

ANNEX H

INTERCHANGES AND CONNECTIONS REPORT

**Highways Department
Government of the Hong Kong
Special Administrative Region**

Agreement No. CE 82/97

**Route 10 - North Lantau to Yuen Long Highway
Investigation and Preliminary Design Assessment**

**REPORT ON INTERCHANGES AND CONNECTIONS
(SOUTHERN SECTION)**

Report Number T524/15.03/S/00

OCTOBER 1998

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Agreement No. CE 82/97

**Route 10 – North Lantau to Yuen Long Highway
Investigation and Preliminary Design**

**Report on Interchanges & Connections
(Southern Section)**

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1.0 EXECUTIVE SUMMARY

1.1 Purpose of the Report

This Report on Interchanges and Connections has been prepared as part of the 'Route 10 - North Lantau to Yuen Long Highway, Investigation and Preliminary Design Assignment' under the Highways Department Agreement No. CE 82/97.

The purpose of the Interchanges and Connections Report is to present the assessment of possible interchanges and connections to Route 10 - North Lantau to Yuen Long Highway (NLYLH) southern section. It examines in detail the possible connections and interchanges, then conduct evaluations and comparisons of the merits and demerits of the options identified. The preferred interchanges and connections are then recommended to take forward to preliminary design.

1.2 Interchanges and Connections

The Sham Tseng Link Feasibility Study presented an interchange at So Kwun Wat based on a mainline design speed of 85km/h. Following discussions with Transport Department, the mainline alignment has been reviewed and revised to give a design speed of 100km/h. Accordingly, the slip and link roads of the interchanges have been designed to a design speed of 85km/h.

1.3 North Lantau Road P1 Connection

1.3.1 Key Issues

Road P1 on Lantau is planned to run parallel to the existing North Lantau Highway to supplement the road network in serving the New Town developments of Tung Chung and Tai Ho, and the Airport. A connection between Road P1 and Route 10 (NLYLH) would benefit the transport network on Lantau.

1.3.2 Findings

A connection allowing west/north movements has been found to be feasible within the available space on the Kwai Shek headland. Development of the P1 connection has taken account of:

- a single lane merge configuration which has been agreed in principal with Transport Department;
- the constraints between the Tsing Lung Bridge tower and anchorages to the north and the cutting of the North Lantau Highway to the south would only permit a maximum horizontal curvature for a design speed of 70km/h; and
- the formation of the new platform for the construction of the slip roads would require the removal of the two uppermost berms of the existing North Lantau Highway cutting.

1.4 Tsing Lung Tau Connection

1.4.1 Key Issues

The Tuen Mun District Board requested Highways Department to investigate the possibility of providing a Route 10 (NLYLH) connection with Tuen Mun Road at Tsing Lung Tau.

1.4.2 Findings

The proposed Route 10 (NLYLH) alignment will pass in tunnel beneath Tuen Mun Road at Tsing Lung Tau. The area where the route will cross is constrained by an extensive cutting and the steep hillside of Tai Lam Chung Country Park to the north. To the south-east, a steep hill lies between Castle Peak Road and Tuen Mun Road. Furthermore, the Tsing Lung Bridge tower and anchorages will impose additional space constraints in the area.

Traffic studies have shown that the demand is for the north to east and south to west movements. However, providing for these movements has been shown within this Report to be un-desirable on engineering grounds, in particular, on highway design standards.

1.5 So Kwun Wat Interchange

1.5.1 Key Issues

Modifications to the So Kwun Wat (SKW) Interchange developed under the Feasibility Study are required as a result of the decision by Government to upgrade the mainline design speed from 85km/h to 100km/h. A further SKW Interchange configuration has been developed to improve the highway geometry and to reduce the southbound travelling distance between Route 10 (NLYLH) and Tuen Mun Road.

1.5.2 Comparison of the modified interchange (Option A) and the new scheme (Option B)

The Option B satisfies all the recommended geometric standards for slip roads and also provides adequate merge/diverge distances at the northern section tunnel portal area which could not be provided under the modified Feasibility Study scheme. The Option B scheme has also undergone the following changes :

- horizontal alignment of the SKW Link Road is moved north onto the northern slopes of SKW valley;
- the north-westbound slip roads between Route 10 (NLYLH) and the SKW Link Road are deleted; and
- a Siu Lam Link Road connecting SKW Interchange and Tuen Mun Road at Siu Lam is added.

These changes combine to give further benefits :

- journey distance reduced by more than 2km between southbound traffic on Route 10 (NLYLH) and Tuen Mun Road;
- weaving movements reduced on the SKW Link Road;
- So Kwun Wat valley avoided which will reduce land resumption and re-site of a recognised village;
- severance of the So Kwun Wat valley avoided which will open up opportunities for future potential developments within So Kwun Wat; and
- reduced environmental impacts and the need for corresponding mitigation measures.

2.0 INTRODUCTION

2.1 Background of the Project

This Project will provide a western road corridor from the future Chok Ko Wan Link Road (formerly known as the Lantau Port Expressway) Interchange to Yuen Long Highway with an intermediate link to Tuen Mun Road to cope with the future development of the proposed Lantau Port and within the north-western New Territories (NWNT).

In 1979, the Lantau Fixed Crossing Feasibility Study established the need for two road links between north Lantau and the mainland, one via Ma Wan to Tsing Yi (i.e. the Lantau Link which opened to traffic in May 1997) and the other via Ma Wan to Sham Tseng (Sham Tseng Link). A Preliminary Feasibility Study conducted in March 1993 recommended that the Sham Tseng Link (STL) alignment should commence at an interchange with the road network planned for the Lantau Port development and end with a connection to the Route 3 Country Park Section and Tuen Mun Road at the Ting Kau Interchange.

The Territorial Development Strategy Review in 1996 identified the NWNT as a strategic growth area. The Second Comprehensive Transport Study Update forecasts that the STL will be required before 2006 in order to meet the demand of traffic generated by the new developments on Lantau and the Lantau Port Peninsula. The traffic forecasts indicated a need to extend the STL to Yuen Long to meet the future traffic demands and to better serve the needs of the NWNT. Following the Feasibility Study conducted by Highways Department, the constraint to connect the STL to Route 3 was removed, and the STL was extended to Yuen Long to meet the future traffic demands. Since the purview of the STL project has changed, the project title is now changed to Route 10 - North Lantau to Yuen Long Highway (R10(NLYLH)). The proposed R10(NLYLH) alignment is illustrated in Figure no. 524/RPT/H016.

The purpose of this Assignment is to carry out a review of the findings, conclusions and recommendations of the Feasibility Study, in particular, the recommendations for the northern section of R10(NLYLH) to cater for the findings of the Crosslinks Further Study. In addition, a detailed investigation of the various impacts resulting from the project, as identified in the Feasibility Study, will be carried out. Preliminary designs will subsequently be produced addressing identified constraints and maintenance strategy and defining more precisely the extent of the Project such that it can be implemented in well defined time frame and to an accurate estimate of the expenditure cash flow.

2.2 Purpose of the Report

This Report on Interchanges and Connections has been prepared as part of the 'Route 10(NLYLH) Investigation and Preliminary Design Assignment' under the Highways Department Agreement No. CE 82/97.

The purpose of this report is to present the assessment of possible interchanges and connections to Route 10(NLYLH) southern section.

2.3 Structure of Report

The Report is divided into six further sections to address the above mentioned issues. The sections are summarised as follows:

- Section 3 : Outlines and briefly describes the interchanges and connections that have been developed.
- Section 4 : Investigates the feasibility of providing a slip road from R10(NLYLH) at Kwai Shek to Road P1 in the Northshore Lantau Port Development.
- Section 5 : Reports on the engineering and traffic investigations conducted for a possible connection of Tuen Mun Road with R10(NLYLH) at Tsing Lung Tau.
- Section 6 : Evaluates and compares the So Kwun Wat Interchange options in engineering, drainage, environmental, land, land use planning and landscape/visual impact terms
- Section 7 : Presents a summary of the key issues identified in Section 6.
- Section 8 : Makes a recommendation on the interchanges and connections to be taken forward to preliminary design.

3.0 INTERCHANGE AND CONNECTION OPTIONS

The Report evaluates the interchange and connection options at the following locations:

- North Lantau, connection to Road P1;
- Tsing Lung Tau, connections to Tuen Mun Highway; and
- So Kwun Wat, interchange and link roads to Tuen Mun Highway, including the mainline from Chainages 13400 to 14456.

These options have been developed taking account of the following:

- the Feasibility Study Alignment;
- cost-effectiveness;
- topography and geology;
- engineering and technical constraints;
- construction risk and programme;
- environmental concerns;
- land issues;
- planning issues; and
- operation and maintenance systems.

The Heritage Impact Assessment which will be undertaken as part of the statutory EIA process will examine in detail the potential archaeological significance of the north Lantau and So Kwun Wat areas.

Following comments from Commissioner for Transport on the Route 10(NLYLH) draft Design Memorandum, the mainline design speed of 85 km/h, adopted for the Feasibility Study, has been reviewed and revised to give a mainline design speed of 100 km/h. The design speed for link and slip roads has been revised to 85 km/h., except for the following :

1. the two slip connections to Tuen Mun Road from the So Kwun Wat Link Road, shown in the Feasibility Study, where because of future development constraints only a design speed of 70 km/h is possible without encroaching into the development area; and
2. the slip road connections with Road P1 on North Lantau, where the available space between the Tsing Lung Bridge anchorages and the North Lantau Highway would only permit a maximum horizontal curvature for a design speed of 70 km/h.

The options are fully described in Sections 4,5 and 6 of this Report.

4.0 NORTH LANTAU ROAD P1

4.1 Introduction

Road P1 is planned to supplement the North Lantau Highway in serving the New Town developments of Tung Chung and Tai Ho, and Hong Kong International Airport. Other studies have shown that the transport network on Lantau would benefit from a direct connection between P1 and Route 10(NLYLH); in particular a connection allowing west/north movements. It is this option which has been addressed in detail below. A connection which also allowed west/south movements would be difficult to facilitate because of the constraints imposed by the existing Kap Shui Mun Bridge approach span below which Route 10(NLYLH) will pass, the topography of the area and the necessity to achieve acceptable highway design standards. Such a movement could be provided elsewhere at Yam O where the tolling of Route 10 would not be affected.

It has been agreed that the demarcation of Road P1 between R10(NLYLH) and the Northshore Lantau Development Feasibility Study is at the high cut slope line.

4.2 Topographical and Geometrical Considerations

The alignment of P1 generally will be parallel to North Lantau Highway (NLH). P1 was recommended as a dual two-lane primary distributor road by the Comprehensive Feasibility Study of Remaining Development in Tung Chung and Tai Ho. It will have a design speed of 85 km/h.

The proposed connection of P1 with Route 10(NLYLH), is located immediately to the south of Tsing Lung Bridge on the Kwai Shek headland. It is proposed that this headland is re-contoured to provide a working platform for the construction of Tsing Lung Bridge and it is principally upon this platform that the connection would be constructed. The geometry of the connection is constrained by the southern tower and anchorages of the bridge to the north and the cutting of the North Lantau Highway to the south. To minimise the effect of the existing cutting as far as practicable it has been assumed that the two uppermost berms of that cutting will be removed when forming the new cutting to the working platform. Because of the constraints, as stated in Section 3, it has been agreed that a design speed of 70 km/h for the slip road connections will be adopted.

The vertical alignment of Route 10(NLYLH) mainline approaching Tsing Lung Bridge from the south passes beneath the approach spans of Kap Shui Mun Bridge at about +40mPD and climbs with a gradient of 3% to approximately +66mPD at the southern tower of Tsing Lung Bridge. The southbound diverging slip of P1 would cross above the mainline with a minimum vertical clearance of 5.12 metres before traversing the platform at a level of approximately +67mPD. The northbound merging slip of P1 would pass between the anchorages of the Tsing Lung Bridge and join the mainline immediately to the south of the bridge at a level of approximately +66mPD.

Configurations were drawn up for single and two lane merges. A single lane merge is preferred because of the following:

- it will not require as long a taper – 150 metres rather than 220 metre;
- the diverging slip road can pass between the two anchorage blocks of the bridge without requiring special provisions to be made;
- sight lines will not be restricted; and
- the merging of one lane with the three lane main line will be better operationally than a two lane merge.

This option has been agreed in principal with Transport Department.

The configuration of the P1 connection with Route 10 is illustrated in Figure no. 524/RPT/H017 which also shows turnaround provisions and hardstandings for emergency and maintenance vehicles.

The alignment of P1 to the west of the connection together with the location for a toll plaza will be the responsibility of others.

4.3 Geotechnical

Available site investigation data and field inspections for the Kwai Shek headland are accurately represented by HKGS 1:5,000 Sheet 10-NE-A. This indicates coarse ash tuff intruded by a succession of east-north-east trending dykes of quartzphyric rhyolite in this area. Shear zones or areas of faulting within the tuff and rhyolite are likely to be present at some locations and the areas of shoreline erosion to the east and west of the headland may be indicative of the coastal outcrops of such features.

Findings of land seismic surveys previously carried out in the Kwai Shek area, together with the results of the feasibility study site investigations, suggest the depth of weathered rock (Grade IV to VI) varies from approximately 20m at the ridge line above Kwai Shek, thinning to approximately 3m towards the North Lantau coastline. Drillhole P3 from the Feasibility Study, the most northerly drillhole and inclined at approximately 45°, indicates the presence of Debris Flow Deposits some 6.5m thick, comprising clayey, sandy silt, underlain by moderately decomposed coarse ash tuff. Meanwhile, vertical drillhole P7 encountered strong to very strong slightly decomposed quartzphyric rhyolite at shallow depth with no evidence to suggest sheared zones or faulting.

4.4 Drainage

The exposed cut faces of the excavations will require stabilization and/or protection. The requisite drainage will need to be designed in accordance with the relevant Hong Kong standards for slope drainage.

The proposed platform will change the existing natural slopes of the highland to a predominantly flat landscaped area to which drainage provisions will be applied. This will take into account the requirements for the drainage of the Road P1 link roads.

4.5 Environmental Issues

There are no sensitive receivers near the site and hence the construction noise and dust emissions associated purely with the construction of the P1 connection would not be expected to contribute to the choice of layout.

4.6 Land Matters

The construction of P1 would not have an increased effect on land issues. The principal issues which are affected by the construction of Route 10(NLYLH), namely Private Lot 8 in DD 362, two graves and the radio-telecommunications systems, have been addressed in the Report on Route 10(NLYLH) Alignment for the Southern Section.

4.7 Utilities

An 11kV electricity supply cable and a telecommunications cable which are located on pylons on the ridgeline north of North Lantau Highway, would require diversion. No other utilities would be affected apart from the radio-telecommunications mentioned above.

4.8 Land Use Planning

The connection would traverse through a GB Zone. The choice of alignment for the mainline P1 will be addressed in the recently commissioned Northshore Lantau Development Feasibility Study.

4.9 Landscape/Visual Impact

The Ng Kwu Leng headland is clearly visible from the relocated village on Ma Wan as well as more distant VSRs in residential developments from Sham Tseng to Gold Coast providing a degree of screening in views towards the North Lantau Highway. As such it is an important and prominent landscape and visual feature on the northern extremity of Lantau Island.

There will be significant impacts during the construction of Route 10 when the changes caused by earthworks would be highly visible. The 30 metre high rock cutting required for the connection together with the expansive essentially flat platform required for the construction of the Tsing Lung Bridge will be in complete contrast to the existing landform. During the construction of the platform a 4 metre high natural shield will be left to screen the works area and upon completion of the works the platform will be sensitively and fully landscaped to provide a feature at the southern end of Tsing Lung Bridge.

5.0 TSING LUNG TAU CONNECTION

5.1 Introduction

In a letter ref. (37) in TM131/1/38 V dated 6 May 1998 from Tuen Mun District Board (TMDB) to Highways Department, the TMDB requested Highways Department to investigate the possibility of providing a Route 10 (NLYLH) connection with Tuen Mun Road at Tsing Lung Tau. The engineering and traffic investigations conducted for the connection at Tsing Lung Tau are summarised in this section.

5.2 Constraints

Tuen Mun Road is a 3-lane dual carriageway which generally follows the coastline of the Ma Wan Channel and serves as the principal route between Tsuen Wan and Tuen Mun.

Route 10 (NLYLH) will cross Tuen Mun Road at Tsing Lung Tau. The alignment will pass in tunnel beneath Tuen Mun Road at a level of +65mPD some 325m north of the coastline. Details of the tunnel portal and the Route 10 (NLYLH) alignment are described in the Report on R10 (NLYLH) Alignment - Southern Section. The level of Tuen Mun Road at this location is approximately +84.5mPD.

To the north of Tuen Mun Road is the steep hillside of Tai Lam Chung, which lies within the Tai Lam Country Park. A catchwater system commences immediately north of the road at the 122m contour and extends northwards. To the south the terrain slopes steeply to Castle Peak Road and the Ma Wan Channel coastline.

The vertical alignment of Route 10 (NLYLH) leaving the Tsing Lung Bridge is constrained by the marine clearance requirements for the shipping channel. The route will descend at 3% gradient from a level of some 66mPD at the north tower with a sag curve as it enters Tai Lam Chung tunnel. This arrangement would satisfy an engineering constraint that it is desirable that there should be at least one tunnel diameter between the soffit of the tunnel and Tuen Mun Road.

The constraints on the possible connections between Tuen Mun Road and Route 10 (NLYLH) at this location are:

- the steep rock hillside of Tai Lam Chung Country Park immediately north of Tuen Mun Road;
- the steep hill (knoll) at Tsing Lung Tau between Castle Peak Road and Tuen Mun Road;
- the location of the portals to Tai Lam Chung tunnel;
- the distance between the north tower of Tsing Lung Bridge and Tuen Mun Road (only 350m);
- the location of the Tsing Lung Bridge cable anchorage blocks; and
- the requirement to maintain a constant overall width of the main span of the Tsing Lung Bridge deck.

The key issues and constraints associated with the connection at Tsing Lung Tau are illustrated in Figure no. 524/RPT/H018

5.3 Engineering Investigations

The possible routes for the slip road connections are indicated on Figure no. 524/RPT/H018.

5.3.1 North-East Slip Connections

Route 10 (N:YLH) Southbound to Tuen Mun Road Eastbound – TL1

The construction of this connection would involve commencing the diverge lane within the Tai Lam Chung tunnel. This could be feasible but would result in a slip road with a relatively small radius involving a reduction in sight lines within the rock section of the diverge road. This would lead to a reduction of the design speed or the tunnel section for the single lane slip would need to be widened to some 12.75m to provide a Desirable Minimum sight distance for 85km/h. As the slip road joins Tuen Mun Road, an extension to an existing subway beneath Tuen Mun Road would be required together with associated footpath diversions

Tuen Mun Road Westbound to Route 10 (NLYLH) Northbound – TL2

The earthworks required for this option would be significant as it would require the removal of the steep hill (knoll) adjacent to the disused quarry to the east of Route 10 (NLYLH). The connection would also require extensive tunnelling to join Route 10 (NLYLH) together with bridgeworks over the existing Tuen Mun Road. The merge with Route 10 (NLYLH) would be within the Tai Lam Chung tunnel which is not considered acceptable. The construction of this connection would involve considerable costs.

5.3.2 East-South Slip Connections

Tuen Mun Road Westbound to Route 10 (NLYLH) Southbound – TL3

This connection would be possible in engineering terms and would have a design speed of 85 km/h. However, the earthworks required for this option would be significant and would entail the removal of the steep hill (knoll) adjacent to the disused quarry to the east of Route 10 (NLYLH). Also, there would be an enhanced adverse environmental impact upon the adjacent residential developments.

Route 10 (NLYLH) Northbound to Tuen Mun Road Eastbound – TL4

Due to the limited space available, it would not be possible to climb over Tuen Mun Road without exceeding an 8% uphill gradient, and the turn eastward would intrude into the Tai Lam Country Park through difficult terrain.

5.3.3 South-West Slip Connections

Tuen Mun Road Eastbound to Route 10 (NLYLH) Southbound – TL5

There is an extensive cutting on the north side of Tuen Mun Road. Above this is the steep hillside of Tai Lam Chung. The construction of this slip road would require extensive earthworks which would require restrictions on the operation of the Tuen Mun Road. In addition, the construction would intrude into the Country Park. Furthermore, the gradient of the slip road would be of the order of 12%.

Route 10 (NLYLH) Northbound to Tuen Mun Road Westbound – TL6

By commencing the tapers for the slip roads on the main span of the Tsing Lung Bridge, as for the Road P1 connections, a 70 km/h design speed diverge slip could be constructed. The diverge slip would leave the main line at an initial gradient of -2.9% before continuing on viaduct at 4.29%, climbing to reach Tuen Mun Road. The slip road would then join Tuen Mun Road on a downhill gradient of -8.3%. The radius of the slip road would be 175m but with substandard transitions. Due to the short length of slip road and the likely high proportion of heavy goods vehicles, the maximum super elevation proposed would be 7% rather than 10% as recommended in TPDM Volume 2.

5.3.4 West-North Slip Connections

Tuen Mun Road Eastbound to Route 10 (NLYLH) Northbound – TL7

There is an extensive cutting on the north side of Tuen Mun Road. Above this is the steep hillside of Tai Lam Chung. The construction of this slip road would require extensive earthworks which would require restrictions on the operation of the Tuen Mun Road. In addition the construction would intrude into the Country Park.

Route 10 (NLYLH) Southbound to Tuen Mun Road Westbound – TL8

This connection would have similar implications to the eastbound connection in terms of tunnel widening to provide sight lines. To enable the slip road to climb above Tuen Mun Road the gradient would exceed 8% and would involve bridgeworks over the existing highway. The anchorages of the Tsing Lung Bridge would also constrain the connection. To avoid the cables the slip road would have to be pushed southwards. This would involve extensive viaducts as the slip road curves to join Tuen Mun Road.

5.4 Traffic Tests

For the purposes of the traffic model it was assumed that the interchange at So Kwun Wat as presented in the Feasibility Study remained unchanged. The connection at Tsing Lung Tau therefore produces some duplication in strategic connections. It has also been assumed that Route 10 (NLYLH) would be a dual-3 lane throughout its length, with a dual-2 lane So Kwun Wat Link Road.

The 2016 forecast flows for the Tsing Lung Tau Connection tests are shown in Figure nos. 524/RPT/H019 and H020.

It should be noted that in the base case scenario (presented in the Draft TIA Report) the 2016 peak hour forecast demand flows are in excess of the design capacity for many roads, including Route 10 (NLYLH). As a result, any test carried out on the connections will suffer from two problems. Firstly, the forecast flows on any proposed slip road may in practice be unachievable owing to upstream capacity constraints and, secondly, some trip routings may occur which may appear unreasonable but which are caused by capacity constraints being exceeded somewhere in the network.

5.4.1 Tsing Lung Tau Connection

The addition of these slips provides a connection between the southern section of Route 10 (NLYLH) and Tuen Mun Road between the Siu Lam and Sham Tseng Interchanges. In part these duplicate 'existing' connections via So Kwun Wat Link Road. Furthermore, the addition of these connections results in the So Kwun Wat Link and the section of Route 10 (NLYLH) between the So Kwun Wat Interchange and the Tsing Lung Tau Interchange becoming a parallel and alternative route to Tuen Mun Road. As a result, some traffic might be expected to route onto part of Route 10 which would be adequately served by Tuen Mun Road.

Within the Route 10 traffic model, traffic is free to make any feasible routing. However, in reality traffic would be guided by the road signing to take the most effective route, and to distribute traffic efficiently across the alternative routes.

