

For discussion on 28 June 2002

Legislative Council Panel on Transport

**Replacement of traffic control and surveillance system
in Cross Harbour Tunnel**

PURPOSE

This paper outlines the Administration's proposal to replace the traffic control and surveillance system (TCSS) in Cross Harbour Tunnel (CHT).

BACKGROUND

2. The existing TCSS in CHT was installed when the tunnel opened in 1972. Although the system is subject to regular maintenance and is rendering smooth operation, the Director of Electrical and Mechanical Services (DEMS) considers that the core components of the existing system are reaching the end of their serviceable life. It is also getting increasingly difficult to purchase spare parts to maintain the obsolete TCSS equipment. The cost of maintenance of the system is expected to become substantially higher when more and more component parts become obsolete and have to be specially ordered from the suppliers.

3. Designed some 30 years ago, the existing TCSS relies totally on manual operation. A modern TCSS, however, provides important functions such as over-height alarm, computerised traffic plan systems, variable message signs and automatic incident detection systems (AIDS) as standard features.

4. Transport Department (TD) plans to replace the existing TCSS in CHT with a modern TCSS to ensure the continued provision of a safe, reliable and efficient system to control and monitor the tunnel traffic. This will bring the facilities and equipment of the tunnel in line with other existing tunnels in the territory. We also take this opportunity to install a new environment monitoring system which is a standard equipment in other tunnels to measure the environmental parameters as required by the Environmental Protection Department and replace the emergency telephone system which is approaching the end of its economic life.

MAIN FEATURES OF THE PROPOSED SYSTEM

5. The new TCSS will be fully computerised using state-of-art technology and designed as a single integrated system. For example, under the new system when an over-height alarm is raised, the camera of the nearby closed circuit television (CCTV) system will automatically pan to the incident site. The response to incident including mobilisation of recovery vehicles will thus be enhanced. Details of the proposed TCSS equipment and their features as compared with the features of the existing equipment are shown at **Annex 1**.

6. There is no computerised traffic plan system in the existing TCSS of the tunnel. Tunnel operators manually switch on and off different button arrays to change the traffic signs and signals and other field equipment for implementing different tunnel traffic plans. With the new TCSS, a number of pre-programmed traffic plans will be devised and stored in a new traffic management computer. When there is a need to change the tunnel traffic plan, operators can select and execute the appropriate pre-programmed traffic plan. The computer system helps control the change of traffic signs, signals and other field equipment as well as check against any conflicts in the signs and signals. This greatly increases the efficiency and reliability in traffic control and safety of the tunnel.

7. Full Variable Message Signs (FVMS) will be erected on gantries at strategic locations of the main approach roads to provide traffic information on the tunnel to motorists so that they can take alternative routes in case of congestion or tunnel closure. FVMS are large and bright signs capable of displaying real-time bilingual messages and graphical information. At secondary approach roads where it is not practical to have FVMS, there will be Limited Variable Message Signs (LVMS) to display critical traffic information (e.g. Tunnel Closed/ Congested) to tunnel users. Suggested locations of the new FVMS and LVMS are shown at **Annex 2**. As suggested by some Members during past discussion on ways to enhance the dissemination of real-time tunnel traffic information to motorists, we will install FVMS at strategic locations of the main approach roads to CHT on both sides of the harbour covering Chatham Road South, Chatham Road North, Princess Margaret Road, Island Eastern Corridor and Gloucester Road. The tunnel tubes and their approach roads will also be equipped with signs and signals which are brighter and more reliable and require less maintenance.

8. At present, there is no AIDS installed in CHT. We will also

take this opportunity to install an AIDS in the tunnel to assist operators to detect traffic incidents and prevent secondary accidents. The vehicle detectors will be of the overhead type to allow maintenance to be carried out without affecting normal traffic.

