FINAL REPORT

Highways Department

Agreement No. CE 24/94: Environmental Impact Assessment for Chai Wan Road/Wing Tai Road Widening : *EIA Report*

14 July 1995

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CONSULTING SERVICES BY ENVIRONMENTAL RESOURCES MANAGEMENT

FINAL REPORT

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Agreement No. CE 24/94: Environmental Impact Assessment for Chai Wan Road/Wing Tai Road Widening : *EIA Report*

14 July 1995

Reference c1269/10367

For and on behalf of ERM Hong Kong

Approved by:

Position: Technical Director

Date: 14 July 1995

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1 INTRODUCTION

ERM Hong Kong, in association with Urbis Travers Morgan Limited have been commissioned by the Government of Hong Kong, Highways Department (HyD), to undertake an Environmental Impact Assessment Study (EIA) for the Chai Wan Road/Wing Tai Road Widening (Agreement No. CE24/94). The EIA Study commenced on 30 September 1994 and this report provides a detailed assessment for the proposed road widening scheme.

1.1 BACKGROUND TO THE STUDY

As Siu Sai Wan and the industrial area on the eastern side of Wing Tai Road continue to be developed, traffic growth ensues and great pressure is therefore placed upon the capacity of the junction of Chai Wan Road and Wing Tai Road. According to the traffic counts in 1992, the volume/capacity ratio for the existing Chai Wan Road/Wing Tai Road junction is 0.9. The average queue length is estimated to be 40m. With the implementation of the one-way gyratory system in March 1994, the junction should then have a reserve capacity of about 20%, but will not be able to cope with any further developments in Siu Sai Wan.

To resolve this problem, Highways Department (HyD) are preparing to modify the junction to increase its capacity and to meet demand for the foreseeable future. If the project is delayed, the resulting traffic problem will be a great hindrance to the future development in the area. All remaining developments in Siu Sai Wan including the Siu Sai Wan North PSPS and the Urban Council's sports stadium would have to be disallowed on traffic grounds.

1.2 PURPOSE OF THE STUDY

The purposes of the present Study as indicated in the Study Brief are as follows:

- to describe the characteristics of the proposed Project and related facilities and the requirements for their development;
- to identify and describe the elements of the community and environment likely to affect/be affected by the proposed Project;
- to minimize pollution, environmental disturbance and nuisance arising from the development and related facilities, and its construction and operation;
- to identify, predict and evaluate the net environmental impacts and cumulative effects expected to arise due to the construction and operation of the development in relation to the existing and planned community and the neighbouring land uses;
- to identify and specify cost effective methods, measures and standards for the inclusion into the design, which are locally available to mitigate

these impacts to an acceptable level;

- to identify the nature and extent of any adverse impacts associated with such mitigation measures when applied/installed, and assess them in terms of visual, local air quality objectives, potential landscape environmental qualities and functional aspects of the development (pedestrian comfort, sightline clearances, public safety, utility services routing and access, road maintenance, etc);
- to identify other potential constraints associated with the mitigation measures recommended in the Study, eg. structural, visual and maintenance problems, and to recommend proposals to resolve the constraints;
- to recommend environmental monitoring and audit requirements necessary to ensure the effectiveness of the environmental protection measures adopted;
- to identify and specify cost-effective mitigation measures to landscape and visual impacts during the construction and operation of the development; and
- to identify additional studies where necessary to fulfill the objectives or requirements of this EIA Study.

1.3 *ORGANISATION OF THE REPORT*

Following this introductory section, the remainder of this EIA Report is arranged as follows:

- *Section 2* describes the existing local environment and landuse in the vicinity of the project area.
- *Section 3* describes the proposed development.
- *Section 4* assesses the noise impact.
- *Section 5* assesses the air quality impact.
- *Section 6* assesses the potential visual and landscape impact.
- *Section 7* presents the overall conclusions and recommendations of the EIA.

2 SURROUNDING ENVIRONMENT

2.1 THE LOCAL ENVIRONMENT

As shown in *Figure 2.1a*, the Study Area extends from the boundary of Wing Tai Temporary Housing Area in the north-west to Hiu Tsui Street in the south-east of the project area. The existing land uses along the proposed road alignment are GIC, residential and industrial. The residential buildings within the Study Area include Yue Wan Estate and Tsui Wan Estate in the western sector, as well as Fu Shing Court, Fu On Court, Artland Court and Sun Tak House to the south of Chai Wan Road in the eastern sector of the Study Area. The GIC uses along the proposed road alignment are listed as follows:

Along Chai Wan Road:
- Bus Depot
- Chai Wan Swimming Pool and Park
- Po Leung Kuk Committee Fellowship Primary School
- Chai Wan Estate Playground

Along Wing Tai Road:
- Chai Wan Fire Station
- Football Court
- Fung Yiu Hing Memorial Primary School
- Chai Wan Faith Love Lutheran School

The following describes the local environment in more details.

2.1.1 *Wing Tai Road*

The stretch of Wing Tai Road involved in the road widening project measures about 300m in length and is dual-lane in each direction. The area north of Wing Tai Road is mainly industrial in nature. Major buildings on the northern side of Wing Tai Road include Chai Wan Industrial City Phases I and II, Cornell Centre, Chai Wan Fire Station and a open-air bus depot of China Motor Bus Company. Further from Wing Tai Road are the Marine Department Chai Wan Public Cargo Working Area, two football courts and another group of industrial buildings.

On the southern side of Wing Tai Road stands the thirty-one storey Tsui Fuk House of Tsui Wan Estate, which is also the highest building on this side of the road. There are also two schools, Fung Yiu Hing Memorial Primary School and Chai Wan Faith Love Lutheran School, situated within Yue Wan Estate. Further from the road are the Yue Wan Temporary Housing Area and the residential blocks of Yue Wan Estate. In addition, there are two proposed housing blocks under the Home Ownership Scheme will be constructed at the infill site within Tsui Wan Estate between Tsui Fuk House and the two schools.

Both sides of Wing Tai Road are planted, with younger trees on the northern pavement. At present, there is one set of traffic lights, with pedestrian crossing, at the junction of Wing Tai Road and Ka Yip Street.

2.1.2 *Chai Wan Road/Wing Tai Road Junction*

The China Motor Bus Company open–air depot mentioned above is situated in the north–east of the road junction. In the north–west of the junction, there is a small sitting–out area, with Yue On House of Yue Wan Estate behind it. Chai Wan Estate is situated south of the junction, with Block 13, a playground and a sitting–out area in the immediate vicinity of the junction.

2.1.3 *Chai Wan Road*

The stretch of Chai Wan Road involved in the road widening measures about 600m in length. The seven–storey Yue On House of Yue Wan Estate is situated on the northern side of Chai Wan Road and the western boundary of the proposed road works. Blocks 9, 10, 11, 12 and 14 of Chai Wan Estate are situated on the opposite side of the road in the same area. The height of these residential blocks varies, ranging from two to over fifteen storeys. On the same side further along the road are a sitting–out area and a playground, as mentioned above. Block 13 of Chai Wan Estate, which is a fifteen–storey elongated residential block, extends along Chai Wan Road from the junction up to Wing Ping Street. The Po Leung Kuk Committee Fellowship Primary School is immediately behind Block 13.

Beyond Wing Ping Street and on the southern side of Chai Wan Road are four private residential block, including Sun Tak House, Artland Court, Fu On Court and Fu Shing Court from the west to east. The height of these four blocks varies from fourteen to twenty–seven storeys. The Chai Wan Swimming Pool and Park complex is situated on a podium on a slope further along Chai Wan Road. This complex extends from the wall of Fu Shing Court to Hiu Tsui Street.

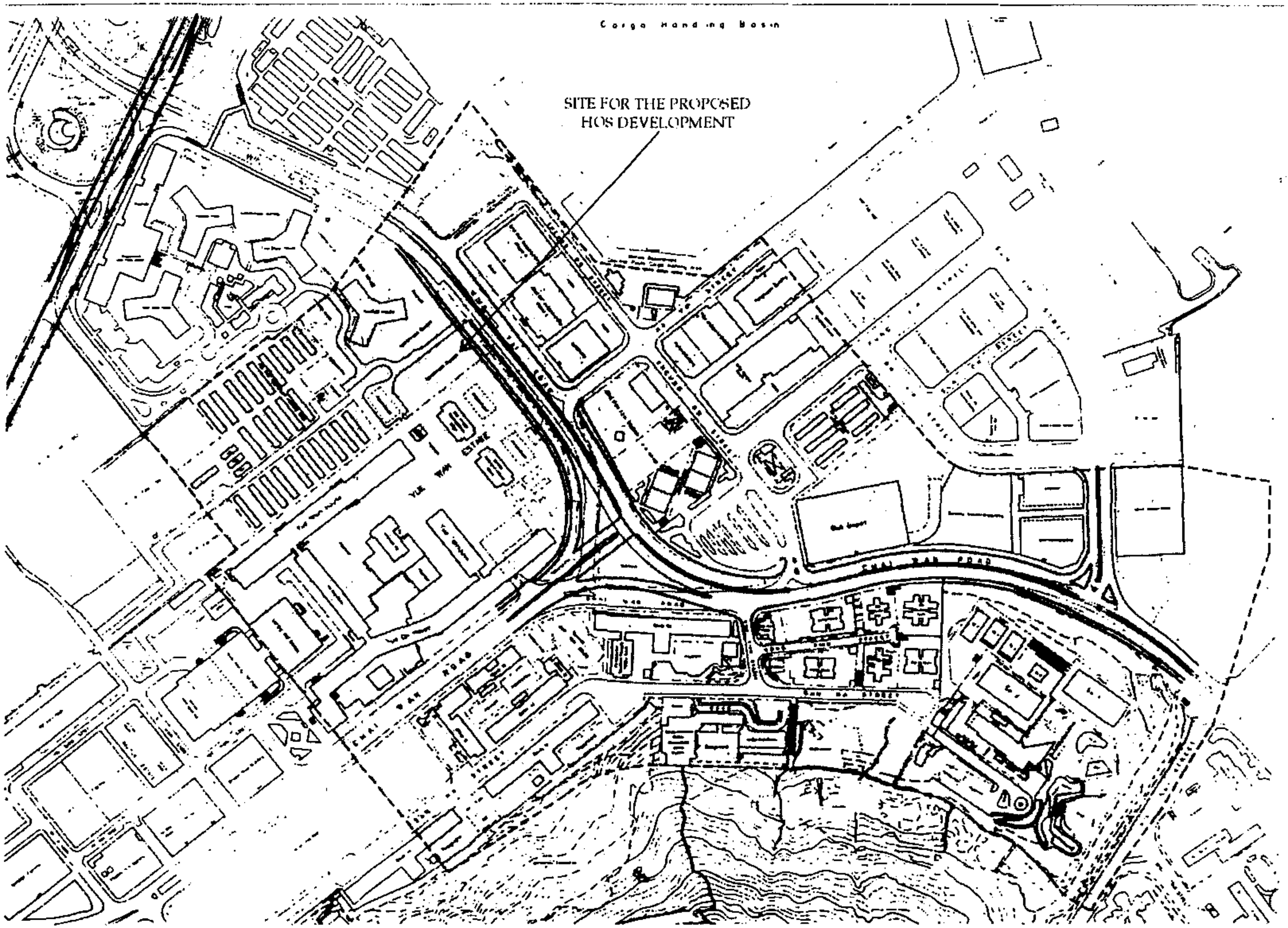
As for Wing Tai Road, the area north of Chai Wan Road is almost entirely industrial in nature. The facilities and buildings on this side of Chai Wan Road include, from west to east, a bus terminus, a multi–storey bus depot, Sunview Industrial Building and an industrial/commercial building still under construction.

