

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND

HEAD 710 – COMPUTERISATION

Transport Department

New Subhead “Transport Information System”

HEAD 708 – CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT

Transport Department

New Subhead “Journey Time Indication System”

Members are invited to approve –

- (a) a new commitment of \$63.6 million for the implementation of a Transport Information System; and
- (b) a new commitment of \$20 million for the provision of a Journey Time Indication System.

PROBLEM

In order to meet transport demand in a sustainable manner, there is a need to find ways to maximise the capacity and to enhance the performance of existing transport system in Hong Kong through the application of information technology.

PROPOSAL

2. The Commissioner for Transport, with the support of the Secretary for Transport and in consultation with the Director of Information Technology Services, proposes to establish a Transport Information System (TIS) at an

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estimated cost of \$63.6 million. The TIS will collect, process, analyse and disseminate comprehensive transport information including traffic conditions, progress of road works, traffic diversion measures, public transport services and traffic incidents.

3. In addition, the Commissioner for Transport, with the support of the Secretary for Transport, proposes to provide a Journey Time Indication System (JTIS) at an estimated cost of \$20 million. The JTIS will indicate, by digital displays installed ahead of critical traffic diversion points, to motorists the average journey time of travelling from these points to selected destinations.

JUSTIFICATION

4. Currently, road users are often not aware of road accidents, road works or traffic diversion measures until they are at the spot. This could result in unnecessary congestion. Also, existing transport information, such as public transport routing and services, is mostly paper-based or kept in isolated systems, and we cannot utilise such information for electronic sharing and dissemination.

5. The advance in information and telecommunication technologies, such as the Internet and the forthcoming third generation (3G) mobile phone provides us with opportunity for innovation and improvement in transport management and transport services.

Transport Information System

6. The TIS is a computerised system which integrates transport and traffic data into a common, structured format to enable information sharing and data analysis in a timely and efficient manner. The system will improve efficiency in Transport Department (TD) in providing transport statistics for queries and analysis, and will facilitate transport management. It will also provide accurate, reliable and timely transport and traffic information to the public to enable road users to make better and more informed choice on their transport needs. Furthermore, it will create a conducive environment for private sector to develop value-added transport services in Hong Kong. Under the proposed TIS, all transport and traffic data would be digitised and put into a centralised data warehouse, such that information can be shared among TD offices and that the public can obtain updated transport and traffic information via the Internet or 3G mobile phone.

7. The TIS will be implemented as one project with three phases. Phase I covers the establishment of a data warehouse, development of an intelligent road network and construction of communication network at the TD Headquarters. To develop an intelligent road network, we need to digitise all the traffic and transport information first, such as traffic directions, turning movements at road junctions, stopping restrictions, bus only lanes, etc. The digitised networks and information will then be validated for accuracy. This is the most time-consuming part of the project. Phase I will also include the development of an application interface for public transport users to enquire for public transport services and motorists to enquire for travel route.

8. Phase I will be completed in early 2003. By then, passengers using public transport will have access through the Internet to obtain one-stop information on all public transport services. Information on routes and fares, including options based on price, time and the need to interchange will be provided. Motorists will have access to a travel route finding function. Links to relevant information such as car park or petrol filling station locations can also be provided. This pre-trip planning service encourages better use of public transport and better use of transport facility for motorists.

9. Phase II covers migration of existing data systems within TD. Phase III covers data conversion and networking with other TIS users. This includes the connection and interface development for potential traffic information users, both within the Government (such as Highways Department, Fire Services Department and the Hong Kong Police Force (the Police)) and outside the Government (such as public transport and car park operators). Phases II and III will be completed by mid-2003 and late 2003 respectively.

10. As part of the TIS, real-time traffic information will be made available to government agencies for planning and management of their transport related operations by mid-2003. This will result in more efficient traffic regulation/diversion by the Police and better managed and co-ordinated road works by Highways Department and the utilities companies. With the real-time traffic information, Fire Services Department and the Police will also find it much easier to avoid congestion points when deploying their emergency vehicles.

11. With information from TIS, transport operators including the franchised bus companies, railway companies, tunnel operators and commercial vehicle fleet operators, will be able to adjust their operation readily to cope with

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changes in traffic conditions. In addition, the public transport operators, in implementing their fleet management system, can further develop a passenger information system that provides pre-schedule, real-time scheduling and other related information, such as bus location, bus stop information, occupancy and traffic condition.

