

For discussion on
12 November 1999

**Panel on Transport and
Panel on Planning, Lands and Works of the
Legislative Council**

Route 10 – North Lantau to Yuen Long Highway

Purpose

This paper provides Members' with detailed information regarding the project Route 10 – North Lantau to Yuen Long Highway.

Background

2. We included the project in Category B in August 1997 and the Finance Committee approved the part upgrading of the investigation and preliminary design for the project to Category A. We briefed panel members on the project in January 1998.

3. In discussing paper PWSC(1999-2000)67 (copy at **Annex A**) on 519TH 'Route 10 - North Lantau to Yuen Long Highway' on 3 November 1999, members of the Public Works Subcommittee requested that the following information should be given to panel members for further discussion -

- (a) possibility of providing an interchange with Tuen Mun Road at Tsing Lung Tau;
- (b) possibility of providing an interchange with North Lantau Highway at Kwai Shek;
- (c) possibility of advancing the current planned completion date of 2007;
- (d) possibility of adopting "Design and Build" and "Build-Operate-Transfer" arrangements;

- (e) management of construction waste for the project;
- (f) the procedures of the Environmental Impact Assessment Ordinance as applied to the project; and
- (g) the justifications for the consultant's staff cost for preparation of contract documents and tender assessment.

Provision of an interchange with Tuen Mun Road at Tsing Lung Tau

4. The Administration is aware of the request of some members of the Tsuen Wan Provisional District Board to provide an interchange between Route 10 and Tuen Mun Road at Tsing Lung Tau. The Director of Highways had earlier on undertaken a detailed study on the feasibility of the proposal. The study report examined the possibility of three options for the design of the interchange and connecting roads. They include –

- (a) an all-movement interchange whereby traffic to and from Tsing Lung Bridge could be connected to all directions (see **Annex B**). The estimated cost of this interchange is about \$2,300 million;
- (b) a two-movement interchange through a tunnel whereby traffic from Tsing Lung Bridge could join Tuen Mun Road eastbound at Tsing Lung Tau (see **Annex C**). The estimated cost is about \$700 million; and
- (c) a two-movement interchange also joining Tuen Mun Road eastbound but through a viaduct alignment (see **Annex D**). The estimated cost is about \$500 million.

5. However, all the above connections are subject to serious topographic constraints and as a result the connections are sub-substandard and unacceptable from the safety point of view. These constraints include –

- (a) the hill between Castle Peak Road and Tuen Mun Road at Tsing Lung Tau is very steep. The provision of an interchange here would require significant earthworks to remove the steep hill. This would create adverse environmental impact upon the adjacent residential developments;

- (b) the rock slopes of Tai Lam Country Park immediately north of Tuen Mun Road at Tsing Lung Tau are very steep. Provision of an interchange and connecting roads would require extensive tunneling work at these rock slopes. The works would intrude into the Tai Lam Country Park through difficult terrain. They would also require protracted lane closures on Tuen Mun Road which is unacceptable given that Tuen Mun Road is a busy trunk road for Northwest New Territories;
- (c) the short horizontal distance (only 350 m) between the north tower of Tsing Lung Bridge and Tuen Mun Road and the substantial difference in level between Tuen Mun Road and the proposed Route 10 make it impracticable to provide an interchange. The north tower of Tsing Lung Bridge will need to be located 220 m to 270 m into the Ma Wan Channel to accommodate the slip road merging length. This would have great impact on marine navigation and will pose a serious danger of ship impact on the tower. Even if the north tower could be relocated, the slip road from Route 10 connecting to Tuen Mun Road which is some 30 m above would have an uphill gradient of about 12% (as opposed to the minimum acceptable standard of 8%) with sharp turning radius. As a result, the interchange would have an unacceptable configuration and would cause safety hazard to motorists;
- (d) the provision of an interchange at Tsing Lung Tau would require extensive construction works to be carried out above Tuen Mun Road. These activities would be subject to operational constraints of this primary route. A large number of construction vehicles would need to access Tuen Mun Road and the local road network during construction therefore causing traffic congestion and adverse environmental impact.

6. An artist's impression and a photomontage of the site at Tsing Lung Tau which may be helpful in visualising the problems discussed above are at **Annexes E and F**.

7. We have also predicted the traffic flows of the various interchanges for Route 10. Results indicate that the demand for traffic at Tsing Lung Tau via the two-movement connection is low (about 400 to 800 passenger car units/hour) as shown at **Annex G**. For comparison, forecasts of traffic volume at Lam Tei Interchange and So Kwun Wat/Siu Lam Interchange are shown at **Annexes H and I**.

8. Given the engineering constraints, sub-standard highway geometry, environmental impacts, disruptions to Tuen Mun Road traffic flow and impacts on the Ma Wan navigation channel, we do not consider it practicable and desirable to provide an interchange at Tsing Lung Tau. Moreover, the traffic demand at this interchange is relatively low and alternative routes are/will be available. Currently, traffic to Lantau from Tsuen Wan and Kwai Chung areas need to use Ting Kau Bridge and Rambler Channel Bridge to access Lantau Link. When the Tsing Yi North Coastal Road is completed in end 2001, a more direct access will be available for such traffic via Tsing Tsuen Bridge and Tsing Yi North Coastal Road.

Provision of an interchange with North Lantau Highway at Kwai Shek

9. We have also looked into the possibility of providing an interchange with North Lantau Highway at Kwai Shek. It is concluded that it is impractical to provide an interchange at this location. As shown at the plan at **Annex J**, a link road to North Lantau Highway will have to be built in a tunnel above the existing tunnel of the Airport Railway. The geological conditions of this area are extremely unstable. There were several incidents of collapse when the tunnel for the Airport Railway was built. We have grave concern about building another tunnel which may bring risk to the operation of the Airport Railway.

10. Moreover, to provide a link road connection between the two major expressways of design speed 100 km/hour, the minimum curvature of the link roads dictates that the connection at North Lantau Highway will be beyond the existing toll plaza because of the level difference between Route 10 and North Lantau Highway.

Advancing the planned completion date of 2007

11. Route 10 North Lantau to Yuen Long Highway is a mega scale project comprising over 17 km of road, including two tunnels (1.8 km and 4.1 km) and a long span suspension bridge of 1,418m span (Tsing Lung Bridge) which is of similar scale to Tsing Ma Bridge.

12. As shown in the implementation timetable at **Annex K**, various tasks are involved in planning for the project. They include the detailed design of the bridge, the completion of the statutory procedures of the Environmental Impact Assessment Ordinance and the Roads (Works, Use and Compensation) Ordinance, land acquisition and funding application processes. We envisage that the earliest start date for construction would be April 2002.

