for 2007-08 was in the region of $99.22 million.

Transport and Housing Bureau
June 2008

Comparison of the Existing and New Traffic Control and Surveillance System (TCSS) in Shing Mun Tunnels

(I) Traffic Control Facilities

Item	New System	Existing System
1) Traffic Management Computer (controls and monitors the various traffic control and surveillance facilities, alerts tunnel operators by alarms, implements traffic plans and provides the human-machine interface. It is the core component of the TCSS.)	New traffic management computer to improve the traffic control and surveillance capability through a wider coverage and updated pre-installed traffic plans for efficient and error-free operational interface.	The existing traffic plans do not cater for the new road networks at approach roads (such as Route 8 Project and Tsuen Kam Interchange Project), and the control interface is outdated and inefficient.
2) Full Variable Message Sign (mounted on gantries in major approach roads to the tunnel to display bilingual traffic messages and graphical information to tunnel users.)	A number of light emitting diode (LED) type variable message signs will be erected on major tunnel approach roads to disseminate real-time bilingual messages to motorists for their timely action.	No such provision.
3) Limited Variable Message Sign (LVMS) (mounted in secondary approach roads for displaying "Tunnel Closed"/ "Congested" signs and advisory/ warning/ regulatory signals to effect traffic management schemes.)	LVMS to be installed on secondary approach roads to display pre-set messages.	Limited signs with limited message display capability.

Item	New System	Existing System
4) Traffic Light Signal (installed on approach roads to regulate traffic entering the tunnel area and stop over-height vehicles.)	Brighter maintenance-free LED type signals will be installed.	Conventional lamp bulb type.
5) Gantry Lane Control Signal (installed at tunnel approach roads for control of traffic especially during lane or tube closure.)	Brighter maintenance-free LED type signals will be installed.	Old design of fibre optic signs, difficult to be read in daytime.
6) Tunnel Lane Control Signal (installed throughout the tunnel tubes for lane control.)	Brighter maintenance-free LED type signal will be installed.	Conventional lamp bulb type, less conspicuous and aged.
7) Control Centre Facilities (control console and wall map.)	All the control panels and computer terminals will be integrated on a single console to facilitate operation. A large liquid crystal display wall map will be installed to show the real-time aspect and status of the traffic signs and signals on a roadmap background to enhance the efficiency of surveillance.	Old design with less integrated control panels. The wall map is small and on mimic display.

(II) Traffic Surveillance Facilities

Item	**New System**	**Existing System**
1) Automatic Incident Detection System (detect traffic incidents in tunnel area.)	New Automatic Incident Detection System with latest technology will be installed to increase efficiency of incident detection.	Old design of using detector loops which are difficult to repair.
2) Closed Circuit Television System (cameras installed in the tunnel areas to capture real- time image for displaying at monitors at the control centre of the tunnel.)	With colour cameras with pan-tilt and zoom functions and colour monitors with good resolution. More cameras will be installed to ensure better coverage over the tunnel area.	Old black and white cameras and monitors. The coverage is limited.
3) Over-height Vehicle Detection System (installed at approach roads to detect vehicles that exceed the permitted height prior to their entering the tunnel.)	Reliable detectors of latest technology will be installed.	Aged system with reducing reliability.

Proposed Locations of Full Variable Message Signs (FVMS) and Limited Variable Message Signs (LVMS)

Tsuen Wan side approach roads

(locations (a) to (k) marked on the map on page 2 of Encl. 2)