12. On the other hand, private sector service providers, using the basic information and the intelligent road network obtainable from the TIS, will be able to develop value-added applications for the public. For example, vehicle manufacturers could make use of the TIS to develop in-vehicle route display units for drivers. Car park operators could develop a parking management system. Dissemination of information on available parking spaces could be made via on-street variable message signs, radio, Internet, in-vehicle navigation units or mobile phones. Also, parking reservation service can be explored. For other non-transport sectors, they could also make use of the TIS to provide tailor-made services to their customers. For example, hotels could use the system to design specific tour packages for their customers. Restaurant operators could also use the system to provide route guidance and parking reservation for customers going to their restaurants.

Journey Time Indication System

13. Apart from setting up the TIS, we also plan to implement a JTIS to provide motorists on the move with the means of obtaining up-to-date traffic information. The purpose of JTIS is to convey to motorists real-time traffic conditions of different cross-harbour routes from Hong Kong Island to Kowloon so that they could make more informed choice on their cross harbour routing well ahead of critical diversion points.

14. The JTIS will be implemented in phases. The initial phase will be completed in early 2003. This involves the installation of digital indicators ahead of the three cross-harbour tunnels and associated approach roads on the Hong Kong side. The tentative locations are Canal Road Flyover northbound, Gloucester Road eastbound and Island Eastern Corridor westbound.

15. Subject to satisfactory performance, the system will be extended to major approach roads on the Kowloon side, and subsequently to other tunnels and the associated approach roads under different projects.

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BENEFITS

16. With the establishment of a comprehensive central database and digitisation of transport information under the TIS, TD could respond to data queries and other public services in a much more accurate, reliable and timely manner without additional staff. It is estimated that if similar functions and services were to be provided without TIS, it would require additional staff with an annual recurrent costs of about \$59 million. Moreover, without the proposed information system, some of the functions cannot be performed manually and the quality of service will be much lower.

Economic Benefits

17. For TIS, the total economic benefits amount to some \$280 million. At present, there are 1.34 million private vehicle trips made every weekday, among which 0.93 million trips are non-regular trips. When the route guidance service is available to the public, it is expected that the travelling time of 5% of these non-regular trips could be saved by five minutes per trip. Using the surveyed values of time from the Third Comprehensive Transport Study completed in 1999, this would represent an annual saving of about \$100 million.

18. Likewise, there are 9.89 million public transport trips (excluding taxi trips) made every weekday, among which 4.33 million trips are made by non-regular travellers. With the availability of public transport enquiry service under the TIS, it is expected that an average of three minutes per trip for 5% of these non-regular travellers could be saved. This would represent an annual saving of about \$180 million.

19. For JTIS, there are about 260 000 passenger trips crossing the harbour from Hong Kong Island to Kowloon side during the peak hours every day. It is expected that the travelling time of 5% of these trips could be saved by three minutes per trip, which would represent an annual saving of about \$11 million.

Other Benefits

20. Besides savings in travelling time, a more efficient transport system enabled by the trip planning service can offer other indirect benefits such as lower vehicle operating costs due to avoidance of congestion, improved safety, lower total vehicle emissions, more efficient use of parking facilities and better image of Hong Kong's transport system.

21. Online access of up-to-date or real-time information in TIS to other government agencies will forge government-wide co-ordination. The interaction will include co-ordination with Highways Department in the maintenance programme and strategic project implementation and co-ordination between the Police and the Fire Services Department during a major incident or special event.

22. Following the implementation of the TIS infrastructure, private sector companies can make use of the TIS to develop and deliver Intelligent Transport Systems (ITS) applications, such as in-vehicle navigation, parking management, fleet and freight management and real-time traffic reporting services. ITS applications in Hong Kong can be nurtured with private funding with only minimal development and maintenance costs to Government.

COST AND BENEFIT ANALYSIS

Encls. 1 & 2 23. The cost and benefit analysis for the TIS and JTIS is at Enclosures 1 and 2 respectively. Based on the analysis, it shows significant economic benefits in terms of time saving from travel alone, and that the TIS and JTIS will break even in 2004-05 and 2005-06 respectively.

24. There will also be considerable indirect social and environmental benefits through reduction in congestion and pollution emission as a result of timely dissemination of transport and traffic information to the public through TIS and ITS applications.