The road widening scheme also include a short stretch of Sun Yip Street, measuring a total of about 100m. The land use on both sides of this stretch of Sun Yip Street is industrial.

2.1.4 *Existing Landscape*

The existing landscape character of the site comprises an existing wide streetscape located at the urban fringe surrounded by residential towers, industrial and commercial buildings. Occasional glimpses of the surrounding mountains are visible between buildings and along side roads towards the north, west and south east.

There are a number of existing mature trees as well as new street trees within the site area. Some of these trees have a low to moderate amenity value with respect to their species, size, form and shade contribution.



KEY
STUDY AREA FOR ENVIRONMENTAL IMPACT ASSESSMENT
PROPOSED ROAD WIDENING

FIGURE 2.1a - THE STUDY AREA

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2.2 *TRAFFIC FLOW*

Traffic flow data has been provided by the Transport Department for the purpose of the present EIA Study. These are shown in *Table 2.2a* and *Table 2.2b* which present the existing (1991) and forecasted (2011) a.m. peak hour traffic flow at the Chai Wan Road and Wing Tai Road junction. The traffic flow direction is presented in *Figure 2.2a*.

Table 2.2a ***Existing (1991) Traffic Flow at the Chai Wan Road and Wing Tai Road Junction (A.M. Peak Hour)***

Flow Direction	From	To	Traffic Flow	% of Heavy Vehicles
A	Chai Wan Road E/B	Chai Wan Road E/B	174	29.3%
B	Chai Wan Road E/B	Wing Tai Road N/B	309	19.7%
C	Wing Tai Road S/B	Chai Wan Road W/B	42	30.9%
D	Wing Tai Road S/B	Chai Wan Road E/B	149	47.7%
E	Chai Wan Road W/B	Wing Tai Road N/B	260	30.4%
F	Chai Wan Road W/B	Chai Wan Road W/B	380	23.9%

Table 2.2b ***Forecast (2011) Traffic Flow at the Chai Wan Road and Wing Tai Road Junction (A.M. Peak Hour)***

Flow Direction	From	To	Traffic Flow	% of Heavy Vehicles[1]
A	Chai Wan Road E/B	Chai Wan Road E/B	482	60%
B	Chai Wan Road E/B	Wing Tai Road N/B	286	60%
C	Wing Tai Road S/B	Chai Wan Road W/B	79	60%
D	Wing Tai Road S/B	Chai Wan Road E/B	207	60%
E	Chai Wan Road W/B (Flyover)	Wing Tai Road N/B (Flyover)	921	60%
F	Chai Wan Road W/B	Chai Wan Road W/B	625	60%

(1) The estimated percentage, viz 60%, has been provided by Transport Department based on the CTS-2 and IETS models

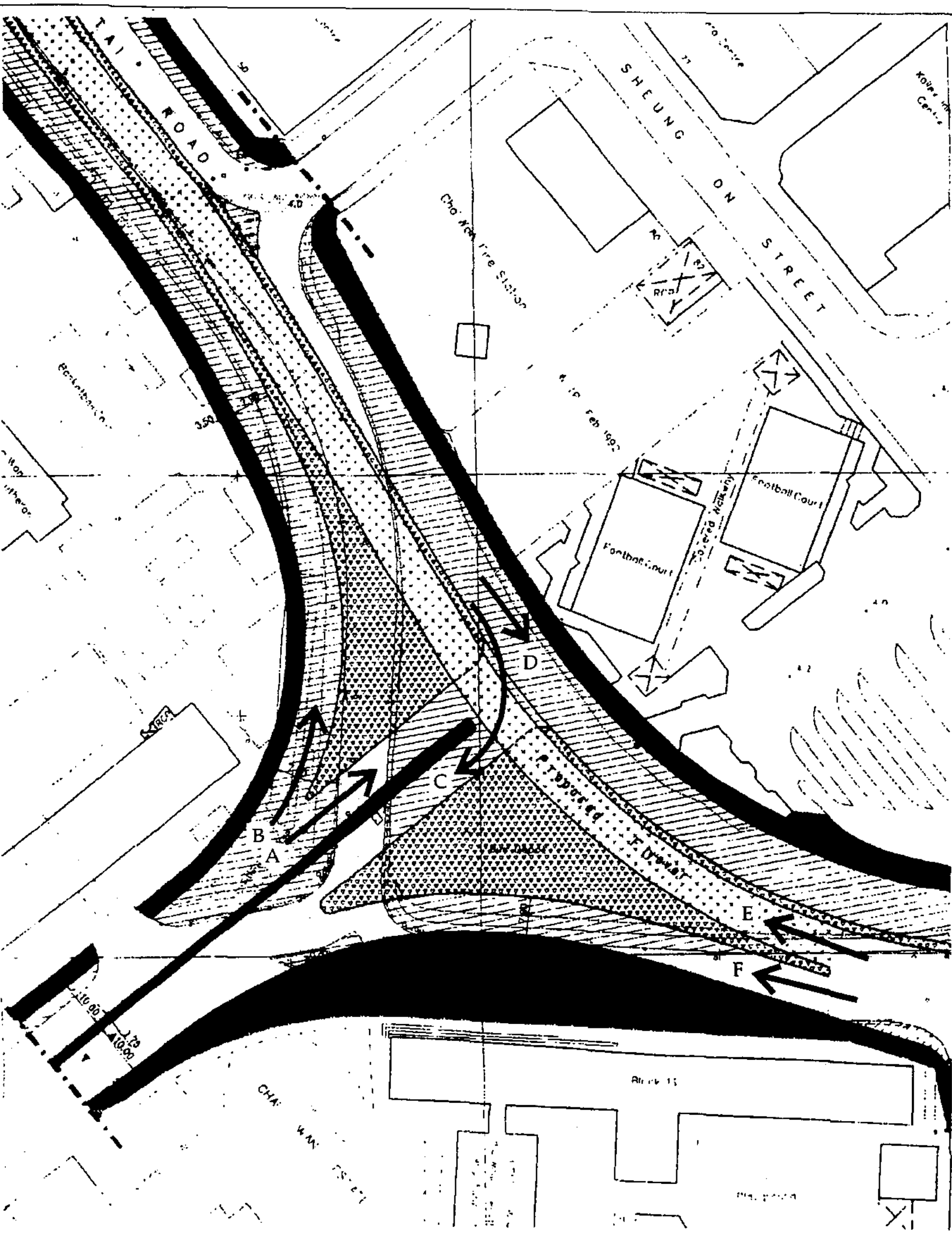

FIGURE 2.2a - TRAFFIC FLOW DIRECTION AT THE CHAI WAN/ WING TAI ROAD JUNCTION

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3 PROPOSED DEVELOPMENT

3.1 CONSTRUCTION PHASE

The proposed improvement works under this project are required to cater for the traffic growth resulting from the developments in Siu Sai Wan and the industrial area on the eastern side of Wing Tai Road. The extent of the project has been shown in *Figure 2.1a* and comprises improvement works listed below:

- construction of a flyover to carry through traffic from Chai Wan Road westbound to Wing Tai Road northbound;
- widening of a section of Wing Tai Road between Sheung On Street mini-bus terminus and Chai Wan Road to dual three-lane carriageway;
- modification of the junction layout of Chai Wan Road/Wing Tai Road and Chai Wan Road/Sun Yip Street; and
- construction of the associated traffic islands, footway, landscaped open-space and traffic aids.

The entire construction scheme will be divided into five major stages, each of which may be further divided into sub-stages. Works for the five major stages are shown in *Figure 3.1a – Figure 3.1d* and described in the following sub-sections.

3.1.1 *Stage 1*

Stage 1 of the scheme will involve construction of carriageway on Wing Tai Road. During this stage, the pavement on the northbound side of Wing Tai Road will be removed to make way for the carriageway. The stretch of pavement affected will extend from the playground just outside Tsui Fuk House to the Chai Wan Road/Wing Tai Road junction.

Works on the opposite side of Wing Tai Road at this stage will be conducted in an area extending from the Wing Tai Road/Ka Yip Street junction near the Chai Wan Fire Station to the Chai Wan Road/Wing Tai Road junction. The new carriageway surface will cover about half the area of the current open-air bus depot.

Piling work for flyover construction will also be carried out at this stage.

The existing traffic directions will remain unchanged during this stage.

3.1.2 *Stage 2*

During this stage, new carriageway will be put in place for a section of Wing Tai Road. The areas involved in the carriageway construction works will be outside the Tsui Wan Estate on the northbound side, and extending from the current Wing Tai Temporary Housing Area to Cornell Centre on the southbound side. Bridge piers and abutments for the proposed flyover will also be constructed. In addition, works will be conducted for new carriageway for a very short section of Chai Wan Road near the multi-storey bus depot.

Traffic diversion will be carried out from the Chai Wan Road/Wing Tai Road junction to the Wing Tai Road/Sheung On Street junction to cater for the road and bridge works. A majority of the area of the existing open-air bus depot will be convert into temporary traffic diversion surface. Further on along Wing Tai Road, a new pedestrian signal crossing will be installed to compensate for the one lost to the bridge works. At the same time, the minibus terminus near the Wing Tai Road/Sheung On Street junction will be removed.

3.1.3 *Stage 3*

The majority of roadworks during this stage will be conducted at the Chai Wan Road/Wing Tai Road junction and the Chai Wan Road/Sheung On Street junction. As a result of the roadworks, temporary traffic diversion will be carried out at the Chai Wan Road/Wing Tai Road junction. New signal control will also be installed at this junction.