13. In view of the scale of the project, construction will be carried out under several packages. The Tsing Lung Bridge and some advance works for the section of elevated road in North Lantau forms one of the packages. The construction of the bridge is estimated to take at least five years and even this is tight as construction activities of a long suspension bridge can be prone to disruption by typhoon and require continuous working round the clock. We therefore envisage that the earliest completion date barring any unforeseen situations and adverse inclement weather is mid 2007.

14. The following is a list of recently completed suspension bridges and the time taken for their construction for reference purpose -

Name of Bridge	Location	Span (m)	Year of Completion	Construction Period (Yrs)
Jiangyin Yangtse River Bridge	China	1385	1999	5
Akashi-Kaikyo Bridge	Japan	1991	1998	10
Great Belt East Bridge	Denmark	1624	1998	7
Tsing Ma Bridge	Hong Kong	1377	1997	5

15. We recognise the need to complete the route as soon as possible. We would take every possible step to expedite each of the procedures with a view to completing the project at the earliest possible date.

“Design and Build” and “Build-Operate-Transfer” arrangements

16. We have examined the possibility of adopting the “Design and Build” (D&B) and “Build-operate-Transfer” (BOT) arrangements for the construction of Route 10. The major benefit of D&B is the shortening of the programme as some design and construction activities can be undertaken concurrently. However, for this project we could conduct the detailed design in parallel with the statutory procedures. The time we could gain by adopting the D&B arrangements is very limited, if any. Moreover, we would not have a direct control on the detailed design under the D&B arrangements because the designer of the bridge would be employed by the D&B contractor. From experience on similar previous projects, the potential risk of substantial contractual dispute is very high. In view of the complexity of the project, it is desirable for the Administration to maintain a direct control over the detailed design.

17. We have also examined the possibility of BOT arrangement. We conclude that the potential for the private sector being interested is limited because of the high construction cost (\$24.8 billion). For the BOT to be financially viable, the toll may need to be pitched at a high level, which would not be acceptable to the public and traffic attraction would be reduced as alternative routes are available.

Management of construction waste for the project

18. It is estimated that the Route 10 project would generate about 3 million m³ of construction waste which needs to be disposed of off-site.

19. The following measures will be taken in the planning and preliminary design stage to reduce the generation of construction waste -

- The project will be predominantly constructed on hillsides and in rural areas. Site clearance waste generated will therefore mainly consist of low-grade natural vegetation such as scrub and grass.
- The majority of the excavated material will be rock and soil and they will be re-used for reclamation.
- Dredging of marine deposits has been minimised by adopting drained reclamation as far as possible.

20. The following measures will be taken in the construction stage to reduce the generation of construction waste -

- Designation of areas for the segregation and temporary storage of reusable and recyclable materials.
- Minimising the generation of waste through adopting best practices and design.
- Reuse, recovery and recycling of materials, thus avoiding disposal. For example, excavated material would be reused as fill in the construction of seawalls.

21. We will take the following measures in the construction stage for waste disposal -

- Handle and store wastes in a manner which ensures that it is held securely without loss or leakage, thereby minimising the potential for pollution.

- Use waste hauliers to collect specific categories of wastes.
- Remove wastes in a timely manner.
- Maintain and clean waste storage areas regularly.
- Minimise windblown litter and dust during transportation by either covering trucks or transporting waste in enclosed containers.
- Dispose of waste at licensed waste disposal facilities.
- Develop procedures such as a ticketing system to facilitate tracking of loads, particularly for chemical waste, and to ensure that illegal disposal of waste does not occur.
- Maintain records of the quantities of waste generated, recycled and disposed.

22. We shall dispose of the construction waste through the following methods

-

- The majority of the excavated material will be re-used on site as fill in the construction of seawalls and road embankment.
- Surplus excavated material will be re-used as fill material for other reclamation projects.
- Principal means of disposal will be via marine route. Excavated material from the Tai Lam Chung Tunnel and Siu Lam cutting will be transported via the southern portal to barging points at Tsing Lung Tau by means of an enclosed conveyor belt.

The Environmental Impact Assessment Ordinance (EIAO) procedures

23. Under the EIAO, the approval of the EIA report is subject to the procedures as set out at **Annex L**, which essentially includes a period of 150 days to complete the EIAO process before the approval of the Final EIA Report.

24. After introduction of the EIAO, the approval of the EIA report or the permission to apply directly for the environmental permit has to be obtained before gazetting a road project under the Roads (Works, Use and Compensation) Ordinance.

25. The EIAO procedures as applied to the Route 10 project is set out below -

Commencement of the EIA Study	April 1998
Circulation of the Draft EIA Report	January 1999
DB consultation	May 1999
Submission of EIA Report under EIAO	September 1999
Review of EIA Report	Before end November 1999
Public Inspection	Before end December 1999
ACE Consultation	Before end January 2000
Approval of EIA Report	Before end February 2000

Consultant's staff cost for preparation of contract documents and tender assessment

26. During the preparation of contract documents and tender assessment, the following activities will be undertaken –

- (a) preparation of tender documents (including drawings);
- (b) assisting in tender queries/clarifications and tender negotiations;
- (c) finalisation of contract documents; and
- (d) contract award.

27. It is currently anticipated that the section of Route 10 between North Lantau and So Kwun Wat will be undertaken under eleven contracts. Each of the contracts will have its own peculiarities and will require particular inputs. The contract for the Tsing Lung Bridge is likely to require the greatest effort and examples of required inputs are -

- (a) the tender documents will include a large number of drawings (in the case of the similar Tsing Ma Bridge there were approximately 400 drawings);
- (b) many of the construction activities will fall outside the scope of the standard specifications and thus special clauses and whole sections (e.g. cable wire) will need to be developed;

- (c) conditions of tender need to be developed which allow tenderers maximum flexibility in their choice of construction techniques whilst ensuring the Government getting the finished structure that it requires. The conditions must also ensure that the tenderers provide sufficient information on such aspects to enable them to be assessed during the tender evaluations and defined to a sufficient extent in the Contract;
- (d) during the tender assessment stage, the consultant will need to carefully review the information received and discuss with the tenderer further;
- (e) also during the tender assessment stage, all pricing and programming submissions must be reviewed and views developed on the adequacy or otherwise of the tenderers allowances for plant and equipment. Such analysis could be crucial in any arising dispute later since arguments may centre on the tenderers allowances at the time of contract award; and
- (f) the results of the tender assessment must be collated into the Contract documents for award.