FINANCIAL IMPLICATIONS

Non-recurrent Cost

Transport Information System

25. The total non-recurrent cost for implementing TIS is estimated to be \$69,430,000. The breakdown of the costs and cashflow is as follows -

	2001-02	2002-03	2003-04	Total
	\$'000	\$'000	\$'000	\$'000
Non-recurrent expenditure				
(a) Computer hardware, software and networking equipment	0	1,878	7,512	9,390
				/(b)

	2001-02	2002-03	2003-04	Total
	\$'000	\$'000	\$'000	\$'000
Non-recurrent expenditure				
(b) Implementation services	360	30,276	14,774	45,410
(c) Miscellaneous	500	1,500	1,000	3,000
(d) Contingencies	86	3,385	2,329	5,800
Sub-total	946	37,039	25,615	63,600
Non-recurrent staff cost				
(e) TD staff cost	338	1,357	3,559	5,254
(f) Information Technology Services Department (ITSD) staff cost	72	288	216	576
Sub-total	410	1,645	3,775	5,830
Total	1,356	38,684	29,390	69,430

26. As regards paragraph 25(a), the cost of \$9,390,000 is for the acquisition of computer hardware, software, network equipment and data communication lines as well as facilities for disaster recovery.

27. As regards paragraph 25(b), the cost of \$45,410,000 is for the acquisition of professional services to support the tendering exercise, system development and implementation. These include project management, system design and implementation, data warehouse construction as well as data standardisation and communication services.

28. As regards paragraph 25(c), the cost of \$3,000,000 is for site preparation, acquisition of start-up consumables and training for the staff of TD in using the new system.

29. As regards paragraph 25(d), the cost of \$5,800,000 represents a 10% contingency on the cost items set out in paragraphs 25(a) to (c).

30. As regards paragraph 25(e), the cost of \$5,254,000 represents 66 man-months of TD staff resources required to support the tendering process and system implementation. These include one man-month of Assistant Commissioner for Transport, three man-months of Chief Engineer, ten man-months of Senior Engineer, 16 man-months of Engineer, six man-months of Senior Technical Officer and 30 man-months of Technical Officer. TD will meet the staffing requirements by redeployment of existing resources.

31. As regards paragraph 25(f), the cost of \$576,000 represents the resources from ITSD. These include four man-months of one Senior Systems Manager for technical and information technology policy advice during tendering, system development and implementation. ITSD will meet the staffing requirements by redeployment of existing resources.

Journey Time Indication System

32. The total non-recurrent expenditure for implementing JTIS is estimated to be \$20 million, made up of -

	2001-02	2002-03	Total
	\$'000	\$'000	\$'000
(a) Electronic, electrical and mechanical equipment	750	11,350	12,100
- traffic monitoring stations	0	4,800	4,800
- computer hardware and software	500	3,000	3,500
- journey time indicators	0	2,000	2,000
- control console	0	700	700
- cable and accessories	250	850	1,100
(b) Related civil and building services works	300	3,500	3,800
(c) Project management charges by Electrical and Mechanical Services Trading Fund (EMSTF)	1,250	1,250	2,500
(d) Contingencies	100	1,500	1,600
Total	2,400	17,600	20,000

33. The non-recurrent staff cost for implementing JTIS is negligible and will be absorbed by TD.

34. As regards paragraph 32(a), the cost of \$12,100,000 is for the supply, installation, testing and commissioning of the new system comprising vehicle detection equipment for traffic monitoring, computer hardware and software and ancillary data communications equipment, digital display devices for display of journey times and a control console.

35. As regards paragraph 32(b), the cost of \$3,800,000 is for the related civil works such as provision of cable ductworks, gantry mounting for journey time indicators and associated fixed signs, as well as necessary building services works for installation of the computer hardware and the control console at a control centre.

36. As regards paragraph 32(c), the cost of \$2,500,000 is for the project management and system design charges by EMSTF which is about 16% of the equipment installation and civil and building services works.

37. As regards paragraph 32(d), the cost of \$1,600,000 represents a 10% contingency on the cost items set out in paragraph 32(a) to (b).

Recurrent Cost

Transport Information System

38. The estimated recurrent expenditure for maintaining and supporting TIS is as follows -

	2003-04	2004-05
	\$'000	\$'000
(a) System and technical support services	-	5,000
(b) Maintenance of hardware, system and application software	1,000	2,520
(c) Training and miscellaneous	1,300	1,300
Sub-total	2,300	8,820
(d) TD staff cost	<u>8,771</u>	<u>8,771</u>
Total	<u>11,071</u>	<u>17,591</u>

39. As regards paragraph 38(a), the expenditure of \$5,000,000 is for outsourcing of on-going technical support services for system, database management, network and communication system as well as the support services for system performance management and system disaster recovery.