In addition to works at the two junctions mentioned above, new carriageway will be constructed on a section of Sun Yip Street outside Honour Industrial Centre.

3.1.4 *Stage 4*

The proposed flyover will have been constructed during this stage. New carriageway will be put in place at three road junctions. Major conversions will be carried out at the Chai Wan Road/Sun Yip Street junction while the Chai Wan Road/Wing Ping Road junction and the Wing Tai Road/Ka Yip Street junction will have new carriageway surface constructed.

As a result of the works, traffic will be diverted temporarily at the Wing Tai Road/Ka Yip Street, Chai Wan Road/Wing Tai Road, Chai Wan Road/Sheung On Street and Chai Wan Road/Sun Yip Street junctions.

3.2 *OPERATION PHASE*

With the completion of the above-mentioned improvement works, westbound traffic from Chai Wan Road to Wing Tai Road northbound will be carried by the new flyover. Coupled with the operation of the flyover, increased traffic flow on the section of Wing Tai Road between Sheung On Street minibus terminus and Chai Wan Road will be accommodated by the new dual three-lane carriageway.

Conversion of the Chai Wan Road/Wing Tai Road junction will result in generally widened carriageway and straightened alignment. With the new layout of this junction, southbound traffic from Wing Tai Road will be allowed to make a right turn directly into Chai Wan Road eastbound.

Traffic directions at the Chai Wan Road/Sheung On Street junction will also be different from existing ones. The changes will allow Wing Tai Road southbound traffic to be carried by the widened carriageway directly into Chai Wan Road westbound. At the same time, Chai Wan Road eastbound traffic will also be allowed to turn right into Sheung On Street.

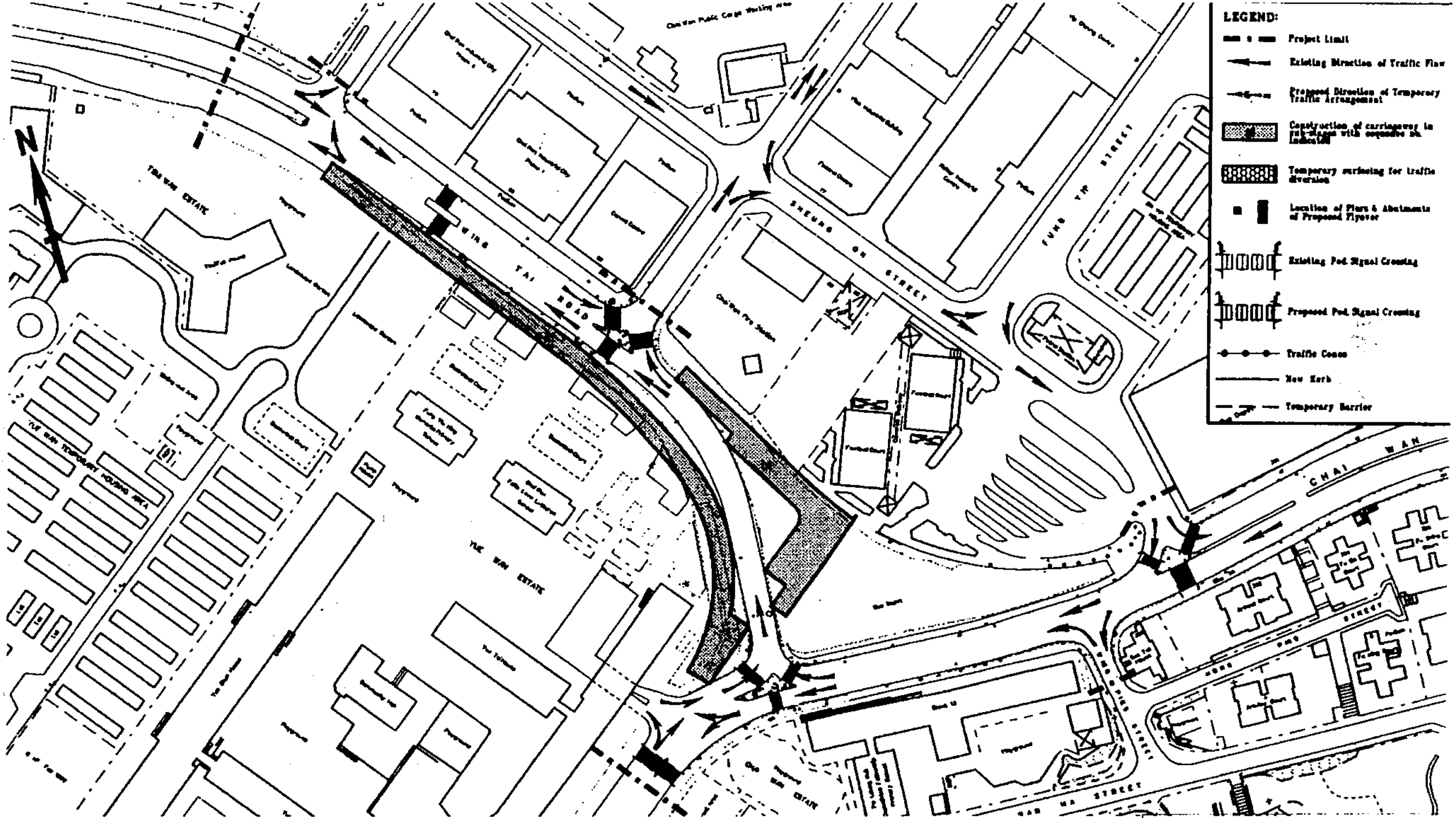

FIGURE 3.1a - CONSTRUCTION PHASE - STAGE 1

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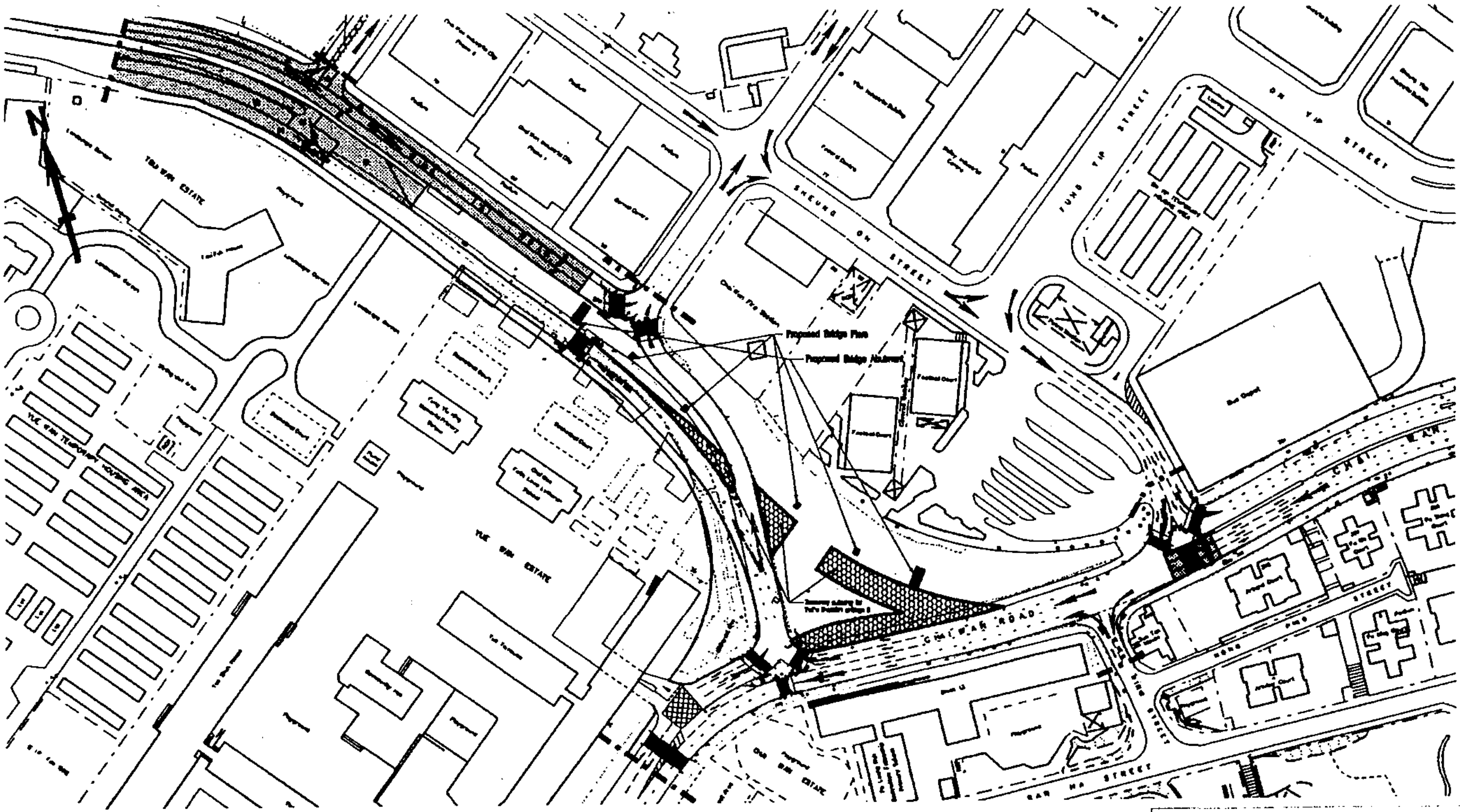

