For discussion **PWSC(1999-2000)67**
on 3 November 1999

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 706 - HIGHWAYS
Transport - Roads
519TH - Route 10 - North Lantau to Yuen Long Highway

Members are invited to recommend to Finance Committee –

(a) to upgrade part of **519TH**, entitled "Route 10 - North Lantau to Yuen Long Highway - detailed design of the southern section" to Category A at an estimated cost of $454.5 million in money-of-the-day prices; and

(b) to retain the remainder of **519TH** in Category B.

PROBLEM

There is no alternative external road link to Lantau in case emergency incidents occur on the Lantau Link. Moreover, the existing road network connecting Lantau to the rest of the territory will not be able to cope with future traffic demand.

PROPOSAL

2. The Director of Highways (DHy), with the support of the Secretary for Transport, proposes to upgrade part of **519TH** to Category A at an estimated

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cost of $454.5 million in money-of-the-day (MOD) prices to employ consultants to undertake detailed design of the southern section (i.e. from North Lantau to So Kwun Wat) of the proposed Route 10 from North Lantau to Yuen Long Highway (Route 10 (NL-YLH)), and to carry out the associated site investigation.

PROJECT SCOPE AND NATURE

3. The scope of works of **519TH** includes -

(a) Southern section

(i) the construction of about 2.6 kilometres of dual 3-lane road on North Lantau (which includes a toll plaza) from the future Pa Tau Kwu interchange to Kwai Shek;

(ii) the construction of about 1.7 kilometres of dual 3-lane bridge (Tsing Lung Bridge) spanning across the Ma Wan Channel from Kwai Shek to Tsing Lung Tau;

(iii) the construction of about 4.0 kilometres of dual 3-lane road from Tsing Lung Tau to So Kwun Wat (which includes a 1.8-kilometre long dual 3-lane tunnel section);

(iv) the construction of about 2.0 kilometres of dual 2-lane link road from So Kwun Wat to Tuen Mun Road (So Kwun Wat Link Road);

(v) the construction of about 2.2 kilometres of dual 2-lane link road from So Kwun Wat to Siu Lam (Siu Lam Link Road); and

(vi) the construction of Siu Lam interchange, So Kwun Wat interchange, and So Kwun Tan interchange;

(b) Northern section

the construction of about 4.8 kilometres of dual 3-lane road from So Kwun Wat to Yuen Long Highway near Lam Tei (which includes a 4.1-kilometre long dual 3-lane tunnel section) and an interchange at Lam Tei;

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(c) For both southern and northern sections

(i) associated civil, geotechnical, landscape, road and drainage works, ancillary buildings, toll facilities, electrical and mechanical installations, and environmental mitigation measures; and

(ii) traffic control and surveillance system (TCSS).

4. The part of the project we now propose to upgrade to Category A comprises -

(a) detailed design of all the proposed works described in paragraph 3 (a) and (c)(i) above for the southern section from Pa Tau Kwu in North Lantau to So Kwun Wat, and

(b) detailed design of the proposed TCSS described in paragraph 3 (c)(ii) above for the whole Route 10 (NL-YLH);

(c) associated site investigation and supervision; and

(d) preparation of contract documents.

Site plan is at Enclosure 1 for Members' reference.

JUSTIFICATION

5. At present the only external road access for Lantau and the new airport at Chek Lap Kok is the Lantau Link. There will be no road access between Lantau and the rest of the territory in the event of closure of the Lantau Link. Therefore, we need to plan for an alternative road link between Lantau and the rest of the territory. Route 10 (NL-YLH) will serve as such a link between Lantau and the North West New Territories (NWNT). The Route will connect Yuen Long South to Northeast Lantau via So Kwun Wat and Tsing Lung Tau.

6. Apart from providing an alternative road link to Lantau, Route 10 (NL-YLH) is also required to meet the forecast traffic demand generated by cross boundary activities and by the anticipated population and employment growth in NWNT.

