For discussion **PWSC(2002-03)30**
on 22 May 2002

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 706 - HIGHWAYS
Transport - Roads
694TH – Route 9 between Cheung Sha Wan and Sha Tin

Members are invited to recommend to Finance Committee the upgrading of **694TH** to Category A at an estimated cost of $6,759.7 million in money-of-the-day prices.

PROBLEM

The existing capacity of Lion Rock Tunnel, Tate's Cairn Tunnel, Tai Po Road and Shing Mun Tunnel cannot cope with the present and growing traffic demand.

PROPOSAL

2. The Director of Highways, with the support of the Secretary for Transport, proposes to upgrade **694TH** to Category A at an estimated cost of $6,759.7 million in money-of-the-day (MOD) prices for the construction works of Route 9 between Cheung Sha Wan and Sha Tin (Route 9-CSWST).

PROJECT SCOPE AND NATURE

3. The scope of works of **694TH** includes –

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(a) Lai Chi Kok Viaduct – a 1.4-kilometre (km) dual three-lane elevated carriageway from Lai Wan Interchange to Butterfly Valley. It connects to another section of Route 9 between Tsing Yi and Cheung Sha Wan (Route 9-TYCSW), with slip roads connecting to Lai Wan Interchange and Ching Cheung Road;

(b) a 0.5-km dual three-lane carriageway within Butterfly Valley;

(c) Eagle's Nest Tunnel – a 2.1-km dual three-lane tunnel under the Eagle's Nest;

(d) a toll plaza at the valley of Sha Tin Heights;

(e) Sha Tin Heights Tunnel – a one-km dual three-lane tunnel under Sha Tin Heights;

(f) Sha Tin Heights Tunnel Approach – a 0.6-km dual two-lane tunnel approach road in Tai Wai connecting to the proposed Road T3, with slip roads connecting to Che Kung Miu Road (Che Kung Miu Road Slip Roads);

(g) some 6.5 km of noise barriers, including about 4.8 km of vertical barriers ranging from three to seven metres high, about 0.8 km of semi-enclosures and about 0.9 km of full enclosures; and

(h) associated traffic control and surveillance system, electrical and mechanical, building, drainage, landscaping and geotechnical works.

A layout plan and typical sections of the Route 9-CSWST are at Enclosures 1 and 2 respectively.

4. We have substantially completed the detailed design and working drawings for the project. We plan to commence construction of **694TH** in October 2002 for completion in April 2007.

JUSTIFICATION

5. Route 9 is a trunk road linking Lantau and Sha Tin via Tsing Yi and

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West Kowloon. The North Lantau Highway and Lantau Link, completed in 1997, form the existing sections of the Route. The remaining two sections to be built are Route 9-TYCSW (which was partly upgraded to Category A in July 2001 as **757TH**[1], with the remainder in Category B under **711TH**[1]) and Route 9-CSWST (the subject of this paper). Upon completion of these two sections, Route 9 will provide a direct route between the airport at Chek Lap Kok and the North East New Territories via Tsing Yi and Cheung Sha Wan. Route 9-CSWST will provide a strategic road link between Cheung Sha Wan in West Kowloon and Tai Wai in Sha Tin.

6. At present, traffic congestion occurs at existing road links between Kowloon and Sha Tin, in particular Lion Rock Tunnel and Tate's Cairn Tunnel, during morning peak hours. To alleviate traffic congestion, we need to construct Route 9-CSWST to provide an additional road link between Kowloon and Sha Tin. The findings of the latest Strategic Highway Project Review carried out in 2001-02 (the Review) confirmed that Route 9-CSWST will be required by 2007. According to the latest traffic forecast, the peak hour volume to capacity (V/C) ratios[2] at critical sections of the relevant road links, with or without the proposed project, are as follows –

Year / Road Link	2002	2007		2011		2016	
	Without	Without	With	Without	With	Without	With
Route 9-CSWST	-	-	0.6	-	0.6	-	0.7
Lion Rock Tunnel	1.2	1.3	1.1	1.3	1.1	1.3	1.1
Tate's Cairn Tunnel	1.2	1.1	1.0	1.1	1.0	1.2	1.1
Tai Po Road	0.9	1.0	0.8	1.0	0.8	1.1	0.9
Shing Mun Tunnel	1.0	1.1	0.8	1.2	0.9	1.2	0.9