FIGURE 3.1b - CONSTRUCTION PHASE - STAGE 2

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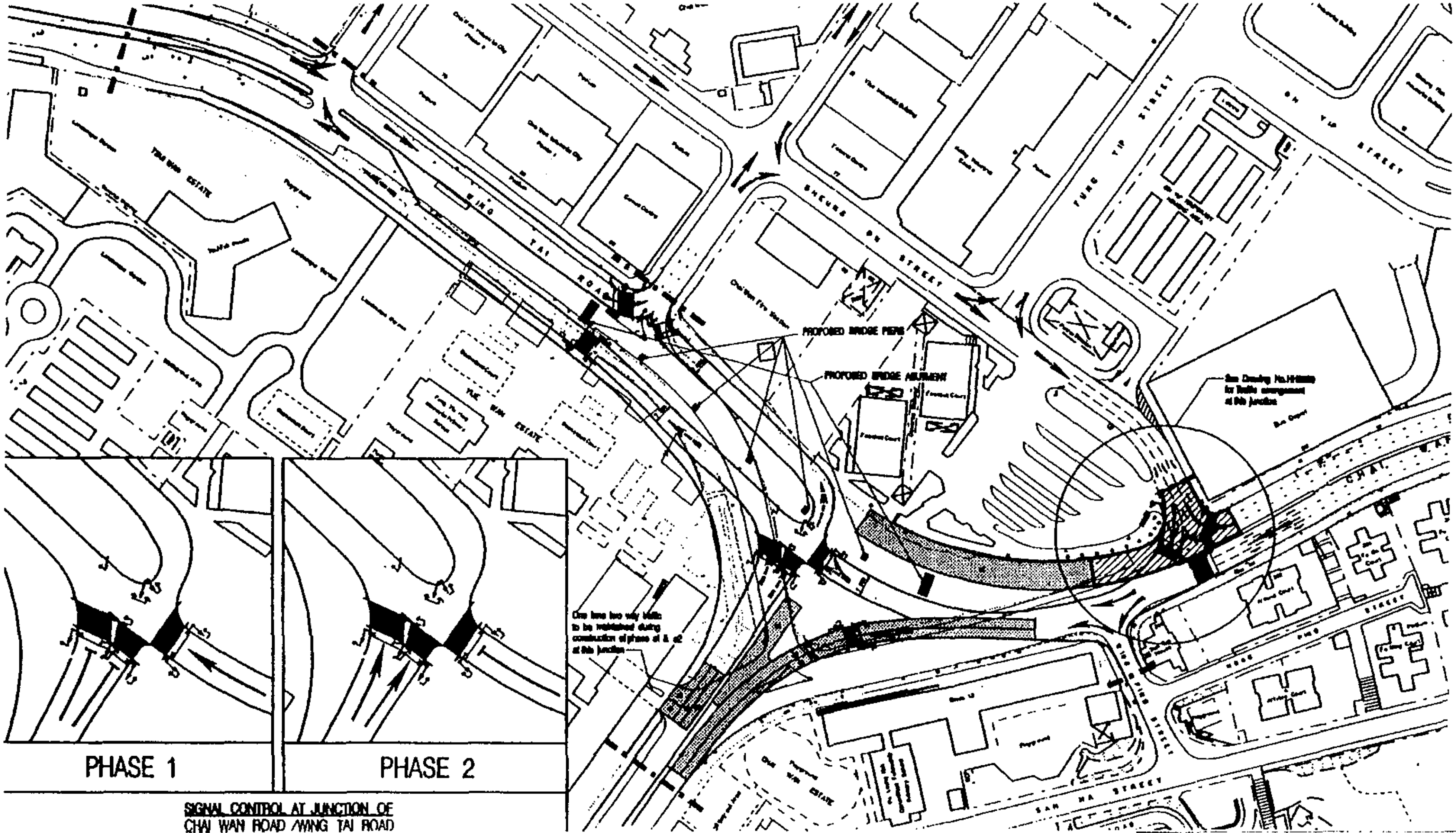

FIGURE 3.1c - CONSTRUCTION PHASE - STAGE 3

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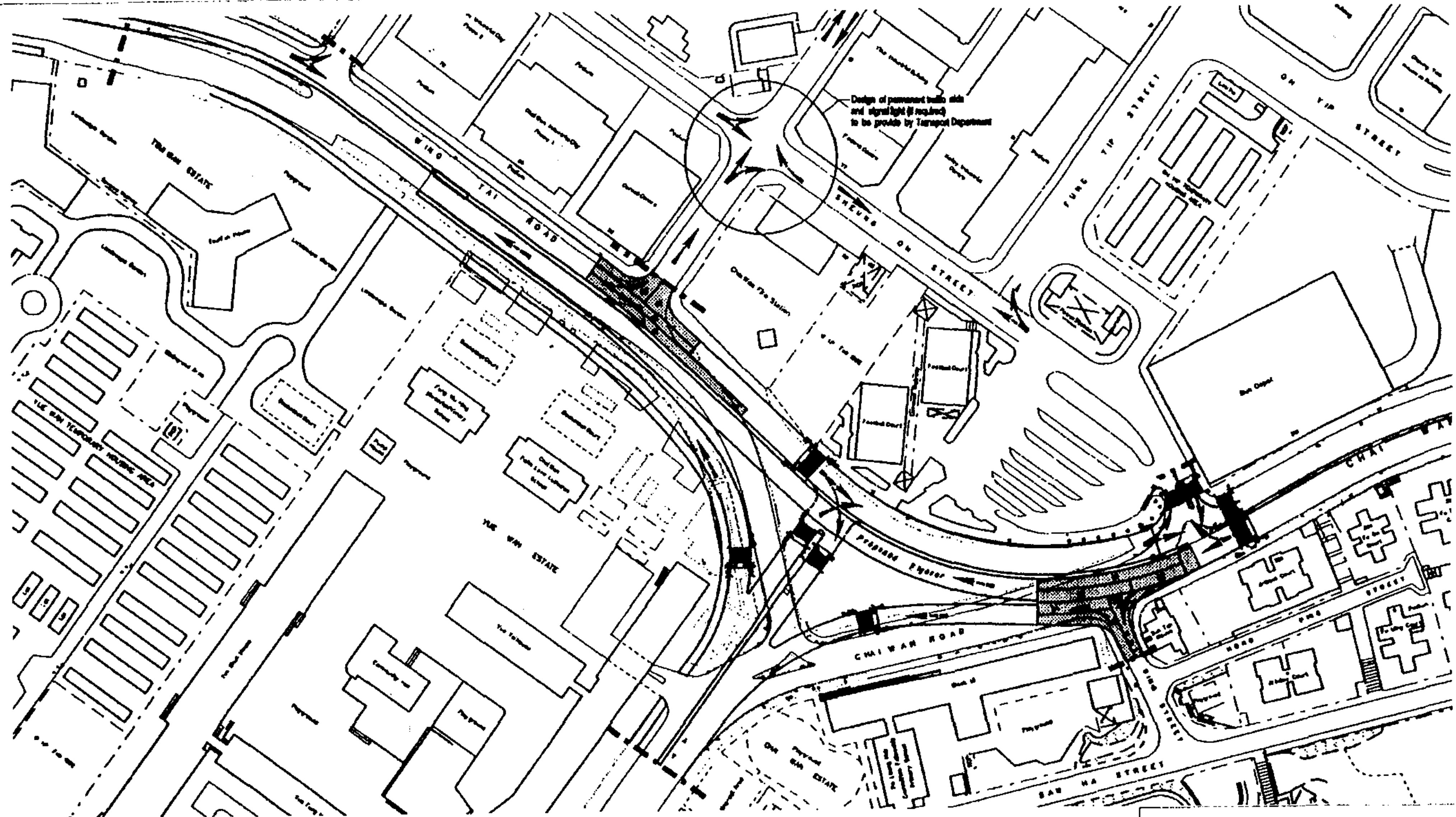

FIGURE 3.1d - CONSTRUCTION PHASE - STAGE 4

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Other major changes include alterations to the layout of the Chai Wan Road/Sun Yip Street junction and the inclusion of a U-turn loop at Wing Tai Road.

4 NOISE ASSESSMENT

4.1 INTRODUCTION

This section provides an assessment of noise from the construction and operation of the proposed roads and recommends measures to control construction noise and traffic noise at nearby noise sensitive receivers, namely schools and existing and proposed residences.

4.1.1 Construction

The construction noise assessment has assessed all noise impacts from the four construction stages proposed for the road widening works. Only construction activities and sensitive receivers within the Study Area, defined below, have been assessed.

4.1.2 Operation

The EPD has advised that the proposed road widening works would change the category of many of the roads in the study area from 'existing' to 'new', due to the major changes proposed for many of the sections of road within the study area. As a result, there will be two main designations for roads in this assessment. These are 'new' roads and 'existing' roads. 'Existing' roads include all road segments to the east of Sheung On Street (by Artland Court) and all road segments southwest of the junction between Chai Wan Road and Wing Tai Road. 'New' road sections include the fly-over and all other modified sections of road in the Study Area. Figure 4.1a indicates which road sections have been identified as 'new' and which have been identified as 'existing'.

4.2 BASELINE CONDITIONS

The region surrounding Chai Wan and Wing Tai Roads in the area of Siu Sai Wan proposed for widening activities, is primarily zoned as a mix of residential and industrial area. Residential development is positioned primarily to the south of these roads, while the industrial facilities are primarily to the north of the roads.

Sample measurements and data from previous reports indicate that the existing environment around the study area is already noisy, with peak hour noise levels at several locations approaching or exceeding the $L_{Aeq,30min}$ 75 dB daytime construction noise criterion and generally above the $L_{A10, peak hour}$ 70 dB operational criterion for residences and the $L_{A10, peak hour}$ 65 dB operational criterion for schools. These measurements also indicate that the existing noise levels at the façades of NSRs along Chai Wan road tend to be higher than those along Wing Tai Road.

4.3 NOISE SENSITIVE RECEIVERS (NSRs)

NSRs, as defined by the HKPSG and the NCO, have been identified with reference to previous environmental studies undertaken in the region of the

Siu Sai Wan, and have been updated by site surveys and by referring to survey sheets and development plans.

All noise sensitive receivers, which are within a 300 metre radius of the proposed widening works and which have a direct view of the widened road, are shown in *Table 4.3a*, below, and in *Figure 4.3a*.

Table 4.3a *Noise Sensitive Receivers*

NSRs		No. of Floors	Flats/Floor[1]	Approximate Set-back from the Edge of the Proposed Road (m)
Fu Shing Court	N1	14	8	15
Fu On Court	N2	14	4	10
Artland Court	N3	16	8	8
Sun Tak House	N4	28	4	5
Chai Wan Estate (Block 13)	N5	14	10	8
Chai Wan Estate (Block 10)	N6	2	5	7
Yue On House	N7/N8	6	20	15
Fung Yiu Hing Memorial Primary School	N9	6	4[2]	45
Chai Wan Faith Love Lutheran School	N10	6	4[2]	45
Tsui Fuk House	N11	31	12	30

[1] This column only indicates flats per floor which have a direct view of Chai Wan or Wing Tai Road.
[2] This figure includes classrooms, staff rooms, offices, libraries, etc.

In addition to the NSRs indicated above, there is a planned Home Ownership Scheme (HOS) residential development next to Tsui Fuk House. This HOS scheme was assessed in a separate report by another Consultant and so will not be assessed in this study.

Though Blocks 10 (N6) and 13 (N5) of Chai Wan Estate have been assessed in this report, it should be noted that Hong Kong Housing Authority has confirmed that these buildings will be demolished before the year 2000.