In examining the practical advantages of the new slip road connections it is important to consider not only the total forecast flow on the connections but also how many of those trips have gained a direct benefit from the new connections rather than a small diversion (i.e. switching between Tuen Mun Road and So Kwun Wat Link).

5.4.2 North-East Slip Connections

These slips provide improved connections for trips between the Yuen Long area (and Shenzhen Western Corridor) and Kowloon/Kwai Chung/Tsuen Wan etc., reducing the journey length by removing the need to travel via the So Kwun Wat Link Road. In addition, weaving movements would be reduced on the So Kwun Wat Link Road

When this additional slip road connection was tested in isolation, the 2016 forecast flows were relatively low. Furthermore the flows were particularly low for the expected peak directions (i.e. 400 pcu/h towards Kowloon for the AM, and 600 pcu/h away from Kowloon for the PM). This is due to the underlying high demands on Route 10 (NLYLH) reducing the ability for additional trips to make use of the new connections.

Widening of the So Kwun Wat Link Road and Route 10 (NLYLH) north of Tsing Lung Tau could increase the usage of the slips for the peak movements by allowing better access to the interchange. This would be expected to increase other traffic movements, although by retaining the Tsing Lung Bridge at dual-3 lanes the only traffic that could benefit would be those using the Tsing Lung Tau Interchange.

For the counter-peak movements the flows are higher (i.e. 1700 pcu/h away from Kowloon for the AM, and 1500 pcu/h towards Kowloon for the PM), but still less than the capacity of one lane. Looking beyond 2016 these are likely to increase, but as the mainline flows of Route 10 (NLYLH) increases the slips flows will be reduced at the expense of other movements (in the same way that the peak direction flows are reduced).

Therefore, based upon the forecast flows, the Tsing Lung Tau North-East connections on their own (and without any other option to reduce overall traffic demands) only provide a limited benefit, owing to the high traffic demands for other movements.

5.4.3 South-West Slip Connections

These slips provide improved connections for trips between the Tuen Mun Road to North Lantau/Lantau Port/Hong Kong. In part these duplicate the connections via So Kwun Wat Link Road but would provide more direct access for journeys to/from Siu Lam and other areas on Castle Peak Road to the east of the Tuen Mun Road Interchange. In addition, weaving movements would be reduced on the So Kwun Wat Link Road.

The 2016 forecasts show relatively low flows on the proposed slip roads, with a maximum peak flow of 800 pcu/h for both directions. This is because So Kwun Wat Link Road would provide the preferred route for the majority of traffic.

Looking beyond 2016, there is little opportunity for these flows to increase significantly as the flows on Tsing Lung Bridge are above or close to the design capacity. The flow is also limited by the available capacity of Tuen Mun Road and those links feeding the bridge.

Based upon the forecast flows, the Tsing Lung Tau South-West slips on their own (and without any other option to reduce overall traffic demands) only provide a limited benefit, due to the So Kwun Wat Link Road being the preferred route for most trips.

5.4.4 Tsing Lung Tau Combined Slips

The addition of the two sets of slip roads produces forecast slip road flows greater than that predicted by the individual tests. This is due to the complimentary nature of the connections providing alternative route choices. Between the Tuen Mun Road Interchange and the Tsing Lung Tau Connection there are two alternative routes between Tuen Mun Road to the west and both Tuen Mun Road to the east and Tsing Lung Bridge.

Traffic travelling between these points therefore has improved route choice allowing a better balance in overall traffic between Tuen Mun Road and So Kwun Wat Link Road. Therefore, more traffic is able to access and make use of the new slip roads. However, in part this is due to the high demand flows which are close to or above design capacity for some links. With lower flows there would be less need for traffic to re-route, reducing the slip road flows.

The advantage of these slips is a better distribution in traffic which will provide for shorter journey times. This benefit is not accrued simply by those trips using the slips but traffic travelling through this corridor.

However, this assumes that traffic route freely, taking the least cost (in time and distance) choice (it is upon this assumption that the Route 10 (NLYLH) forecast model is based). In reality there will be less opportunity for vehicles to distribute across the alternative routes as traffic will be more likely to follow a designated signed route. The benefits of the slip roads, therefore, may be reduced and be closer to that shown in the individual slip road tests.

6.0 SO KWUN WAT INTERCHANGE

6.1 Introduction

The terminology used in this section is as follows:-

So Kwun Wat Link Road (SKWLR)- the link used between Tuen Mun Road and Route 10 (NLYLH) through So Kwun Wat Valley

West So Kwun Wat (WSKW) Interchange - the interchange between Tuen Mun Road and SKWLR

East So Kwun Wat (ESKW) Interchange - the interchange between Route 10 (NLYLH) and SKWLR

The objective of the SKWLR is to provide a crossover connection between Route 10 (NLYLH) and Tuen Mun Road (Route 2). This will provide an alternative route to the heavily congested Tuen Mun Road and a bypass to Tuen Mun. The SKW interchange will also accommodate the relatively small demand for a connection between Siu Lam and southbound of Route 10 (NLYLH).

In the general region of the interchange the Route 10 (NLYLH) mainline is essentially oriented in a north - south direction some 1.3 km east of Tuen Mun Road. Tuen Mun Road itself generally runs parallel to the mainline but to the south curves east towards Tsuen Wan and to the north curves west away from Route 10 (NLYLH) towards Tuen Mun. The SKWLR as proposed in the Feasibility Study runs in an east-west direction through the So Kwun Wat valley.

The So Kwun Wat valley is essentially a flat floodplain used for agricultural and container storage purposes, bounded in the east, north and south by steeply rising mountains reaching an elevation in excess of 80mPD. Towards Tuen Mun Road the topography flattens considerably as the valley drains from east to west in a minor rivercourse. Two small dams are located on the valley's eastern slopes, and a catchwater runs along its northern slopes at approximately 68mPD. A Country Park lies immediately north of this catchwater. The valley itself features several hillocks on its floor which may have Fung Shui properties. So Kwun Wat Tsuen village lies at the foot of these hillocks on the northern foothills of the mountains bounding the valley. A further smaller settlement - So Kwun Wat Sun Tsuen - is located at the heart of the East So Kwun Wat Interchange at the foot of a spur, the top of which is traversed by the Route 10 (NLYLH) mainline.

The northern valley slopes remain relatively untouched natural countryside, but the southern slopes have numerous large platforms cut, generally for roads or quarrying operations. The Siu Lam fresh water reservoir is located on one such platform overlooking the interchange in the eastern valley floor.

The Route 10 (NLYLH) mainline traverses a further major platform just south of the interchange formed from a depleted quarry. On the south western side of the valley adjacent to Tuen Mun Road, a further platform exists which is to be developed together with an area of floodplain to its north, into a major residential complex. This area is classified as a Comprehensive Development Area (CDA Area 55 and 56) under the So Kwun Wat Outline Zoning Plan no. S/TM-SKW/1. The north-west perimeter of the area is traversed by the slip roads connecting Tuen Mun Road.

6.2 Feasibility Study Scheme

The Feasibility Study (FS) So Kwun Wat Interchange is shown on Figure No. S24/RPT/H021.

The mainline of Route 10 (NLYLH) was designed for a design speed of 85 km/h under the Feasibility Study.

The Route 10 (NLYLH) mainline, as it bears due north at chainage 13200, crosses above the De-salter Water Tunnel on a +3% gradient. It then crosses over a ridge running east - west, and also a north facing spur; both have been flattened for a length of about 400m by previous quarrying operations.

The mainline then descends at -3% passing out of cut at chainage 13700 in a 500m right hand before cutting through a spur sited immediately above So Kwun Wat Sun Tsuen. This may have negative "Fung Shui" connotations with resultant objections from villagers.

Thereafter the mainline proceeds north across the valley floor and streamcourse on the eastern side of the valley on embankment at a 0% gradient at level 26mPD, between 5m and 14m above the valley. Whilst still on 0% gradient, the mainline reverses hands and turns through a point of inflection into a 1000m left hand arc before passing a water tunnel portal some 50m to its west. It reaches the portal of the northern section tunnel at about chainage 14450 where it passes under a catchwater.

The SKWLR between Route 10 (NLYLH) and Tuen Mun Road allows all movements to take place. The various slip roads merge to form a dual 4-lane link on embankment some 10m high. A collector road at the base of the embankment allows village access. Located essentially diagonally on the valley floor and crossing the main watercourse, the link passes over considerable areas of floodplain suitable for agriculture or development. This is particularly the case in the central and western parts of the valley where the link also separates fields at the base of the southern foothills from the rest of the valley.

The ESKW interchange comprises four slip roads. The southbound slip road from Route 10 (NLYLH) to SKWLR, LR3, diverges on the eastern side of the mainline immediately after exiting the northern section tunnel, and drops at -1.5% to pass under the mainline and northbound slip road from the mainline at about 20.9mPD. It then cuts across the foothills below the reservoir in a 350m left hand arc at about 25mPD, resulting in highly visible cut slopes which extend all the way up to the reservoir platform. This slip road, together with the northbound slip merging with Route 10 (NLYLH), are expected to be relatively lightly trafficked.

The northbound slip road from the SKWLR to Route 10 (NLYLH), LR4, diverges from the link at chainage 1520 in a left arc to merge with the mainline. The merge is completed at the tunnel portal, and will allow only limited redistribution of traffic between lanes in advance of the tunnel. This slip passes across the valley floor on embankment to form the most northerly encroachment in the eastern end of the valley

The northbound slip road from the mainline to the SKWLR passes over the southbound slip from Route 10 (NLYLH) on a bridge in a left hand arc of radius 350m. The eastbound slip road from the SKWLR to the mainline diverges from LR4 at chainage 1500 and passes over both mainline and LR3 at 41.25mPD in a right hand arc of 175m radius before merging with the Route 10 (NLYLH) mainline. No particular problems are evident with these alignments.

At the WSKW interchange the east-westbound slip roads with Tuen Mun Road pass scattered housing across a mixture of floodplain and convoluted northern hill slopes. The geometry of these slip roads is relatively straightforward as their orientation is similar, although the future junction with the Tuen Mun Road Southern Bypass must be taken into account.

The north-southbound slip roads with Tuen Mun Road, LR1 and LR2, traverse the floodplain immediately adjacent to the planned major Comprehensive Development Area (CDA). The northbound slip road which passes closer to the CDA has a minimum radius of 175m which will satisfy the requirements for a design speed of 70 km/h. Sight distance is a problem on both of the slip roads, particularly if a noise enclosure or barrier is required to shield the CDA.

6.3 Alternative Scheme - Option A

6.3.1 Introduction

The design speed of the Route 10 (NLYLH) mainline has been increased to 100km/h. As such, the So Kwun Wat Interchange design has been reviewed and revised to accommodate the change of design speed for link and slip road to 85km/h. The refined scheme is referred to as Option A in this Report and the details are shown in Figure nos. 524/RPT/H022 to H024.

6.3.2 Topographical and Geometrical

The horizontal and vertical alignments of Option A Interchange are similar to the Feasibility Study (FS) scheme apart from the ESKW Interchange.

As noted in Section 6.2, in the FS the slip roads LR3 and LR4 merge at the northern section tunnel without providing adequate distance for a crossover south of the portal. Option A modifies the FS mainline alignment by substituting a 350m radius arc for the 500m radius curve, and shifts the tunnel portal about 50m east to alter the mainline bearing, thereby also allowing the tunnel portal to move about 30m to the north. This eases the angle of the merge nosing of LR4 with the mainline, and allows the fitting of a 175m radius arc to LR4. The normal minimum radius for this arc is 250m. This enables crossover to be achieved, which is not possible with the FS interchange configuration.

The level of LR3 has been raised about 4m to mitigate the extent of cut necessary to the slope below the Siu Lam fresh water reservoir.

The impact on So Kwun Wat Sun Tsuen village is somewhat reduced, as the alignment of LR4 has shifted south relative to the FS. However the embankment required for LR4 will still encroach on the southern portion of this village.

6.3.3 Geotechnical

Construction of the Route 10 (NLYLH) mainline will require considerable open-cut excavations through the existing natural terrain and construction of bridges spanning across valleys and low-lying areas. A preliminary geotechnical assessment of various sections along the mainline route is given below in Table 6.3.3.1.

Table 6.3.3.1 Geotechnical Assessment

Chainage from	to	Preliminary Geotechnical Assessment
12860	13130	From the north end of the Siu Lam section towards the North, the mainline spans across a valley where the north-east trending Siu Lam Fault is located.
13130	13700	The route cuts through a previously quarried area where cut slopes averaging 20m and up to about 40m high will be formed. As a rough estimate, 450,000 m ³ of soil/rock will be excavated for this section. Extensive cutting/blasting works with associated slope works will be required. Further, tight vibration control will be required for blasting and foundation works due to proximity of WSD's Water Tunnel Reserve.
13700	13800	The route spans across a creek with about 40° sideslopes along the banks. Local slope stabilisation may be required in the abutment areas.
13800	13850	The route cuts through a small spur behind So Kwun Wat Sun Chuen, requiring formation of an approximately 10m high cut slope on the east side. The majority of the cut slope is likely to be in soils.
13850	14290	The section will be bridge supported. Between chainages 13890 and 13990, the bridge will span across the So Kwun Wat Basin where a possible fault is located. Large variations in bedrock levels are expected near the fault. The bridge supports across the basin will need to be pile-supported.
14290	14360	The route cuts into the existing slope on the east side and connects to the south portal of the northern section Tunnel. About 5m to 8m high cut slopes will be formed.

The majority of the SKWLR will be constructed on fill embankment. In the area north of the existing Siu Lam Service Reservoir, considerable excavation will be required to the existing natural slope between the reservoir and LR3.

The construction of fill embankment in the So Kwun Wat basin will cause long-term consolidation settlement of the underlying clayey alluvial deposits. With the high water table in the basin, considerable dewatering will be needed during subgrade preparation for embankment fill placement.

6.3.4 Drainage

The Int. range crosses two sub-catchments; namely Siu Lam and So Kwun Wat which are the sub-catchments of the Sham Tseng Basin (Drainage Master Plan Study in Tuen Mun and Sham Tseng being undertaken by Binnie Consultants Limited). No major flooding has been reported within this study area, except for a flooding blackspot near the So Kwun Wat Tsuen due to the insufficient capacity of existing

drainage. The following major drainage impact issues will need to be considered for the Interchange.

The 600m long mainline open-cut will require extensive excavation but the disruption to the surface watercourses in these areas will not be significant due to the contours of the slopes adjoining the cutting. The exposed cut faces of the excavation will require proper stabilization and/or protection and the requisite drainage will need to be designed in accordance with the relevant Hong Kong standards for slope drainage. Drainage provisions will be required at the northern end of the cuttings to drain stormwater collected from the open-cut faces to the existing watercourses within the So Kwun Wat sub-catchment. The drainage capacity of existing downstream watercourses will need to be checked and upgraded if necessary.

The highway embankment will be built downstream of Low Gap Dam Nos.2 and 3 of the Tai Lam Chung Reservoir. The existing watercourses near So Kwun Wat Tsuen and So Kwun Wat Sun Tsuen downstream of the Low Gap Dams Nos.2 and 3 will be intercepted by the highway embankment. Considerable drainage works will be required to re-route or upgrade existing watercourses along or under the highway embankment.

The So Kwun Wat sub-catchment is embraced by steep highland to the north. Most areas of this sub-catchment are occupied by natural slopes of the highland and the undeveloped rural areas in the downstream portion of the sub-catchment. These areas comprise over 90% of the total sub-catchment area. The highway will change the existing land uses of the sub-catchment. Considerable paved areas will result in increases in peak flow. As a result, the increased peak flow may impose additional hydraulic load on the existing downstream drainage facilities and cause adverse drainage impacts.

The highway is located downstream of Low Gap Dam Nos.1, 2 and 3 of the Tai Lam Chung Reservoir. These dams were built decades ago and any failure of the dams could cause significant increases in flood level and impact forces on the highway embankment downstream of Dam Nos.2 and 3, and on the piers of the proposed viaduct downstream of Dam No.1. A hazard and risk assessment of the dams is recommended to identify potential impacts that would result from a dam-break and to provide design information for the highway embankment levels, the embankment structure, the pier structure and the proposed drainage facilities.

Residential development has been proposed immediately downstream of the proposed slip roads which will connect the SKWLR to the Tuen Mun Road. The DIA study for the residential development has indicated the necessity to upgrade the existing downstream drainage facilities. The proposed drainage facilities for Route 10 (NLYLH) may impose additional hydraulic load on the drainage scheme for the residential development, hence this drainage scheme should be reviewed as part of the drainage design.

Proposed slip roads will be built on the embankment with road elevations varying from 27mPD to 14mPD. This layout will intercept the main stream of the So Kwun Wat sub-catchment and other sub-streams collecting surface runoff from the north-west areas of the sub-catchment. Considerable drainage works will be required to re-

route or upgrade existing watercourses along or under the highway embankment. Drainage capacity of existing drainage facilities adjacent to the proposed slip roads needs to be checked and /or updated if necessary.

6.3.5 Environmental Issues

Noise and Air Quality

The villages houses in So Kwun Wat Sun Tsuen and So Kwun Wat Tsuen and planned high-rise developments in the Comprehensive Development Area 55 and 56 will be affected by the Interchange. In accordance with the Feasibility Study Report, the capacity of the SKW interchange will be 9400 vehicle per hour. The locations and their horizontal distances from the Interchange are shown in Table 6.3.5.1 and Figure no. RPT/524/H025.

Table 6.3.5.i NSRs and ASRs near So Kwun Wat Interchange

Receivers	Name	Horizontal Distance (m)
R1	So Kwun Wat San Tsuen	60
R2	So Kwun Wat Tsuen	160
R3	PSPS Development in Area 56	200
R4	CDA site in Area 55	200

The air quality impacts of the Interchange have been assessed in the Feasibility Study and the predicted NO₂ concentrations at the identified air sensitive receivers are about 150 Fgm⁻³ (50% of AQO). As the Option A scheme follows the same route as the Feasibility Study, it is expected their air quality impact would be similar.

Road traffic noise impacts of the Interchange have been addressed in the Feasibility Study. The existing NSRs in the vicinity of the Interchange consist of mainly low rise village houses. Owing to the difference in elevation, these low rise village houses are expected to fall within the noise shadow zone of the interchange structure itself. In addition, solid crush barrier is expected to be located along the edge of the alignment, as a standard design of viaduct. In view of the above, the vertical height of the road and the crush barrier could potentially increase the noise shadow zone of the alignment hence providing a general improvement to the extent of noise impacts at the nearby receivers. In addition, the slant distance between the Interchange and NSRs will be increased, which would further improve the noise impacts at these receivers. Hence the predicted road traffic noise levels at these NSRs are within the noise criterion (predicted noise levels in the region of 60 to 65 dB(A)).

It is expected that the construction noise and air quality impacts of the Option A Interchange will be slightly lower than the FS Scheme with smaller volume of excavation and a reduction in the volume of plant and equipment required for the construction of the viaduct.

Other Issues

It is expected that the environmental impacts of other issues including ecology, waste, and risk will be minimal.

6.3.6 Land Matters

A summary of the features and land interests which have been identified as being affected by the land take for the Option A is contained in Appendix B to this Report. This section highlights the key issues.

Private Lot

It has been identified that 561 private lots will be affected by the Option A Interchange. The majority of lots are situated in So Kwun Wat Sun Tsuen and So Kwun Wat Tsuen which are both designated as recognised villages under the New Territories Small House Policy. Indigenous villagers or other qualified persons (those who inherited the land from owners of land before 25th December 1941) who own Old Schedule lots or pre-war New Grant lots will be entitled to compensation in accordance with Village Removal Terms in the event of resumption of building land by the Government.

The exact boundary of the village environs and the identification of those parties entitled to Village Removal Terms will be subject to further clarification with DLO/Tuen Mun. The status of the land owners affected by the implementation of the scheme will also be subject to further investigation and confirmation with the DLO/Tuen Mun. It should be noted that the lead time for resumption under Cap. 370 is normally between eighteen and twenty four months. However, if Village Removal Terms are involved, a period of between 24 and 36 months will be essential. Therefore, the need for substantial land resumption within the So Kwun Wat area may have significant implications upon the project implementation programme.

With regard to those agricultural lots affected by the Option A Interchange, it has been identified upon site inspection that a number of them are being used for storage of containers, vehicle parking and open storage of goods. Taking into account that most of the land used for storage of containers falls within the 'Village' zone upon the relevant Outline Zoning Plan, and the storage of containers upon those agricultural lots affected is well established and substantial in scale, it is likely that the existing uses upon the agricultural lots, as defined in the Town Planning Ordinance, would be the storage of containers, subject to further confirmation by DLO/Tuen Mun. In this case, the lot owners of those agricultural lots are eligible to continue the 'existing use' upon their lots and it is then necessary to assess the statutory compensation for those agricultural lots affected based upon open market value and compensation for disturbance, which may be higher than the ex-gratia rate for agricultural land resumed.

With regard to those agricultural lots currently used for vehicle parking and open storage of goods, the use of these lots will be subject to further clarification with the DLO/Tuen Mun to confirm their existing uses as defined in the Town Planning Ordinance.

Licences

It has been identified that 44 licences will be affected by the implementation of the Option A Interchange. Upon site inspection, it was identified that several types of structures with licences existed, including domestic buildings, workshops and chicken sheds, both upon private land and Government land. The details of the licences and associated structures will be subject to further confirmation with DLO/Tuen Mun. Clearance of these structures may require compensation to be paid to the licencees and the amount of such compensation will be subject to the nature of the licences and the type and form of the structures upon each site.

Graves and Shrines

It has been identified from the land status plans that 6 graves and 10 urns will be affected by the implementation of the Option A Interchange. Furthermore, there will be 2 shrines affected as established upon site inspection, located upon survey sheet Nos. 6-SW-13D & 6-SW-18A. The exact number of graves, urns and shrines to be affected can only be ascertained by further detailed inspection and will also depend upon the extent of the works that are required to be undertaken. It has been determined that there is no Gazetted Burial Area affected by the alignments in Tuen Mun.

The significance of the impact of the road upon graves and shrines will depend on the clans influenced, the types of graves involved, the material used to build the graves and shrines and their historic importance. Based upon reference to the land status plan no. 6-SW-13D, a grave of substantial size will be affected under both options and thus it will be necessary to undertake further enquiries of the DLO/Tuen Mun regarding the specific details of this grave. Clearance of graves, and in particular clan graves of historical significance will be difficult and should be avoided wherever possible. If clearance of such graves is necessary, measures should be taken to address the concerns of the villagers and considerable and lengthy consultation and negotiation with the respective village representatives and other affected parties is likely to be required. Under normal circumstances, ancestral graves of "Fung Shui" significance which have existed for more than 60 years may cause clearance problems whilst impacts associated with other graves will be relatively less significant.

Short Term Waiver

Two short term waivers, namely STW 212 and STW 523, will be affected, the details of these short term waivers will be subject to clarification with the DLO/TM.

Temple

It has been identified from the land status plan that a temple located near the Perowne Camp will be affected by the areas required for slope cutting in order to implement the SKWLR. Although this temple is not listed as a historical building under the relevant Ordinance, it will be necessary to liaise with the District Lands Office/Tuen Mun and District Office/Tuen Mun to confirm if any difficulties will be encountered in the clearance and relocation of the temple.