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7. Cross-boundary vehicular traffic between Hong Kong and the Mainland has been growing at a rapid rate in line with the rapid economic development of the Pearl River Delta Region. The average annual increase of cross-boundary vehicle flow was 9.5% since 1992. Together with Deep Bay Link, Route 10 (NL-YLH) will form part of the strategic road network to accommodate the increasing cross-boundary traffic.

8. In the light of committed developments under existing plans and strategic growth under the Territorial Development Strategy Review (TDSR), we envisage that the population in NWNT will increase from 800 000 in 1996 to 1.4 million by 2011. The NWNT has also been identified as a potential area of new employment with possible business estates and office nodes at Au Tau/Yuen Long and Hung Shui Kiu. Together with the plan to establish a fourth industrial estate in Tuen Mun West, we estimate that the total number of jobs in NWNT will increase from 190 000 in 1996 to 440 000 in 2011. All the above developments in the NWNT will generate traffic demand impacting on the design capacity for Route 10 (NL-YLH).

9. Taking into account the above developments, the Feasibility Study[1] for **519TH** concluded that a number of strategic routes within the NWNT, including the Lantau Link, Country Park Section of Route 3 and Tuen Mun Road east of So Kwun Wat will be operating at or beyond their capacity by 2007 and confirmed the need of the route to relieve the congestion. The volume/capacity[2] (V/C) ratios of these road links during morning peaks with and without the proposed Route 10 from North Lantau to Yuen Long Highway are as follows –

	Year		
	2007	**2011**	**2016**
Lantau Link	1.48 (1.04)	1.85 (1.26)	2.05 (1.29)

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[1] We charged the Feasibility Study at the cost of $17 million to **Head 706 Subhead 6008TX** - 'Consultants' design fees and charges and major in-house investigations for highways projects', which has been replaced by **Subhead 6100TX** - 'Highway works, studies and investigations for items in Category D of the Public Works Programme' since April 1996. Before 1 June 1995, DHy had delegated authority to approve expenditure on any single item under **Subhead 6008TX** up to the total provision approved by the Finance Committee.

[2] The capacity here refers to the design of the road. A V/C ratio equal to or less than 1.0 means that the road has sufficient capacity to cope with the volume of vehicular traffic under consideration. A V/C ratio above 1.0 indicates the onset of mild congestion; above 1.2 indicates more serious congestion with traffic speeds progressively deteriorating with further increase in traffic.

	Year		
	2007	**2011**	**2016**
Route 3 Country Park Section	1.25 (1.12)	1.33 (1.20)	1.38 (1.23)
Tuen Mun Road East of So Kwun Wat	1.20 (0.74)	1.29 (0.84)	1.35 (0.82)

Note - Figures in bracket denote V/C ratios with Route 10 (NL-YLH) in place.

10. The Investigation and Preliminary Design (I&PD) Study for **519TH** commenced in March 1998. We have already completed investigations and preliminary design on the southern section and established its preferred alignment together with the associated land, environmental, marine, drainage, traffic and other impacts on the affected areas.

11. The design and construction of the southern section are lengthy tasks, particularly for the construction of Tsing Lung Bridge which will take almost five years to complete. In order not to affect its timely commissioning in 2007, we propose to undertake the detailed design for the southern section now rather than in conjunction with the northern section. As we do not have the necessary in-house resources, we need to employ consultants to undertake the tasks and to supervise the associated site investigation works.

12. The northern section of the Route 10 (NL-YLH) is less complicated than the southern section in terms of engineering and technicalities and hence requires lesser time for design and construction. We have commenced the I&PD Study on the northern section in May 1999 for completion in August 2000 to meet the completion date of 2007.

13. There is a need to provide a comprehensive traffic control and surveillance system (TCSS) along Route 10 (NL-YLH), as Route 10 (NL-YLH), when complete, will form part of the critical route to the new airport at Chek Lap Kok. To ensure the efficient and effective operation of Route 10 (NL-YLH) under all conditions, it has been decided that the TCSS should operate as one integrated system for the Route 10 (NL-YLH) as a whole. The detailed design of the TCSS for the Route 10 (NL-YLH) is therefore best carried out as a route-wide

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assignment encompassing both southern and northern sections. This TCSS design needs to commence soon after the southern section detailed design starts. We therefore also apply for funding for the TCSS detailed design.