4.4 *STATUTORY REQUIREMENTS*

Construction

In Hong Kong the control of construction noise outside of daytime, weekday working hours (0700-1900, Monday through Saturday) is governed by the Noise Control Ordinance (NCO) and the subsidiary Technical Memorandum (*TM*). This TM establishes the permitted noise levels for construction work depending upon working hours and the existing noise climate.

The NCO criteria for the control of noise from powered mechanical equipment (PME) are dependant upon the type of area containing the NSR

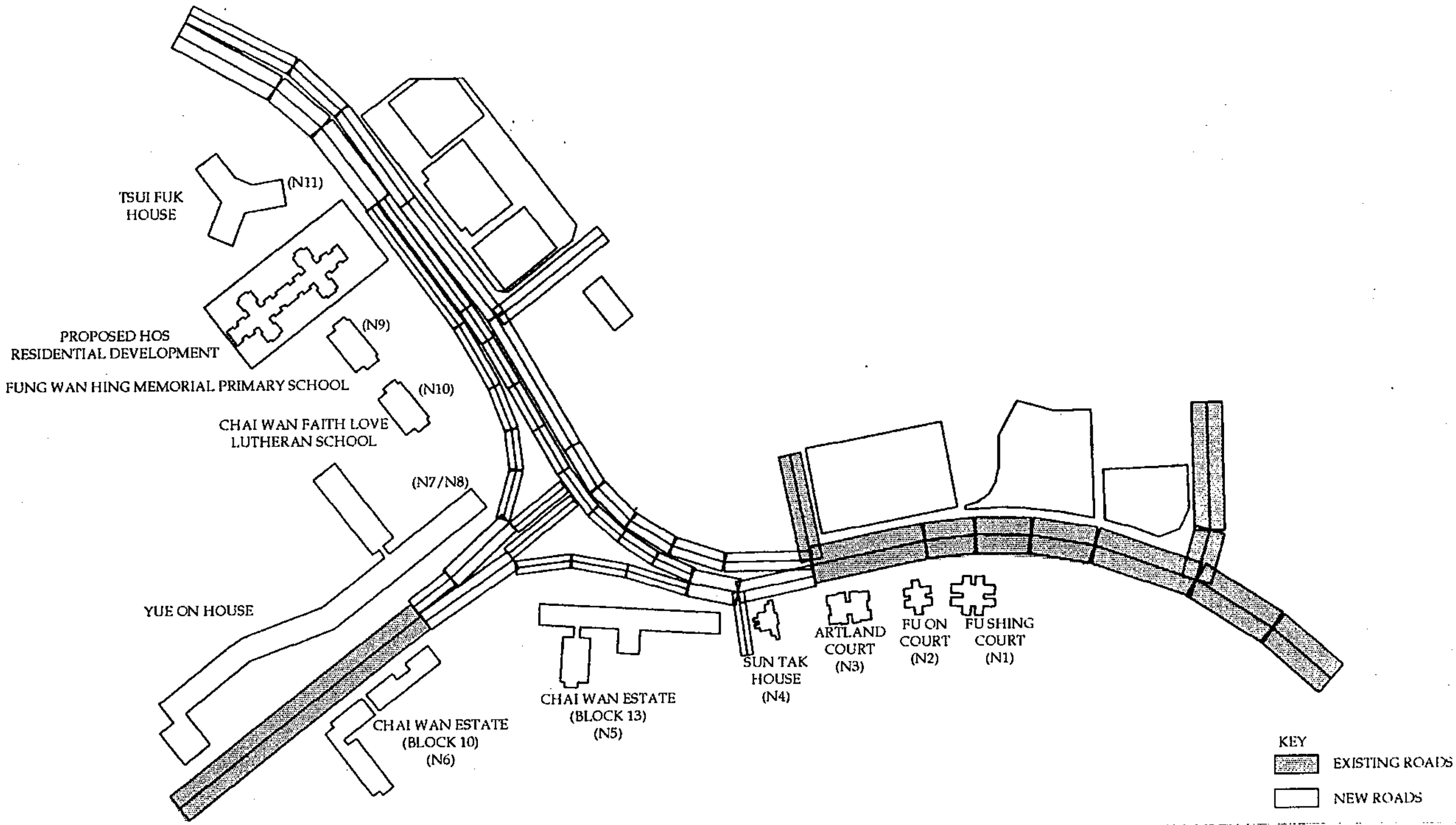

FIGURE 4.1a - DESIGNATION OF EXISTING AND NEW ROADS

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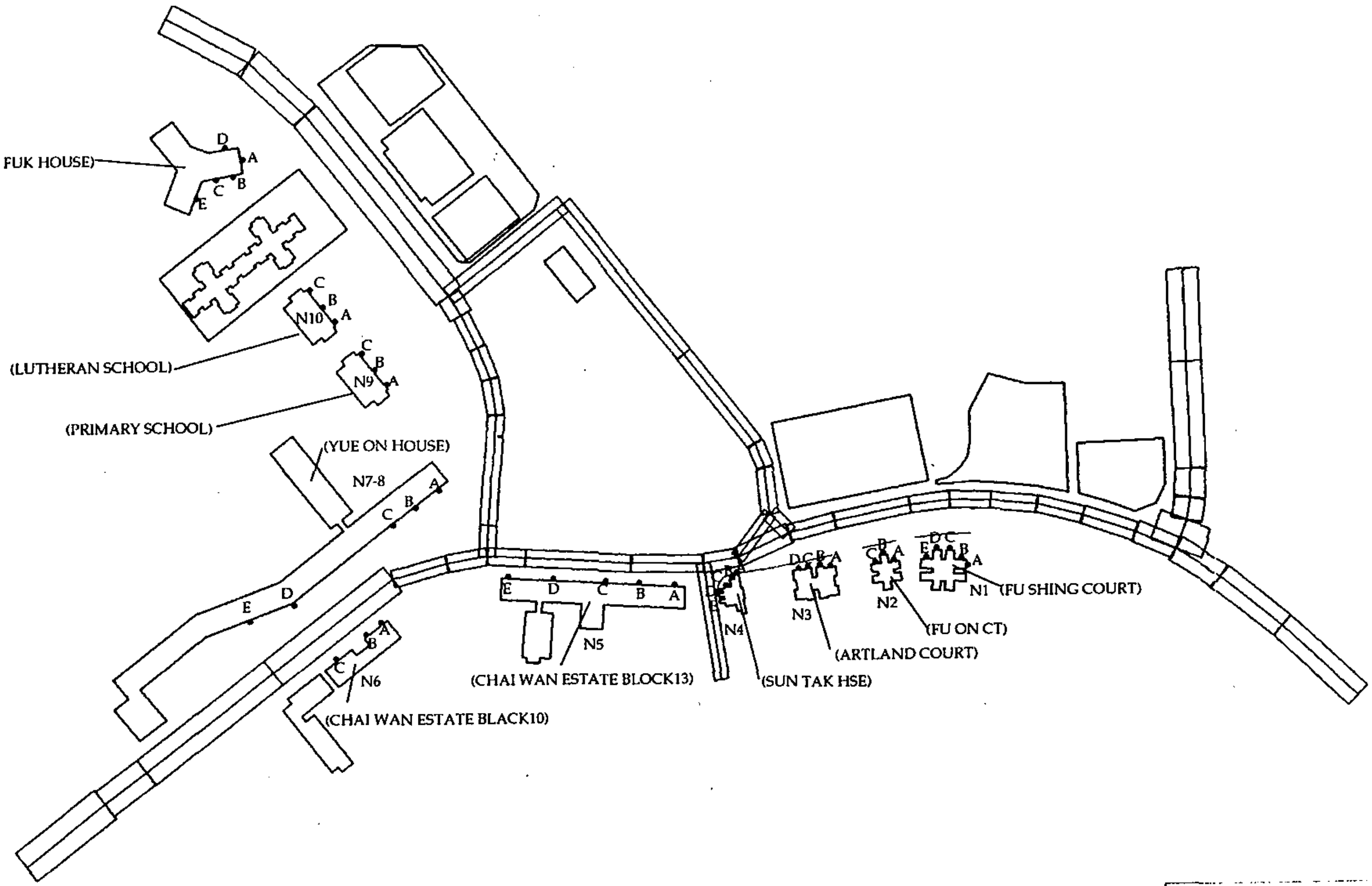

FIGURE 4.3a - RECEIVER LOCATIONS AND DESIGNATIONS

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rather than the measured background noise level. As an industrial area is located within the Study Area and Chai Wan Road is an Influencing Factor (IF), the Area Sensitivity Rating (ASR) for the nearby NSRs, according to the *TM*, is specified as 'C'. The NCO requires that noise levels from construction at affected NSRs be less than a specified Acceptable Noise Level (ANL) which depends on the ASR.

It is intended that the construction activities of the proposed works should be planned and controlled in accordance with the NCO. Works requiring the use of PME during restricted hours (i.e. outside of 0700–1900 Monday through Saturday and during public holidays) and particularly at night, will require a Construction Noise Permit (CNP) and will need to achieve the applicable ANL. The ANL is derived from the Basic Noise Levels (BNL) by applying corrections for the duration of the works and the effect of any other nearby sites operating under a CNP. For this assessment these corrections are assumed to be zero. As a result, the ANLs are equal to the BNLs. These are shown in *Table 4.4a* below.

Table 4.4a *Acceptable Noise Levels for Construction*

Time Period	ANL, dB(A)
All days during the evening (1900-2300) and general holidays (including Sundays) during the day an evening (0700-2300)	70
All days during the night-time (2300-0700)	55

Although the NCO does not provide for the control of construction activities during normal working hours, a limit of $L_{Aeq,30min}$ 75 dB is proposed in the "Practice Note For Professional Persons, PN2/93" issued by the Professional Persons Environmental Consultative Committee (ProPECC) in June 1993. This limit has been applied on major construction projects and is now generally accepted in Hong Kong, and will therefore be adopted in this study in order to protect NSRs to an appropriate extent. In addition, this note recommends $L_{Aeq,30minr}$ 70 dB for schools outside of examination periods and $L_{Aeq,30min}$ 65 dB for schools during examination periods.

Further subsidiary regulations control the noise from hand held percussive breakers and air compressors and require compliance with the relevant noise emission standards and the fitting of Noise Emission Labels.

4.4.1 *Operation*

The Hong Kong Planning Standards and Guidelines (HKPSG) recommends that the façade $L_{A10,peak\ hour}$ for road traffic noise at the openable windows of a new residential development or at a residential development from a new road should be limited to 70 dB to minimise disturbance to the residents. In addition, according to the HKPSG, road traffic noise impacts at the openable windows of a new school or at an existing school from a new road should be limited to $L_{A10,peak\ hour}$ 65 dB to minimise disturbance to students.