Tse Tong in the So Kwun Wat Sun Tsuen

Under the Feasibility Study scheme, the Tse Tong within the So Kwun Wat Sun Tsuen will be affected. Since the Tse Tong of a village is very important from a historical and social perspective, the Option A Interchange has been refined so that it will not encroach upon the Tse Tong.

Temporary Structures

Some temporary structures will be affected as identified from the land status plans. It may be necessary for rehousing arrangements to be implemented by the Housing Department in the event that clearance of these temporary structures is required.

6.3.7 Utilities

Power Supply

The major power line crossing in the vicinity of the So Kwun Wat Interchange occurs at mainline chainage 14150. The line in question is 33kV and as proposed in the Feasibility Study it is to be diverted from pylon to cable for the crossing of the mainline embankment and cutting.

Two minor power routes carrying low voltage lines are located on the southern side of the Route 10 (NLYLH) mainline and approach closest at chainage 13200. These lines are unlikely to affect the mainline or Option A, but if necessary these lines can be diverted.

Water Supply

Significant WSD facilities are located adjacent to the mainline which runs past the Tai Lam Chung Reservoir. Two large spillways from this dam drain into the So Kwun Wat valley, crossing the mainline at chainages 14080 and 14310. These will necessitate stream diversion for the embankment construction.

Water Tunnel 0105 runs from the Desalination Plant to Tai Lam Chung Reservoir, crossing the mainline at an elevation of 15mPD in an east - west direction at chainage 13300 on the southern side of the quarry platform. Due to its elevation it appears likely that protection of the tunnel will be required. This should take the form of pre-emptive measures to ensure blasting does not damage the tunnel. It should be noted that the tunnel is not operational and that the Desalination Plant has been decommissioned for some time.

At chainage 14050 a 1200mm diameter water trunk main crosses the mainline in the SKW valley before entering a tunnel. The crossing of the 1200mm diameter trunk main is not problematic, although additional protective measures may be required to cope with embankment loadings. The water tunnel's southern portal forms a constraint to the mainline in that clearance is required for blasting during construction of the northern section tunnel.

Drainage

There are no major drainage facilities within the area.

6.3.8 Land Use Planning

The So Kwun Wat Interchange will encroach on several zones depicted on the Draft So Kwun Wat Outline Zoning Plan No. S/TM-SKW/1, including a Village (V) Zone embracing So Kwun Wat Tsuen and So Kwun Wat Sun Tsuen, a Green Belt (GB) Zone south of the above-mentioned V Zone and a G/IC Zone which was occupied by a quarry.

It appears that the whole So Kwun Wat Sun Tsuen will need to be relocated for construction of the Interchange. Furthermore, there would be a reduction of flat land for village housing development and potential landscape and "Fung Shui" impacts. Objections from the villagers in both So Kwun Wat Tsuen and So Kwun Wat Sun Tsuen on the Interchange are expected. To relieve their objection, re-provisioning of So Kwun Wat Sun Tsuen and the encroached V land and suitable environmental, landscape and "Fung Shui" mitigation measures should be identified.

The impact on the GB zone is to be established through the landscape and visual assessment.

It is understood from Planning Department that the affected G/IC Zone has been earmarked for the use of a Hospital, Primary School and Indoor Recreation Centre. However, no details or development programmes for these proposed uses have been fixed. In any event, the relevant Government departments should be consulted to confirm the need and requirements of re-provisioning of an alternative site(s).

The slip road LR1 would also encroach on several zones depicted on the Draft Tuen Mun Outline Zoning Plan No. S/TM/10, including a Village (V) Zone, an Open Space (O), a GB and a CDA.

Subject to further consultation with the relevant Government departments, re-provisioning would be necessary to replenish the area of affected V and O zones. The impact on the GB zone is to be established through the landscape and visual assessment.

Regarding the impact on the CDA Zone, further consultation with Planning Department would be necessary to establish the implication on the future development and the appropriate approach of mitigation.

6.3.9 Landscape and Visual Impact

So Kwun Wat valley is a long valley with a broad flat floor below 20mPD. The valley sides are steep sided and variously vegetated with grass and scrub, together with dense woodland in the lower parts and along the sheltered watercourses. The valley has distinctly contrasting landscape and visual characters between its western and eastern ends. To the west, adjacent to the Tuen Mun Road, it is heavily disturbed by open stacked container storage, derelict development areas and the modern village

housing in So Kwun Wat Tsuen village, which is currently undergoing expansion. This part of the So Kwun Wat valley has low landscape quality. However, east of this is a relatively undeveloped area of agricultural land, although much lies fallow, and a small satellite settlement off the main So Kwun Wat Tsuen village. A number of gravesites are present in the lower hillsides. The relatively low level of disturbance within this part of the valley results in a high landscape and visual quality. Further east, at Pak Shek Hang, the valley branches into two. Both arms are primarily undisturbed, except for the hillside catchwater, and end at the reservoir. The long distance Maclehose Trail runs along the catchwater. There are distant views up the valley from the Gold Coast development.

Much of the Interchange will be at grade, and constructed on embankment. This will result in significant and irreversible impact to the existing landscape and visual quality of the valley. The earthworks will cause a severe change to the current character and bisect the valley at ground level. The low profile of much of the road, relative to the existing ground level, will require permanent landtake of the valley floor and introduce infrastructure as the dominant feature. Additionally, a number of short sections of the slip roads disturb the existing hillsides and will require extensive earthworks. Landscape work will be possible on the associated embankments.

The primary significant impact of the Option A Interchange is caused by it being routed along the high quality western section of the So Kwun Wat valley, incurring change to the natural topography and vegetation of the slopes. The requirement for much permanent landtake within the valley floor, together with the additional take for long sections of embankment results in a new landscape type. The slopes could be planted with trees and shrubs to "green" and screen the alignment.

6.4 Alternative Scheme - Option B

6.4.1 Introduction

The Option B Interchange is shown on Figure nos. 524/RPT/H026 to H030.

Option B was developed to address five issues:-

- (i) The radius on LR1. It was envisaged that by taking the flow from Route 10 (NLYLH) to Tuen Mun Road southbound directly at Siu Lam, LR4 could be eliminated. However, the final traffic predictions indicate that there will a moderate flow of local traffic travelling to Lantau from Tuen Mun Road via Route 10 (NLYLH). Hence it is desirable to keep this connection although the volume of traffic is much less than forecast in the FS.
- (ii) The severance of So Kwun Wat Valley by the SKWLR. By moving the SKWLR onto the hillside north of So Kwun Wat village, there will be many benefits such as reduced resumption of developable land, reduced noise impact, reduced flood impact, reduced severance and social impact, and reduced need for corresponding mitigation measures such as noise enclosures.
- (iii) The merge/diverge at the south portal of the northern section tunnel. The location of the merge /diverge is crucial to the satisfactory operation of the tunnel. The position of the diverge should allow traffic from all lanes of the tunnel to use the diverge, otherwise traffic has to select the appropriate lane(s) before entering the tunnel. The requirements for cross-overs, laybys for prohibited vehicles, U-turn facilities, and acceleration/declaration lanes into the median for operator's vehicles all require a reasonable distance between the tunnel portal and the merge/diverge locations. Option B eliminates the slip roads leading from the tunnel into So Kwun Wat Valley and thus provides a much greater space for the operational facilities required for the tunnel. There is no need to reduce geometric standards as is necessary in Option A.
- (iv) Weaving on the SKWLR. Option B eliminates the weaving sections on the SKWLR.
- (v) Travel Distance. For south bound traffic between Route 10 (NLYLH) and Tuen Mun Road, the more direct alignment of Option B reduces journey distance by more than 2 km. In the northbound direction, this advantage should significantly reduce the number of vehicles which choose to go through Tuen Mun town centre rather than "going back" through the northern section tunnel. Also it reduces traffic on the section of Tuen Mun Highway between Siu Lam and West So Kwun Wat.

6.4.2 Traffic Connection Tests

The Siu Lam Link Road (SLLR) is a dual two lane connection between Route 10 (NLYLH) north of the So Kwun Wat Interchange and Tuen Mun Road east of the Siu Lam Interchange allowing north/east movements. The overall objective of the road is to shorten the route distance between Route 10 (NLYLH) and Tuen Mun Road.

With the addition of the SLLR the north-westbound slip roads, LR3 and LR4, are deleted as shown on Figure no. 524/RPT/H033. There is limited underlying demand for these movements (as shown in Figure Nos. 524/RPT/H034 and H035). As shown on Figure No. 524/RPT/H036, the 2016 (AM and PM) forecast flows for those slip roads are between 1,700 and 1,800 pcu/h. However, although the removal of these slips at present has a relatively minor effect, if the southern Tuen Mun area was to develop further then loss of the connection could have a potential impact.

Due to the improved connections, the traffic on the Route 10 (NLYLH) northern section increases compared to the base case by about 400 pcu/h for the peak movements and about 1,000 pcu/h in the counter-peak direction. Also by simplifying the SKWLR there will be benefits from reduced weaving movements.

6.4.3 Topographical and Geometrical

The mainline horizontal and vertical alignment for Option B remain unchanged. Topographic features encountered are similar to those for Option A.

In the West SKW Interchange, the radii of LR1 and LR2 have been eased as the SKWLR is further north, with the lowest arc radius used being 250m. This conforms with an 85 km/h design speed and provides adequate sight distance in accordance with TPDM Vol II requirements.

The SKWLR will be located on the northern slopes of the SKW valley, generally on viaduct. As it passes behind So Kwun Wat Tsuen village fewer private lots are affected, and as it no longer passes diagonally across the valley, land take is mitigated. However, the link does cut a spur intruding south into the valley on the western end of the link. Care will have to be taken here to ensure that cut slopes do not encroach on the catchwater.

At the East SKW Interchange the westbound link from Route 10 to the SKWLR crosses a spur intruding into the valley which may have lesser "Fung Shui" significance than the adjacent wooded hillock. Every attempt will be made to reduce disturbance to this area and the slip will be constructed on viaduct which will pass over the spur without any cutting.

The Siu Lam Link Road includes the north and southbound slip roads to Tuen Mun Road at the Siu Lam Interchange. This commences at about 15mPD in the vicinity of Siu Lam, running parallel to Tuen Mun Road on either side of it for about 500m. The southbound slip road then crosses Tuen Mun Road in a 250m left hand arc to the western side where it merges with the northbound slip road. From here the merged SLLR passes over the existing interchange with Castle Peak Road and over/through a hill west of the Marine Police Base. It then curves north east in a 250m right hand arc, crossing Tuen Mun Road and ascending the hills at a gradient of 3% towards its eventual interchange with Route 10 (NLYLH). In doing so it passes over a ridge partially cut for an access road to the quarry face/platform formed at about 60mPD. Use of this route reduces earthworks volumes and environmental impact. The link then passes over a crest and descends at 2% through a valley between two platforms. This will necessitate filling with attendant rehabilitation of the watercourse, or the use of a culvert. At this point the SLLR bifurcates to form the north - and southbound

links with the mainline. The northbound link passes over the spur above So Kwun Wat Sun Tsuen without disturbing the village, whereas, in the Option A the village is resumed. The link roads in this area run closely parallel with the Route 10 (NLYLH) mainline and will accordingly take up little land.

With Option B the proposed merge and diverge at the northern section tunnel south portal is no longer constrained by the need to fit in slip road LR4, and can be shifted south. This will allow space for traffic to distribute itself between lanes on the northbound merge before entering the tunnel. It will also allow adequate space - in the order of 150m - for the maintenance/emergency and crossover roads at the portal. The southbound diverge from Route 10 (NLYLH) can also be relocated an adequate distance south of the portal to facilitate signing and decision making before the diverge, so that traffic from all three lanes of the tunnel can use the diverge.

6.4.4 Geotechnical

In Option B, the So Kwun Wat Link Road is generally located on the northern slopes of the So Kwun Wat basin. In the flood plain near Tuen Mun Road (from chainage 0 to 400), the viaduct piers will be supported by piles driven through the alluvial deposits and decomposed granite to the underlying slightly to moderately decomposed granite. Further east, the link road traverses some areas that exhibit moderate to severe gully erosion and isolated areas that are covered with colluvium, such as between chainages 900 and 1000.

From a geotechnical perspective, it is prudent to carry out a detailed study in these areas to confirm that they are adequately stable. Also, scattered boulders are apparent on the hillside. A boulder assessment is required to assess their stability and to determine if stabilisation works are required. Since the majority of this link road is elevated, there is little need for hard excavation and associated slope improvement works along the route, except for a short span between chainages 1100 and 1300.

The Siu Lam Link Road unique to Option B connects Tuen Mun Road at Siu Lam to the proposed Route 10 (NLYLH) mainline in the East SKW interchange area. The Siu Lam connection point is located in the coastal area, traversing a peninsula near the Marine Police Base before proceeding northward towards So Kwun Wat Interchange through hilly terrain.

Along the link road, excavation works will be required from chainage 1300 to 2000, and between chainage 800 and 900 near the Marine Police Base. The rest of this link road will be elevated. From chainage 1900 to 2100, the road spans across cultivated land in the So Kwun Wat Basin.

The Physical Constraint Map published by the GCO indicates that the link road spans across slopes with in situ terrain generally steeper than 30 degrees between chainage 1700 and 1900. These areas are scarred with moderate to severe gully erosion. Local slope stabilisation may be required if bridge piers are to be constructed on these slopes. Near chainage 1800, the route crosses the Water Tunnel Reserve where tight controls over construction-induced vibrations will likely be required on the existing installations.

6.4.5 Drainage

The approximately 2500m long SLLR from the Siu Lam section of Tuen Mun Road includes about 700m open-cut section and a viaduct structure built over some existing watercourses. No significant adverse drainage impacts are likely on the existing drainage conditions due to the construction and operation of the slip roads, except for the following potential drainage issues.

- The 700m long open-cut will require excavation, disrupting existing watercourse. The exposed cut faces of the excavation will require proper stabilization and or protection and the requisite drainage will need to be designed in accordance with the relevant Hong Kong standards for slope drainage.
- Drainage provisions will be required at the ends of the cuttings to drain stormwater collected from the open-cut faces to the main watercourses of the So Kwun Wat sub-catchment.
- Drainage provision will be required to convey floodwater from the disrupted watercourse to the main watercourses of the sub-catchment.
- Drainage capacity of existing drainage facilities adjacent to the proposed slip roads needs to be checked and/or updated if necessary due to the increased peak runoff from the paved area of viaduct.

The SKWLR includes about 150m open-cut section and the viaduct structure built over some existing watercourses. No significant adverse drainage impacts are likely on the existing drainage conditions due to the construction and operation of the slip roads, except for the following potential drainage issues.

- The 150m long open-cut will require excavation. The exposed cut faces of the excavation will require proper stabilization and/or protection and the requisite drainage will need to be designed in accordance with the relevant Hong Kong standards for slope drainage.
- Drainage provisions will be required at the ends of the cuttings to drain stormwater collected from the open-cut faces to the main watercourses of the So Kwun Wat sub-catchment.
- Drainage capacity of existing drainage facilities adjacent to the proposed slip roads needs to be checked and/or updated if necessary due to the increased peak runoff from the paved area of viaduct.

6.4.6 Environmental Issues

Noise

A number of noise sensitive receivers (NSRs) have been identified in the vicinity of the So Kwun Wat Interchange. They are mainly low to medium rise, low density developments. Table 6.4.6.1 presents the list of representative NSRs together with the horizontal and vertical distance from the road alignment. Locations of the NSRs are shown in Figure no. 524/RPT/H031.

Table 6.4.6.1 Noise Sensitive Receivers near So Kwun Wat Interchange

NSR	Ref	Horizontal Distance (m)	Height of carriageway (mPD)	Height of receiver (mPD)
Siu Lam Hospital	N1	150	32	75
Siu Lam Psychiatric Centre	N2	180	24	60
Correctional Institution (South Bound of the Siu Lam Interchange)	N3	30	387	55
Correctional Institution (North Bound of the Siu Lam Interchange)	N4	25	38	55
Police Quarters	N5	50	39	25
Correctional Institution Staff Quarters	N6	200	38	35
Villas next to Kings Park Villa	N7	90	34	20
Kings Park Villa	N8	70	34	34
The Castle Bay	N9	100	34	34
Castle Peak Villa	N10	280	34	20
Siu Lam Sun Tsuen	N11	300	32	40
Scattered House to the west of Siu Lam Tsuen	N12	40	34	55
Scattered House to the south of Siu Lam Tsuen	N13	20	38	30
Scattered House to the west of Poseidon Court	N14	25	40	30
West of Siu Lam Tsuen	N15	70	44	30
Poseidon Court	N16	200	38	38
Home for the Aged at Siu Lam	N17	160	52	40
Village House to the north of Siu Lam	N18	200	54	40
So Kwun Wat Ching Uk Tsuen	N19	50	48	20
So Kwun Wat Lee Uk Tsuen	N20	50	55	20
So Kwun Wat Govt. School	N21	200	47	38
Lo Tsing Shan Tsuen (So Kwun Wat Interchange - West Bound)	N22	20	37	40
Lo Tsing Shan Tsuen (So Kwun Wat Interchange - East Bound)	N23	50	37	40
Scattered House	N24	20	30	30
Scattered House at So Kwun Wat	N26	50	30	20

NSR	Ref	Horizontal Distance (m)	Height of carriageway (mPD)	Height of receiver (mPD)
Scattered House next to the Perowne Barracks	N27	20	30	20
Perowne Barracks (South)	N28	20	30	30
Perowne Barracks (North)	N29	20	30	30
Scattered House at SKW Road	N30	50	32	20
Scattered House located near Tuen Mun Road/So Kwun Wat Road junction	N31	30	34	20
Scattered village houses in Area 56	N33	30	30	30
Nim Wan Kar Wo Lei Tsuen	N34	90	20	40
Area 56 - CDA site western facade	N35	150	24	40
Area 56 - CDA site northern facade	N36	200	37	40
Area 56 - PSPS site eastern facade	N37	400	45	130

Based on the Calculation of Road Traffic Noise (CRTN) methodology, preliminary noise levels at each of the worst case representative NSRs have been calculated. For the purpose of this assessment, it has been assumed that vehicles will be travelling at a speed of 70km/h on the East and West So Kwun Wat Interchange, So Kwun Wat Link Road and Siu Lam Link Road. In addition, it has been assumed that standard impervious road surface will be used for this section of the alignment and a 1m high standard solid parapet along the road alignment has been assumed. Table 6.4.6.2 presents the results. Details of the spreadsheet calculations are shown in Appendix A.

For the purpose of this initial assessment, cumulative effect from other nearby road networks have not been included. The effect from these roads such as Tuen Mun Road, local access roads will be included in the assessment in the EIA Key Issue Report. It is expected that if the contribution from these roads are included, the cumulative noise levels would be increased. NSRs located in the vicinity of Tuen Mun Road and other roads will be more affected by these roads rather than the Option B Interchange. The extent of mitigation measures might need to be increased and will be confirm in the EIA Key Issue Report when more information is available.

Table 6.4.6.2 Predicted Road Traffic Noise Levels ($L_{10, \text{peak hour}}$ dB(A))

NSR	Ref	mPD height of receiver	Predicted Noise Levels
Siu Lam Hospital	N1	75	76
Siu Lam Psychiatric Centre	N2	60	74

NSR	Ref	mPD height of receiver	Predicted Noise Levels
Correctional Institution (South Bound of the Siu Lam Interchange)	N3	55	84
Correctional Institution (North Bound of the Siu Lam Interchange)	N4	55	85
Police Quarters	N5	25	69
Correctional Institution Staff Quarters	N6	35	69
Villas next to Kings Park Villa	N7	20	69
Kings Park Villa	N8	34	73
The Castle Bay	N9	34	71
Castle Peak Villa	N10	20	66
Siu Lam Sun Tsuen	N11	40	68
Scattered House to the west of Siu Lam Tsuen	N12	55	82
Scattered House to the south of Siu Lam Tsuen	N13	30	72
Scattered House to the west of Poseidon Court	N14	30	71
West of Siu Lam Tsuen	N15	30	70
Poseidon Court	N16	38	69
Home for the Aged at Siu Lam	N17	40	68
Village House to the north of Siu Lam	N18	40	68
So Kwun Wat Ching Uk Tsuen	N19	20	67
So Kwun Wat Lee Uk Tsuen	N20	20	64
So Kwun Wat Govt. School	N21	38	67
Lo Tsing Shan Tsuen (So Kwun Wat Interchange - West Bound)	N22	40	80
Lo Tsing Shan Tsuen (So Kwun Wat Interchange - East Bound)	N23	40	75
Scattered House	N24	30	73
Scattered House at So Kwun Wat	N26	20	66
Scattered House next to the Perowne Barracks	N27	20	66
Perowne Barracks (South)	N28	30	72
Perowne Barracks (North)	N29	30	72
Scattered House at S KW Road	N30	20	65
Scattered House located near Tuen Mun Road/So Kwun Wat Road junction	N31	20	66
Scattered village houses in Area 56	N33	30	70

NSR	Ref	mPD height of receiver	Predicted Noise Levels
Nim Wan Kar Wo Lei Tsuen	N34	40	65
Area 56 - CDA site western facade	N35	40	69
Area 56 - CDA site northern facade	N36	40	69
Area 56 - PSPS site eastern facade	N37	130	70

In general, where the elevation of the alignment is higher than the nearby NSRs, these NSRs are expected to fall within the noise shadow zone of the alignment itself, and the road traffic noise contribution from the alignment are expected to be minimal. These NSRs include the low rise Police and Correctional Institution Staff Quarters located in Siu Lam (N5 & N6), Villa next to King Park Villa (N7), Castle Peak Villa (N10), Siu Lam San Tsuen (N11), village houses west of Siu Lam Tsuen (N15), Poseidon Court (N16), village houses in Siu Lam (N18), So Kwun Wat Ching Uk Tsuen (N19), So Kwun Wat Lee Uk Tsuen (N20), scattered houses in So Kwun Wat (N26, N27, N30, N31) and Nim Wan Kar Wo Lei Tsuen (N34). In addition, owing to the large separation distance between the PSPS site and CDA site in Area 56 (N35, N36 & N37), the noise contribution from the alignment at these receivers will comply with the traffic noise criterion.

There are a number of NSRs that are marginally exceeding the road traffic noise criterion of $L_{10, \text{peak hour}}$ 70 dB(A), and the use of low noise road surfacing have been considered. These NSRs include the Kings Park Villa (N8), The Castle Bay (N9), scattered village houses in Siu Lam (N13 & N14) and Perowne Barracks (N28 & N29). With the use of low noise road surfacing, the potential road traffic noise impacts from the alignment are expected to comply with the road traffic noise criterion at these NSRs.

In general, where the elevation of the NSRs are higher than the alignment, these NSRs are expected to be affected by the potential road traffic noise. These NSRs include Siu Lam Hospital (N1), Siu Lam Psychiatric Centre (N2), Correctional Institution (N3 & N4), village house in Siu Lam near Tuen Mun Road (N12), Lo Tsing Shan Tsuen (N22 & N23) and village houses in So Kwun Wat (N24). In addition to the use of low noise road surfacing, roadside noise barrier is also required in order to reduce the extent of noise impacts at these receivers. Details of the spreadsheet calculations on noise levels with these mitigation measures are shown in Appendix A, and proposed locations of the noise barriers are shown in Figure no. 524/RPT/H032. Based on this arrangement, it is expected that the road traffic noise levels at most of the NSRs will comply with the road traffic criterion.