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of the project to be \$112 million, made up as follows –

	\$ million
(a) Electronic, electrical and mechanical equipment installation	78.9
(i) computer hardware and software	15.0
(ii) data communication system	6.0
(iii) automatic incident detection system	6.4
(iv) signs, signals and other field equipment	28.0
(v) emergency telephone system	3.5
(vi) uninterruptible power supply	2.0
(vii) environmental monitoring system	8.0
(viii) cables, accessories and spares	2.0
(ix) testing, commissioning, training and documentation	7.0
(x) dismantlement and disposal of replaced equipment	1.0
(b) Related installation and works	14.0
(i) cable ducts	1.7
(ii) mountings for gantry signs	1.8
(iii) mountings for roadside signs and signal	1.5
(iv) civil, builder and building service works and contract preliminaries	9.0
(c) Project management charges by Electrical and Mechanical Services Trading Fund (EMSTF)	9.8
(d) Contingency [10% of (a) to (b)]	9.3
Total	<u>112.0</u>

10. As regards paragraph 9(a), the cost of \$78.9 million is for the dismantling and removal of the existing TCSS equipment and the supply, installation, testing and commissioning of a new system comprising computer hardware and software, a data communication network, automatic incident detection devices, various traffic signs, signals and field equipment (e.g. over-height detectors, variable message signs, traffic lights, lane signals and remote control signs), an emergency telephone system, an environmental monitoring system, as well as the associated cabling works.

11. As regards paragraph 9(b), the cost of \$14 million is for the related civil, builder and building services works such as cable ducting, erecting gantries and mountings for signs and signals, building equipment room, engagement of civil and traffic engineering consultants, and contract preliminaries.

12. As regards paragraph 9(c), the cost of \$9.8 million is for the EMSTF's engineering consultancy services. DEMS will undertake the whole project which includes feasibility study, definition of requirements, preparation of project programme and estimates, design, tendering, site inspection, installation supervision, testing and commissioning, as well as monitoring defect rectification during the defect liability period. In the light of the Enhanced Productivity Programme, the EMSTF has rationalised its costs and offered a reduced price of \$9.8m, which is about 10.5% of the estimated project cost.

13. Subject to approval, we will phase the expenditure as follows:
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Year	\$ million
2002 – 2003	8
2003 – 2004	22
2004 – 2005	34
2005 - 2006	48
Total:	<u>112</u>

14. Similar to the present arrangement, the additional recurrent expenditure for the new system estimated at \$0.2M will be added to the overall management fees payable to the tunnel contractor for the management, operation, and maintenance of the tunnel.

15. We shall award the contract on a lump-sum fixed price basis. We consider the fees charged by EMSTF is reasonable when compared to fees charged by consultancy firms in the private sector for projects of similar nature.

IMPLEMENTATION PROGRAMME

16. We plan to start the project in the third quarter of 2002, which will take about 50 months to complete. A work programme is set out at **Annex 3**. The first 28 months are for preparatory works inclusive of detailed investigation, system design, specification preparation and tendering. The latter 22 months are for system installation, testing and commissioning. The works contract is anticipated to commence in January 2005 for completion by October 2006.

17. We will plan and implement the project with minimal traffic impact to the tunnel as far as possible. There will be proper temporary traffic management measures to facilitate equipment installation. For equipment installation and testing within the tunnel tubes, works will only be carried out at night in the closed tube when the tunnel is operating under the one-tube-two-way mode for normal maintenance.

CONSULTATION

18. The Administration consulted the Traffic and Transport Committees of Wan Chai, Yau Tsim Mong and Kowloon City District Councils on the proposal earlier this year. Members strongly supported the proposal and urged for its early implementation.

THE WAY FORWARD

19. We will seek the approval of the Finance Committee on 12 July 2002 on funding for the implementation of this project.

ADVICE SOUGHT

20. Members are invited to comment on the proposal.

Transport Bureau
June 2002

**Major features of the proposed
traffic control and surveillance system (TCSS)
in Cross Harbour Tunnel**

In general, a TCSS is installed in a tunnel and along its approaches to ensure safe and efficient operation of the tunnel and real-time monitoring of tunnel traffic. There are two major categories of facilities in a TCSS. The traffic control facilities are designed to guide the motorists through the tunnel safely and efficiently. The traffic surveillance facilities allow the tunnel operator to observe and monitor the actual traffic condition in the tunnel area at all times and act promptly in response to incidents.

(i) Traffic Control Facilities

Item	New System	Existing System
1) Full Variable Message Sign (FVMS) (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 message to motorists for their timely action.	No such provision.
2) Limited Variable Message Sign (LVMS) (Includes Tunnel Closed/Congested signs and advisory/warning/regulatory signs to effect traffic management schemes.)	Variable message signs to be installed can display additional pre-set messages, e.g. "Tunnel Congested".	Most are light-box type, which can only display limited pre-set information and may be difficult to read in daytime.