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[1] Route 9-TYCSW was partly upgraded to Category A in July 2001 as 757TH entitled "Route 9-TYCSW-Ngong Shuen Chau Viaduct and the associated works" at an estimated cost of $3,650 million in MOD prices. We commenced the construction works of the Route 9-TYCSW in April 2002 for completion in December 2007. The remaining part of Route 9-TYCSW is in Category B under 711TH "Route 9-TYCSW – remaining works", with an estimated cost of $7,591 million in September 2001 prices. A separate submission is made at the same meeting under PWSC(2002-03)31 for upgrading 711TH to Category A.

[2] Volume to capacity (V/C) ratio is an indicator which reflects the performance of a road. A V/C ratio equal to or less than 1.0 means that a road has sufficient capacity to cope with the volume of vehicular traffic under consideration and the resultant traffic will flow smoothly. A V/C ratio above 1.0 indicates the onset of congestion; that above 1.2 indicates more serious congestion with traffic speeds progressively deteriorating with further increase in traffic.

7. In the absence of Route 9-CSWST, the major external links of Sha Tin including Lion Rock Tunnel, Tate's Cairn Tunnel, Shing Mun Tunnel and Tai Po Road, which are already experiencing congestion or operating near full capacity at peak hours, would be operating at or above their capacities in future years. Lion Rock Tunnel would be operating at a high V/C ratio of around 1.3 during the peak hours. With the opening of Route 9-CSWST, the road conditions would be greatly improved with the V/C ratios on most of the concerned roads reduced to within their capacities. Although the utilisation of the popular Lion Rock Tunnel would remain at a high level, its V/C ratio at the peak hours could be improved from the heavily congested level of 1.3 to around 1.1. Route 9-CSWST itself would be well utilised with a peak V/C ratio of 0.7 in 2016. The Review indicates that a dual three-lane configuration of the project is appropriate for meeting the future traffic demand and relieving traffic pressure on the existing external road corridors from Sha Tin to the urban areas and the container ports in Kwai Chung/Tsing Yi.

FINANCIAL IMPLICATIONS

8. We estimate the cost of this project to be $6,759.7 million in MOD prices, made up as follows –

			$ million
(a)	Roads and drains of about 3.8 km		781.5
(b)	Elevated highway structures		958.4
	(i) Lai Chi Kok Viaduct	836.6	
	(ii) Che Kung Miu Road Slip Roads	121.8	
(c)	Tunnels		2,425.3
	(i) Eagle's Nest Tunnel	1,685.2	
	(ii) Sha Tin Heights Tunnel	740.1	

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(d)	Environmental mitigation measures		423.8	
	(i) noise barriers	416.6		
	(ii) low noise road surfacing	7.2		
(e)	Landscaping works		43.9	
(f)	Electrical and mechanical works		993.0	
(g)	Consultants' fees		698.9	
	(i) supervision of construction and administration of contract	39.6		
	(ii) site staff costs	619.9		
	(iii) environmental monitoring and audit[3] (EM&A) programme	24.4		
	(iv) Electrical and Mechanical Services Trading Fund (EMSTF) charges	15.0		
(h)	Contingencies		546.0	
	Sub-total		6,870.8	(in September 2001 prices)
(i)	Provision for price adjustment		(111.1)	
	Total:		6,759.7	(in MOD prices)

[3] We will engage consultants to implement an environmental monitoring and audit (EM&A) programme for the project at an estimated cost of $24.4 million to ensure timely and effective implementation of the recommended mitigation measures for the project.

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A breakdown by man-months of the estimates for consultants' fees is at Enclosure 3.