Air Quality

A number of air sensitive receivers (ASRs) including village houses, schools, planned and existing residential development are located along to the alignment. The identified ASRs are similar to the list of NSRs, and their locations are shown in Table 6.4.6.1 and on Figure no. 524/RPT/H031. Similar to the preliminary noise assessment above, the impacts from other major roads such as Tuen Mun Road have not been included in this initial assessment but will be included in the EIA Key Issue Report.

ASRs located in the vicinity of Tuen Mun Road and other roads will mainly be affected by these roads rather than the Option B Interchange. The extent of cumulative air quality impact, and the mitigation measures, if required, will be assessed in the EIA Key Issue Report when more information is available.

The capacity traffic flow of the Siu Lam Link Road is expected to be 4340 veh/hr. As the ASRs are located at more than 20m from the alignment, satisfying the HKPSG requirements for trunk road, adverse air quality impact from the Siu Lam Link Road is therefore not expected. The predicted NO₂ level at the nearest ASRs attributed to the Siu Lam Link Road, N4 (Correctional Institution) and N13 (village house) is expected to be 100 Fg m⁻³ (33 % of AQO). The Tuen Mun Road is located at more than 80m from the ASRs, and air quality impacts from Tuen Mun Road is low.

The capacity traffic flow of So Kwun Wat Link Road is 4650 veh/hr. Village houses including N10, N22, N23, N24 are located at about 20m from the alignment, and their NO₂ level is expected to be 100 -150 Fg m⁻³ (33 - 50% of AQO). The Tai Lam Country Park is located at about 50m from the Interchange alignment. Given that sufficient setback has been allowed for, adverse air quality impact on the country park is therefore not expected. ASRs including N28, N29 and N32 will also be affected by the vehicle exhaust emissions from the existing Tuen Mun Road. As these receivers are located at more than 20 m from Tuen Mun Road, adverse air quality impact is not expected. This will be confirmed in the EIA Key Issue Report when more details are available.

Ecology

The So Kwun Wat area to varying degrees is disturbed by human activity. The main habitats on the hill slope affected by the proposed So Kwun Wat Link Road comprises largely scrubland (fire controlled), grassland (also fire controlled), mixed scrubland and grassland, and agricultural land. The most widespread habitat type is mixed scrubland. The plant species recorded in this section are well-representative and typical to such habitat types elsewhere in Hong Kong. The grassland-scrubland mosaic is one of the dominant habitat type in the Tai Lam Country Park, and the species composition is similar to that of other scrubland but tend to be shorter in height as a result of the frequent disturbance (hill-fire). No wildlife of ecological/conservation interest were observed during the preliminary field visits. The proposed link road is close to the Tai Lam Country Park, with the nearest separation distance of approximately 50m.

The Siu Lam Link Road will mainly go through grassy or shrubby habitats. They are grassland-scrubland mosaic, and scrubland in various height, with presence of common plant species typical to these habitat types in Hong Kong, dominated by the shrub *Rhodomyrtus tomentosa* and *Backea frutescens*, as well as herbaceous plant *Arundinaria cantorii* and *Gahnia tristis*. Given the existing human disturbance in the area, no wildlife of ecological/conservation interest is expected.

Other Issues

It is expected that the environmental impacts of other issues including waste and risk will be minimal.

6.4.7 Land Matters

A summary of the features and land interests which have been identified as being affected by the land take for the Option B Interchange is contained in Appendix B to this Report. This section highlights the key issues.

Private Lots

It has been identified that 206 private lots will be affected as a result of the implementation of Option B. The implication on the resumption of these lots is described in Section 6.3.6.

One of the private lots affected by the Option B is the Seaman's Training Centre of the Vocational Training Council, within which only a small portion of land with no structure will be encroached upon, based upon the desktop study of the land status plans. There is a resumption clause in the Lease documents of this lot which specifies that the Grantee is obliged to deliver up possession of any part of the land so resumed by the Government for any public purpose at the cost of one sixty-second of the site formation cost of the said land, multiplied by the number of complete years of the unexpired term at the date of resumption, after the receipt of twelve months' advance notice. Therefore, there will not be any significant cost implications relating to this lot, subject to further clarification between the engineering consultants and the Vocational Training Council in respect of the site formation costs and any impacts upon the remainder of the lot not resumed as a result of the implementation of Option B Interchange.

With regard to three private lots, namely DD375 Lot 47, DD375 Lot 58 and DD375 Lot 73, upon which single-storey buildings have been identified, it has been assumed that no additional compensation would be provided to the owner concerned for the structures that have been erected given that no licence has been issued in connection with these three agricultural lots, subject to further clarification with the DLO/Tuen Mun.

For private lot DD374 Lot 718RP, which is affected by Option B, upon which a 3-storey building operated as a Home for the Aged has been identified, it is assumed that ex-gratia compensation rate for building land resumed will be adopted in the assessment of the resumption cost, with the statutory compensation including the value of the land and building and the compensation for disturbance not taken into account at this stage.

Some crops and fruit trees were also identified upon some of the affected lots and the details of which are summarised in Appendix B of this Report. However, the exact amount of crops and fruit trees affected by the route will be subject to a detailed survey at a later stage and thus no assessment of the compensation associated with the crops and fruit trees to be cleared has been undertaken in this Report.

Structures with Licences

It has been identified that 33 licences will be affected by the implementation of Option B. The details of the licences and associated structures will be subject to

further confirmation with the DLO/Tuen Mun. Clearance of these structures may require compensation to be paid to the licencees and the amount of such compensation will be subject to the nature of the licences and the type and form of the structures upon each site. It is also anticipated that legal domestic occupiers may be entitled to permanent/interim rehousing as compensation for the loss of accommodation.

Graves and Burial Areas

It has been identified from the land status plans that 2 graves would be affected by the implementation of the proposed route based upon Option B. However, the exact number of graves to be affected can only be ascertained by further detailed inspection along the proposed routes and will also depend upon the extent of the works that are required for the project. It has also been established that Gazetted Burial Areas No. 19 and 20 would be affected by the alignment.

The significance of the impact of the road upon graves and shrines is described in Section 6.3.6.

Catchwater

It has been identified from the land status plans that part of a catchwater channel and an associated road will be permanently affected by Option B.

Government Land Allocations

Three Government Land Allocations, namely GLA-TM 139, GLA-TM 329 and GLA-TM DSO TM 13/21 as indicated on plan, will be affected by the proposed alignments and details relating to these Government Land Allocations will be subject to clarification with the DLO/Tuen Mun.

Land Requirements within Country Park Boundary

It has been identified that the proposed route corridor falls within the boundary of Tai Lam Country Park. Pursuant to the Country Parks Ordinance (CAP. 208), the prior approval of the Director of the Agriculture and Fisheries Department will need to be sought for the implementation of the section of the route falling within the boundary of the Tai Lam Country Park. It is also envisaged that consultation with the Country Park Board that was formed under the Ordinance will also be necessary to obtain endorsement of the form and extent of the proposed route corridor.

Short Term Tenancy

A Government Short Term Tenancy No. 872, as identified on Land Status Plan No. 6-SW-24A, will be affected upon implementation of the southern part of the proposed Interchange. Details of the Short Term Tenancy will need to be confirmed with DLO/TM. Given that Government is authorised to terminate the Government Short Term Tenancy by serving notice in advance, the cost implication associated with this Short Term Tenancy has not been addressed in this Report.

Temporary Structures

Some temporary structures erected on Government land have been identified as being situated within the alignment of the proposed Interchange and Link Roads, upon review of Land Status Plans Nos. 6-SW-12D and 6-SW-17B. Clearance of these structures may require the provision of compensation and re-housing arrangements to the affected occupants and the details of such requirements will be subject to further discussions with the Housing Department.

6.4.8 Utilities

Power Supply

The diversion of the 33kV from pylon to cable for the crossing of the mainline embankment and cutting would provide a satisfactory solution for Option B.

Two minor power routes carrying low voltage lines are located on the southern side of the Route 10 (NLYLH) mainline and approach closest at chainage 13200. The proposed SLLR of Option B will cross both routes, necessitating diversion from pole to cable duct at such crossings.

Water Supply

Option B will have similar impacts to WSD facilities as Option A.

Drainage

As with Option A, there are no major drainage facilities in the area.

6.4.9 Land Use Planning

Northern Section - Tuen Mun Road to So Kwun Wat Sun Tsuen

At the West SKW Interchange, the east bound lane encroaches on the non-building area of an ex-military site zoned Government/Institution/Community (G/IC) on the Draft Tuen Mun Outline Zoning Plan (OZP) No. S/TM/10. The Tuen Mun New Town Area 48A Layout Plan shows this encroachment in a 'non-building area' and acknowledges Route 10 (NLYLH) merging with Tuen Mun Road at that location.

The west bound lane encroaches on a G/IC zone and a Residential Group B (R(B)2) zoned site south of Tuen Mun Road. The Layout Plan for Area 48A depicts Route 10 (NLYLH) encroaching on Green Belt (GB) use in the G/IC zone and a 'non-building area' in the R(B)2 zone. The route also encroaches on the edge a R(B) zone shown on the OZP which is zoned for GB on the Tuen Mun Areas 55 and 57 Layout Plan. The Layout Plans indicate that Route 10 (NLYLH) has been previously acknowledged in past planning. The proximity of the road to potential housing sites may have potential environmental implications for the future developments and should be a subject of further investigation

The route proceeds to the east through a zone of GB as shown on the Draft So Kwun Wat OZP No. S/TM-SKW/1 and on the northern edge of the So Kwun Wat Village type Development (V) zone. The impact on the GB zone is to be established through the landscape and visual assessment.

The connection slip road LR2 will slightly encroach on areas zoned Open Space (O) on S/TM/10 OZP. It is understood that the areas do not have a programmed use. Across Tuen Mun Road, slip road LR1 cuts the corner of a site zoned CDA. The impact is anticipated to be slight in planning terms as most of the encroachment area is an existing cutting adjacent to Tuen Mun Road.

Subject to further consultation with the relevant Government departments, re-provisioning would be necessary to replenish the area of affected V and O zones. Regarding the impact on the CDA zone, further consultation with Planning Department would be necessary to establish the implication for the future development and the appropriate approach of mitigation.

Southern Section - So Kwun Wat Sun Tsuen to Siu Lam Interchange

The Siu Lam Link Road would encroach on several zones depicted on the Draft So Kwun Wat Outline Zoning Plan No. S/TM-SKW/1, including a V zone embracing So Kwun Wat Tsuen and So Kwun Wat Sun Tsuen, a GB zone south of the above-mentioned V zone, a G/IC zone which was occupied by a quarry and a G/IC zone occupied by open storage. The alignment also passes through an O and G/IC zone shown on the Tuen Mun OZP No. S/TM-SKW/1.

The Siu Lam Link Road passes within the eastern perimeter of the V zone near So Kwun Wat Sun Tsuen. There would be a slight reduction of flat land for village housing development and potential visual, landscape and "Fung Shui" impacts. Objections from the villagers in both So Kwun Wat Tsuen and So Kwun Wat Sun Tsuen are expected. To relieve their objection, re-provisioning of the encroached V land and suitable environmental, landscape and "Fung Shui" mitigation measures should be identified.

It is understood from Planning Department that the G/IC zone affected by the Route 10 (NLYLH) mainline has been earmarked for Hospital use. The southern section of the same G/IC zone near Tuen Mun Road is earmarked for educational use. However, no details or development programs for these proposed uses have been fixed. In any event, the relevant Government departments should be consulted to confirm the need and requirements of re-provisioning of an alternative site(s). It is beyond the scope of this study to identify sites to re-provision these facilities.

The future use of the G/IC zones and O zone on the Tuen Mun OZP will be marginally limited by the encroachment of the link road.

6.4.10 Landscape and Visual Impact

The landscape and visual issues are primarily related to the level of disturbance to:

- landscape features;

- areas of natural or semi-natural vegetation, particularly woodland; and.
- views from residential properties (visually sensitive receivers or VSRs).

Existing Context

This part of the Route 10 (NLYLH) study area primarily comprises the So Kwun Wat valley, together with part of a large knoll to the south. Sections of the knoll are naturally vegetated with grass and scrub on the more exposed areas and dense tree and scrub in the valley and stream courses, however, further south large areas are heavily disturbed by the formation of earthworks platforms and some development.

So Kwun Wat valley is a long valley with a broad flat floor below 20mPD. The valley sides are steep and variously vegetated with grass and scrub, together with dense woodland in the lower parts and along the sheltered watercourses. The valley has distinctly contrasting landscape and visual characters between its western and eastern ends. To the west, adjacent to the Tuen Mun Road, it is heavily disturbed by open stacked container storage, derelict development areas and the modern village housing in So Kwun Wat Tsuen village, which is currently undergoing expansion. This part of the So Kwun Wat valley has low landscape quality. East of this, however, is a relatively undeveloped area of agricultural land, although much lies fallow, and a small satellite settlement off the main So Kwun Wat Tsuen village. A number of gravesites are present in the lower hillsides. The relatively low level of disturbance within this part of the valley results in a high landscape and visual quality. Further east, at Pak Shek Hang, the valley branches into two. Both arms are primarily undisturbed, except for the hillside catchwater, and end at the reservoir. The long distance Maclehoose Trail runs along the catchwater. There are distant views up the valley from the Gold Coast development.

To the south of the So Kwun Wat valley is a large knoll separating it and the Siu Lam valley. Sections of this knoll are naturally vegetated with grass and scrub on the more exposed areas and dense tree and scrub in the river courses. However, large areas are heavily disturbed by the formation of earthworks platforms and some development.

The Siu Lam valley is narrow and bounded by steep slopes vegetated with a mix of grass and scrub on the upland areas and woodland in the more sheltered watercourses. There are villages and agricultural land in the upper sections towards the reservoir. The lower parts of the valley are heavily disturbed with the ongoing high-rise residential development adjacent to Tuen Mun Road.

So Kwun Wat Link Road

Much of the road will be on viaduct some 10m to 20m above the ground level. Assuming that the construction works area can be limited to a relatively narrow strip of land below the alignment, the road will cause only relatively minor direct landscape impacts at ground level. However, the section of cut and fill required through the valley side will result in irreversible impacts to the natural topography and vegetation at that point.

The link road will be a major visual feature along the natural valley side causing an extreme change in the existing views. Its general height of 10m to 20m above the

local hillside will limit the extent of effective intermediate screen planting possible for both the local and wider views. It will result in some degree of visual intrusion and cause a major change in the visual character of the valley side.

The primary significant impact is caused by the link road being routed along the high quality western section of the So Kwun Wat valley, and the northern valley side incurring change to the natural topography and vegetation of the slopes. The height of the viaduct sections would allow tree and shrub planting below, reducing its harsh character although not screening it effectively.

Siu Lam Link Road

The alignment of the link road will cause landscape impacts to the knoll between the So Kwun Wat and Siu Lam valleys. However, in the context that the knoll is already disturbed and that the Route 10 (NLYLH) alignment is adjacent this impact will be limited. The Siu Lam valley side is already disturbed due to an access road to the former excavations. However, the extent of the earthworks required will cause significant and irreversible landscape impacts to the valley side, particularly considering that this entire section will be at-grade. The remaining section will cause only limited landscape impacts at the ground level, assuming that the works area below is restricted to below the viaduct only.

The level of the road will result in it being a major visual feature of the Siu Lam valley side and along the coastline, with the viaduct connection to Tuen Mun Road. With much of the Siu Lam valley section being at-grade there are opportunities for roadside screen tree and shrub planting. However, the section of road to the south of Tuen Mun Road is primarily on viaduct up to their connection. This would be a prominent feature in all views from the south causing a severe change in their character and in blocking the future views towards the channel from the on-going construction of the high-rise development in the valley.

The primary significant impacts arise due to the alignment along the side of Siu Lam valley and the visual prominence of the viaduct along the coastline. Tree and shrub planting along the roadside will screen much of the road along the valley although the new slopes will be major visual features. The height of the viaduct along the coastline limits mitigation to screen the road, although tree and shrub planting below the road will be possible to soften the views, particularly from the lower levels. Particular attention should be given to the appearance of structures and earthworks.

6.5 Cost Estimates

6.5.1 Comparison of Construction Cost

The estimates have been derived from the Base Estimate - Package 1, given in Table 9.1 of the Sham Tseng Link, Feasibility Study Final Report. The unit rates used are as the Feasibility Study but updated to allow for inflation from December 1996 to December 1997, the base date for the current study. The rates have been increased by 8.7% as advised by Finance Bureau.

From a review of the quantities presented in the Feasibility Study Base Estimate, it would appear that some of the quantities quoted in the Feasibility Study are under measured. The quantities have been corrected and presented as the Remeasured Feasibility Study Estimates.

Comparative construction cost estimates between the Remeasured Feasibility Study, Option A Interchange and Option B Interchange are given in Table 6.5. Thus all costs are measured between equivalent topographical locations between Ch 13400 - 14456 for all the Interchange options.

The cost estimate allocates unit rates to broad construction categories and therefore do not, at this stage make allowance for a number of factors. This includes the reduced travelling time for south bound traffic between Route 10 (NLYLH) and Tuen Mun Road under the Option B Interchange. This travel time and vehicle economic cost saving is estimated to be \$440,000 per day.

The Option A Interchange which has been modified to suit the revised mainline design speed of 100km/h shows a comparative cost saving of HK\$147.4M compared with the Remeasured Feasibility Study Interchange construction cost of \$1,884.9M.

The Option B Interchange which includes the additional Siu Lam Link Road shows a construction cost of \$2,319.5M.

6.5.2 Comparison of Land Costs

Details of the total land acquisition costs are presented in Appendix B and summarised below.

Feasibility Study Interchange:	HK\$ 632.4M
Option A Interchange:	HK\$ 513.8M
Option B Interchange:	HK\$ 146.0M

6.5.3 Operation and Maintenance Costs

The cost per annum attributable to the Operation and Maintenance costs have been estimated as a percentage of the construction costs identified in Table 6.5. The costs have been derived from percentages used in the Feasibility Study as follows:

Earthworks/Roadworks	-	1.0%
Viaducts	-	0.5%
E&M	-	0.6%

The Operation and Maintenance costs for the noise barriers have been assumed to be included in the maintenance costs for the highways and viaducts.

The costs for the respective interchanges are as follows :

Feasibility Study Interchange:	HK\$ 6.8M / year
Option A Interchange:	HK\$ 6.7M / year
Option B Interchange:	HK\$ 10.8M / year

Table 6.5: Comparative Construction Cost Estimates for So Kwun Wat Interchange

Description of the Works	Unit	Rate (HK\$)	Re-measured Feasibility Study Estimate		Option A Interchange Estimate		Option B Interchange Estimate	
			Quantity	Total (HK\$000's)	Quantity	Total (HK\$000's)	Quantity	Total (HK\$000's)
<u>Highway (At grade)</u> Mainline Interchange	m ²	Varies*	24,476	69,136	26,796	69,456	24,476	69,136
	m ²	Varies*	89,196	264,056	89,196	264,056	50,607	134,107
<u>Highway (Elevated)</u> Mainline Interchange	m ²	12,773	17,168	219,287	17,168	219,287	81,547	1,041,600
	m ²							
<u>Electrical & Mechanical</u> Mainline Interchange	m	30,436	2,112	64,281	2,212	67,324	2,112	64,281
	m	30,436	7,895	239,582	7,430	225,471	12,830	389,339
<u>TCSS</u> Mainline Interchange	m	9,370	2,112	19,789	2,212	20,726	2,112	19,789
	m	9,370	7,895	73,976	7,430	69,619	12,830	120,217
<u>Environmental Mitigation</u> Noise Barrier-on structure Noise Barrier-at grade	m	15,000	380	5,700	2,410	36,150	1,105	16,575
	m	13,625	1,900	25,888	-	-	50	681
<u>Site Clearance/Land Resumption</u>	Item			632,400		513,800		146,000
<u>Landscape (7.5% of at-grade)</u>	Item			24,989		25,013		15,243
Sub-Total				1,639,084		1,510,903		2,016,969
General Preliminaries	15%			245,863		226,635		302,545
Package Total				1,884,946		1,737,538		2,319,514

Notes: * Rates for Highway on Embankment \$3,200, Highway at-grade \$2,650

7.0 SUMMARY

7.1 Introduction

This section presents a summary of the key issues and constraints identified and discussed for the So Kwun Wat Interchange options in Section 6.

A score is applied to the impact of the issues within the disciplines against which the option can be evaluated. The scoring system is applied as follows: 1 = Very Bad; 2 = Bad; 3 = Medium; 4 = Good; and 5 = Very Good.

Summation of the scores presents a comparative assessment of each option.

7.2 So Kwun Wat Interchange

Discipline	Option A		Option B	
	Key Issues	Score	Key Issues	Score
Topographical & Geometrical	<ul style="list-style-type: none"> Traverses wholly within the floor of So Kwun Wat valley which is essentially a flat floodplain. Mainline satisfies 100 km/h design speed. Southern sliproad (LR1) to Tuen Mun Highway 70km/h design speed with reduced sight distance. East SKW Interchange sliproad (LR4) to mainline does not meet normal minimum radius requirement. Geometric constraints to merging distances at connection between link road and the northern section tunnel. 	3	<ul style="list-style-type: none"> Passes on viaduct on the northern slopes of the So Kwun Wat valley. Passes on the eastern slopes of Siu Lam area consisting quarry access road and platforms, crosses a beach to the south of Tuen Mun Highway and a small promontary. Mainline satisfies 100km/h design speed. All sliproads 85 km/h design speed with adequate sight distance. No geometric constraints to merging distances. 	5
Land Matters	<ul style="list-style-type: none"> Significant land resumption. Requires re-site of the recognised So Kwun Wat Sun Tsuen village. 	2	<ul style="list-style-type: none"> Reduced land resumption. No re-site of So Kwun Wat Sun Tsuen village. Requires Land resumption in Siu Lam. Affects beach. Encroaches into Marine Police Base. 	3

Discipline	Option A		Option B	
	Key Issues	Score	Key Issues	Score
Transport Planning	<ul style="list-style-type: none"> Traffic movements not direct. All traffic movements accommodated. 	3	<ul style="list-style-type: none"> Shorter travelling distances for major traffic movements. Two minor traffic movements not served. Reduced movement conflicts along So Kwun Wat Link Road. 	4
Land Use Planning	<ul style="list-style-type: none"> Occupies potential future development zones in So Kwun Wat. Impact on CDA near West SKW Interchange. Bisects existing land uses in So Kwun Wat valley. 	2	<ul style="list-style-type: none"> Frees potential development sites in So Kwun Wat valley SLLR affects designated G/IC zone earmarked for educational use, though no fixed programme. 	4
Landscape & Visual Impact	<ul style="list-style-type: none"> Significant impact and permanent landtake in So Kwun Wat valley. Landscape and visual impact at SKW valley due to extensive earthworks for the embankment. 	3	<ul style="list-style-type: none"> Significant impact on the northern hillside of So Kwun Wat valley. Significant impact on Siu Lam valley. Visually prominent viaduct along the coastline at Siu Lam. 	2
Drainage	<ul style="list-style-type: none"> Potential impact on drainage at head of So Kwun Wat valley. Effect on drainage within the floodplain of So Kwun Wat valley. 	2	<ul style="list-style-type: none"> Potential impact on drainage at head of So Kwun Wat valley. Disruption to watercourses of the Siu Lam sub-catchment. 	3

Discipline	Option A		Option B	
	Key Issues	Score	Key Issues	Score
Environmental	<ul style="list-style-type: none"> • Significant adverse noise impacts on existing and proposed developments in So Kwun Wat requiring barriers/enclosures. • Adverse air quality impacts in So Kwun Wat particularly where noise enclosures are required. • Alignment goes through areas of minor ecological interest. 		<ul style="list-style-type: none"> • Potential noise impacts on future development possibly requiring single barriers. Noise mitigation measures required in Siu Lam. • Alignment more distant from majority of the ASRs. • No wildlife of ecological/conservation interest affected on hill slope. 	
		3		4
Cost	<ul style="list-style-type: none"> • Estimated construction cost of HK\$1,737,538,000. • Estimated land acquisition cost of HK\$513,800,000. • Estimated operation and maintenance cost of HK\$6,814,000 / annum 		<ul style="list-style-type: none"> • Estimated construction cost of HK\$2,319,514,000. • Estimated land acquisition cost of HK\$146,000,000. • Estimated operation and maintenance cost of HK\$10,802,000 / annum 	
		4		2
	Total	22	Total	27

8.0 RECOMMENDATIONS

8.1 North Lantau Road P1 Connection

The Road P1 will run parallel to the North Lantau Highway to serve the new town developments of Tung Chung and Tai Ho, and the Airport. The traffic studies show that a connection between Road P1 with Route 10 (NLYLH) will benefit the transport network on Lantau. As stated in Section 4 of the Report, a connection allowing west/north movements is feasible.