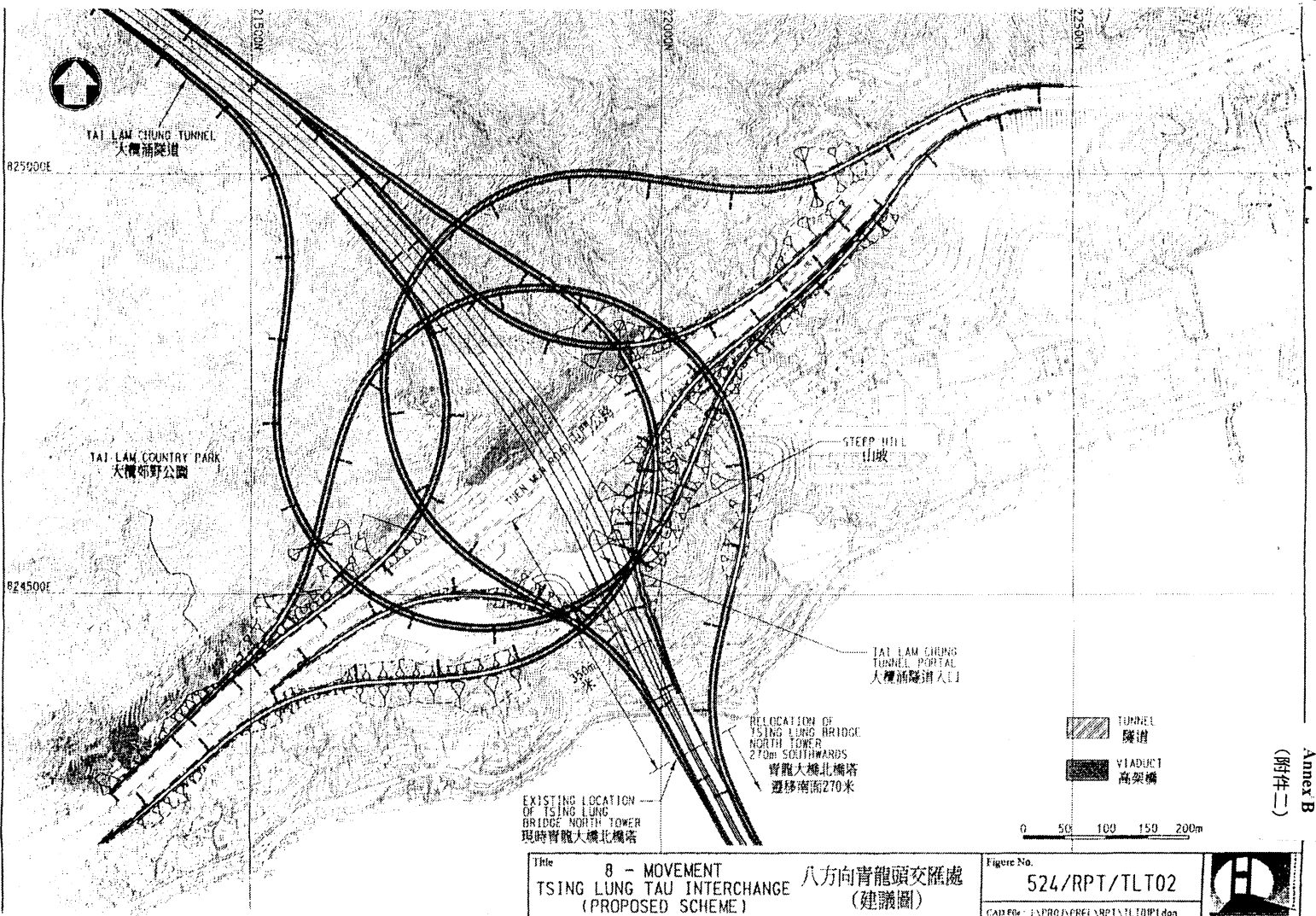
28. While many of the above activities are common to “normal” contracts, the size and technical complexity of this project will make these matters far more complex and time consuming. In the case of the Tsing Ma Bridge, the tender period was 6 months and the tender assessment period was 5 months involving a very considerable input from the consultant’s team. Preparation of drawings and documents and the development of Conditions of Contract all required substantial effort in addition to this in the course of detailed design which in itself could take up to 18 months.

29. The contracts for the tunnel, electrical & mechanical services and the traffic control and surveillance system will also require similar levels of input.

ADVICE SOUGHT

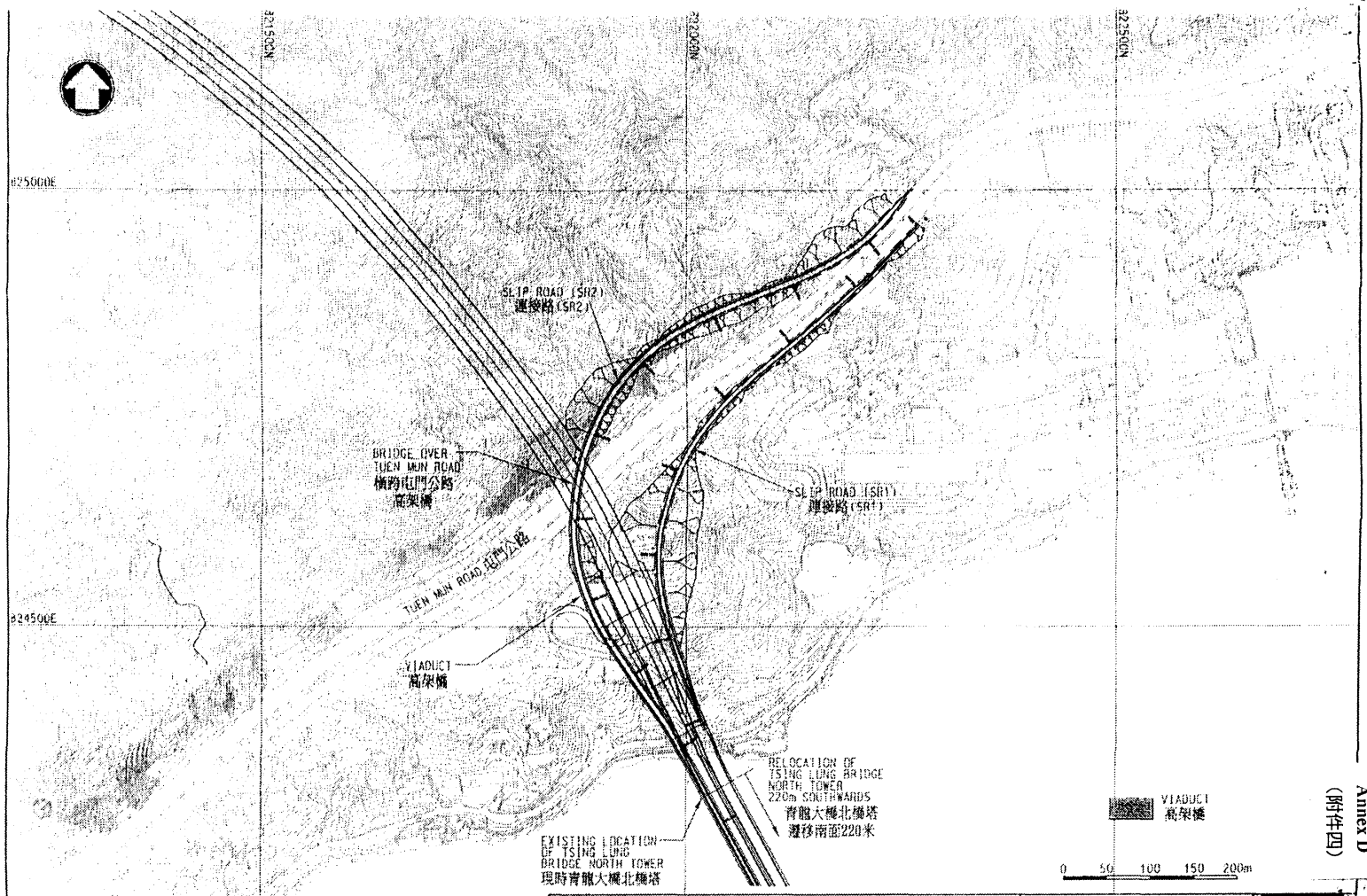
30. Members are requested to note the contents of this paper.