9. Subject to approval, we will phase the expenditure as follows -

Year	$ million (Sep 2001)	Price Adjustment Factor	$ million (MOD)
2002 – 2003	143.5	0.98625	141.5
2003 – 2004	662.1	0.98378	651.4
2004 – 2005	1,643.9	0.98378	1,617.2
2005 – 2006	2,590.7	0.98378	2,548.7
2006 – 2007	979.4	0.98378	963.5
2007 – 2008	547.6	0.98378	538.7
2008 – 2009	303.6	0.98378	298.7
	6,870.8		6,759.7

10. We have derived the MOD estimate on the basis of the Government's latest forecast of trend labour and construction prices for the period 2002 to 2009. We will tender the proposed works under standard remeasurement contracts because the quantities of foundation and earthworks involved may vary according to the actual ground conditions. The contracts will provide for price adjustments as the construction period will exceed 21 months.

11. We estimate the annual recurrent expenditure arising from this project to be $92.5 million.

PUBLIC CONSULTATION

12. We consulted the then Sha Tin Provisional District Board (PDB) on the Route 9-CSWST project on 23 January 1998 and 27 March 1998. Members supported the road scheme and remarked that adequate noise mitigation measures

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should be incorporated into the road scheme to minimize disturbance to residents nearby. We incorporated all the noise mitigation measures recommended in the Environmental Impact Assessment (EIA) Report into the project. We presented the latest development of the project to the Traffic and Transport Committee (T&TC) of the Sha Tin District Council on 13 November 2001. Members had no objection to the project.

13. We consulted the then Kwai Tsing PDB on 8 July 1999. Members had no in-principle objection to the alignment design, and indicated the wish to discuss the detailed implementation of the road scheme. On 24 January 2002, we presented the detailed implementation of the road scheme with the latest development of the project to the Kwai Tsing District Council. Members had no objection to the project.

14. We consulted the Environmental Committee and T&TC of the then Sham Shui Po PDB on 8 July and 29 July 1999 respectively. Members endorsed the implementation of the road scheme. We presented the latest developments of the project to the Traffic Committee of the Sham Shui Po District Council in May 2000 and again in January 2002. Members had no comments on the project.

15. We gazetted the road scheme of Route 9-CSWST under the Roads (Works, Use and Compensation) Ordinance on 21 July 2000 and received a total of 68 objections. Two objections were withdrawn unconditionally. One objector was concerned about the safety hazard imposed by the project on his gas offtake station. He subsequently withdrew his objection on the understanding that the Administration would implement a package of safety measures to protect the safety of the station. Details of the unresolved objections are as follows –

(a) 62 objectors were concerned about the clearance and re-housing of and compensation for their residential dwellings. 61 of them were residents of Wai Man Tsuen and they requested the Administration to revise the proposed road alignment to avoid Wai Man Tsuen. We explained to them that the clearance of Wai Man Tsuen had to be undertaken in accordance with the policy to clear all cottage areas and not because of the Route 9 project. We only make use of the cleared area for the construction of Route 9. We also explained to the objectors in detail the clearance, re-housing as well as compensation policy and arrangement and agreed to

meet their re-housing requests as far as possible. However, according to legal advice and court ruling, their dwellings were on government land. Hence, no compensation would be payable to the residents for the housing structures upon clearance. The objectors maintained their objections;

(b) one objector was concerned that the remaining unresumed portion (the remaining portion) of an agricultural lot with cultivation would become unusable after resumption. He requested the Administration to resume the whole lot, or else to re-provide access and agricultural facilities and provide utility supplies to the remaining portion. We explained that the proposed portion of land for resumption would adequately serve the project needs and there was no ground to extend the resumption limit. We agreed to re-provide access to the remaining portion and grant ex-gratia allowance for his agricultural facilities affected by the resumption. The objector himself could then arrange the necessary facilities and utility supplies for the remaining portion. The objector maintained his objection; and

(c) two objectors were concerned about the environmental impacts of the project on their residential estates. One objector requested the Administration to adopt an alternative road alignment. We explained that the current alignment was chosen as the preferred routing for the community at large after careful consideration of a number of options. We also detailed the environmental mitigation measures that we would implement in order to reduce the environmental impacts to within acceptable levels. He maintained his objection. Another objector requested the Administration to lower a section of slip roads by two metres, provide landscaping on the road side slope adjacent to his residential estate, ban heavy vehicles from using Tai Po Road after the project was opened to traffic, and provide noise enclosure on a section of the project. We proposed to lower the slip road by 1.4 metres at the location requested by the objector since a lowering of two metres was impracticable due to

geometric constraints. The concerned slope would be extensively landscaped. For the traffic volume on Tai Po Road, we expected that there would be a substantial decrease upon the opening of Route 9. We would closely monitor the traffic situation afterwards to see if further traffic management measures are warranted. We also proposed to adopt a noise enclosure as requested. The objector maintained his objection.