FINANCIAL IMPLICATIONS

14. We estimate the cost of this part of the project to be $454.5 million in MOD prices (see paragraph 15 below) made up as follows -

		$million
(a)	Consultants' fees for	333.8
	(i) detailed design (including review of investigation) and preparation of contract documents	308.3
	(ii) supervision of site investigation and wind tunnel tests	3.5
	(iii) independent assessment of the design of Tsing Lung Bridge[3]	20.0
	(iv) Electrical and Mechanical Services and Office of Telecommunication Authority Trading Fund charges[4]	2.0

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[3] The proposed Tsing Lung Bridge (TLB) is a suspension bridge of a slightly longer span than the existing Tsing Ma Bridge (TMB) with similar structural complexity. It is therefore important to carry out an independent assessment of the design of the TLB, similar to that carried out for the TMB to ensure the adequacy of the structure during both the design and construction of the TLB.

[4] The Electrical and Mechanical Services Trading Fund (EMSTF) and Telecommunication Trading Fund (TTF) were established on 1 August 1996 and 1 June 1995 respectively under the Trading Fund Ordinance. Government departments are charged for design and technical services for electrical and mechanical (E&M) and telecommunication installations provided by Electrical and Mechanical Services Department and Office of the Telecommunication Authority respectively. The services rendered for this project include checking consultants' submissions on all E&M and telecommunication installations, and providing technical advice to government on all E&M works and their impacts on the project.

		$million	
(b)	Site investigations	35.0	
(c)	Wind tunnel tests[5]	10.0	
(d)	Contingencies	37.2	
	Sub-total	416.0	(at December 1998 prices)
(e)	Provisions for price adjustment	38.5	
	Total	454.5	(in MOD prices)

A breakdown by man-months of the estimate for consultants' fees is at Enclosure 2.

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

Year	**$ million (Dec 1998)**	**Price adjustment factor**	**$ million (MOD)**
1999 – 2000	3.5	1.02625	3.6
2000 – 2001	213.5	1.06217	226.8
2001 – 2002	101.9	1.09934	112.0
2002 – 2003	57.0	1.13782	64.9

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[5] The proposed Tsing Lung Bridge has a central span of about 1 418 metres and will be subject to strong wind loads. The aerodynamic stability of this type of long span bridge under strong wind conditions is an important element for consideration in its design. The use of wind tunnel tests is currently the most effective method of analysing the wind loads and aerodynamic effects on long span bridges.

Year	$ million (Dec 1998)	Price adjustment factor	$ million (MOD)
2003 – 2004	40.1	1.17765	47.2
	416.0		454.5

16. We have derived the MOD estimate on the basis of Government's latest forecast of trend labour and construction prices for the period 1999 to 2004. We will employ consultants on a lump sum basis with provision for price fluctuation because the duration of the detailed design will exceed 12 months. The consultants will supervise the site investigation works under contracts to be awarded through the normal competitive tendering process.

17. The proposed detailed design has no additional annually recurrent financial implications.

PUBLIC CONSULTATION

18. We consulted the Tsuen Wan and Tuen Mun Provisional District Boards on 5 May 1998, and the Yuen Long Provisional District Board on 25 June 1998 on the findings of the Feasibility Study for **519TH**. They supported the project. The Tsuen Wan and Tuen Mun Provisional District Boards requested us to investigate the provision of an interchange at Tsing Lung Tau for Route 10/Tuen Mun Road/Route 3 Country Park Section. We investigated the request in the I&PD consultancy and found that there would be limited traffic demand at this location. Given the engineering constraints and the costs involved, the I&PD consultants recommended that no connection be provided at the Tsing Lung Tau location. Instead, we developed an alternative proposal of providing a new Siu Lam Link Road to connect Route 10 south of the So Kwun Wat interchange with Tuen Mun Road. This link road will provide a more direct and shorter link between Tuen Mun Road and Route 10.

19. We further consulted the Tsuen Wan and Tuen Mun Provisional District Boards on the findings of the southern section investigation on 4 May 1999. The two Provisional District Boards supported the proposed road scheme except that some Members of the Tsuen Wan Provisional District Board expressed reservation on not providing an interchange at Tsing Lung Tau.