Item	New System	Existing System
3) Traffic Light Signal (Installed on approach roads to regulate traffic entering the tunnel and stop over-height vehicles)	Brighter maintenance-free LED type signal will be installed.	Conventional lamp bulb type.
4) Gantry Lane-use Signal (Installed at tunnel approach roads for control of traffic especially during lane or tube closure.)	Brighter maintenance-free LED type signal will be installed.	Non-standard fibre optic signs. These are aged and difficult to read in daytime.
5) Tunnel Lane Control Signal (Installed throughout the tunnel tubes for lane control.)	Brighter maintenance-free LED type signal will be installed.	The existing signals are aged and difficult to read in daytime.

(ii) Traffic Surveillance Facilities

Item	New System	Existing System
1) Automatic Incident Detection System (AIDS) (Monitors the statistical traffic parameters collected from detection stations to determine whether an incident has happened.)	AIDS will be installed to enhance road safety and improve operational efficiency.	No such provision.
2) 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.

(iii) Control Centre 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, implement traffic plans and provides the human-machine interface. It is the core component of the TCSS.)	Traffic management computer will be provided to improve the traffic control and surveillance capability for efficient and error-free operation.	No such provision.
2) Control Console (Houses all control panels and computer terminals of the system to facilitate the operation of the control and surveillance facilities.)	All the control panels and computer terminals would be housed on a single console to facilitate operation.	Composed of control panels of different sub-systems installed at different periods.
3) Wall Map (Gives the tunnel operators an overview of the traffic conditions and operating status of the tunnel. The CCTV monitors and large display units are assembled on a roadmap background for showing the real-time control status of the tunnel.)	Large display units would 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.	No such provision. Currently, only black/white CCTV monitors are provided.

**Tentative Locations of
Full Variable Messages Signs (FVMS)
and Limited Variable Message Signs (LVMS)**

	FVMS	LVMS
Hong Kong side approach roads		
Gloucester Road		
• E/B near Luard Road	(a)	
• E/B near Wan Chai Sports Ground		(b)
• W/B near Percival Street		(c)
• N/B near Kingston Street		(d)
Island Eastern Corridor W/B near Hing Fat Street	(e)	
Fleming Road N/B near Gloucester Road		(f)
Marsh Road S/B near Hung Hing Road		(g)
Morrison Hill Road N/B near Queen's Road East		(h)
Canal Road Flyover N/B near Gloucester Road		(i)
Kowloon side approach roads		
Chatham Road South		
• N/B near Princess Margaret Road/Gascoigne Road	(j)	
• N/B near Hong Chong Road		(k)
Chatham Road North		
• S/B near Fat Kwong Street	(l)	
• S/B near Wuhu Street		(m)
Princess Margaret Road		
• S/B near Oi Man Estate	(n)	
• S/B near Hong Chong Road		(o)