40. As regards paragraph 38(b), the expenditure of \$2,520,000 is for the maintenance of hardware, system and application software, networking equipment.

41. As regards paragraph 38(c), the expenditure of \$1,300,000 is for the training of new TD staff on applications, the rental costs of the facilities and communication lines and purchase of consumables such as tapes, disks and printer toners.

42. As regards paragraph 38(d), the expenditure of \$8,771,000 represents staff cost of one man-month of Assistant Commissioner for Transport, four man-months of Chief Engineer, 13 man-months of Senior Engineer, 27 man-months of Engineer, 27 man-months of Senior Technical Officer, 12 man-months of Transport Officer I and 27 man-months of Technical Officer (Traffic). The duties of these staff are for business function and applications development and validation as well as routine system operation and maintenance. TD will meet the staffing requirements by redeployment of existing resources.

Journey Time Indication System

43. The estimated recurrent expenditure for maintaining and supporting JTIS is as follows -

	2003-04 onwards \$'000
(a) Rental of communication lines	300
(b) System maintenance	1,000
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Total	1,300
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44. The recurrent staff cost for maintaining and supporting JTIS is negligible and will be absorbed by TD.

45. As regards paragraph 43(a), the expenditure of \$300,000 is for the rental charge of fixed data services provided by telecommunication network operators for data communications between the traffic monitoring stations and the central computer system.

46. As regards paragraph 43(b), the expenditure of \$1,000,000 is for the maintenance of hardware, software and communication network equipment.

Implementation Plan

47. We plan to implement the proposed TIS in phases, as follows -

Activity	Target completion date		
	Phase I	Phase II	Phase III
(a) Tendering for implementation of TIS	December 2001		
(b) System analysis & design	June 2002		
(c) Development and implementation	March 2003	June 2003	September 2003
(d) System testing and user training	June 2003	September 2003	December 2003
(e) Live run	June 2003	September 2003	December 2003
(f) System nursing	September 2003	December 2003	June 2004

48. For the JTIS, the implementation plan is as follows -

Activity	Target completion date
(a) Technology evaluation	June 2001
(b) System design	October 2001
(c) Tendering	March 2002
(d) Construction	December 2002
(e) System testing and commissioning	February 2003

BACKGROUND INFORMATION

49. TD initiated an in-house ITS Strategy Review Study in May 2000 to develop a long-term ITS deployment plan. The Study examined the technical, administrative and financial requirements of implementing an ITS Strategy in Hong Kong to ensure that different systems developed under the Strategy are compatible and co-ordinated, and that seamless integrated services can be provided to all road users effectively and efficiently.

50. The ITS Strategy Review Study was completed in early 2001. It recommends the establishment of a TIS and the adoption of a new Traffic Management Framework to improve the situation. It further suggests that the private sector be encouraged to make use of these systems to provide tailor-made services to individual road users. We consulted the Transport Advisory Committee on 27 February 2001 on the proposals of the Study and the Committee was supportive of these proposals. We also consulted the Legislative Council (LegCo) Panel on Transport on 16 March 2001 on the proposed ITS Strategy. Members generally supported the deployment of advanced technologies to enhance the provision of transport information and traffic management, but considered that the proposed implementation programme was too conservative and should be advanced as far as possible.

51. We circulated a paper on the implementation of TIS/JTIS to the LegCo Panel on Transport on 27 April 2001. The Panel discussed the paper on 18 May 2001. The Panel in general supported the implementation of TIS/JTIS but asked for supplementary information on the costs and benefits analysis, the experience of the implementation of similar systems overseas, and the channels of dissemination of information under the TIS. A note containing the information requested will be issued to Members before the Finance Committee meeting to be held on 25 May 2001.