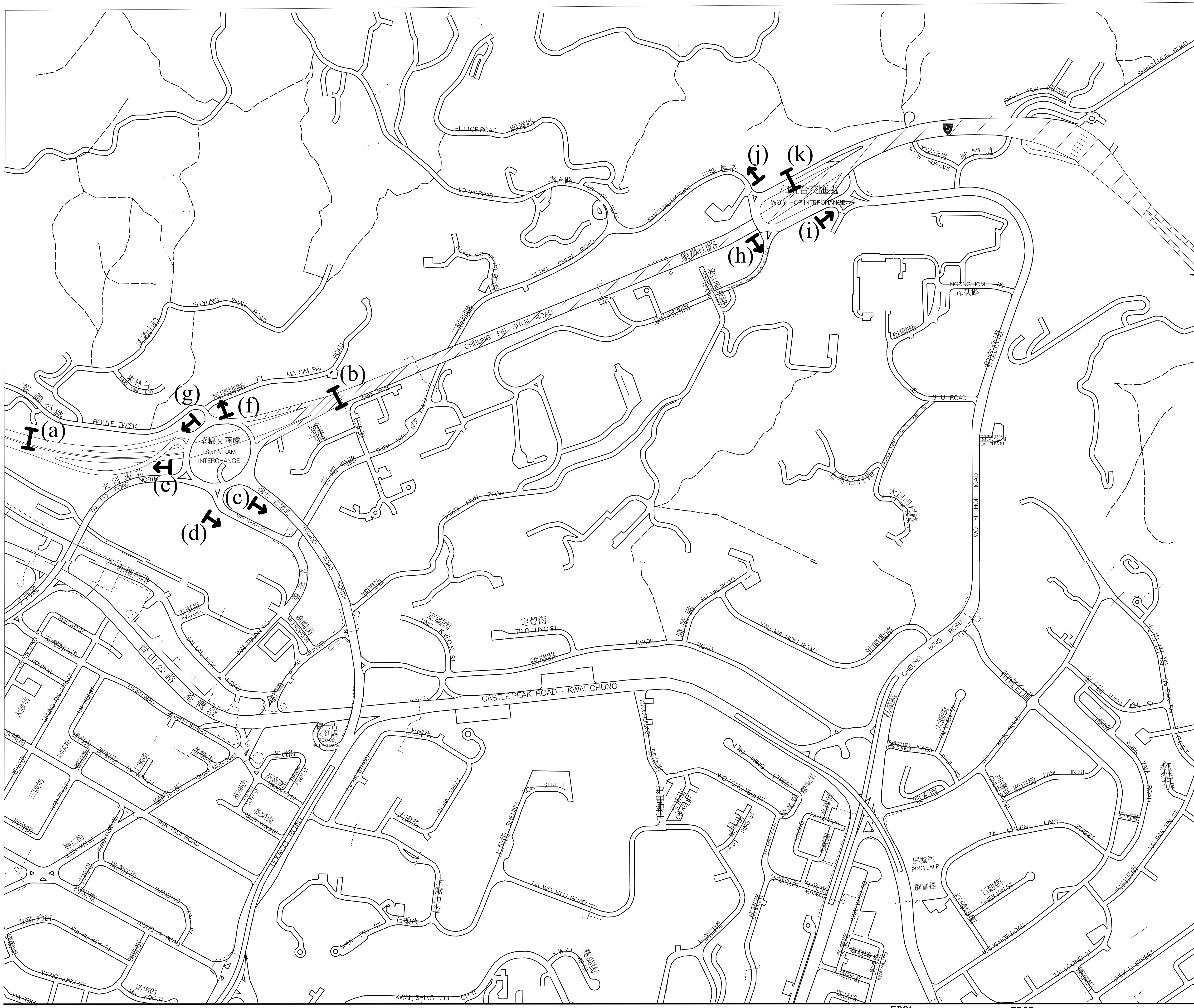
	FVMS	LVMS
Cheung Pei Shan Road		
E/B near Muk Min Ha Tsuen	(a)	
E/B near Shek Wai Kok Estate	(b)	
Tsuen Kam Interchange		
Ingress from Texaco Road North		(c)
Ingress from Wai Tsuen Road		(d)
Ingress from Tai Ho Road North		(e)
Ingress from Ma Sim Pai		(f)
Ingress from Route Twisk		(g)
Cheung Shan Tsuen Road West		(h)
Wo Yi Hop Road near Wo Yi Hop Interchange		(i)
Sam Tung UK Road		(j)
Slip Road to Wo Yi Hop Interchange near Sam Tung UK Road	(k)	

Sha Tin side approach roads

(locations (l) to (s) marked on the map on page 3 of Encl. 2)

	FVMS	LVMS
Mei Tin Road (N/B) near Chik Fai Street	(l)	
Mei Tin Road (S/B) outside Mei Lam Estate		(m)
Mei Tin Road (S/B) near Tai Po Road (Tai Wai Section)		(n)
Tai Po Road near Tai Wai Road		(o)
Tai Po Road (Tai Wai Section) outside Mei Lam Estate	(p)	
Slip road to from Tai Po Road (Tai Wai Section) to Shing Mun Tunnel Road		(q)
Tai Po Road (Shatin Section) W/B outside Sha Tin Plaza		(r)
Tai Po Road (Shatin Section) W/B outside Hilton Plaza		(s)

Enclosure 2 to
FCR (2008-09)30
(P.2 of 3)



LEGEND:

TENTATIVE LOCATION OF LIMITED VMS

TENTATIVE LOCATION OF FULL VMS

TUNNEL AREA

NOTE:
INSTALLATION OF ADDITIONAL LIMITED VMS AND FULL VMS WILL BE FURTHER STUDIED

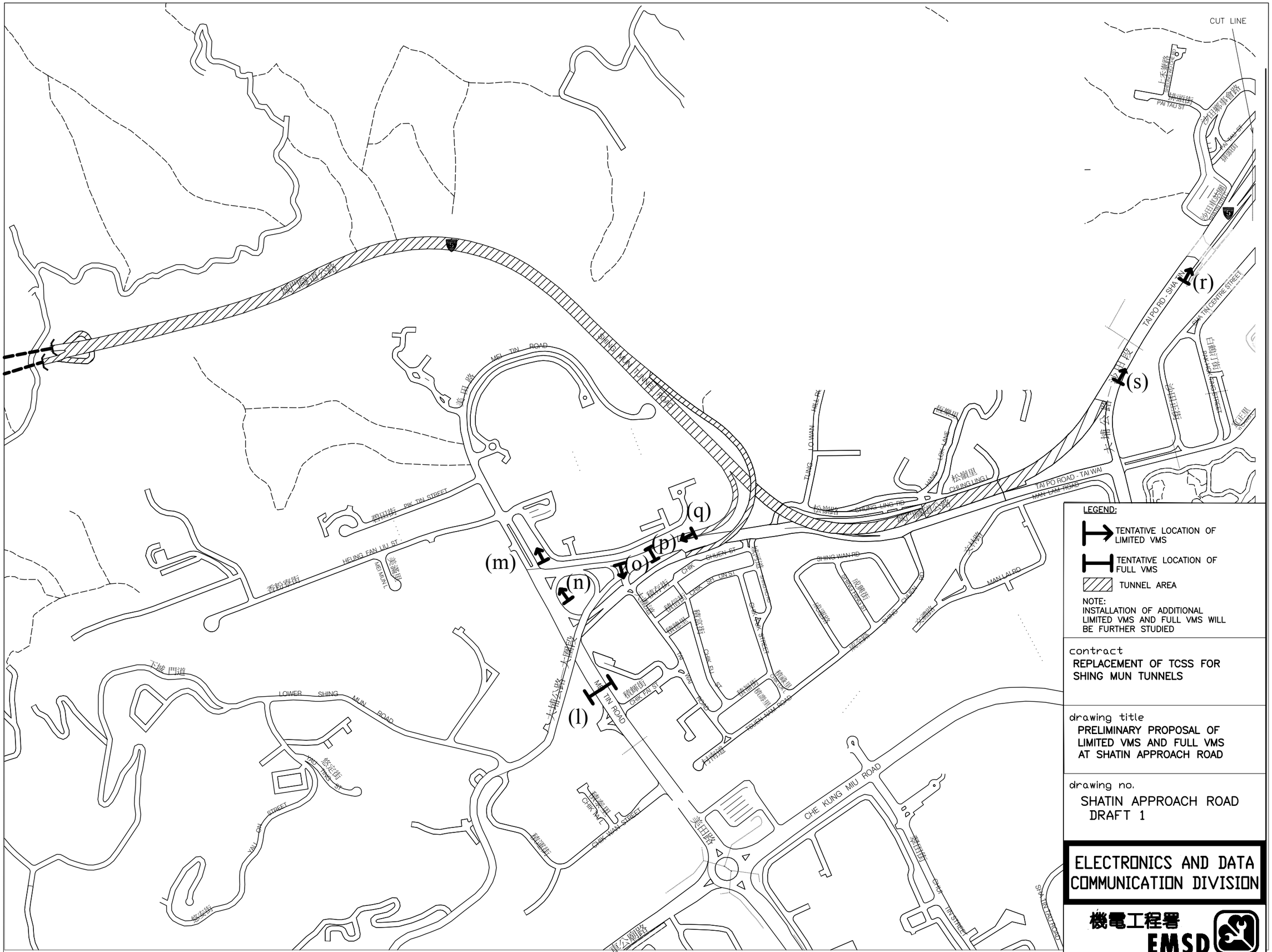
contract
REPLACEMENT OF TCSS FOR SHING MUN TUNNELS

drawing title
PRELIMINARY PROPOSAL OF LIMITED VMS AND FULL VMS AT TSUEN WAN APPROACH ROAD

drawing no.
TSUEN WAN APPROACH ROAD
(DRAFT)

ELECTRONICS AND DATA COMMUNICATION DIVISION

機電工程署
EMSD



LEGEND:

- TENTATIVE LOCATION OF LIMITED VMS
- TENTATIVE LOCATION OF FULL VMS
- TUNNEL AREA

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drawing title
PRELIMINARY PROPOSAL OF LIMITED VMS AND FULL VMS AT SHATIN APPROACH ROAD

drawing no.
SHATIN APPROACH ROAD
DRAFT 1

ELECTRONICS AND DATA COMMUNICATION DIVISION

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Enclosure 3 to FCR(2008-09)30

Work Programme for Replacement of the Traffic Control and Surveillance System in the Shing Mun Tunnels

	Task	Duration	2008		2009				2010				2011				2012				2013			
			7-12		1-6		7-12		1-6		7-12		1-6		7-12		1-6		7-12		1-6		7-12	
1	Traffic and civil engineering study	16 months																						
2	Detailed design	13 months																						
3	Tendering and evaluation	8 months																						
4	Installation, testing and commissioning	25months																						