8.2 Tsing Lung Tau Connection

The area of Tsing Lung Tau where the Tsing Lung Bridge will cross the Tuen Mun Highway is highly constrained by existing developments, existing land features and the proposed locations of tunnel portals, suspension bridge anchorages, and the bridge tower. Nevertheless, this area does provide scope for limited connection options.

Traffic studies suggest that there is limited traffic demand at this location for north/east and south/west movements between Route 10 (NLYLH) and Tuen Mun Road. The former movement would require merging and diverging lanes within the Tai Lam Chung Tunnel and, because of the constraints, the radii of the slip roads would have to be below desirable minimum standards. The latter movement is feasible and would require merge and diverge tapers on the Tsing Lung Bridge viaduct approach. These slip roads would also be below desirable minimum standards.

Given the engineering constraints, the costs and the impacts of providing a connection at Tsing Lung Tau it is not recommended that a connection at this location be considered further, particularly when bearing in mind the low volume of traffic demand for such movements.

8.3 So Kwun Wat Interchange

Two Options have been prepared for the connection of Route 10 (NLYLH) with Tuen Mun Road in the So Kwun Wat area. Option A is based on the Feasibility Study with the link constrained within the confines of the So Kwun Wat valley. Option B has a link road situated on the northern slopes of the valley with a further link road to Tuen Mun Road at Siu Lam.

The Option B differs from Option A in that all recommended geometrical standards for slip roads are satisfied. It also provides adequate merge/diverge distances at the northern section tunnel portal which were not provided by the Feasibility Study alignment, and provides greater space for the operational facilities for the tunnel.

The Option B provides for improved travel times between Route 10 (NLYLH) north section and Tuen Mun Road east, and reduces weaving movements on the So Kwun Wat Link Road.

From a land perspective, Option B has less significant implications in terms of time and costs associated with resumption and clearance. The re-site of the recognised village of So Kwun Wat Sun Tsuen is avoided under Option B.

The So Kwun Wat Link Road under Option B is moved north onto the northern slopes of the So Kwun Wat valley. This result in less environmental impacts as the road is located further away from the sensitive receivers. As the So Kwun Wat Link Road will no longer severance the valley, there will be greater opportunity for potential future developments at So Kwun Wat.

Based on the comparison given in Section 6 and the summary presented in Section 7, it is recommended that the Option B be endorsed to replace the scheme developed in the Feasibility Study.

APPENDIX A
ENVIRONMENTAL ISSUES

So Kwun Wat Interchange - Option B
Noise Impacts on NSRs

NSR	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	
NSR Hourly Flow (veh/hr) % Speed (km/h) % HW Gradient % Surface Type (Impervious/Permeous) Receiver-Corridor Distance (m) Height of Corridor Angle of View (Deg) Barrier (Y/N) MPO Height of Barrier Receiver-Corridor Distance Receiver Height (mPO) Height of noise barrier relative to corridor	4340 70 64 4 4 150 32 180 7 33 25 247	4340 70 64 4 4 30 24 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 30 38 180 7 38 35 517	4340 70 64 4 4 300 32 180 7 33 1 40	4340 70 64 4 4 40 34 180 7 35 1 55	4340 70 64 4 4 20 34 180 7 39 1 30	4340 70 64 4 4 20 34 180 7 41 1 30	4340 70 64 4 4 20 34 180 7 45 1 30	4340 70 64 4 4 200 44 180 7 39 1 38	4340 70 64 4 4 160 52 180 7 53 1 40	Home for the Aged at Su Lam M17 Possidon Court M16 West of Su Lam M15 Scattered House M14 Scattered House M13 Scattered House M12 Su Lam San Tsuen M11 Castle Peak Villa M10 The Castle Bay M9 Kings Park Villa M8 77 Villas M7 Correctional Institution Staff Quarters M6 Polc Quarters M5 Correctional Institution (North Bound) of the Su Lam Interchange M4 Correctional Institution (South Bound) of the Su Lam Interchange M3 Su Lam Psychiatric Centre M2 Su Lam Hospital M1
OUTPUTS Basic Hourly Noise Level dB(A) (Includes speed and %HW correction, also gradient and road surface correction of 1 for concrete and speed <7.5km/hr) Surface correction Attenuation Correction Street Distance (m) Distance Correction dB(A) Calculation of Path Difference Possible Path Difference Working out whether receiver is in the shadow of a barrier from: Source Height of Barrier Height of Line of Barrier Position Illuminated / Shadow? Calculation of Barrier Attenuation: Barrier Awn Illuminated Barrier Awn Shadow Possible Barrier Attenuation Angle of View and Facade Correction: View Angle Correction dB(A) Facade correction Hourly L10, dB(A) Total	86 7021848 150 185132 -10 715660 0 0577897 0 2749187 33 737136 -1 6497378 -1 6497378 0 0 2 5 75 8 76	86 1021848 103 501208 -8 84811648 0 0332378 0 00680272 34 4828978 -7 68445576 -10 3430342 -10 3430342 -7 87568388 -12 156211 -0 3370181 -0 3370181 0 0 2 5 68 8 69	86 7021848 283 870568 -13 227866 0 05005832 -0 05114628 34 4828978 -8 49521679 -10 3430342 -10 3430342 -7 87568388 -12 156211 0 0 0 0 2 5 65 9 66	86 7021848 303 582655 -13 5185748 0 01698642 -0 047117 32 6112026 -6 9367488 -10 3430342 -10 3430342 -7 87568388 -12 156211 0 0 0 0 2 5 67 7 68	86 7021848 48 0884602 -5 51707102 0 26844642 0 47126437 36 6206897 0 38507267 0	86 7021848 74 9166203 7 442444058 0 22268603 0 36842105 43 6122449 38 8421053 11 0128548 11 0128548 13 4613567 13 4613567 0 0 0 0 2 5 69 7 70	86 7021848 203 500614 -11 7823196 0 02969087 0 002457 38 4889435 7 54420678 7 54420678 38 4889435 52 1559633 52 1559633 0 0 0 0 0 0 0 0 0 0 0 0 0 0	86 7021848 74 9166203 7 442444058 0 22268603 0 36842105 43 6122449 38 8421053 11 0128548 11 0128548 13 4613567 13 4613567 0 0 0 0 2 5 69 7 70										

So Kwun Wat Interchange - Option B
Noise Impacts on NSRs

NSR	Scattered House N31	Area 56 N33	Area 56 N33	Area 56 CDA Area 56 N33	Area 56 CDA Area 56 N34	Area 56 CDA Area 56 N36	Area 56 CDA Area 56 N37
Hourly Flow (veh/hr)	1130	1185	1130	2325	4650	4650	4650
Air Speed (m/s)	70	70	70	70	70	70	70
SNV	53	43	53	48	48	48	48
Gradient %	4	4	4	4	4	4	4
Surface Type (Impervious/porous)							
Receiver-Corridorway Distance (m)	30	30	100	150	200	200	400
Height of Corridorway	30	30	30	24	37	37	45
Angle of View (deg)	180	180	180	180	180	180	180
Barrier (T/M)	Y	Y	Y	Y	Y	Y	Y
mPD Height of Barrier	35	31	35	25	38	38	45
Barrier-Corridorway Distance	1	1	1	1	1	1	1
Receiver Height (mPD)	20	20	20	40	40	40	130
Height of noise barrier relative to corridorway							
OUTPUTS							
Basic Hourly Noise Level dBA (Includes speed and SNV correction, also gradient and road surface correction of 1 for concrete and speed correction of 1 for asphalt)	80.1978739	79.7387691	80.1978739	82.8948795	85.0047879	85.0047879	86.0047879
Surface correction	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Distance Correction:							
Slope Distance (m)	36.5034245	84.1575605	104.510765	154.280598	203.515356	203.515356	412.252856
Distance Correction dBA	-4.3198984	-7.9475852	-8.8882758	-10.5787752	-11.7826341	-11.7826341	-14.8483001
Calculation of Path Difference:							
Path Difference	0.67392351	0.13224871	0.14694318	0.00023421	0.02238658	0.02238658	0.02068095
Working out whether receiver is in the shadowed or unshadowed zone:							
Surface Receiver gradient	-0.4328358	-0.1757485	-0.1400862	-0.00534759	0.01228501	0.01228501	0.2084176
Height of Line of Barrier Position	32.5522368	29.8341317	30.4328358	24.8543974	37.5552826	37.5552826	46.4423782
Unshadowed / Shadowed	S	S	S	S	S	S	S
Calculation of Barrier Attenuation:							
Barrier Attenuation	-14.062187	-9.88152153	-10.0944593	-5.722801435	-7.22801435	-7.22801435	-2.72102221
Barrier Attenuation	-14.062187	-9.88152153	-10.0944593	-5.722801435	-7.22801435	-7.22801435	-2.72102221
Possible Barrier Attenuation							
Angle of View and Facade Correction:							
View Angle Correction dB(A)	0	0	0	0	0	0	0
Facade correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly L10, dB(A)	63.3	63.4	62.7	68.9	68.5	68.5	69.9
Total	64	70	65	69	69	69	70

So Kwun Wat Interchange - Option B
Noise Impacts on NSRs
With the Use of Low Noise Road Surfacing

NSR	M17	M18	M18	M18	M21	M22	M23	M24	M26	M28	M27	M28	M28	M29	M29
Hourly Flow (vehicles)	4340	7230	4650	4650	4650	4650	4650	2325	1195	1130	1195	1130	1130	1130	1195
Air Speed (m/s)	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
%W	64	52	48	48	48	48	48	48	53	53	43	55	55	55	43
Gradient %	4	0	1	2	4	4	4	4	4	4	3	3	3	3	3
Surface type (impervious/permeous)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Receiver-Corridor Distance (m)	160	200	50	200	200	200	200	200	50	50	20	20	20	20	20
Receiver-Corridor Distance (m)	52	48	55	47	37	30	32	30	32	40	37	32	25	30	30
Height of Corridor	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Angle of View (deg)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Barrier (VAV)	53	49	58	48	38	38	38	31	33	41	28	33	26	31	31
Barrier-Corridor Distance	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Receiver Height (mPD)	40	20	20	38	40	40	40	20	20	20	20	20	20	20	20
Height of noise barrier relative to corridor															
OUTPUTS															
Basic Hourly Noise Level dB(A)															
(Includes speed and %W correction, also gradient and road surface correction of 1 for concrete and speed <7.5m/s)	88.70218477	88.98316378	85.10478788	85.40478788	85.00478788	85.00478788	85.00478788	82.09448927	79.73876905	80.18787391	79.43876905	79.42561679	79.42561679	79.42561679	79.43876905
Surface correction	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Distance Correction:															
Sight Distance (m)	163.971326	204.0158009	64.20869747	203.7216239	23.83280446	53.5587835	54.94897731	57.29310804	29.30017055	83.83614872	23.6326046	61.65924913	23.50531855	73.50170066	
Distance Correction dB(A)	-10.844882	-11.7433031	-8.52285357	-11.7878335	-2.4317782	-5.98483558	-6.06581822	-6.06581822	-2.40832373	-2.4317782	-2.4317782	-2.4317782	-2.40832373	-2.40832373	
Calculation of Path Difference:															
Possible Path Difference	0.081121352	0.078287724	1.122855553	0.057186842	6.11474E-05	0.010112547	0.281882878	0.40871812	0.544882878	0.544882878	0.095572873	0.130472035	0.003881205	0.04671612	0.03327805
Working out whether receiver is the dominant or shadow zone:															
Source Receiver Gradient	-0.0784526	-0.07125307	-0.6835514	-0.04658305	0.105382979	0.048728972	-0.23384485	-0.0212765	-0.74460085	-0.38317757	-0.08987036	0.10538296	0.010866142	0.0212766	0.00680772
Height of Line at Barrier Position (Influenced / Shadow?)	52.1558833	54.17838118	52.31401588	47.28882623	37.1028037	37.1028037	30.40425530	31.44858913	34.14883617	36.77570083	27.09580838	32.0212766	25.01889164	30.40425532	30.46938716
Calculation of Barrier Attenuation:															
Barrier Area (Influenced)	-9.97882157	-8.97580231	-15.8284756	-8.42072394	-5.42881485	-5.42881485	-11.5859	-8.18698246	-11.5859	-13.4021766	-9.26520781	9.85452385	5.51025223	8.18698246	7.68445516
Possible Barrier Attenuation	-8.97882157	-8.97580231	-15.8284756	-8.42072394	-5.42881485	-5.42881485	-11.5859	-8.18698246	-11.5859	-13.4021766	-9.26520781	9.85452385	5.51025223	8.18698246	7.68445516
Angle of View and Facets Corrections															
View Angle Correction dB(A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Facets correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly L10, dB(A)	65.9	64.6	61.5	64.2	77.6	72.6	70.5	61.1	59.5	58.4	61.1	64.7	64.7	61.8	61.9
Total	64	64	62	64	78	73	78	63	63	63	63	69	69	69	69

So Kwun Wat Interchange - Option B
Noise Impacts on NSRs
With the Use of Low Noise Road Surfacing

NSR	Scattered House at S HW Road	Scattered House	Area 56	Non Wan Kwai Mo Lei Tsuen 77	Area 56 CDA 146	Area 56 CDA 146	Area 56 CDA 146	Area 56 CDA 146	Area 56 CDA 146
	N336	N331	N333	N334	N335	N336	N337	N338	N337
Hourly Flow (veh/hr)	1195	1120	1195	1130	2325	4650	4650	4650	4650
Air Speed (m/s)	70	70	70	70	70	70	70	70	70
AWV	43	53	43	53	48	48	48	48	48
Gradient %	0	4	4	4	2	4	4	4	4
Surface type (impervious/permeous)	P	P	P	P	P	P	P	P	P
Receiver Contiguity Distance (m)	50	30	30	100	30	200	200	200	400
Height of Contiguity	32	34	30	34	20	37	37	37	45
Angle of View (deg)	180	180	180	180	180	180	180	180	180
Barrier (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Barrier Height at Barrier	3.3	3.5	3.1	3.5	3.8	3.8	3.8	3.8	4.6
Barrier Contiguity Distance	1	1	1	1	1	1	1	1	1
Receiver Height (m) (H _R)	20	20	20	20	20	40	40	40	130
Height of noise barrier relative to Contiguity									
OUTPUTS									
Basic Hourly Noise Level (dB(A))	78.53976008	80.19787281	78.73878605	80.19787281	82.99448782	86.00478788	86.00478788	86.00478788	86.00478788
(Include speed and M/W correction, also gradient and road surface correction of 1 for concrete and speed < 70m/hr)	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Surface Correction									
Surface correction									
Distance Correction:									
Start Distance (m)	54.94087731	38.503245	50.373114	104.510785	153.520357	203.5153557	203.5153557	203.5153557	412.2578563
Distance Correction (dB(A))	-4.0881827	-4.3188864	-3.94769408	-8.88827258	-10.5583327	-11.7828341	-11.7828341	-11.7828341	-14.8483201
Calculation of Path Difference:									
Possible Path Difference	0.281982878	0.28245228	0.13274871	0.041197881	0.148843183	0.03197348	0.020757827	0.022788881	0.02088888
Working out whether receiver is in the illuminated or shadow zone:									
Source Receiver gradient:	-0.23364886	-0.2084171	-0.4328582	-0.1257485	-0.14008662	-0.00534758	0.018286645	0.012285012	0.209417596
Height of Line at Barrier Position (unobstructed / Shadow?)	31.44858813	41.4171123	29.81513174	30.43283582	33.88858522	20.47583583	37.5732888	37.55528256	46.44237818
Calculation of Barrier Attenuation:									
Barrier Attenuation (dB(A))	-11.5459	-11.5900776	-14.0821868	-9.88152153	-7.95884404	-10.0944583	-7.63704277	-7.4668144	-7.22801435
Possible Barrier Attenuation	-11.5459	-11.5900776	-14.0821868	-9.88152153	-7.95884404	-10.0944583	-7.63704277	-7.4668144	-7.22801435
Angle of View and Facade Correction									
View Angle Correction (dB(A))	0	0	0	0	0	0	0	0	0
Facade correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly L ₁₀ (dB(A))	59.9	59.1	60.9	60.9	60.7	62.6	62.6	62.6	67.4
Total	62	64	68	68	63	66	66	66	67

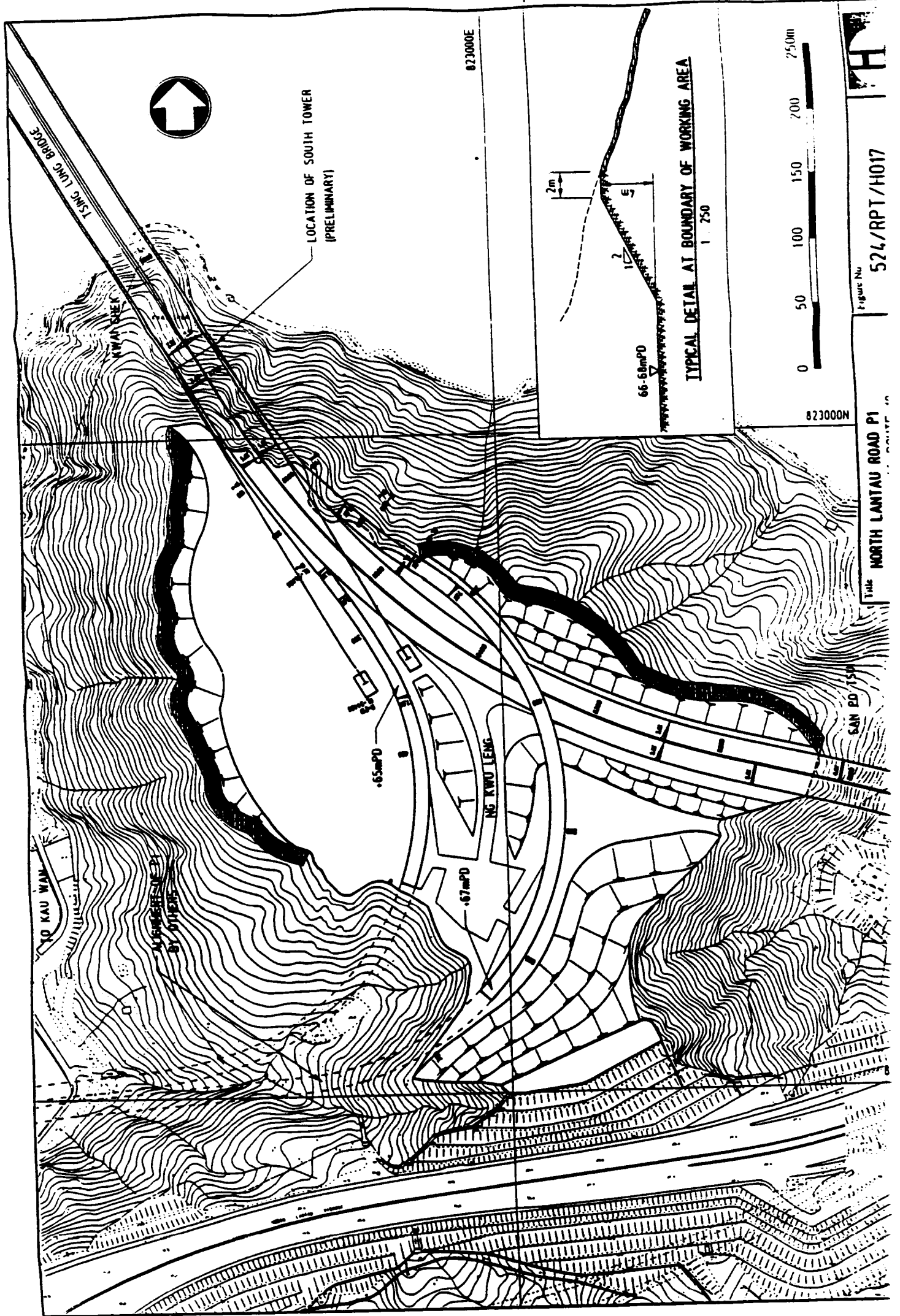
So Kwun Wat Interchange - Option B
 Noise Impacts on NSRs
 With the Use of 3m High Noise Barrier

NSR	Sau Lam Hospital M1	Sau Lam Psychiatric Centre M2	Correctional Institution (South Bound of the Sau Lam Interchange) M3	Correctional Institution (North Bound of the Sau Lam Interchange) M4	Scattered House M12	Lo Tung Shan Tsuen Wat Interchange (West Bound) M22	Lo Tung Shan Tsuen Wat Interchange (East Bound) M23	Scattered House M24
Hourly Flow (veh/hr)	4340	4340	4340	4340	4340	4650	4650	2325
Avg Speed (km/hr)	70	70	70	70	70	70	70	70
M/V	64	64	64	64	64	48	48	48
Gradient %	4	4	4	4	4	4	4	4
Surface type (impervious/permeous)	P	P	P	P	P	P	P	P
Receiver-Corridor Distance (m)	150	180	30	25	40	20	50	20
Height of Corridor	37	24	38	38	34	37	37	30
Angle of View (deg)	180	180	180	180	180	180	180	180
Barrier (V/A)	7	7	7	7	7	7	7	7
Barrier Height of Barrier (m)	35	27	41	41	37	40	40	33
Barrier-Corridor Distance (m)	1	1	1	1	1	1	1	1
Receiver Height (mFO)	747	597	547	547	55	40	40	30
Height of noise barrier relative to Corridor								
OUTPUTS								
Basic Hourly Noise Level dB(A)								
(Includes speed and M/V correction, also gradient and road surface correction of 1 for concrete and speed < 70km/hr)	86 7021846	86 7021846	86 7021846	86 7021846	86 7021846	86 0047876	86 0047876	82 0044879
Surface correction	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Surface correction								
Distance Correction								
Start Distance (m)	150	180	37	37	48	23	53	23
Distance Correction dB(A)	-107156601	-114114818	-440347506	-385307635	-517071027	-24317701	-58493655	-24083373
Calculation of Path Difference								
Possible Path Difference	0 15088883	0 26451487	0 00558883	0 0027919	0 01281811	0 51521047	0 58943571	0 87780058
Attaching out whether receiver is in the shadowed or illuminated zone								
Source Receiver gradient	0 27491857	0 19182961	0 88358208	0 56842105	0 47126437	0 10838298	0 04672697	-0 0212766
Height of Line at Barrier Position	33 7371336	25 3632153	40 8781194	41 0578647	36 6205897	37 8787234	37 7102804	30 4042583
Attenuation / Shadow?	S	S	S	S	S	S	S	S
Calculation of Barrier Attenuation								
Barrier Allen Burdett	0	0	0	-4 65328484	0	0	0	0
Barrier Allen Shadler	-10 1510557	11 426829	6 37782051	0	-6 65786388	-13 2339302	-13 6412558	-14 9415456
Possible Barrier Attenuation	10 1510557	11 426829	-6 37782051	4 65328484	-6 65786388	-13 2339302	-13 6412558	-14 9415456
Angle of View and Facade Correction								
View Angle Correction dB(A)	0	0	0	0	0	0	0	0
facade correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly L10, dB(A)	64.8	62.9	74.9	77.2	73.5	69.3	65.4	61.7
Total	65	63	76	77	74	68	65	64