In the cases where road traffic noise levels cannot be limited, by direct measures, to the criteria specified in the HKPSG, the ExCo directive XCC(89)157: *Equitable Redress for Persons Exposed to Increased Noise Resulting From the Use of New Roads*, recommends to examine the use of indirect technical remedies, in the form of improved glazing and air conditioning, to protect residents from excessive noise levels. For NSRs to be eligible for noise insulation, the residual noise levels from the road sections under consideration must meet all three CRTN criteria under the UK Noise Insulation Regulation (1975). These criteria are as follows:

- the combined expected maximum traffic noise level, ie the *relevant noise level*, from the 'new' or 'altered' road together with other traffic in the vicinity must not be less than the applicable HKPSG recommended noise criterion;

- the relevant noise level is at least 1.0 dB(A) more than the *prevailing noise level*, ie the total traffic noise level existing before the works to construct the road were commenced;

- the contribution to the increase in the relevant noise level from the new or altered road must be at least 1.0 dB(A).

In addition, the CRTN stipulates that all noise modelling at noise sensitive receivers must be carried out by predicting noise levels at 1 metre in front of the centre of an openable window.

4.5 CONSTRUCTION PHASE IMPACTS

4.5.1 *Assessment Methodology*

A methodology for assessing noise from the construction associated with the widening of Chai Wan Road has been developed based on the *Technical Memorandum on Noise From Construction Work Other Than Percussive Piling (TM)*. In general, the methodology is as follows:

- locate NSRs that may be affected by the worksite;

- calculate distance attenuation and barrier corrections to NSRs from worksite notional noise source point;

- predict construction noise levels at NSRs in the absence of any mitigation measures; and,

- calculate maximum total site sound power (SWL) level for construction activities such that $L_{Aeq,30min}$ noise levels at NSRs comply with appropriate noise criteria.

The practicability of achieving the aforementioned maximum total site sound power level is then considered since this might offer a preferred form of mitigation. Other mitigation measures are then considered and recommended as appropriate.

4.5.2 *Potential Sources of Impact*

Construction activities capable of producing noise impacts at the nearby NSRs have been identified. The identified activities are:

- concrete breaking;
- trench excavation;
- lining of underground utilities;
- bored piling; and

- concrete paving of the new lanes.

The construction plant associated with these construction activities are shown in *Table 4.5a*.

It has been assumed that there will be no percussive piling or blasting within the study area. It has been assumed that bored piling will be carried out at the proposed bridge piers.

Table 4.5a *Assumed Plant Inventories for Road Widening Works*

Activity	Plant	Number	TM Reference Number	Sound Power Level, dB(A)
Concrete breaking	Excavator-mounted breaker	1	CNP 027	122
	Lorry	1	CNP 141	112
				Total: 122
Trench Excavation	Excavator	1	CNP 081	112
	Lorry	1	CNP 141	112
				Total: 115
Lining of underground utilities	Mobile crane	1	CNP 048	112
				Total: 112
Bored piling	Piling, bored	2	CNP 164	115+3
	Bentonite filtering plant	1	CNP 162	105
	Lorry	1	CNP 141	112
				Total: 119
Concrete paving	Concrete pump	1	CNP 047	109
	Concrete Lorry	1	CNP 044	109
	Lorry	1	CNP 141	112
				Total: 115

This table indicates that the noisiest operations will be the concrete breaking and bored piling activities. However, it should be noted that the activity with the longest duration in each stage of the road widening will be the lining of underground utilities. As no formal schedule of works has been drawn up, however, the actual duration of this activity are at present unknown.

4.5.3 *Evaluation of Impacts*

The construction activities associated with the road widening will take place in four successive Stages. Each Stage of construction, however, defines a location and not an activity. As a result, it should be noted that all of the activities listed above will take place in each Stage.

To facilitate a worst-case analysis, the noisiest, simultaneous activities during each Stage have been assessed in this study. These activities by Stage are as follows:

- Stage 1: simultaneous concrete breaking in two areas ('a' and 'b'; 122 dB(A) each) acting in parallel with bored piling (119 dB(A)) for the fly-over;
- Stage 2: simultaneous concrete breaking in two areas ('a' and 'b'; 122 dB(A) each) acting in parallel with bored piling (119 dB(A)) for the fly-over, site 'c' is considered too small for assessment;
- Stage 3: simultaneous concrete breaking in three areas ('b', 'c' and 'd'; 122 dB(A) each), site 'a' is considered too small for assessment;
- Stage 4: simultaneous concrete breaking in three areas ('a', 'b' and 'c'; 122 dB(A) each).

The distances to receivers for these worst case activities are shown in the tables below.

Table 4.5b *Distances (m) From NSRs to Work Areas during Stage 1*

NSR	Concrete Breaking Area a	Concrete Breaking Area b	Bored Piling
N1	275	240	210
N2	240	210	175
N3	210	175	135
N4	165	135	95
N5	80	65	40
N6	110	140	175
N7	100	150	160
N8	25	50	120
N9	45	75	100
N10	45	115	155
N11	35	200	235

Table 4.5c *Distances (m) From NSRs to Work Areas during Stage 2*

NSR	Concrete Breaking Area a	Concrete Breaking Area b	Bored Piling
N1	360	435	210
N2	330	410	175
N3	310	380	135
N4	280	345	95

NSR	Concrete Breaking		Bored Piling
	Area a	Area b	
N5	240	300	40
N6	230	290	175
N7	210	260	70
N8	140	270	160
N9	90	140	55
N10	65	100	65
N11	55	200	125

Table 4.5d *Distances (m) From NSRs to Work Areas during Stage 3*

NSR	Concrete Breaking		
	Area b	Area c	Area d
N1	195	160	75
N2	160	125	75
N3	120	85	80
N4	70	45	85
N5	20	50	90
N6	45	175	85
N7	70	175	80
N8	35	100	90
N9	110	140	80
N10	155	190	75
N11	255	280	70

Table 4.5e *Distances (m) From NSRs to Work Areas during Stage 4*

NSR	Concrete Breaking		
	Area a	Area b	Area c
N1	325	125	135
N2	295	90	170
N3	265	50	210
N4	235	15	260
N5	190	50	345
N6	215	195	480
N7	205	225	515
N8	120	150	435
N9	70	215	480

NSR	Concrete Breaking Area a	Area b	Area c
N10	80	260	520
N11	150	350	590

Assessment was carried out by combining noise levels from all simultaneous activities in order to obtain a total noise level at the affected NSRs. In all cases the NSRs have an obstructed view of the roadway.

4.5.4 *Prediction of Impacts*

The worst-case noise levels resulting from the construction activities at the façade of the NSRs have been predicted and are presented in *Table 4.5f*. In the table below the impacts from each Stage are broken down into their component areas ('a', 'b', 'c', 'd') and bored piling (bp), if applicable. The 'total' column gives simultaneous working levels, exceedances are in bold.

Table 4.5f *Maximum Predicted Noise levels at Receivers*

NSR	Stage 1 (4 months) 'a' 'b' bp	total	Stage 2 (6 months) 'a' 'b' bp	total	Stage 3 (6 months) 'b' 'c' 'd'	total	Stage 4 (6 months) 'a' 'b' 'c'	total
N1	68/69/68	73	66/64/68	71	71/73/63	75	67/75/74	78
N2	69/71/69	75	67/65/69	72	73/75/61	77	68/78/72	79
N3	71/72/71	76	67/65/71	74	75/78/60	80	69/83/71	83
N4	73/74/74	79	68/66/74	76	80/84/58	85	70/94/69	94
N5	79/81/82	85	69/68/82	82	91/83/56	92	71/83/66	83
N6	76/74/69	79	60/58/69	70	84/67/53	84	60/61/63	67
N7	77/74/70	79	61/59/77	77	80/72/53	81	61/70/63	71
N8	89/83/72	90	64/58/70	71	86/77/54	87	65/74/64	75
N9	85/80/74	86	78/74/79	82	76/74/53	78	80/70/63	81
N10	84/76/70	85	81/77/78	84	73/71/53	75	79/69/63	79
N11	86/71/67	86	82/71/72	83	69/68/52	72	74/66/62	74

Table 4.5f above indicates that the noise impacts at nearby receivers from the construction of the road will be significant. These predictions indicate that most receivers will receive impacts in excess of the recommended daytime noise criterion of $L_{Aeq,30min}$ 75 dB. However, it should be noted that the exceedances at most of the NSRs are less than 10 dB(A) above the daytime criterion. There are seven exceptions, they are:

- Sun Tak House (N4): 19 dB(A) in Stage 4;
- Chai Wan Est Block 13 (N5): 17 dB(A) in Stage 3;
- Yue On Hse (N8): 15 dB(A) in Stage 1, 12 dB(A) in Stage 3;
- FYH School (N9): 16 dB(A) in Stage 1, 12 dB(A) in Stage 2, 11 dB(A) in Stage 4;
- Chai Wan School (N10): 15 dB(A) in Stage 1, 14 dB(A) in Stage 2;
- Tsui Fuk Hse (N11): 11 dB(A) in Stage 1.

When considering the longest-lived activity (lining of underground utilities; 112 dB(A)), rather than the noisiest (concrete breaking; 122 dB(A)), the values in *Table 4.5f* above would be decreased significantly due to the 10 dB(A) difference in sound power level. For Stages 1 and 2 the decrease is dependent on the relative impact of bored piling when compared with the impacts from areas 'a' and 'b'; however for Stages 3 and 4 the difference would be a 10 dB(A) reduction across the board.

In light of the exceedances of the noise criterion at most of the NSRs for one or more of the construction activities assessed, mitigation measures are recommended.

4.6 *OPERATIONAL PHASE IMPACTS*

4.6.1 *Assessment Methodology*

In Hong Kong, the general methodology for assessing the degree and extent of impact from this road widening project, are as follows:

- carry out theoretical modelling to determine both the present noise levels at nearby NSRs and the future (2011) noise levels from the roads under investigation;
- determine which road segments, if any, are 'new' roads and which road segments are 'existing';
- for impacts from 'new' road segments, compare the predicted 2011 noise levels with the applicable HKPSG noise criteria. In cases of exceedance, all possible direct mitigation measures should be applied and noise levels recalculated at the relevant NSRs with the mitigation in place. It should be noted that no comparison of noise levels with criteria are required for 'existing' roads;
- for those NSRs which are not brought into compliance by all possible direct mitigation measures, these receivers should be considered for the provision of window insulation and air conditioning.