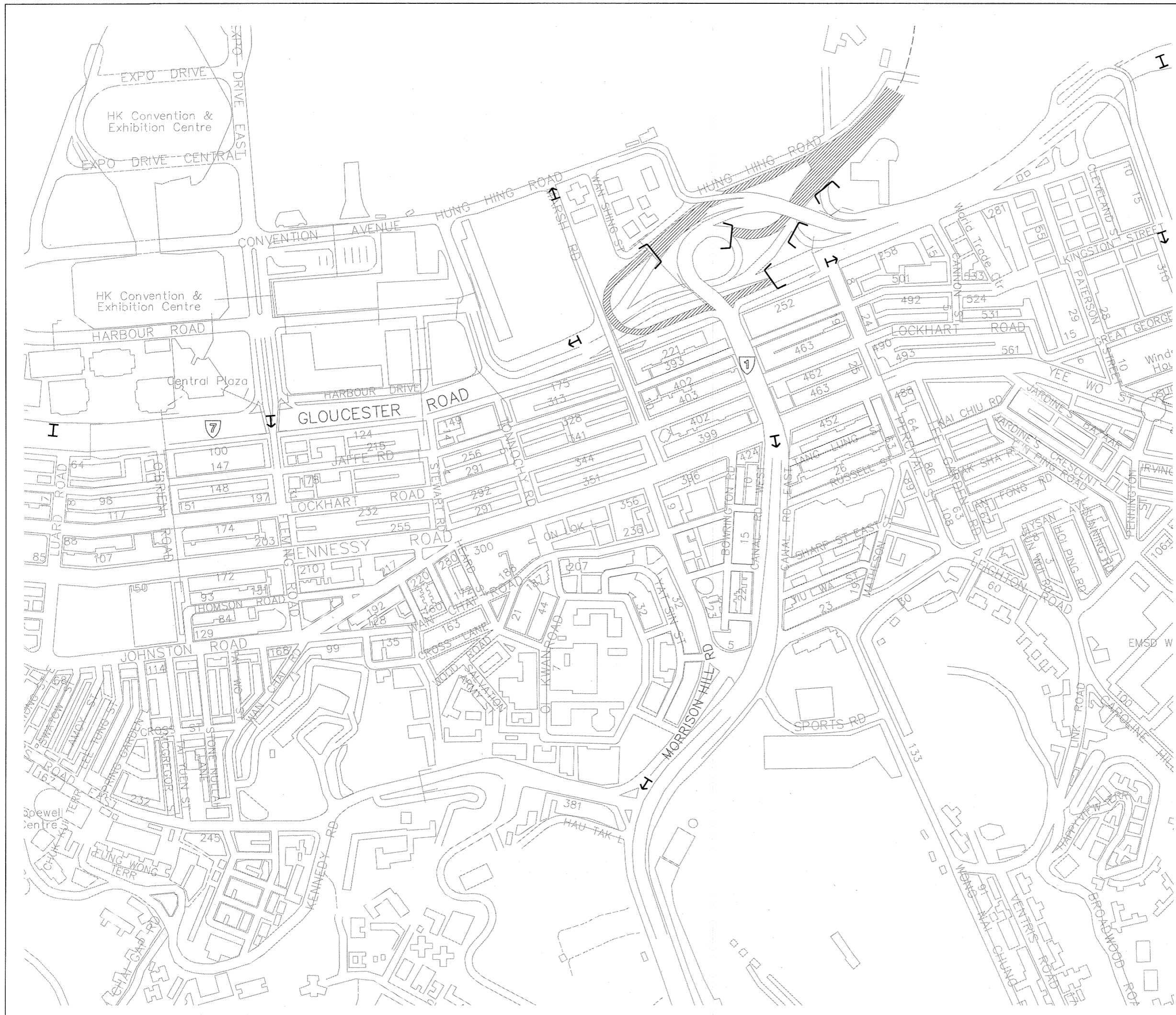
Legend:

E/B – eastbound

W/B – westbound




S/B – southbound

N/B – northbound



NOTES:

LEGEND:

-  PROPOSED LOCATION OF FULL VMS
-  PROPOSED LOCATION OF LIMITED VMS
-  TUNNEL CONTROLLED AREA


no.	date	description	initial
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REVISION

drawn C.S. CHAN  JUN, 2002

checked Y.C. YEUNG  JUN, 2002

approved

Project Engineer: C.Y.HO, JOSEPH (EE/P5/3)  13 Jun 02
Signature Date

contract no. N.A.