Transport Bureau
May 2001

**Cost-benefit analysis of the Transport Information System
(at 2001-02 prices)**

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	TOTAL
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
I. COST											
<i>Non-recurrent</i>											
Expenditure	946	37,039	25,615	-	-	-	-	-	-	-	63,600
Staff	410	1,645	3,775	-	-	-	-	-	-	-	5,830
Sub-total	1,356	38,684	29,390	-	-	-	-	-	-	-	69,430
<i>Recurrent</i>											
Expenditure	-	-	2,300	8,820	8,820	8,820	8,820	8,820	8,820	8,820	64,040
Staff	-	-	8,771	8,771	8,771	8,771	8,771	8,771	8,771	8,771	70,168
Sub-total	-	-	11,071	17,591	17,591	17,591	17,591	17,591	17,591	17,591	134,208
Total Cost	1,356	38,684	40,461	17,591	17,591	17,591	17,591	17,591	17,591	17,591	203,638
II. BENEFIT											
<i>Staff cost avoidance</i> ^{Note 1}	-	-	5,886	17,657	35,314	47,086	58,857	58,857	58,857	58,857	341,371
<i>Economic benefit</i> ^{Note 2}	-	-	28,230	84,690	169,380	225,840	282,300	282,300	282,300	282,300	1,637,340
Total Benefit	-	-	34,116	102,347	204,694	272,926	341,157	341,157	341,157	341,157	1,978,711
III. NET BENEFIT/COST	(1,356)	(38,684)	(6,345)	84,756	187,103	255,335	323,566	323,566	323,566	323,566	1,775,073
IV. CUMULATIVE BENEFIT	(1,356)	(40,040)	(46,385)	38,371	225,474	480,809	804,375	1,127,941	1,451,507	1,775,073	

Notes –

Note 1: 110 additional posts (including 2 Senior Engineers, 6 Engineers, 3 Transport Officers I, 24 Senior Technical Officers, 62 Technical Officers and 13 Assistant Clerical Officers) with an annual staff cost of about \$59 million will be required to undertake similar functions and services without TIS. It is also assumed that the requirement of staffing resources will increase in percentage of 10%, 30%, 60%, 80% and 100% to support the services similar to that provided by TIS.

Note 2: The economic benefits are derived from travel time savings enjoyed by the general public including public transport passengers, commercial vehicles, pedestrian and motorists as presented in paragraphs 17 and 18 of the paper. The total benefits amount to some \$280 million, comprising \$100 million from savings in private vehicle trips and \$180 million in public transport trips, detailed as follows –

- (a) The weighted average of Value of Time of motorists on non-regular trips = \$1.7/min. Based on 250 work days annually, annual benefits accrued from motorists = $930\,000 \text{ trips} \times 5\% \times 5\text{min} \times \$1.7 \times 250 = \$98,812,500$ (say \$100 million).
- (b) The weighted average of Value of Time of public transport passengers on non-regular trips = \$1.13/min. Based on 250 work days annually, annual benefits accrued from passengers = $4\,330\,000 \text{ trips} \times 5\% \times 3\text{min} \times \$1.13 \times 250 = \$183,483,750$ (say \$180 million).

It is also assumed that the net effective benefit will increase in percentage of 10%, 30%, 60%, 80% and 100% with the maturity and increasing popularity of the system during the ensuing years from commissioning. According to overseas experience, full benefits will be achieved in five years' time.

**Cost-benefit analysis of the Journey Time Indication System
(at 2001-02 prices)**

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	TOTAL
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
I. COST											
<i>Non-recurrent</i>	2,400	17,600	-	-	-	-	-	-	-	-	20,000
<i>Recurrent</i>	-	-	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	10,400
Total Cost	2,400	17,600	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	30,400
II. BENEFIT											
<i>Economic Benefit</i> ^{Note 1}	-	-	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	88,000
Total Benefit	-	-	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	88,000
III. NET BENEFIT/COST	(2,400)	(17,600)	9,700	9,700	9,700	9,700	9,700	9,700	9,700	9,700	57,600
IV. CUMULATIVE BENEFIT	(2,400)	(20,000)	(10,300)	(600)	9,100	18,800	28,500	38,200	47,900	57,600	

Note 1: The weighted average of Value of Time of all vehicle types during peak hours = \$1.17/min. Based on 250 work days annually, annual benefits accrued from motorists and passengers = 260 000 trips x 5% x 3min x \$1.17 x 250 = \$11,407,500 (say \$11 million). Unlike the economic benefits gained in phases (i.e. from 10% in year 1 to 100% in year 5) in the implementation of TIS, it is expected that the economic benefits of the implementation of the JTIS can be fully realised from the first year of operation as road users are able to get instant and full benefits once the digital indicators are installed.