To determine which NSRs should be supplied with noise insulation and air conditioning the EPD requires that the residual noise levels (noise levels still above the HKPSG noise criteria), after the implementation of all possible direct measures, meet the three CRTN conditions described in *Section 4.4*, above.

4.6.2 *Modelling Methodology*

The road scheme was divided up into road segments, each of which was assigned the relevant road width, opposing traffic lane separation, surface type, traffic volume, proportion of heavy vehicles and mean speed. The segmentation and calculation process was carried out in accordance with the UK Department of Transport Calculation of Road Traffic Noise (CRTN) procedures using Halcrow Fox and Associates' noise model HFANoise.

It has been assumed that the proposed roads will be constructed with concrete road surfaces. The modelling process included digitising the road scheme, the layout of buildings in the area, and all other features that may have screening or reflective effects, including the parapet on the fly-over, podium structures, nearby buildings and bus depots.

Calculations of future noise levels were based on forecasts of peak hour traffic volume and compositions, provided by Transport Department (TD). For roads near the intersection of Wing Tai and Chai Wan roads, under the widened road scheme, traffic volumes and compositions for the year 2011 were supplied as presented in *Table 2.2b* of *Section 2.2*. Traffic data for the year 2011 on the roads near other intersections in the study area were predicted based on 1991 traffic data (as presented in *Table 2.2a* in *Section 2*) and the assumption of 2 per cent annual growth rate recommended by TD. Prevailing traffic flows, were generated by a detailed traffic survey carried out by Wilbur Smith and Associates (WSA) in March 1995, and are presented in *Figure 4.6a*.

At several junctions, the forecast 2011 data (based on 1991 flows) and supplied data for the year 2011 do not match. In these cases, the supplied data was used rather than the data extrapolated from 1991 flows. Traffic volumes and compositions used are shown in *Figure 4.6b*.

TD advised that, as the developments in Siu Sai Wan would generate a fixed amount of traffic and J/O Chai Wan Road/Wing Tai Road is virtually the only access to the Siu Sai Wan area, the road improvement would only have a minimal effect on the peak hour traffic flows and compositions for the year 2011. TD also advised that the reduction of traffic speeds due to queuing at traffic lights should be considered in the traffic noise assessment. The 2011 traffic forecasts have therefore been allocated to the existing road scheme as indicated in *Figure 4.6c*, assuming the traffic flow directions do not change and the junctions can take the increased numbers of vehicle movements.

For the 'do nothing' scenario, traffic speeds would probably be reduced substantially for traffic queuing in two areas (turning left and turning right from Chai Wan Road into Wing Tai Road), and this could potentially reduce traffic noise levels in these areas. However, reference to CRTN Chart 4 shows that for the given traffic speed and percentage heavies (50 kph and about 60% heavies) the noise level is not sensitive to reduction in traffic speed. For example, a reduction in average traffic speed from 50 kph to 40 kph would reduce noise levels by only 0.3 dB, and a reduction from 50 kph to 30 kph would in fact result in no drop in noise level (heavy vehicles become noisier at low speed). Since the speed of traffic moving in the other directions (ie away from the traffic lights) would be unaltered, the average speed of the two way traffic flows would be reduced to perhaps about 30 kph even though the queuing traffic may average perhaps 10 kph. Hence, since the traffic noise modelling uses two way traffic flows, and because the noise level is not sensitive to a reduction in traffic speed for these traffic conditions, the assumed traffic speed for the 2011 'do nothing' situation is unaltered at 50 kph.

4.6.3 Traffic Noise Impacts

Noise levels have been predicted at the NSRs identified in the study area for three separate scenarios. These scenarios are:

- 2011 noise levels assuming widened roads;
- 1995 'prevailing' noise levels; and
- 2011 noise levels assuming no widening ('do nothing' scenario).