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ENVIRONMENTAL IMPLICATIONS

20. The proposed detailed design will not give rise to any adverse environmental implications. The project is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and environmental permits are required for the construction and operation of the project. We have completed the EIA for the southern section under the I&PD consultancy to identify, predict and assess the potential environmental impacts arising from the project. The EIA recommends the necessary environmental mitigation measures during the construction and operation phases of the project to control the impacts to within the established standards. We will consult the Advisory Council on the Environment on the environmental aspects of the project. We will incorporate the recommended mitigation measures in the detailed design. We will submit the EIA report for the Director of Environmental Protection's approval under the EIA Ordinance and obtain environmental permits prior to construction. The proposed site investigation will not give rise to any adverse environmental implications as we will control short-term impacts to within the established standards and guidelines through pollution control clauses in the site investigation contracts.

LAND ACQUISITION

21. The proposed detailed design and site investigation do not require any land acquisition.

BACKGROUND INFORMATION

22. We upgraded **519TH** to Category B in August 1997. We upgraded part of **519TH** to Category A in December 1997 as **715TH** "Route 10 – North Lantau to Yuen Long Highway – investigation and preliminary design" at an estimated cost of $353.8 million in MOD prices to undertake investigation and preliminary design of the proposed Route 10 (NL-YLH).

23. We plan to start the detailed design for the southern section as soon as practicable, in any case not later than February 2000. We will complete the detailed design for the southern section in 2001, followed by tendering exercises for the construction stage. The tendering exercises for Tsing Lung Bridge and the section from Pa Tau Kwu Interchange to Kwai Shek will be completed in early 2002 as the Tsing Lung Bridge will take the longest time to complete. The tendering exercise for the section from Tsing Lung Tau to So Kwun Wat will be completed in late 2003. We intend to commence construction of the southern section in early 2002 for completion in mid 2007.

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24. For the northern section, we plan to commence its detailed design in early 2001 for completion in end 2002, followed by tendering exercises for completion in late 2003. We plan to start construction in early 2004 for completion by end 2007.

Transport Bureau
October 1999

Enclosure 2 to PWSC(1999-2000)67

519TH - Route 10 - North Lantau to Yuen Long Highway

Breakdown of the estimates for consultants' fees

	Consultants' staff costs		Estimated man months	Average MPS* salary point	Multiplier factor	Estimated fee ($ million)
(a)	Review of the findings of the investigation and preliminary design	Professional	208	40	2.4	31.3
		Technical	163	16	2.4	8.2
(b)	Detailed design	Professional	978	40	2.4	147.3
		Technical	1013	16	2.4	51.1
(c)	Preparation of contract documents and assessment of tenders	Professional	355	40	2.4	53.5
		Technical	336	16	2.4	16.9
(d)	Supervision of site investigation and wind tunnel tests	Professional	25	40	1.7	2.7
		Technical	21	16	1.7	0.8
(e)	Independent assessment of the Design	Professional	109	40	2.4	16.4
		Technical	71	16	2.4	3.6
(f)	Charges by EMSD & OFTA Trading Funds					2.0
					Total consultants' staff costs	333.8
	Out-of-pocket expenses					
(a)	Site investigations					35.0
(b)	Wind tunnel tests					10.0
					Total out-of-pocket expenses	45.0
					Total	378.8

* MPS = Master Pay Scale

Notes

1. A multiplier factor of 2.4 is applied to the average MPS point to arrive at the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultant's offices (at 1.4.98, MPS pt. 40 = $62,780 p.m., and MPS pt. 16 = $21,010 p.m.). A multiplier factor of 1.7 is applied in the case of site staff supplied by the consultants.

2. Out-of-pocket expenses are the actual cost incurred. The consultants are not entitled to any additional payment for the overheads or profit in respect of these items.

3. The figures given above are based on estimates prepared by the Director of Highways. We will only know the actual man months and actual fees when we have selected the consultants through the usual competitive lump sum fee bid system.