**Transport Bureau
November 1999**



Annex B
(附件二)

Title 8 - MOVEMENT
TSING LUNG TAU INTERCHANGE 八方向青龍頭交匯處
(PROPOSED SCHEME) (建議圖)

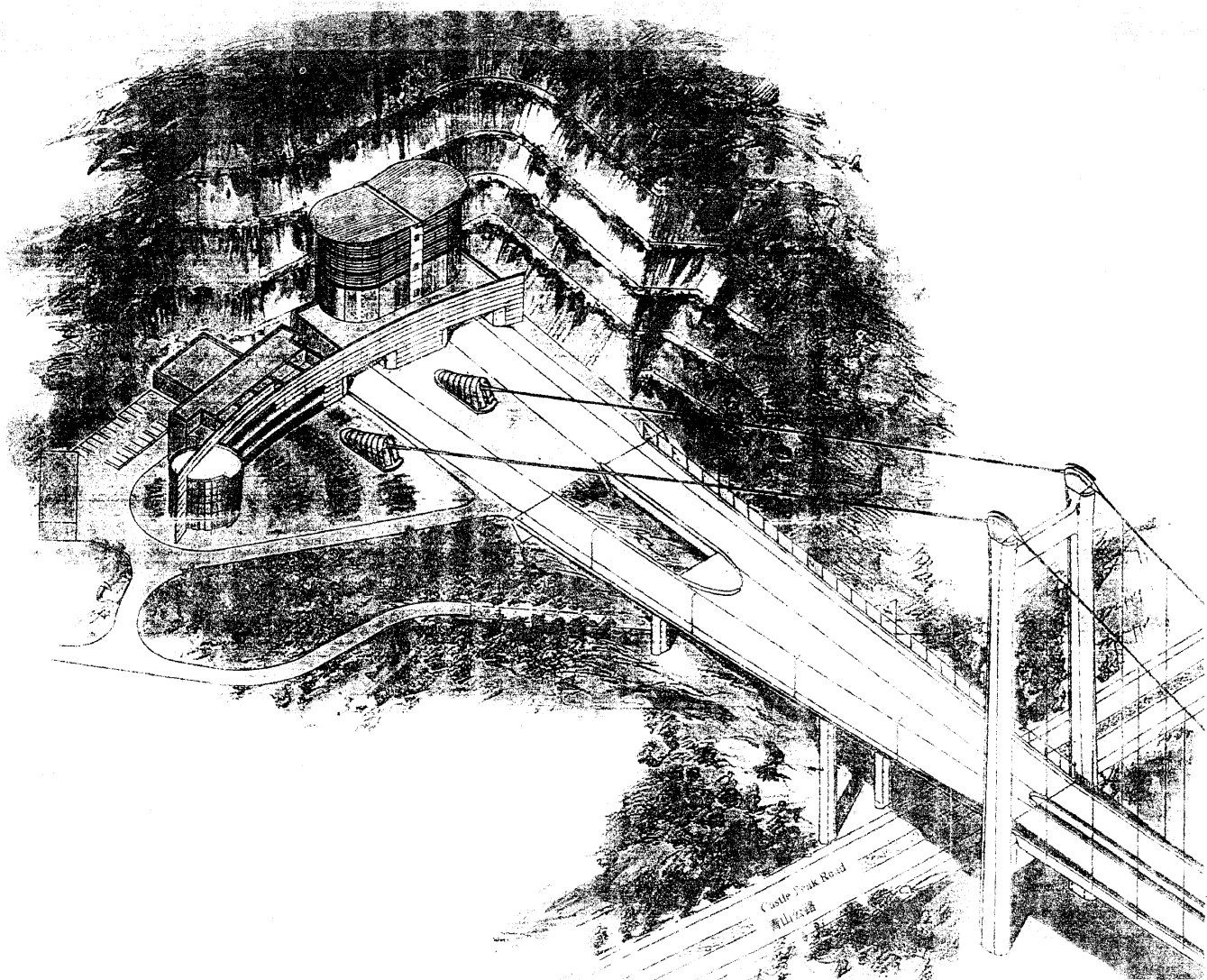