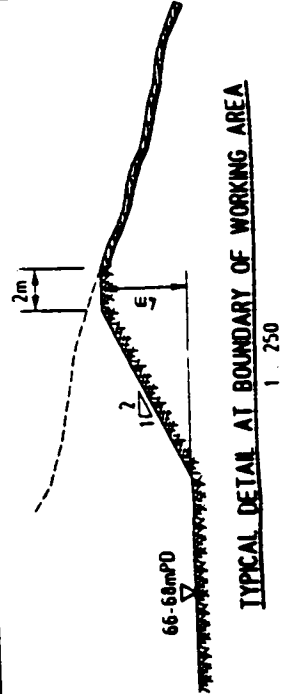
So Kwun Wat Interchange - Option B
 Noise Impacts on NSRs
 With the Use of 5m High Noise Barrier

NSR	Su Lam Hospital M1	Su Lam Psychiatric Centre M2	Correctional Institution (South Bound of the Su Lam Interchange) M3	Correctional Institution (North Bound of the Su Lam Interchange) M4	Scattered House M12	Io Feng Shan Tsuen Wat Interchange (West Bound) M22	Io Feng Shan Tsuen Wat Interchange (East Bound) M23	Scattered House M24
Hourly Flow (veh/hr)	4340	4340	4340	4340	4340	4650	4650	2325
Air Spread (m)	70	70	70	70	70	70	70	70
SNW	64	64	64	64	64	48	48	48
Gradient %	4	4	4	4	4	4	4	1
Surface type (impenetrable)	P	P	P	P	P	P	P	P
Receiver Category Distance (m)	150	180	30	25	40	20	50	20
Height of Contiguity	37	24	36	36	34	37	37	30
Angle of View (deg)	180	180	180	180	180	180	180	180
Barrier (Veh)	7	7	7	7	7	7	7	7
Barrier Height of Barrier (m)	37	28	43	43	38	42	42	35
Receiver Height (m)	1	1	1	1	1	1	1	1
Height of noise barrier relative to category	7.47	59.1	54.7	54.7	55	40	40	30
OUTPUTS								
Basic Hourly Noise Level dBA (Includes speed and SNW correction, also gradient and road surface correction of 1 for concrete and speed $v > 70\text{km/hr}$)	88 7021840	88 7021840	88 7021840	88 7021840	88 7021840	88 0047879	88 0047879	82 0044879
Surface correction	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Receiver Correction	159 195132	188 845631	37 211422	32 7824840	48 0884602	23 6326046	53 5583784	23 5053185
Start Distance (m)	10 7156601	11 4118918	4 6534286	3 65307832	5 51707102	2 4317782	5 86483550	2 40832373
Distance Correction dBA	0 8642748	1 13180284	0 42377084	0 28148821	0 42587858	1 83632861	1 84638101	2 50552518
Calculation of Path Difference								
Possible Path Difference	0.21491857	0.19182581	0.48358208	0.56842105	0.47126437	0.10638298	0.04812897	-0.0212766
Working out whether receiver is in the shadowed or sheltered zone	S	S	S	S	S	S	S	S
Source Receiver Gradient	33 7371336	25 3632183	49 6761184	41 0528947	38 62058807	37 9787234	37 7102804	30 4042553
Height of Line at Barrier Position								
Unobstructed / Shadowed?								
Calculation of Barrier Attenuation								
Barrier Attenuation	14 8877206	15 8526642	12 6681324	11 5815668	12 7101242	17 7904045	17 813929	19 1940483
Barrier Attenuation	14 8877206	15 8526642	12 6681324	11 5815668	12 7101242	17 7904045	17 813929	19 1940483
Possible Barrier Attenuation								
Angle of View and Facade Correction								
View Angle Correction dBA	0	0	0	0	0	0	0	0
Facade correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly L10, dB(A)	60.1	58.4	68.6	70.3	67.5	64.8	61.7	59.7
Total	60	58	68	70	67	65	61	59

FIGURES



823000E



TYPICAL DETAIL AT BOUNDARY OF WORKING AREA
1:250



823000N

Figure No

524/RPT/H017

THE NORTH LANTAU ROAD PI

SAN PD 750



Figure No.

524/RPT/H018

Title

CONNECTIONS AT TSANG LUNG TAU

250m

200

150

100

50

0

ENLARGED TUNNEL SECTIONS

TL2

TL7

TL6

TL8

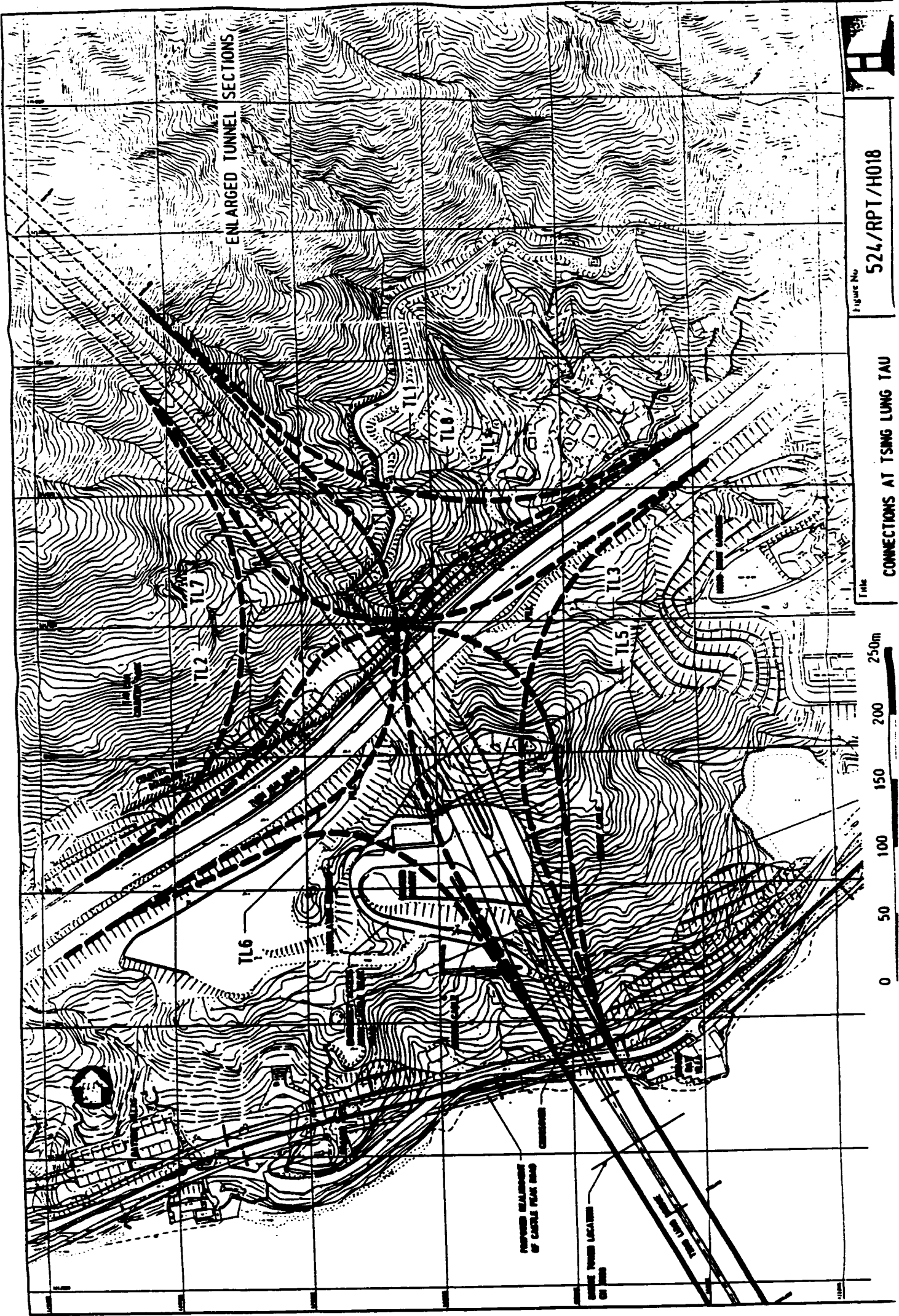
TL9

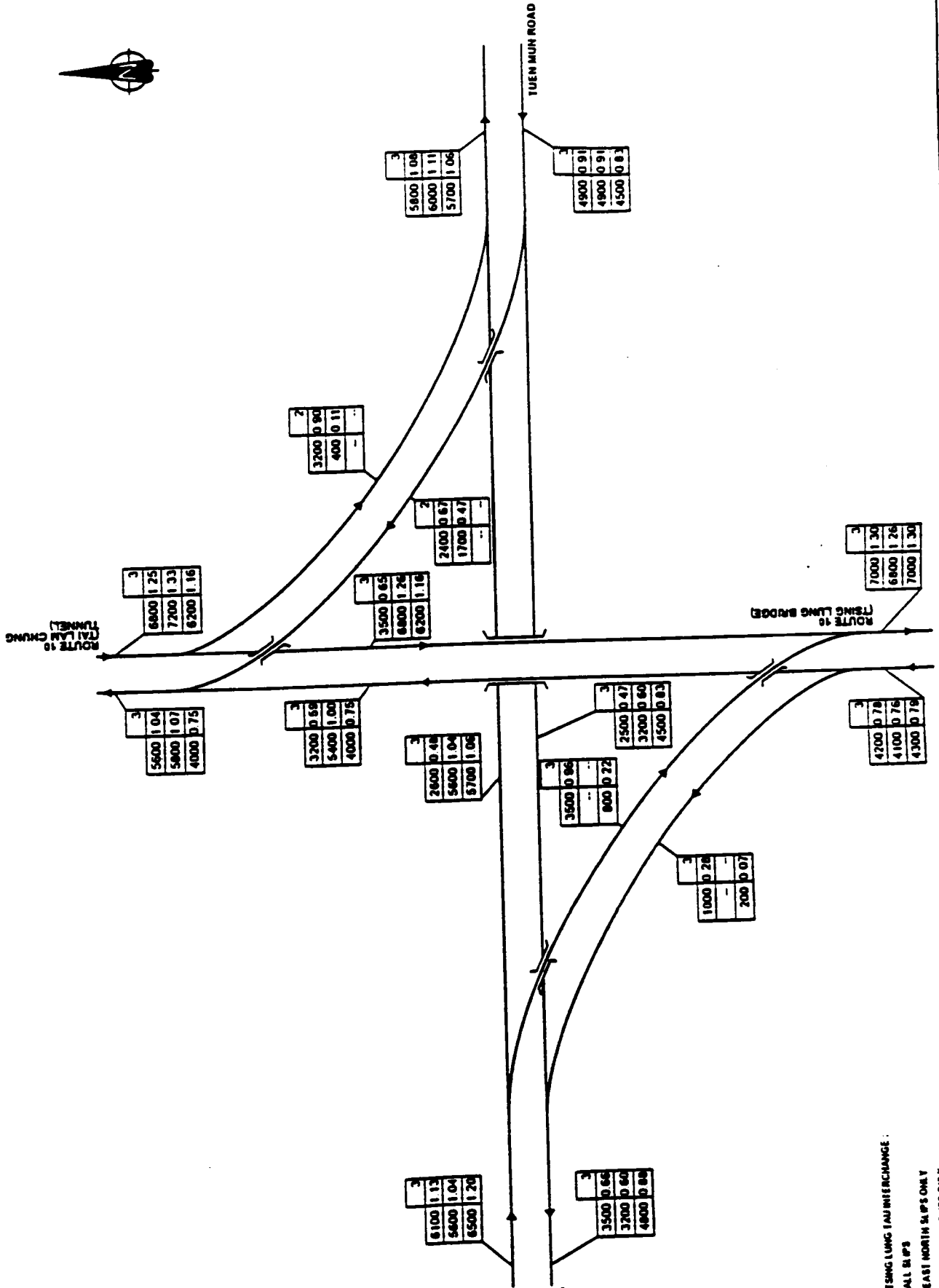
TL3

TL5

PROPOSED REALIGNMENT OF CASTLE PEAK ROAD

EXISTING TUNNEL LOCATIONS





LEGEND :

No. of Lane

3	TSING LUNG TAI INTERCHANGE :
3	ALL SLIPS
5000	EAST NORTH SLIPS ONLY
4000	WEST SOUTH SLIPS ONLY

Flow - V/C



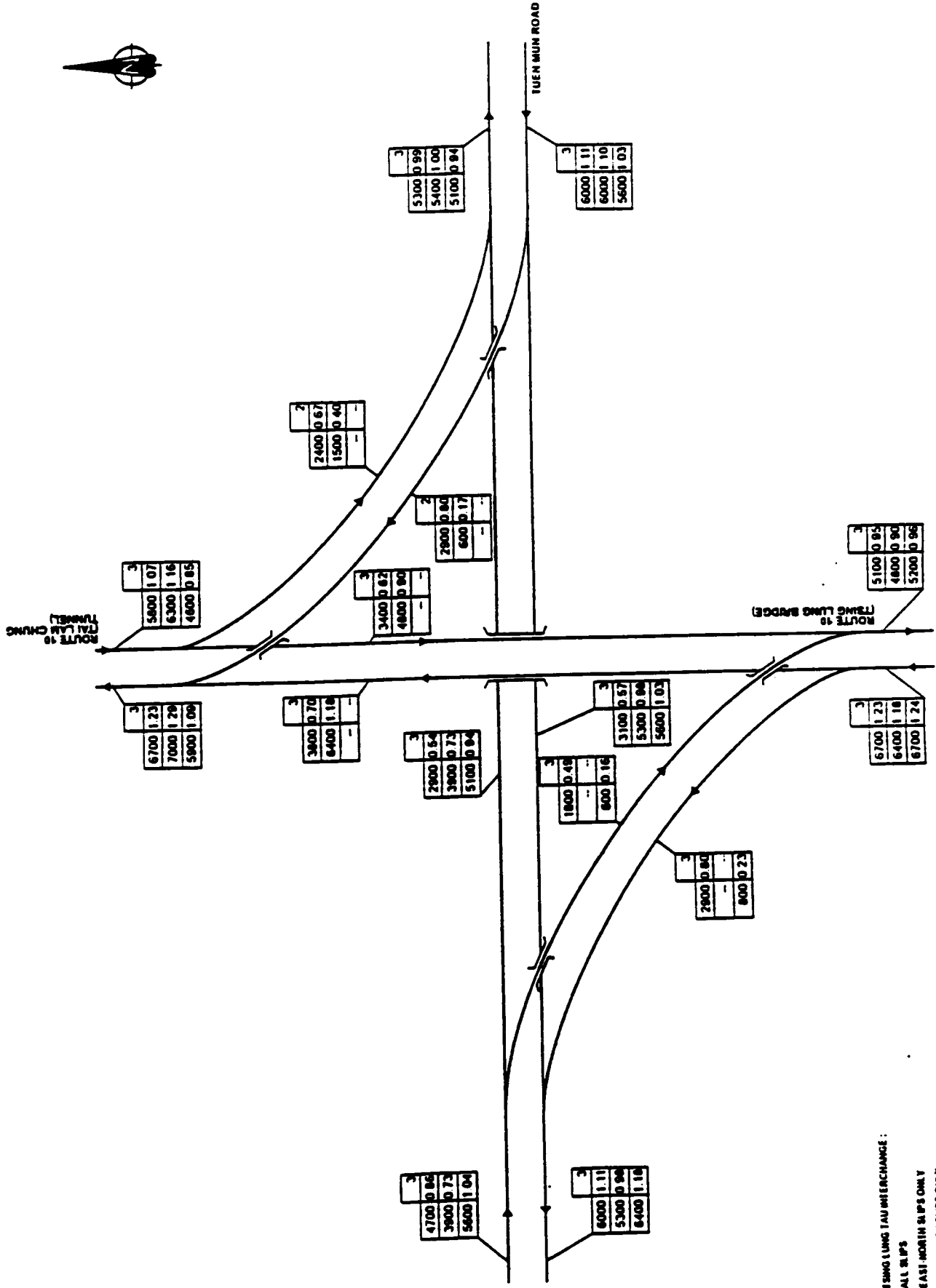
Figure No. 524/RPT/H019

Site TSING LUNG TAI CONNECTION



Figure No 524/RPT/H020

Title TSING LUNG TAU CONNECTION
2016 PM PEAK FORECAST FLOWS



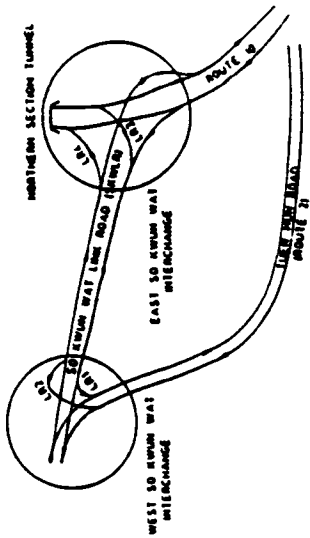
LEGEND:

No. of Lane	Flow	V/C
3	6000	1.11
3	5300	0.98
3	6400	1.16

TSING LUNG TAU INTERCHANGE:

6000	1.11	ALL SLIPS
5300	0.98	EAST-NORTH SLIP'S ONLY
6400	1.16	WEST-SOUTH SLIP'S ONLY

Flow V/C
FLOWS IN PCUSAROUR



SCHMATIC LAYOUT OF
FEASIBILITY STUDY SO KWAN WAI INTERCHANGE
LINK ROADS



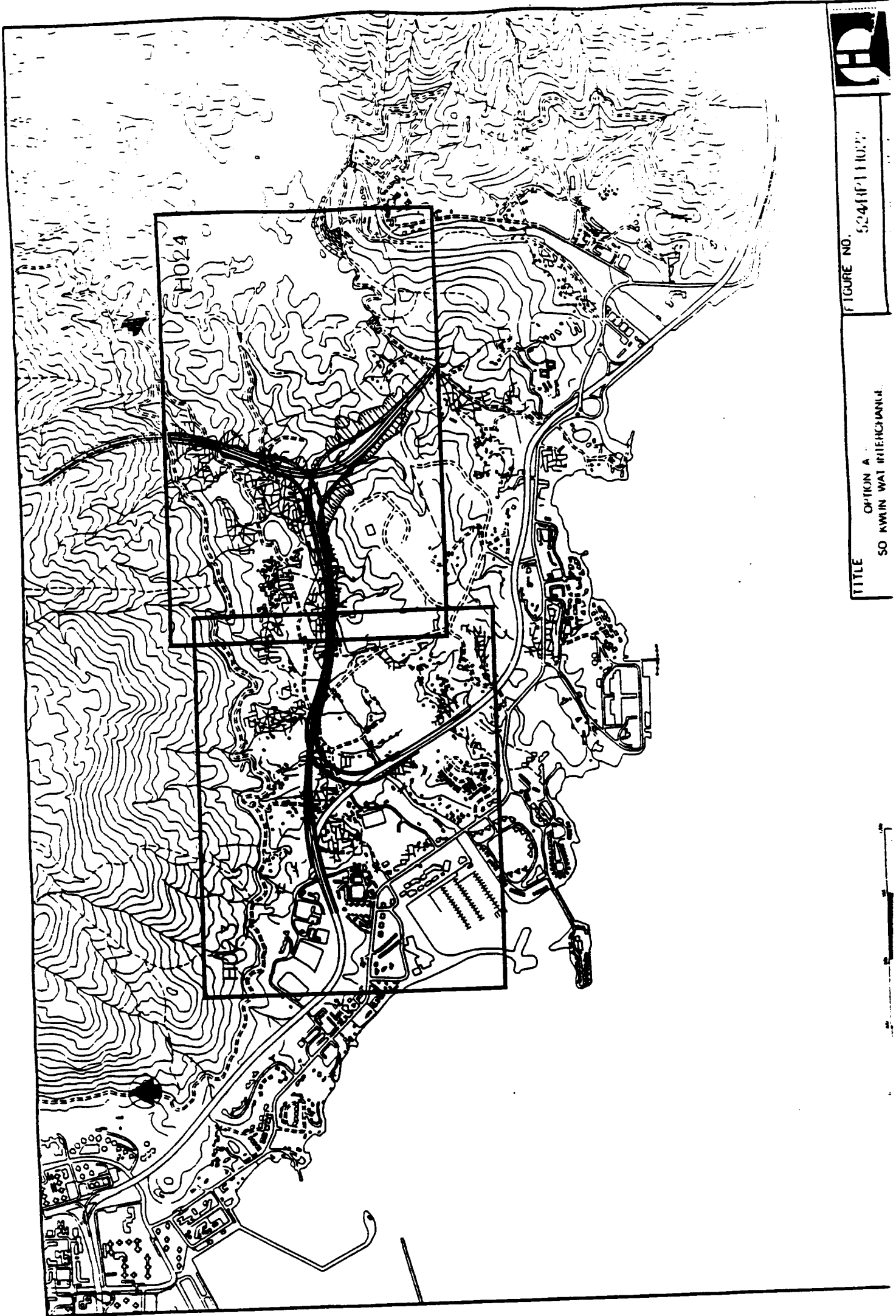


FIGURE NO. 524(F)1102

TITLE OPTION A
SO KWIN WAT INTERCHANGE



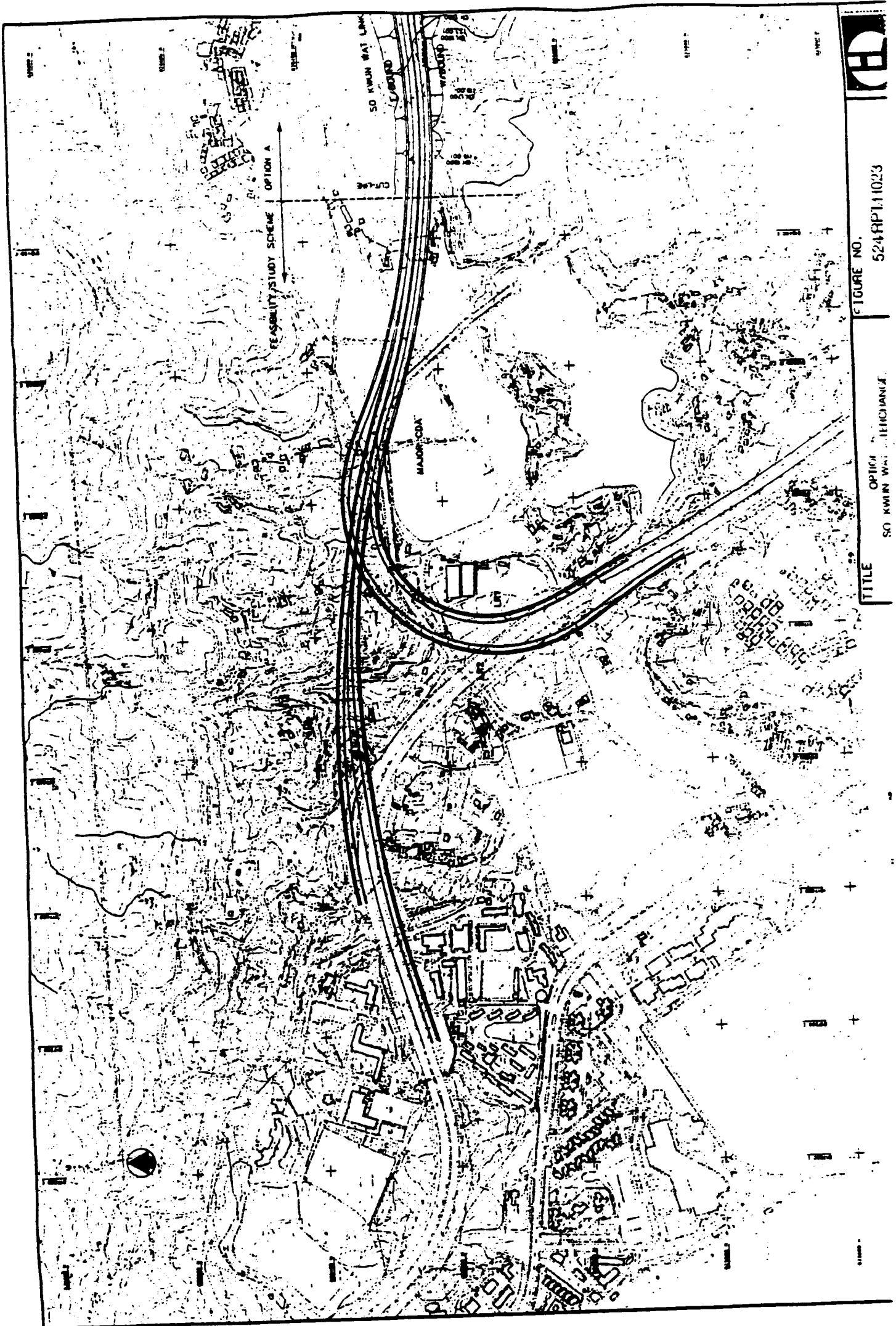


FIGURE NO. 524/PT/1023

TITLE OPTION A SO KWIN WAT LINK

DATE

SCALE

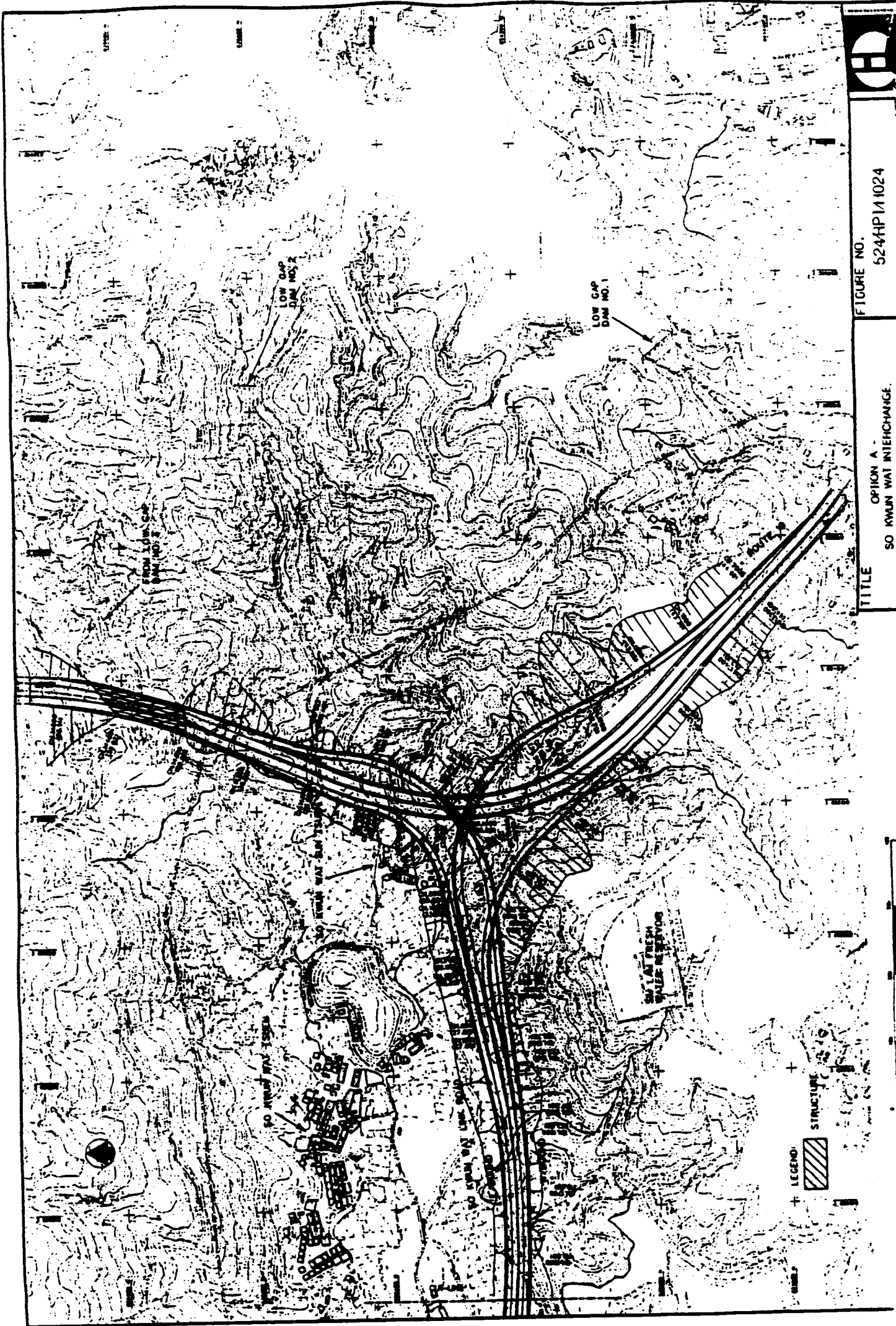
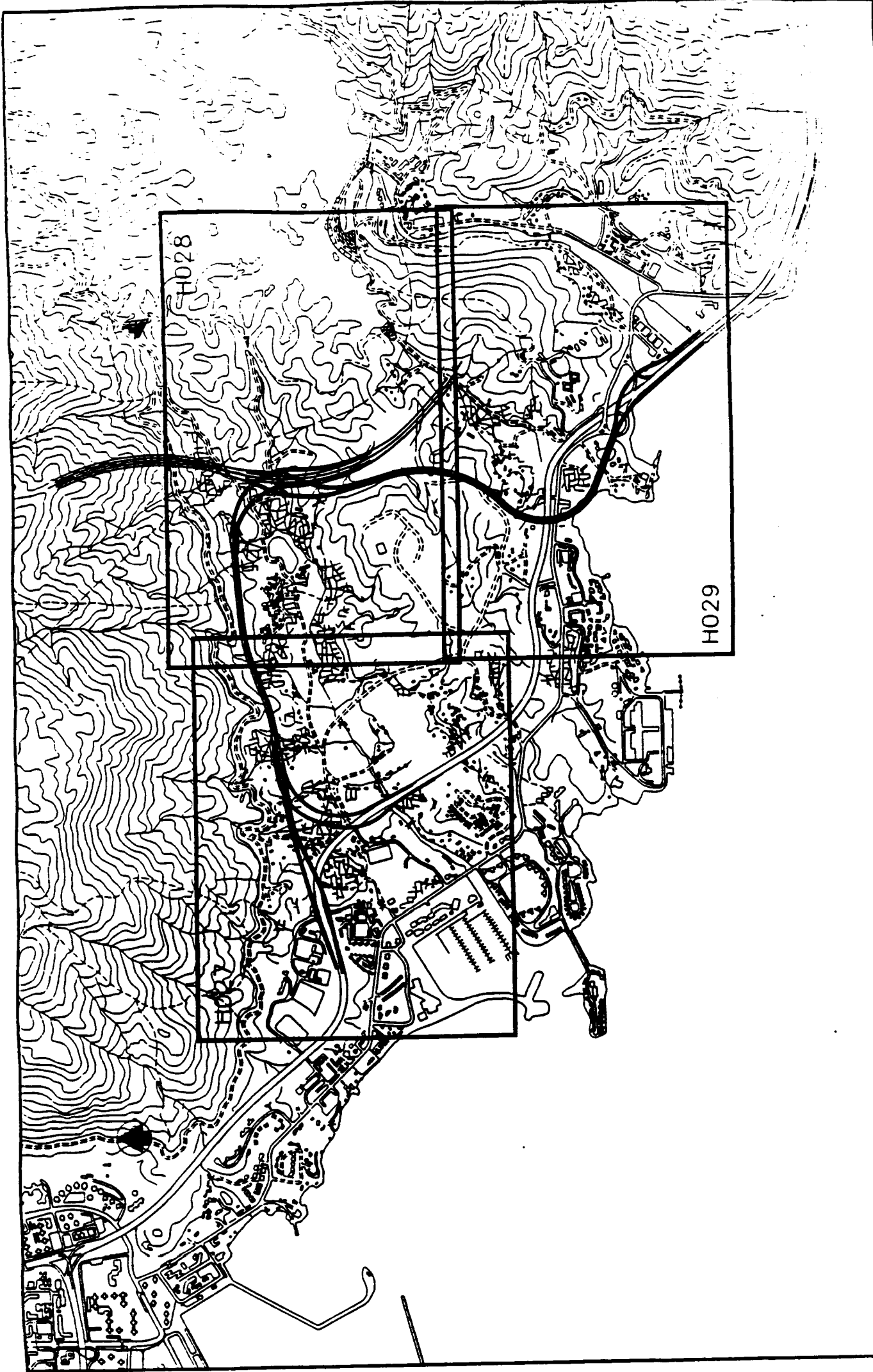



FIGURE NO. 524HP/1/1024

TITLE OPTION A - SO KWUN WAT INTERCHANGE.



TITLE OPTION B -
C/O WANDI WAT WITH STANCO

FIGURE NO. 5244P/11026



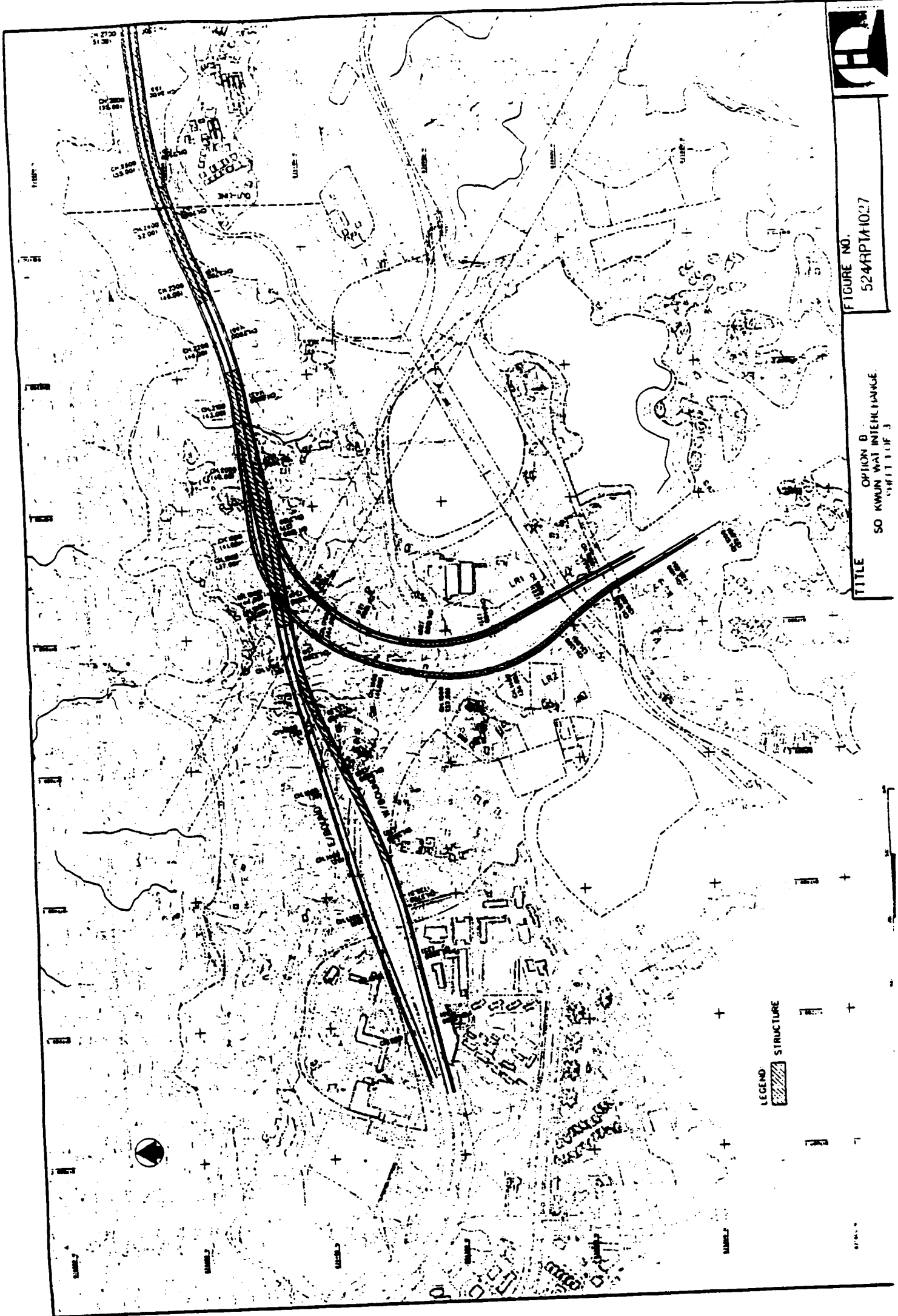


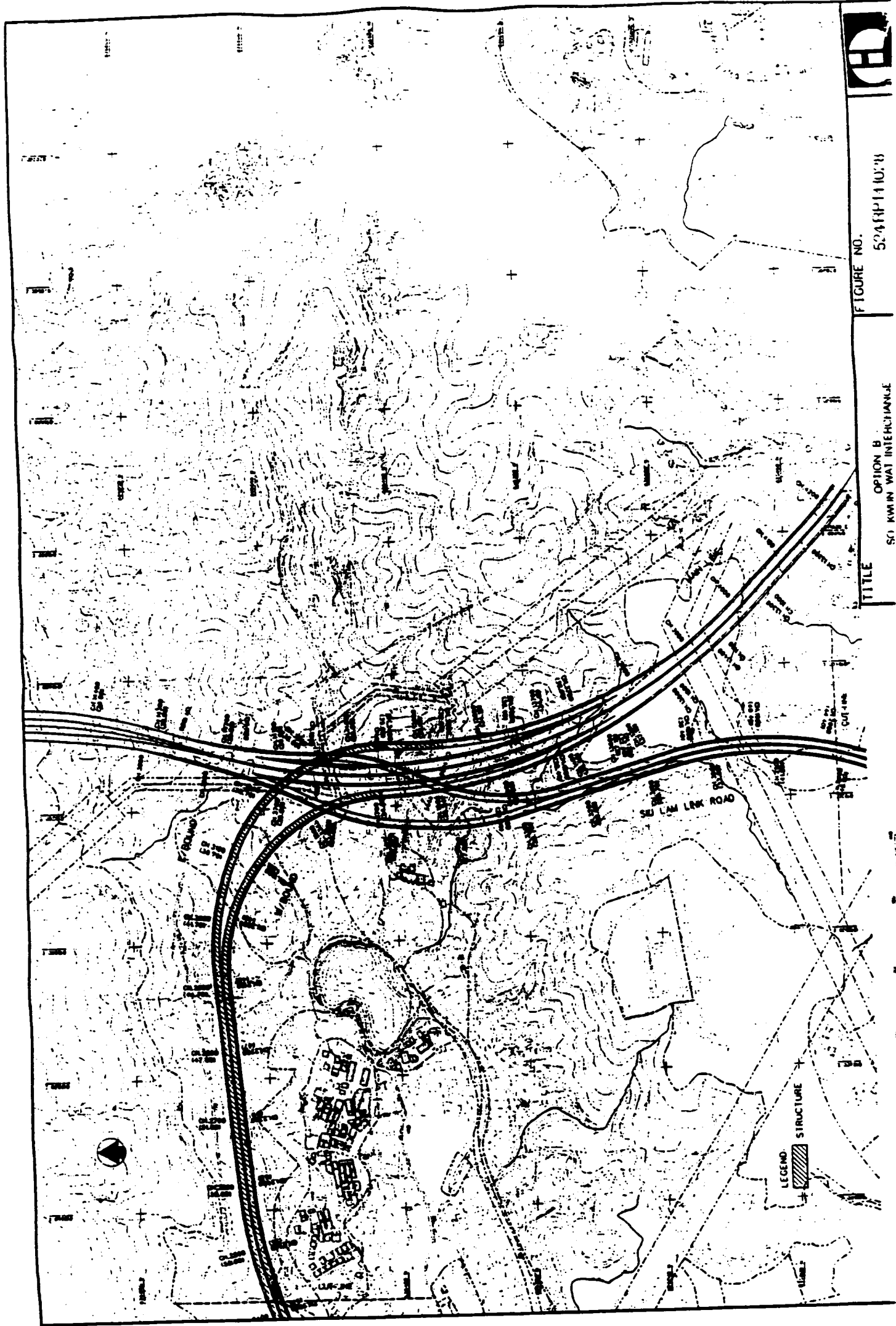
FIGURE NO. 524RPTA10.27

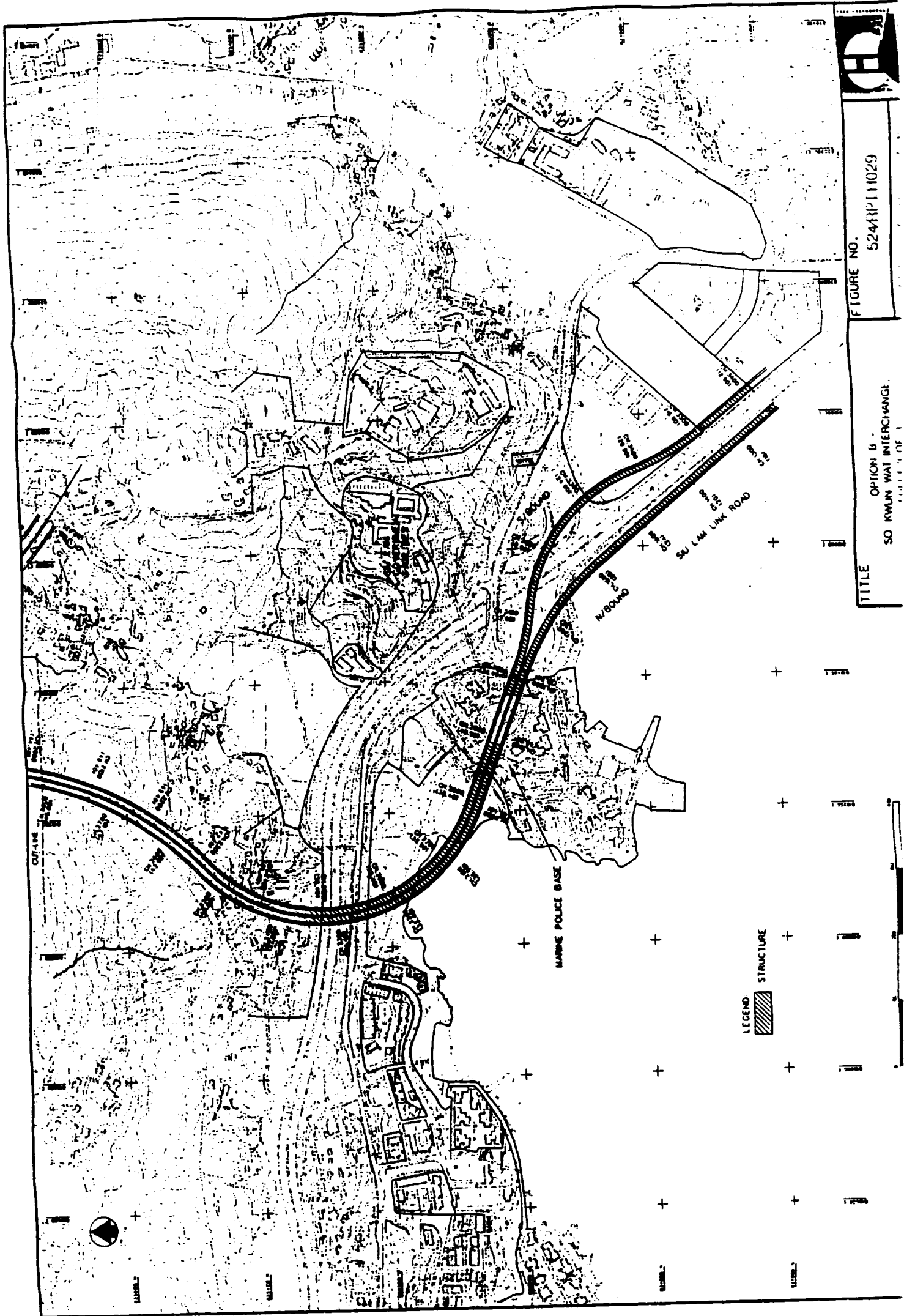
TITLE OPTION B SO KWUN WAT INTERCHANGE SHEET 1 OF 3