file no. EPP-8518

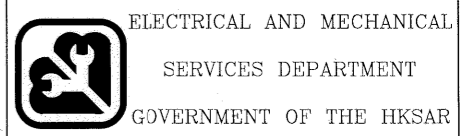
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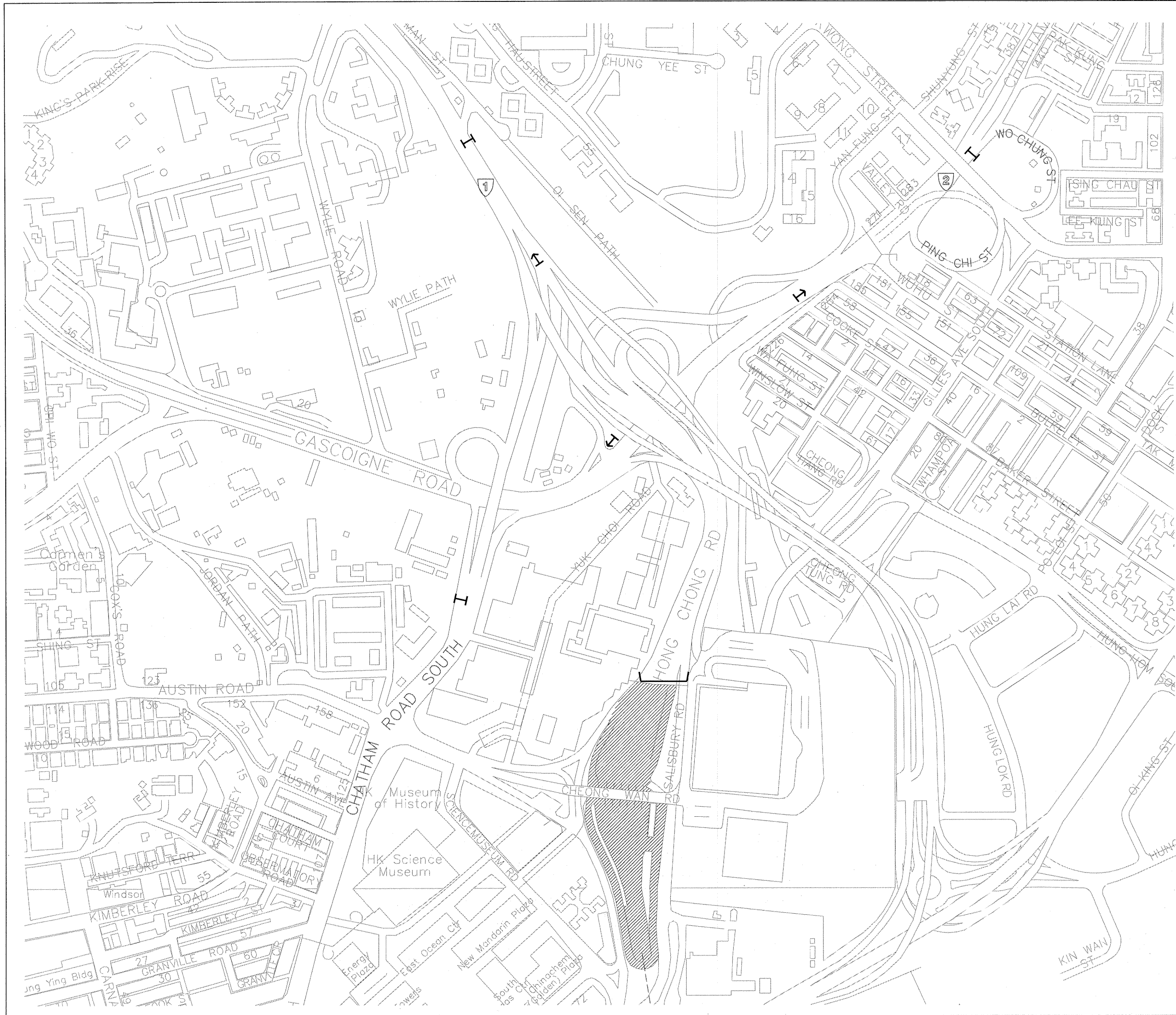
contract
CROSS HARBOUR TUNNEL TCSS

drawing title
TENTATIVE LOCATIONS OF THE FULL VMS AND LVMS FOR CROSS HARBOUR TUNNEL AT SOUTH PORTAL AREA

drawing no.	scale
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


PROJECT DIVISION
ENGINEERING SERVICES BRANCH 1


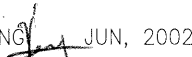





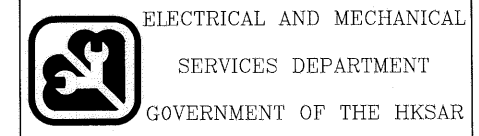
NOTES:

LEGEND:

-  PROPOSED LOCATION OF FULL VMS
-  PROPOSED LOCATION OF LIMITED VMS
-  TUNNEL CONTROLLED AREA

no.	date	description	initial
REVISION			
drawn	C.S. CHAN	JUN, 2002	
checked	Y.C. YEUNG	JUN, 2002	
approved			
Project Engineer : C.Y.HO, JOSEPH (EE/P5/3)		Signature	Date 13 Jun 02
contract no.	N.A.		
file no.	EPP-8518		
project no.	E/PP/8518		
contract	CROSS HARBOUR TUNNEL TCSS		
drawing title			
TENTATIVE LOCATIONS OF THE FULL VMS AND LVMS FOR CROSS HARBOUR TUNNEL AT NORTH PORTAL AREA			
drawing no.	EL(A3)-11367		scale
			1:5000

PROJECT DIVISION
ENGINEERING SERVICES BRANCH 1



Work Programme

	Task Name	Duration (months)	2002		2003		2004		2005		2006		2007	
			1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12
0	Whole Project	50												
1	Traffic & Civil Engineering Study	12												
2	System Engineering Study	12												
3	Detailed Design	11												
4	Pre-qualification	5												
5	Tendering	7												
6	Installation, Testing & Commissioning	22												
7	Defects Liability Period Commencement	12												