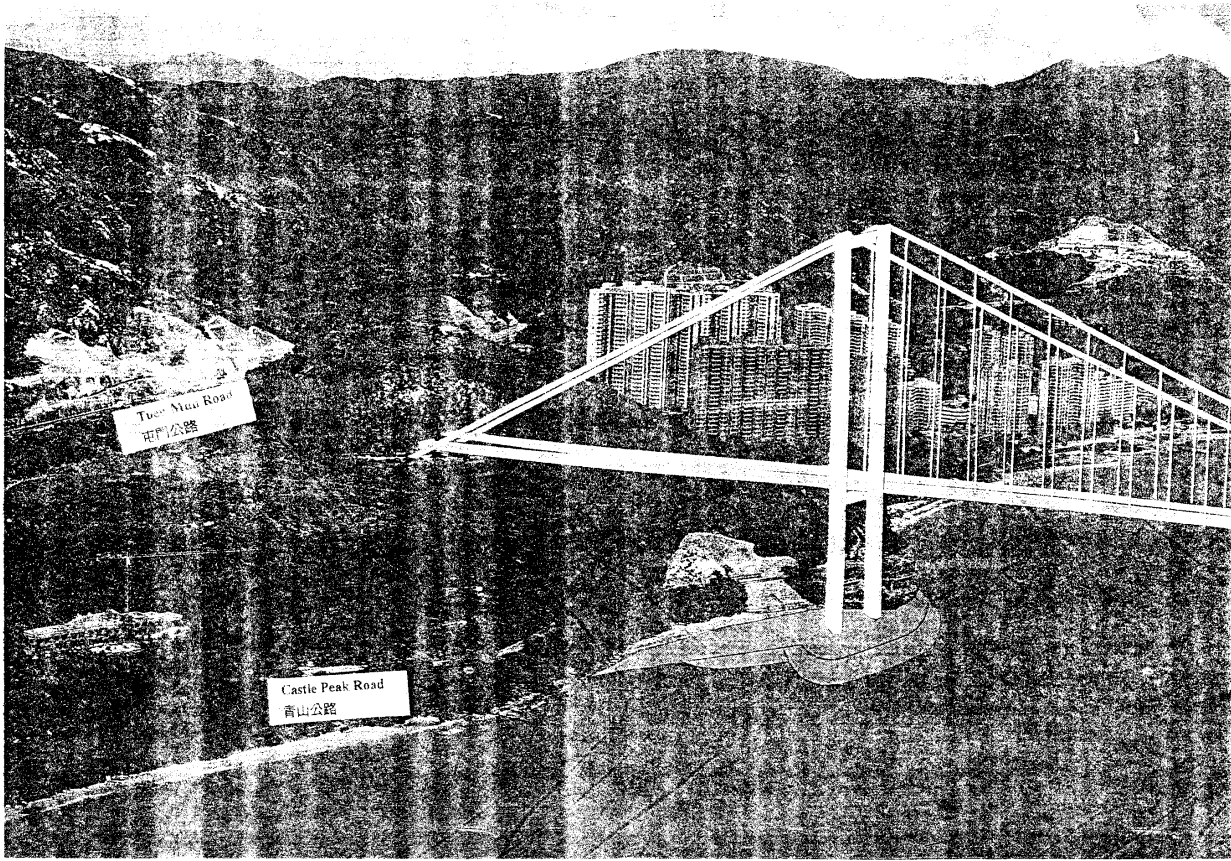
Annex D
(附件四)

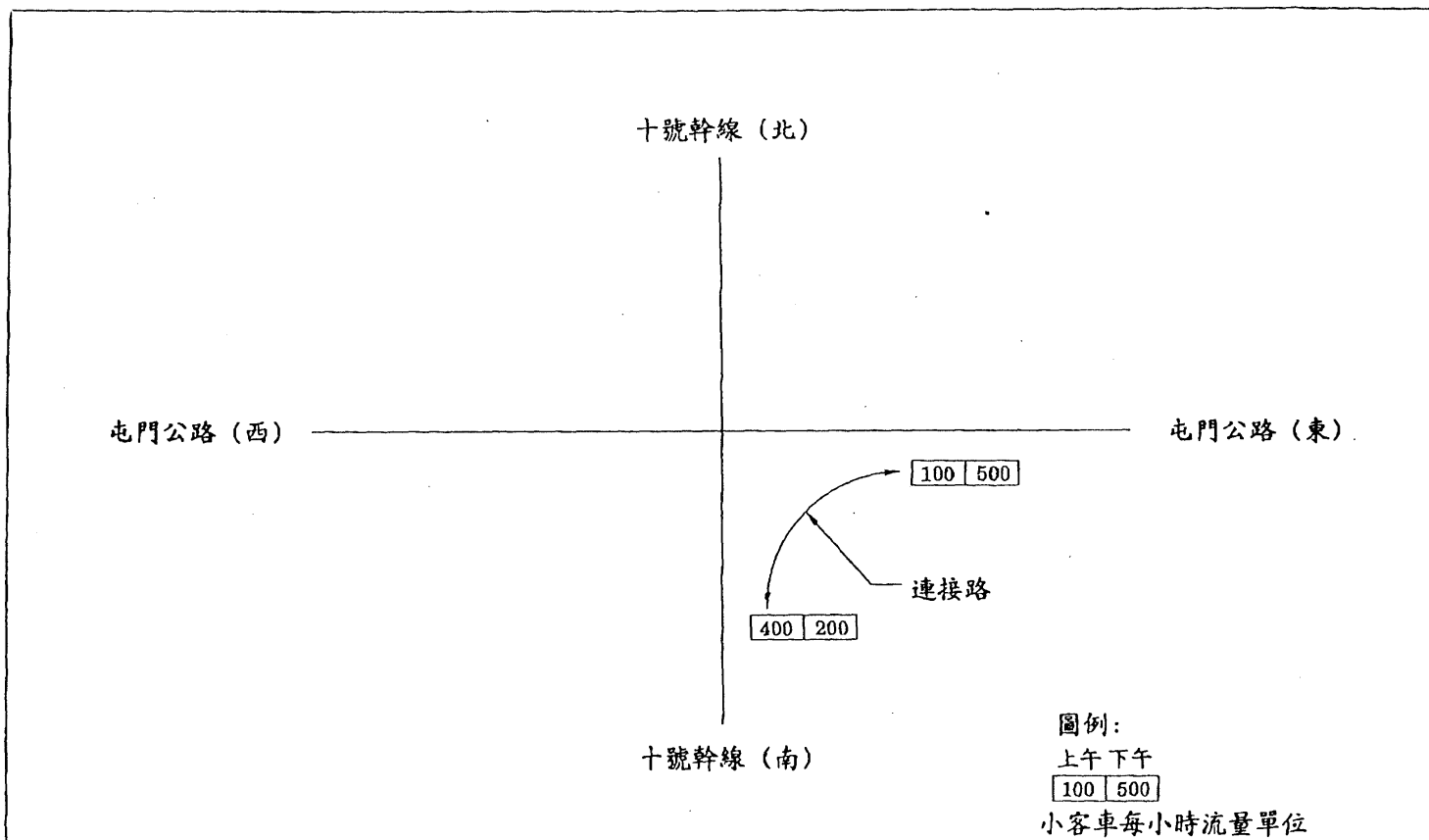
Title 2 - MOVEMENT
TSING LUNG TAU INTERCHANGE 兩方向青龍頭交匯處
(VIADUCT SCHEME) (高架橋連接路建議圖)