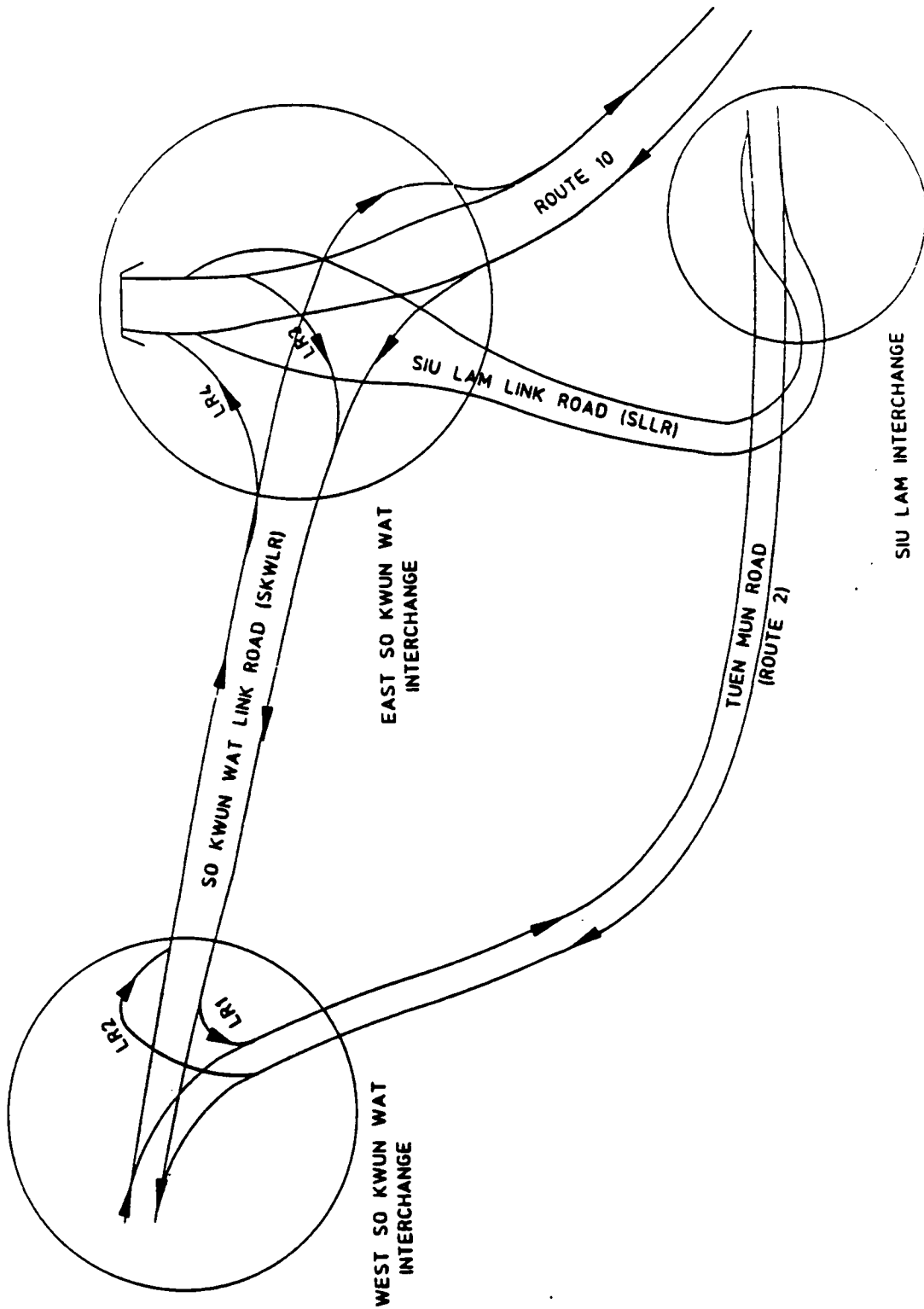


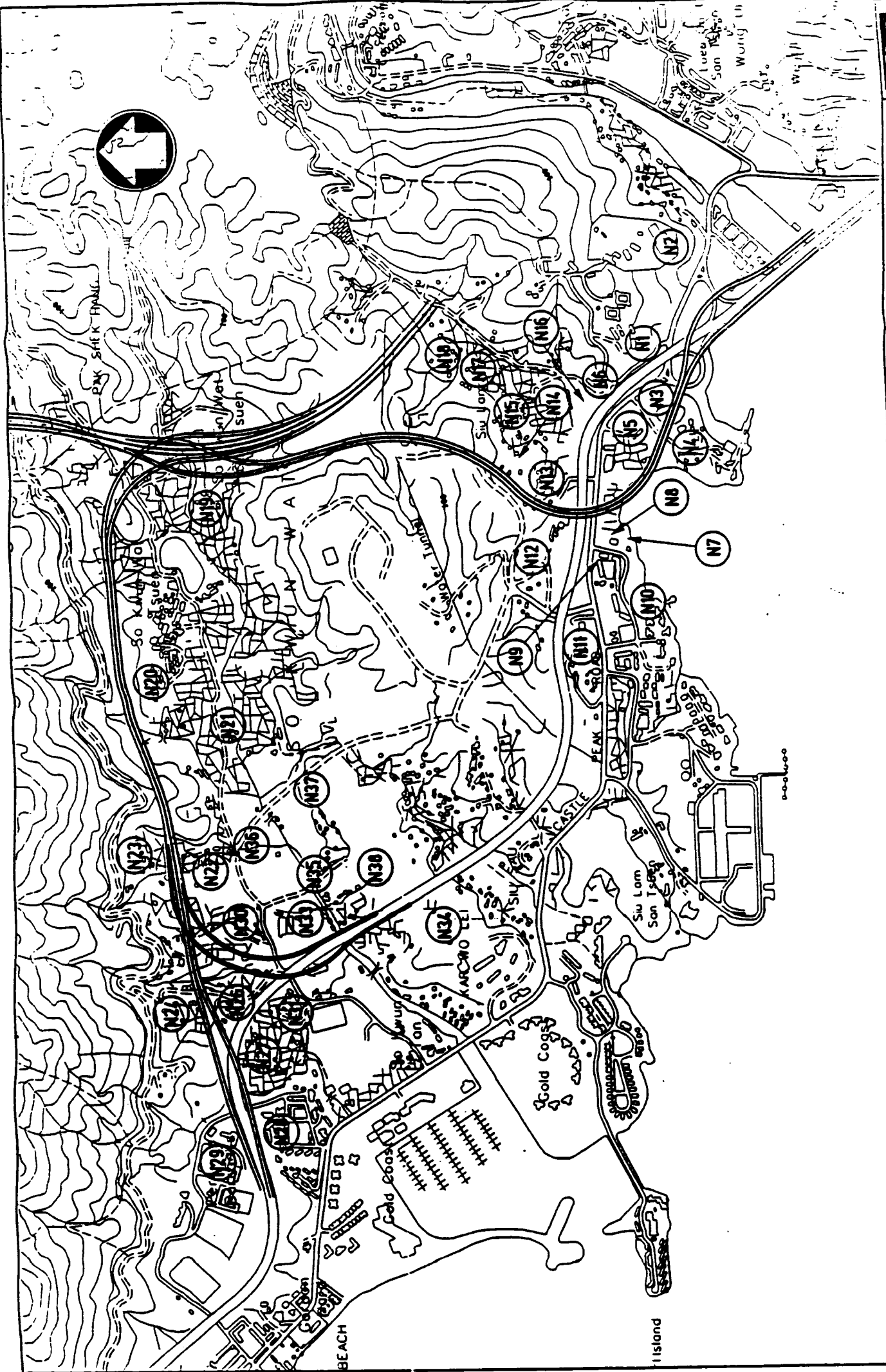
FIGURE NO. 524RP1410'3

TITLE OPTION B
SU KWIN WAT INTERCHANGE









524/RPT/H031

Figure No.

Title **OPTION B**
SO KWIN WAT INTERCHANGE



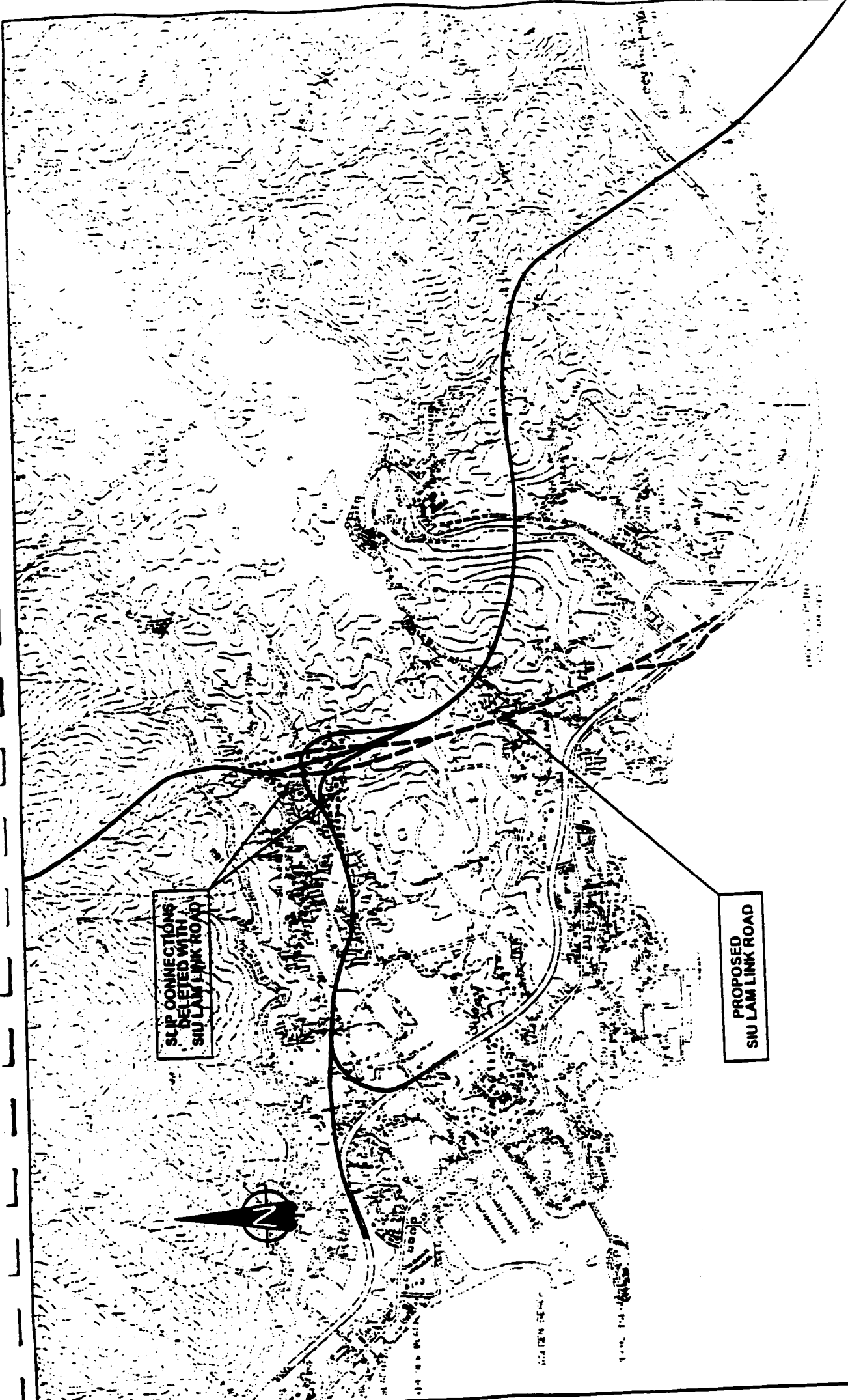
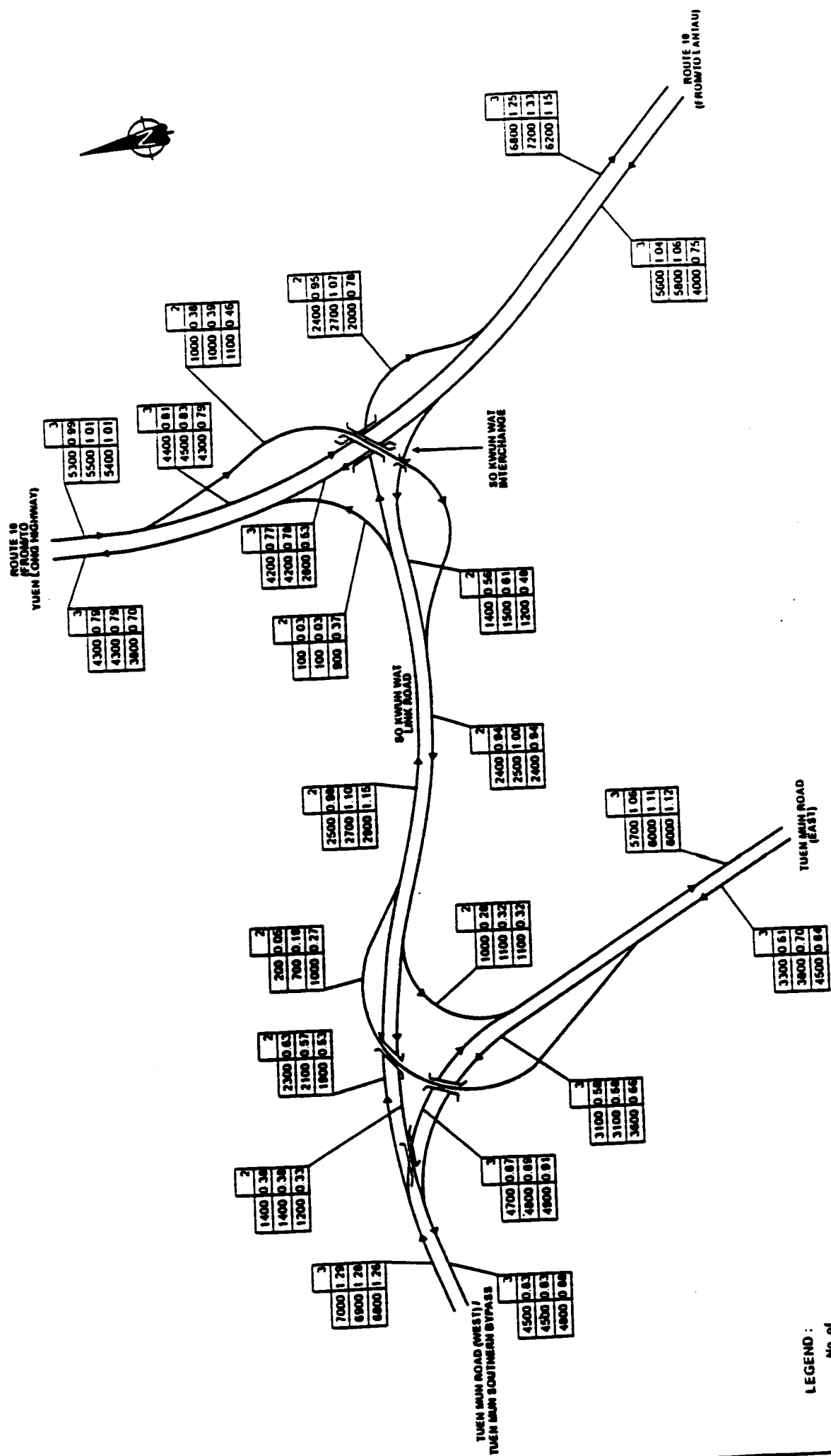


Figure No
524/RPT/H033

Scale 1:50,000
Horizontal Datum: WGS84

1:1000
**SO KWUN WAT INTERCHANGE
TRAFFIC MOVEMENT ALTERATIONS**



LEGEND :

- No. of Lanes
- 3
- 2
- 1
- TSING LUNG TAU INTERCHANGE :
- ALL SLIPS
- EAST NORTH SLIPS ONLY
- WEST SOUTH SLIPS ONLY
- Flow V/C
- Flows in Plus sign

3	3300	0.61
2	3900	0.70
1	4500	0.84

3	5700	1.06
2	6000	1.11
1	6000	1.12

3	3100	0.56
2	3100	0.56
1	3600	0.64

2	1000	0.26
1	1100	0.32
1	1100	0.32

2	2500	0.94
1	2700	1.10
1	2900	1.15

2	2400	0.94
1	2500	1.00
1	2400	0.94

2	1400	0.56
1	1500	0.61
1	1200	0.48

2	4200	0.77
1	4200	0.76
1	2800	0.63

2	1000	0.03
1	100	0.03
1	800	0.37

2	4400	0.81
1	4500	0.83
1	4300	0.75

2	1000	0.36
1	1000	0.36
1	1100	0.46

2	2400	0.95
1	2700	1.07
1	2000	0.78

3	5300	0.99
2	5500	1.01
1	5400	1.01

3	5600	1.04
2	5900	1.06
1	4000	0.75

3	5800	1.25
2	7200	1.33
1	6200	1.15

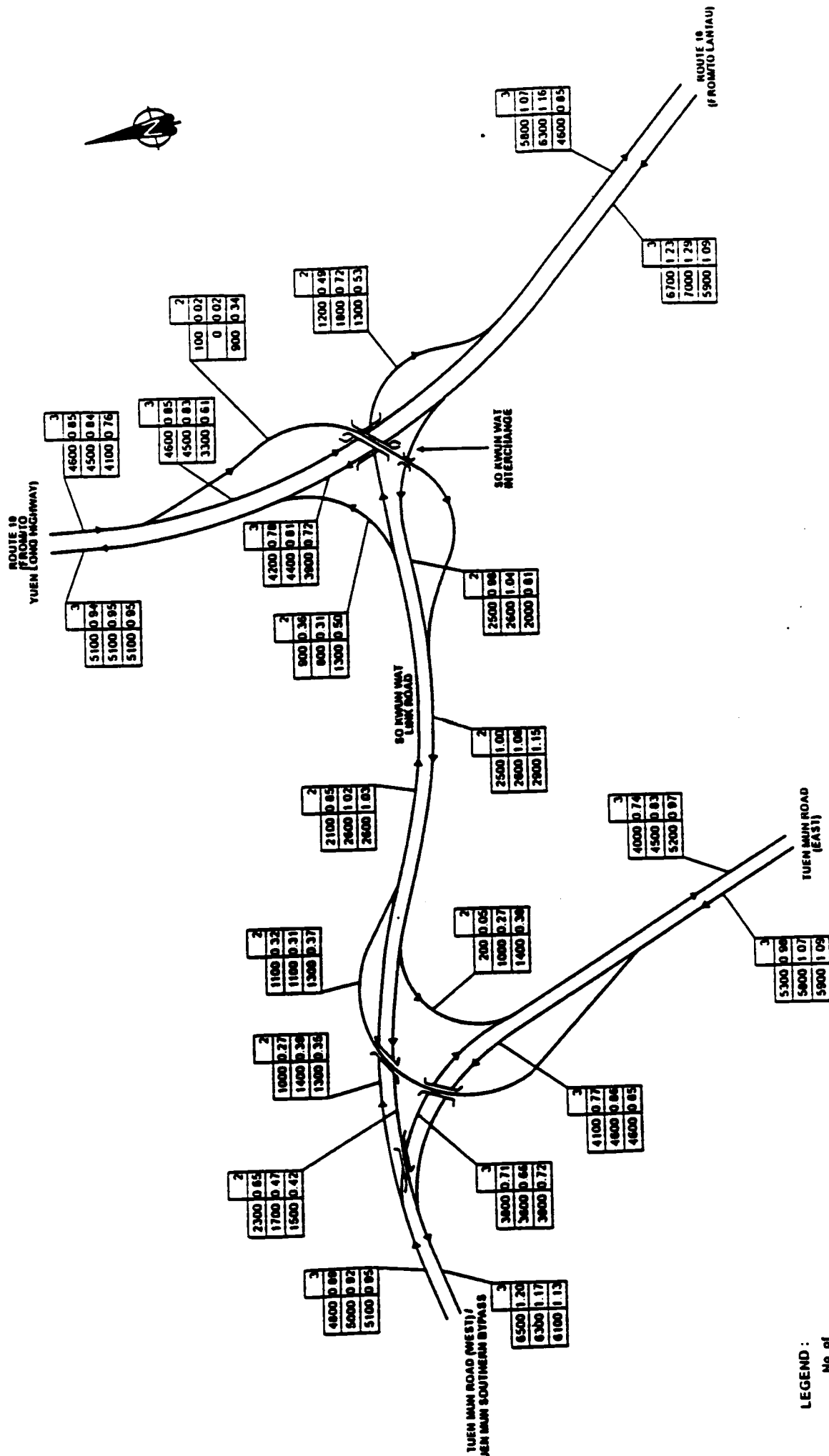
3	7000	1.26
2	8900	1.26
1	6900	1.26

2	1400	0.36
1	1400	0.36
1	1200	0.33

2	2300	0.63
1	2100	0.57
1	1900	0.63

2	4700	0.87
1	4800	0.88
1	4900	0.81

3	4500	0.83
2	4500	0.83
1	4800	0.86



LEGEND:

No of Lane

3	3
5,300 0.96	5,300 0.96
5,800 1.07	5,800 1.07
5,900 1.09	5,900 1.09

TSING LUNG TAU INTERCHANGE:

ALL SLIPS	5,300 0.96
EAST NORTH SLIPS ONLY	5,800 1.07
WEST SOUTH SLIPS ONLY	5,900 1.09

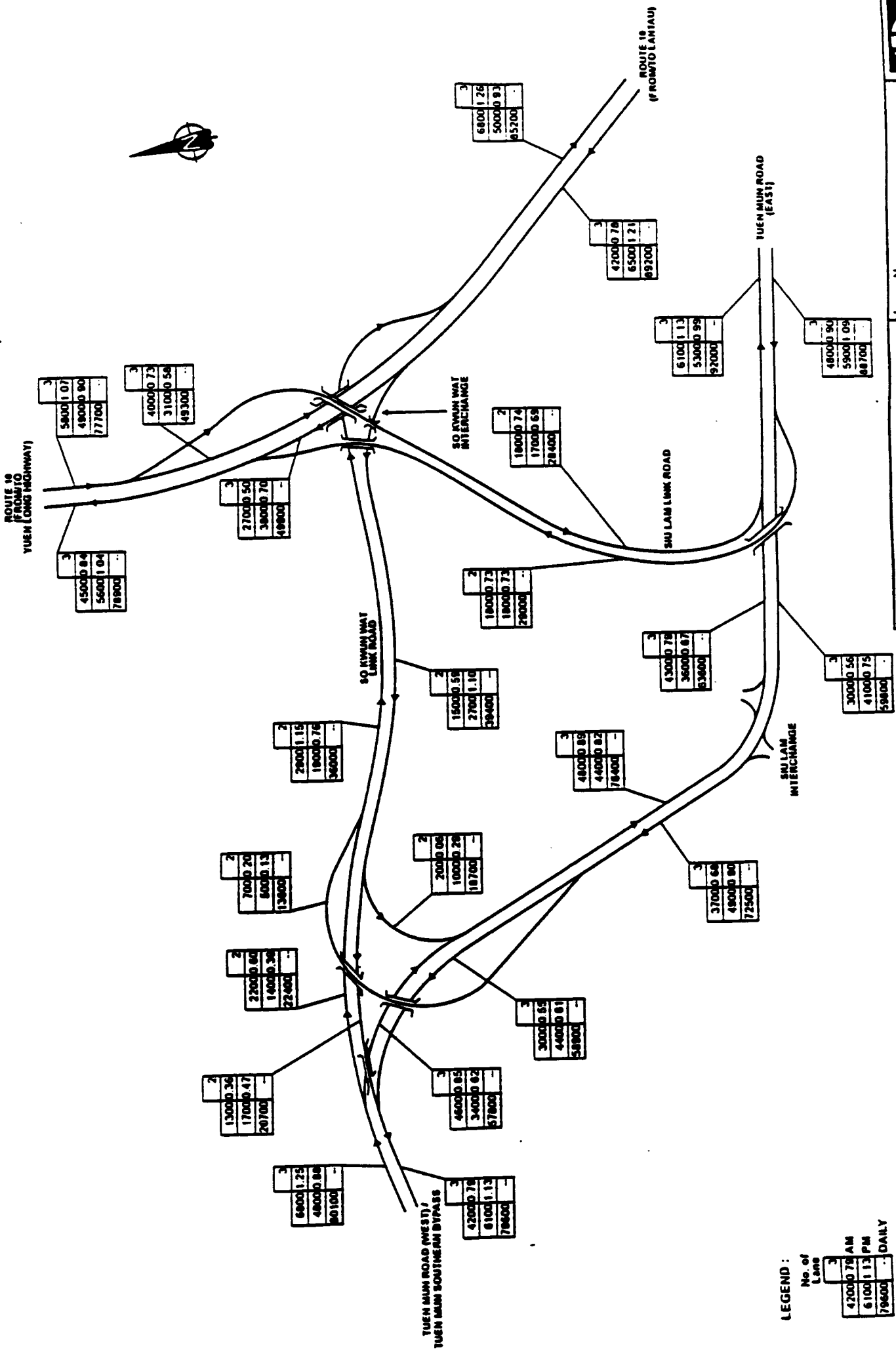
Flow V/C

FLOW IN PCUSATION

Title: SO KWUN WAT INTERCHANGE

Figure No: 524/RP/T/H035





LEGEND :

No. of Lanes	3
Flows in PCUSAKUR	