16. On 10 July 2001, the Chief Executive-in-Council authorised the project with modifications as set out in paragraph 15(b) and (c) above.

17. We consulted the Legislative Council Panel on Transport on 7 May 2001 regarding the proposed Route 9-TYCSW and Route 9-CSWST. Members supported the project but requested additional information on the updated cost breakdown, contract packages, additional traffic forecast, noise impact (in particular on the residential development in the Sha Tin area), tolling strategy for the whole Route 9, and details of the objections raised under the Roads (Works, Use and Compensation) Ordinance for the latter section. We issued a supplementary paper to Members on 31 May 2001 providing the above information.

ENVIRONMENTAL IMPLICATIONS

18. The Route 9-CSWST project is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance. We employed a consultant to conduct an EIA during the preliminary design stage to identify and assess the potential environmental impacts arising from the project. The EIA identified noise, air quality and ecological impacts being the major concerns. We propose a package of mitigation measures to address these impacts, highlighted as follows –

(a) installing vertical noise barriers ranging from three to seven metres high, semi-enclosures and full enclosures along most of the open carriageway section of the Route 9-CSWST to protect noise sensitive receivers in the vicinity of the route. These direct mitigation measures will help contain the noise level to an acceptable standard;

(b) fully ventilating the two tunnels (i.e. Eagle's Nest Tunnel and Sha Tin Heights Tunnel) to cater for both normal operation and emergency situation. In particular, as the south portal of the Eagle's Nest Tunnel is situated in an area more sensitive to adverse air quality, we need an extra ventilation building midway to divert the vehicle emission away from the south portal in order to avoid exceeding the air pollutant standard;

(c) re-planting to compensate for trees felled due to the project. Extensive re-planting will be carried out within the works limit, and native tree species will be used to re-establish the woodland habitat; and

(d) providing vast amount of soft and hard landscaping works along the route to enhance the appearance of the surrounding areas.

19. The Advisory Council on the Environment endorsed the EIA Report for the project without conditions on 1 November 1999. The Director of Environmental Protection (DEP) subsequently approved the EIA Report on 5 November 1999 under the EIA Ordinance. The Environmental Permits to construct and operate the project were issued by DEP on 17 September 2001 and 4 October 2001 for the Kowloon Section and the Sha Tin Section respectively.

20. Tunnel excavation and road formation works would produce construction and demolition (C&D) materials, both rock and soil. The design has maximised the reuse of these materials on site, e.g. used as fill for road embankments in tunnel approaches and toll plaza. We estimate that the project will generate about 2 582 000 cubic metres (m^3) of C&D materials. Of these, we will reuse about 1 141 000 m^3 (44.2%), about 160 000 m^3 (6.2%) for seawall construction in other works projects, about 282 000 m^3 (10.9%) as fill in public filling areas[4], dispose of about 994 000 m^3 (38.5%) to commercial quarries, and about 5 000 m^3 (0.2%) at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be $625,000 for this project (based on a

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[4] A public filling area is a designated part of a development project that accepts public fill for reclamation purposes. Disposal of public fill in a public filling area requires a licence issued by the Director of Civil Engineering.

notional[5] unit cost of $125/m^3$).

21. We shall require the contractors to submit waste management plans (WMPs) for approval. The WMPs shall include appropriate mitigation measures such as the identification of designated areas for waste segregation prior to disposal. We shall require the contractors to ensure that the day-to-day operations on site comply with the approved WMPs. We shall control the disposal of the C&D materials at designated public filling facilities, landfills and quarries through a trip-ticket system. We will record the disposal, reuse and recycling of C&D materials for monitoring purposes. To further minimize the generation of C&D materials, we will encourage the contractor to use non-timber formwork and recyclable materials for temporary works. We will maximize the use of recycled aggregates and rock products in the permanent works.