Figure No. 524/RPT/TLT04
CAD File: \SPR\A\FREE\SRPT\TLT04P1.dgn

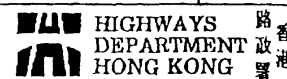


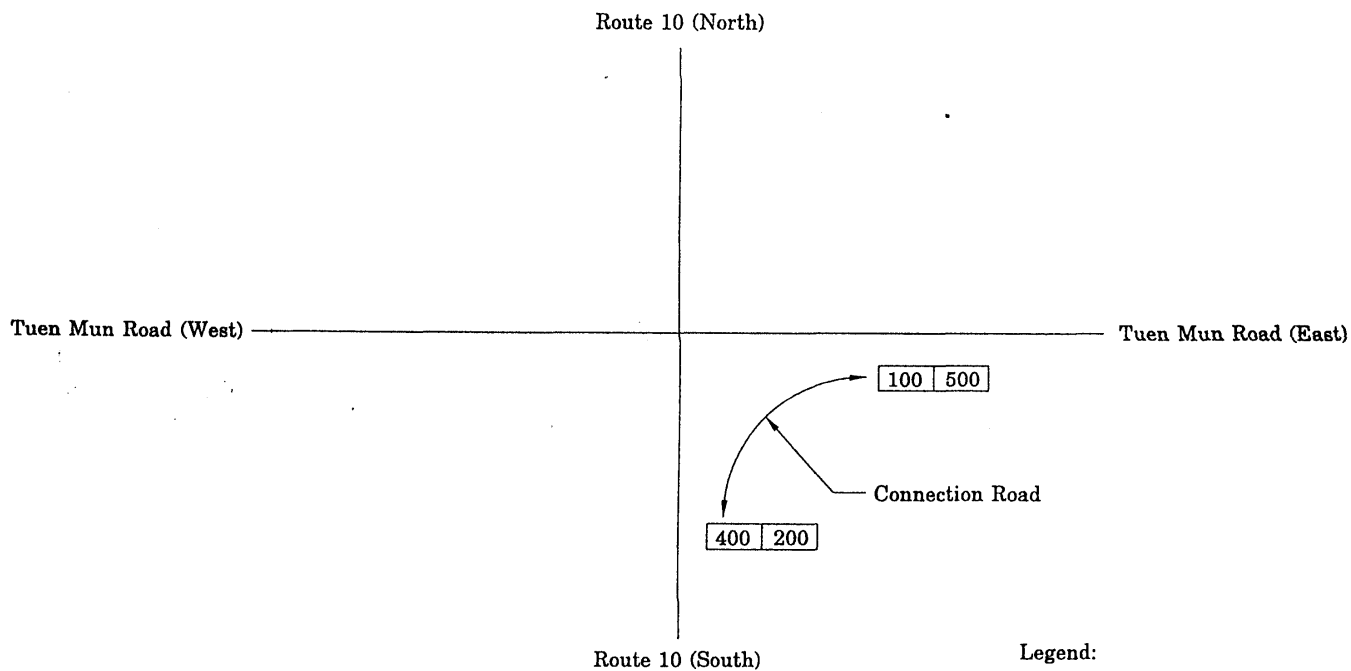






圖則名稱 青龍頭交匯處之2016年繁忙時段交通流量	drawn by Ivan Yip	date 8-11-1999	drawing no. 圖號 Figure 2.6	scale 比例 N.T.S
	approved by	date	 HIGHWAYS DEPARTMENT HONG KONG 路政署 香港	
	office 辦事處 主要工程督理處 Major Works Project Management Office			






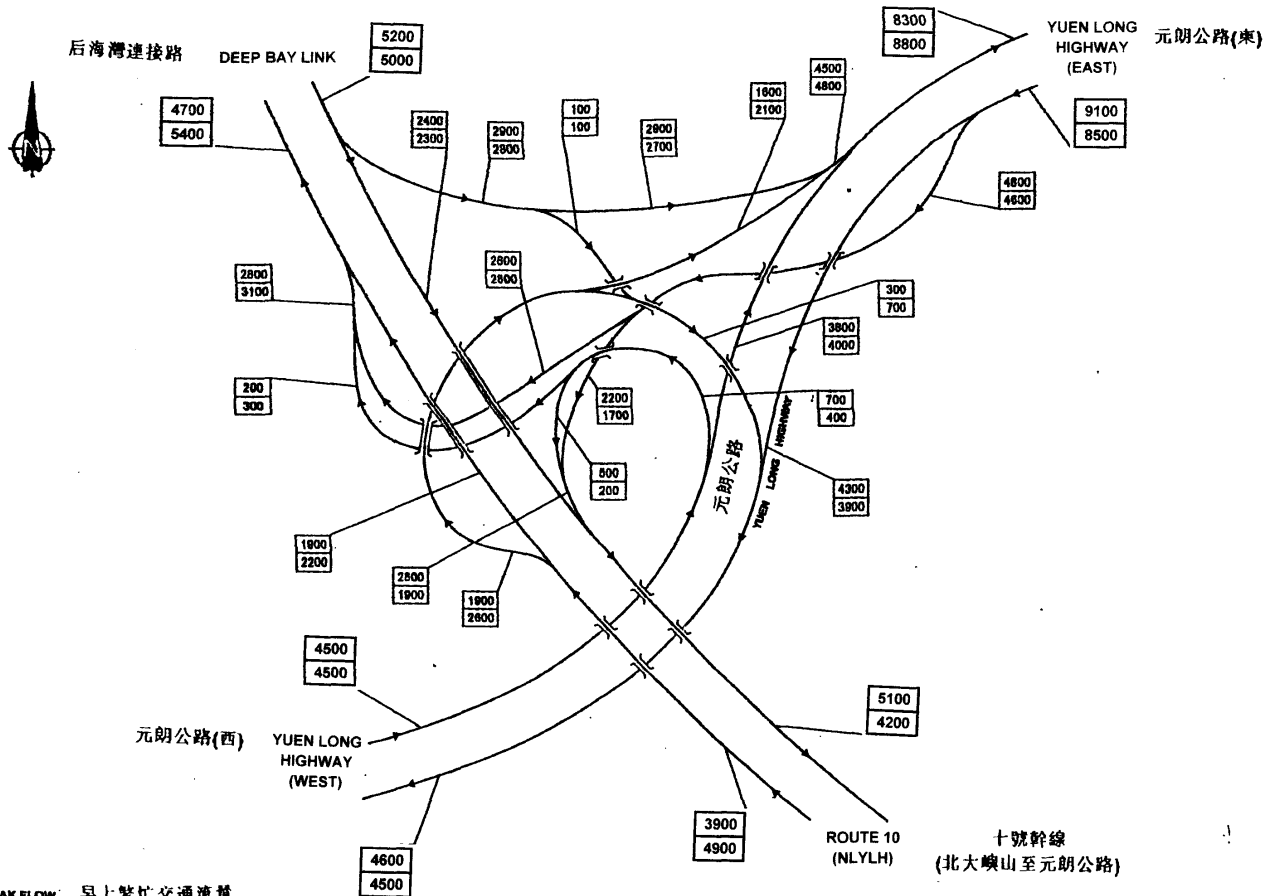
圖則名稱

2016 Peak Hour Flows at Tsing Lung Tau Interchange

drawn by Ivan Yip	date 8-11-1999
approved by	date
office 辦事處 主要工程管理處 Major Works Project Management Office	

drawing no. 圖號 Figure 2.6	scale 比例 NTS
 HIGHWAYS DEPARTMENT HONG KONG	

路政署
香港



2016年預測交通流量
藍地交匯處

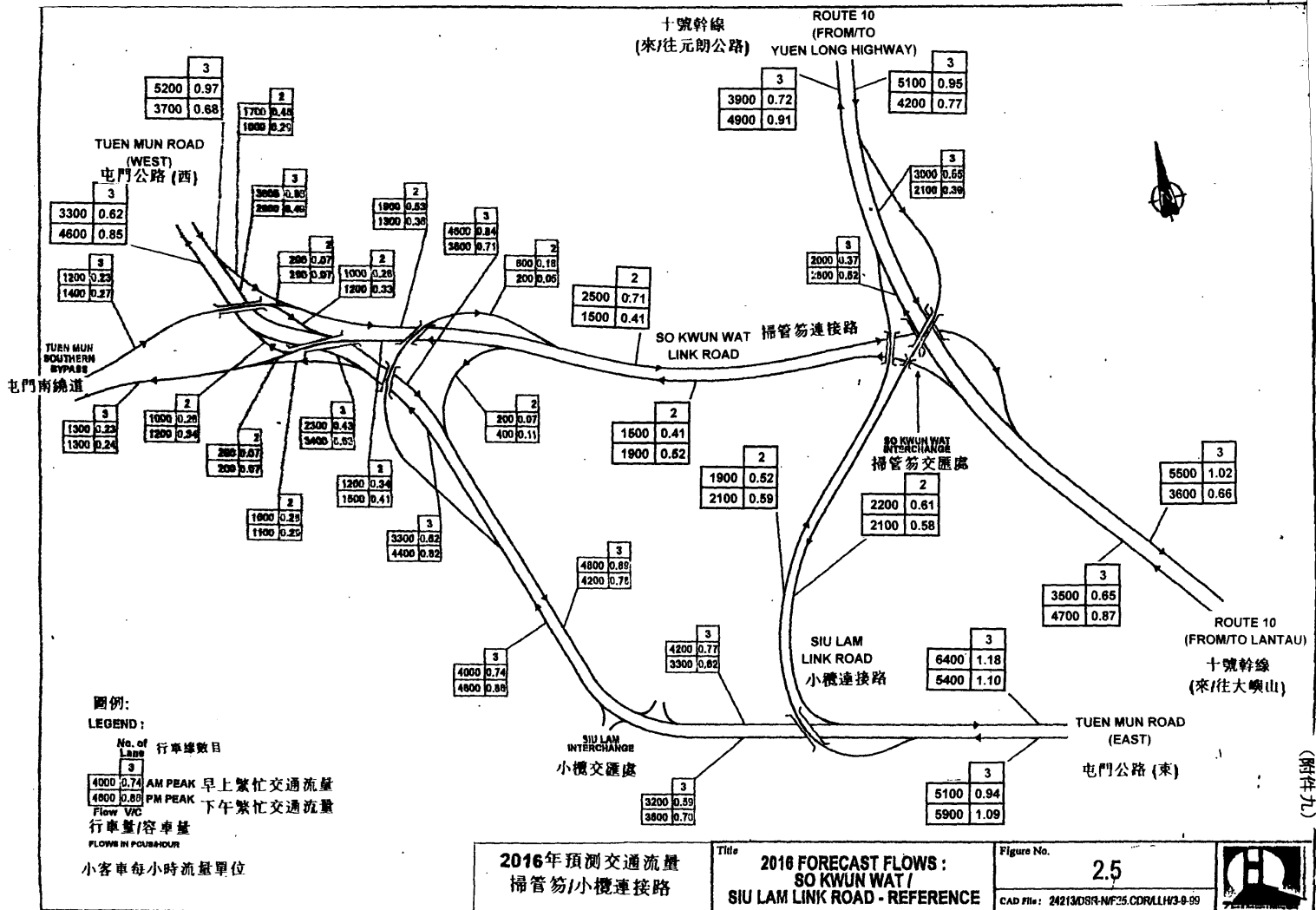
Title
2016 FORECAST FLOWS : LAM TEI
INTERCHANGE - REFERENCE

Figure No.