LAND ACQUISITION

22. We will resume 11 577 square metres (m^2) of agricultural land and create permanent rights of 1 999 m^2. Land acquisition and clearance will affect 96 households and 316 structures. The Director of Housing will offer eligible clearees accommodation in public housing or interim housing in accordance with the existing housing policy. We will charge the land acquisition and clearance costs, estimated to be $60.7 million (in September 2001 prices), to **Head 701** "Land Acquisition" **Subhead 1100CA** "Compensation and ex-gratia allowances in respect of projects in the Public Works Programme".

BACKGROUND INFORMATION

23. We upgraded **694TH** to Category B in October 1996.

24. We upgraded part of **694TH** to Category A as **699TH** "Route 16 from West Kowloon to Sha Tin – investigation" (Route 16 is now renamed as Route 9) in March 1997 at an estimated cost of $15.5 million in MOD prices and engaged consultants in March 1997 to undertake the detailed investigation of the project. We further upgraded another part of the project to Category A as **717TH** "Route 16 from West Kowloon to Sha Tin – detailed design" in February 1998 at

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[5] This estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at $90/m^3$), nor the cost to provide new landfills (which are likely to be more expensive) when the existing ones are filled. The notional cost estimate is for reference only and does not form part of this project estimate.

an estimated cost of $263.0 million in MOD prices and engaged consultants to undertake the detailed design in June 1998. We again upgraded part of **694TH** to Category A as **760TH** "Route 9 between Cheung Sha Wan and Sha Tin – Enabling Works" in November 2001 at an estimated cost of $45.7 million in MOD prices for the entrustment of the construction of ten piers of a section of the Che Kung Miu Road Slip Roads to Kowloon-Canton Railway Corporation.

25. We have substantially completed the detailed design and working drawings for the works of the project. We plan to commence works in October 2002 for completion in April 2007.

26. To minimize disruption to traffic, we will carry out temporary traffic diversion arrangements as and when required. We will consult the relevant District Councils on major temporary traffic diversion arrangements before their implementation.

27. We estimate that this project will create some 2 160 jobs comprising 370 professional/technical staff and 1 790 labourers, totalling 85 500 man-months.

Transport Bureau
May 2002

Enclosure 3 to PWSC(02-03)30

694TH – Route 9 between Cheung Sha Wan and Sha Tin

Breakdown of the estimates for consultants' fees (at September 2001 prices)

Consultants' staff costs			Estimated man-months	Average MPS* salary point	Multiplier	Estimated fee ($ million)
(a) Consultants' fees for						
(i)	Supervision of construction and adminstration of contract	Professional	213	38	2.4	30.9
		Technical	186	14	2.4	8.7
(ii)	Resident site staff	Professional	2700	38	1.7	277.2
		Technical	10333	14	1.7	342.7
(iii)	EM&A programme	Professional	72	38	2.4	10.4
		Technical	300	14	2.4	14.0
					Sub-total	683.9
(iv)	EMSTF charges					15.0
					Total	698.9

* MPS = Master Pay Scale

Notes

1. A multiplier of 2.4 is applied to the average MPS point to arrive at the full staff costs including the consultants' overheads and profits as the staff will be employed in the consultants' offices. A multiplier of 1.7 is applied to the average MPS point in the case of resident site staff supplied by the consultants. (At 1.4.2001, MPS pt. 38 = $60,395 per month and MPS pt. 14 = $19,510 per month)

2. The consultants' fees for construction stage are estimated and will be controlled in accordance with the terms stipulated in Agreement No. CE50/98 titled "Route 9 between Cheung Sha Wan and Sha Tin Design and Construction Assignment " and Agreement No. CE 15/77 titled "Sha Tin New Town, Stage II".

3. Since the establishment of the EMSTF on 1 August 1996 under the Trading Fund Ordinance, government departments are charged for design and technical consultancy services for electrical and mechanical (E&M) installations provided by Electrical and Mechanical Services Department (EMSD). The services rendered for this project include checking consultants' submissions on all E&M installations and providing technical advice to Government on all E&M works and their impacts on the project.