2.4

CAD File: 24213\DSR-N\F24.CDR\LLH\2-9-99





青龍橋橋塔位置
Tsing Lung Bridge Tower Position

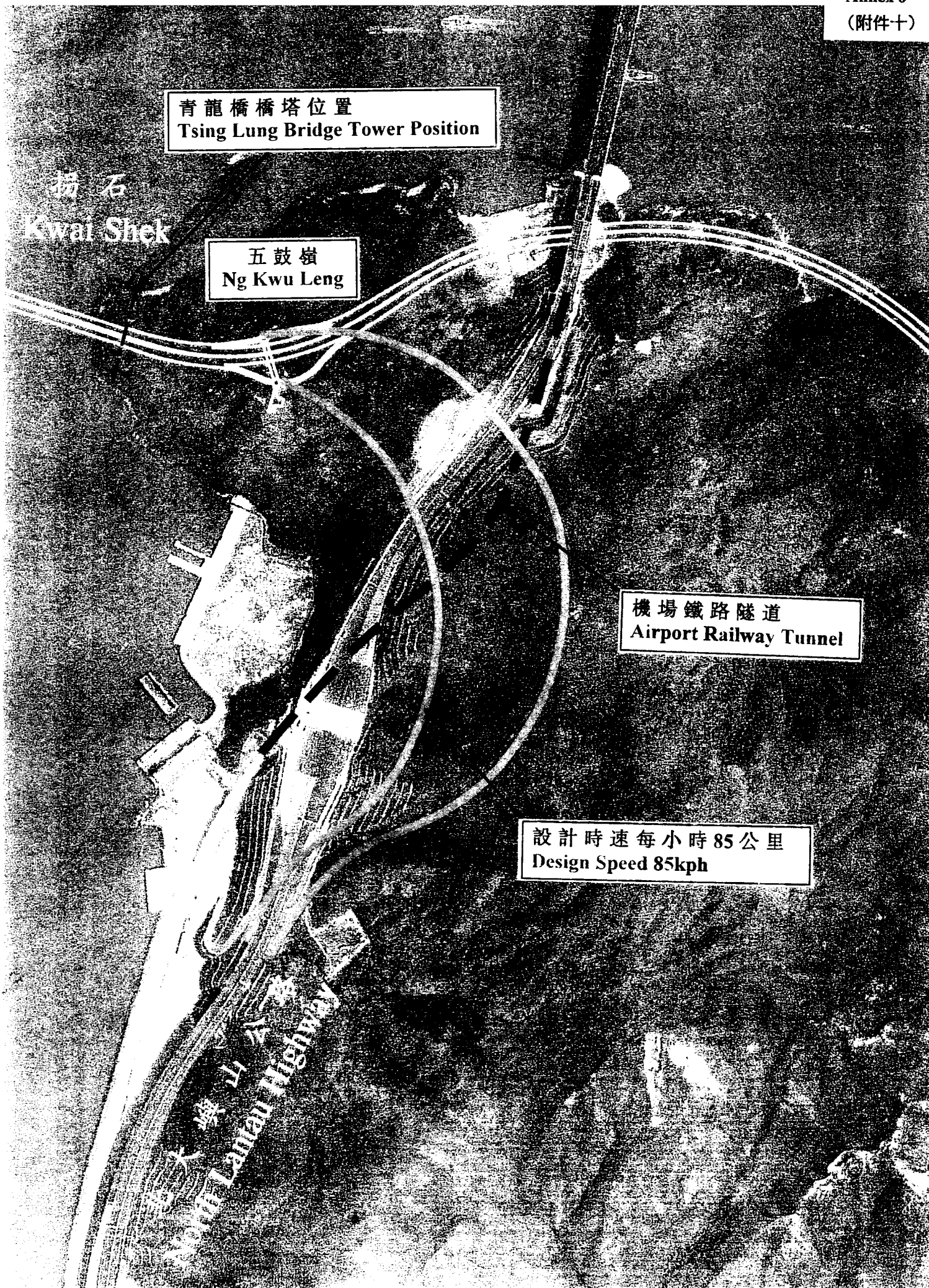
枋石
Kwai Shek

五鼓嶺
Ng Kwu Leng

機場鐵路隧道
Airport Railway Tunnel

設計時速每小時85公里
Design Speed 85kph

北潭山公路
North Lantau Highway



Act ID 工作編號	Description 內容	Duration 期間	Start 開始	Finish 完成	1998 1999 2000 2001 2002 2003 2004 2005 2006 2007											
1000	Investigation and Preliminary Design 勘察及初步設計	74 w (星期)	31.03.98	08.09.99												
1100	Conduct EIA 進行環境影響評估	77 w (星期)	31.03.98	29.09.99												
1200	EIAO Process 環境影響評估條例程序	16 w (星期)	30.09.99	19.01.00												
1300	Roads Ordinance Process 道路 (工程、使用及補償) 條例程序	61 w (星期)	20.01.00	26.03.01												
1350	Land Resumption 土地回收	52 w (星期)	27.03.01	28.03.02												
1400	Upgrade to Cat. A for detailed design 提升工程計劃為甲級使進行詳細設計	0		10.12.99												
1500	Consultants Selection for D&C 選擇工程顧問	28 w (星期)	03.08.99	14.02.00												
1600	Conduct detailed design 進行詳細設計	80 w (星期)	15.02.00	31.08.01												
1650	Upgrade to Cat. A for construction 提升工程計劃為甲級使進行施工	0		23.03.01												
1700	Pre-qualification and Tendering 預判投標資格及投標	64 w (星期)	02.01.01	28.03.02												
1800	Construction 施工	272 w (星期)	29.03.02	28.06.07												

Start Date 開工日期	31.03.98
Finish Date 完工日期	28.06.07
Page Number 頁碼	1A

Summary Implementation Programme
R10 - NLYLH Tsing Lung Bridge
Highways Department
施工程序表摘要
十號幹線 - 北大嶼山至元朗公路 青龍大橋
路政署

表一 署長，公眾及環境問題諮詢委員會回應時間上的規限

	署長的時間規限	公眾的時間規限	環境問題諮詢委員會的時間規限
申請准許直接申請環境許可證	署長須在接獲申請或根據第(4)款提供的進一步資料的45天內 - 1. 向申請人發出環境影響評估研究概要；及 2. 將他已發出環境影響評估研究概要一事通知環境問題諮詢委員會；或 3. 藉書面通知准許申請人直接申請環境許可證。	任何人可在刊登關於工程項目簡介的廣告的14天內，向署長提出關於該工程項目簡介的意見	環境問題諮詢委員會在刊登關於工程項目簡介的廣告的14天內，向署長提出關於該工程項目簡介的意見
環境影響評估報告的檢討	署長須在接獲環境影響評估報告的60天內，決定該項評估符合或不符合環境影響評估研究概要及技術備忘錄的規定		
公眾查閱報告		該報告的廣告刊登後，公眾可在30天內查閱	環境問題諮詢委員會可在接獲該報告文本的60天內，將其對該報告的意見給予署長
環境影響評估報告的批准	公眾查閱期屆滿、或收環境問題諮詢委員會的意見、或收到進一步資料後的30天內，署長須批准環境影響評估		
環境許可證的申請	署長須在30天內將批予或拒絕批予環境許可證一事告知申請人		
新的環境許可證的申請	署長須在30天內將批予或拒絕批予環境許可證一事告知申請人		
更改環境許可證的申請	署長須在30天內將批予或拒絕批予環境許可證一事告知申請人		

Table 1 Time Limits for the Director, the Public and the Advisory Council on the Environment to respond

	Time Limit for the Director	Time Limit for the Public	Time Limit for the Advisory Council on the Environment
Application for approval to apply directly for an environmental permit	45 days of receiving the application or further information	14 days of placing the advertisement	14 days of placing the advertisement
Review of EIA report	60 days of receiving the EIA report		
Public inspection of EIA report		30 days of placing the advertisement	60 days of receiving the EIA report
Approval of EIA report	30 days of the expiry of the public inspection period, or the receipt of comments from the Advisory Council on the Environment, or the receipt of further information		
Application for environmental permit	30 days of receipt of the application (the same time limit as the approval of EIA report if the two applications are submitted at the same time)		
Application for a further environmental permit	30 days of receipt of the application		
Application for variation of an environmental permit	30 days of receipt of the application		