The first two scenarios are the most important for this study as they are

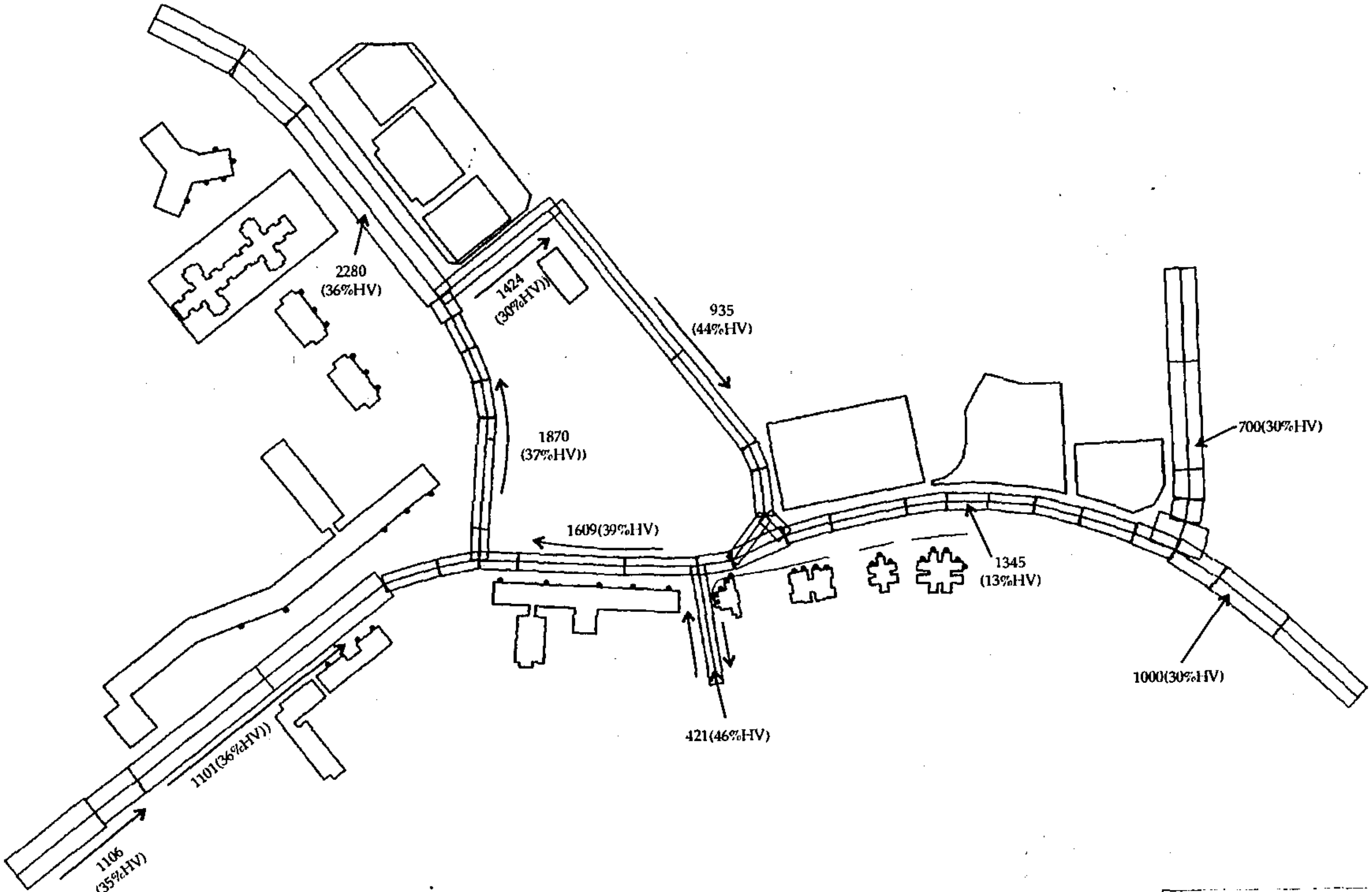

FIGURE 4.6a - TRAFFIC FLOW FOR 1995,PREVAILING TRAFFIC FLOWS

ERM Hong Kong

6th Floor,
Hecny Tower
9 Chatham Road
Tsimshatsui, Kowloon
Hong Kong

ERM

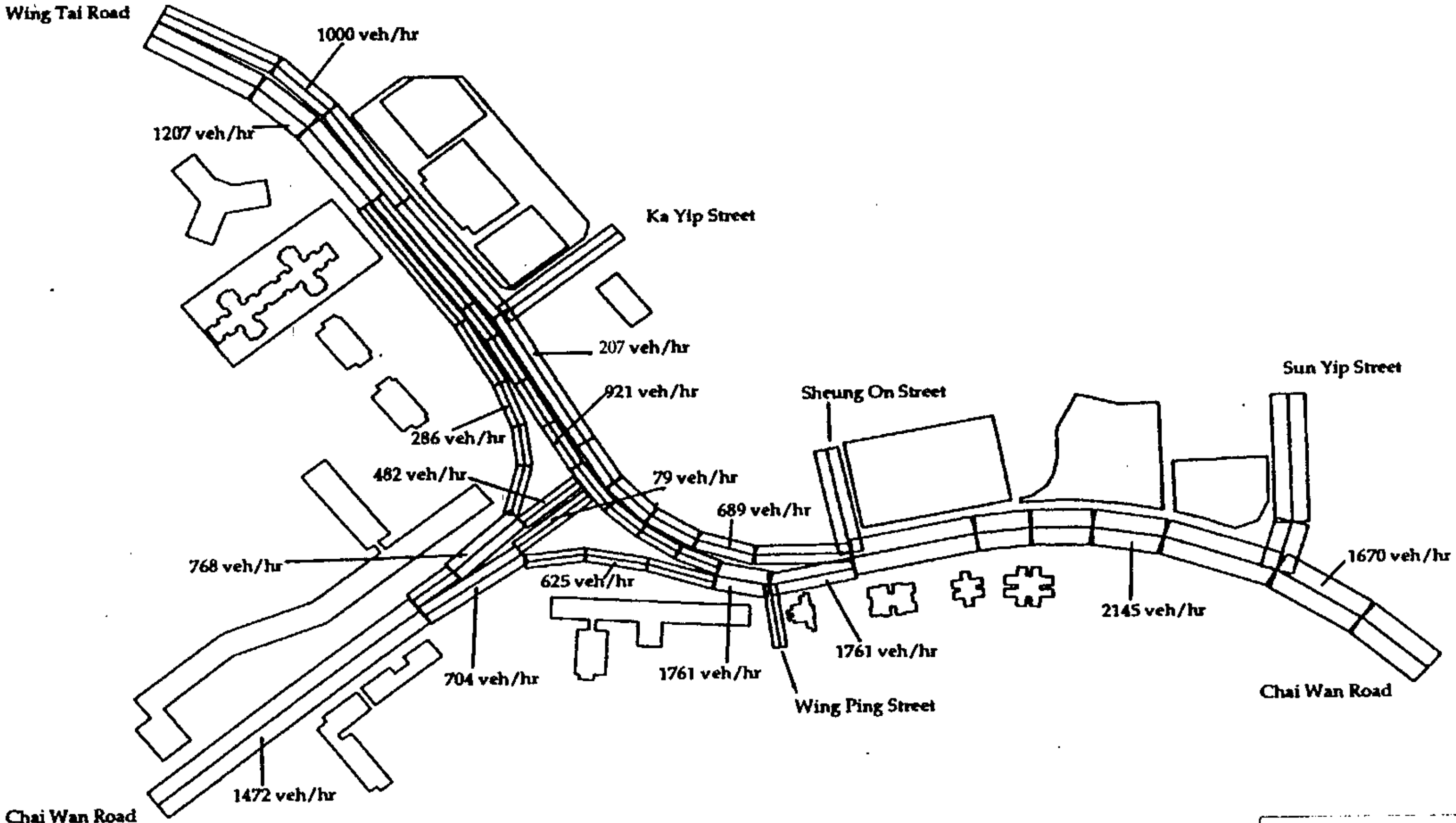

FIGURE 4.6b - 2011 TRAFFIC DATA FOR THE PROPOSED ROAD NETWORK

ERM Hong Kong

6th Floor,
Hecny Tower
9 Chatham Road
Tsimshatsui, Kowloon
Hong Kong

ERM

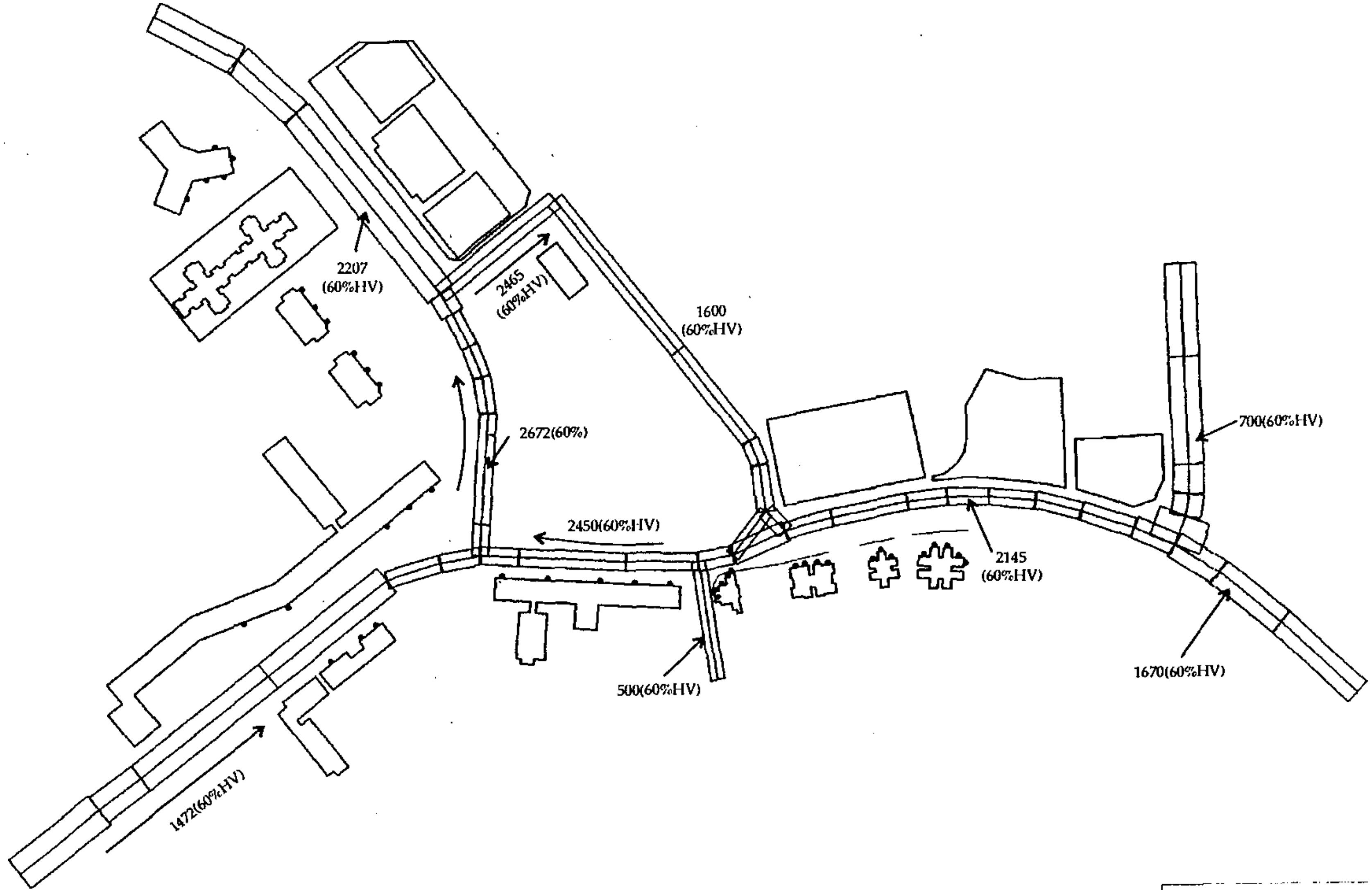

FIGURE 4.6c - TRAFFIC FLOW FOR 2011 WITHOUT WIDENING

ERM Hong Kong

6th Floor,
Hecny Tower
9 Chatham Road
Tsimshatsui, Kowloon
Hong Kong

ERM

necessary for the determination of the degree and extent of mitigation measures. The third scenario, the 'do nothing' scenario, is included solely for comparative purposes.

Predicted 2011 Noise Levels Assuming Widened Roads

For reference in consideration of direct and indirect mitigation measures, the predicted 2011 noise levels at the nearby NSRs, taking into account the proposed widening of Chai Wan and Wing Tai Roads, are shown in *Table 4.6a* below. For the ten existing noise sensitive receivers in the study area, 40 worst case receiver locations have been studied as shown in *Figure 4.3a*.

In the table below, the traffic noise levels at each NSR have been divided into contributions from new roads (designated as 'New') and from existing roads (designated as 'Ex'). Total noise levels, from both new roads and existing roads are tabulated in the 'Tot' column.

Table 4.6a ***Predicted Relevant peak hour Noise Levels for the Year 2011 with Widened Roads, $L_{A10,peak\text{-}hour}$ dB(A)***

NSRs	Location	First Floor			Medium Floor			Top Floor		
		New	Ex	Tot	New	Ex	Tot	New	Ex	Tot
Fu Shing Court (N1)	A	65	77	77	65	77	78 (7/F)	65	76	77 (14/F)
	B	69	77	78	70	80	80 (7/F)	70	78	79 (14/F)
	C	69	77	77	70	80	80 (7/F)	69	78	79 (14/F)
	D	66	75	75	67	78	78 (7/F)	67	76	77 (14/F)
	E	65	77	77	65	76	77 (7/F)	65	76	76 (14/F)
Fu On Court (N2)	A	49	75	75	57	78	78 (7/F)	59	77	77 (14/F)
	B	71	78	78	71	80	81 (7/F)	70	78	79 (14/F)
	C	73	76	77	71	78	79 (7/F)	70	76	77 (14/F)
Artland Court (N3)	A	74	81	82	74	79	80 (8/F)	72	77	79 (16/F)
	B	75	82	83	75	80	81 (8/F)	73	77	79 (16/F)
	C	77	81	83	75	79	81 (8/F)	74	77	79 (16/F)
	D	76	81	82	76	79	81 (8/F)	74	77	79 (16/F)
Sun Tak House (N4)	A	85	72	86	79	70	80(14/F)	77	68	77 (28/F)
	B	78	46	78	79	71	79(14/F)	76	69	77 (28/F)
	C	76	45	76	78	70	78(14/F)	76	69	77 (28/F)
	D	76	44	76	77	69	78(14/F)	76	68	76 (28/F)
Chai Wan Estate, Block 13 (N5)	A	83	66	83	81	67	81 (7/F)	78	66	79 (14/F)
	B	81	65	81	80	65	80 (7/F)	78	64	78 (14/F)
	C	80	64	80	80	64	80 (7/F)	78	63	78 (14/F)
	D	79	63	79	79	63	79 (7/F)	78	61	78 (14/F)
	E	78	61	78	79	61	79 (7/F)	78	60	78 (14/F)
Chai Wan Estate, Block 10 (N6)	A	76	81	82		N/A		76	81	82 (2/F)
	B	73	82	82		N/A		74	81	82 (2/F)
	C	70	82	82		N/A		70	82	82 (2/F)
Yue On House (N7/N8)	A	81	69	81	81	69	81 (3/F)	80	69	80 (6/F)
	B	79	70	80	79	70	80 (3/F)	79	70	79 (6/F)
	C	79	72	80	79	72	80 (3/F)	78	71	79 (6/F)
	D	70	79	80	71	79	80 (3/F)	70	78	79 (6/F)
	E	66	78	78	67	78	78(3/F)	67	77	78 (6/F)
F Y H Memorial Primary School (N9)	A	78	44	78	78	48	78 (3/F)	78	56	78 (6/F)
	B	77	44	77	78	48	78 (3/F)	78	56	78 (6/F)
	C	77	44	77	78	48	78 (3/F)	78	56	78 (6/F)

NSRs	Location	First Floor New	Ex	Tot	Medium Floor New	Ex	Tot	Top Floor New	Ex	Tot
Chai Wan	A	77	44	77	77	47	77 (3/F)	77	55	77 (6/F)
Faith Love	B	76	42	76	77	45	77 (3/F)	77	51	77 (6/f)
Lutheran School (N10)	C	76	42	76	76	44	76 (3/F)	76	51	76 (6/F)
Tsui Fuk	A	76	35	76	77	52	77(15/F)	75	52	75 (31/F)
House	B	66	34	66	70	38	70(15/F)	71	41	71 (31/F)
(N11)	C	62	33	62	66	33	66(15/F)	69	38	69 (31/F)
	D	76	32	76	75	33	75(15/F)	73	37	73 (31/F)
	E	64	38	64	65	38	65(15/F)	68	40	68 (31/F)

It can be seen from *Table 4.6a* that the predicted $L_{A10,peak\ hour}$ noise levels at most residences and schools exceed the HKPSG 70 dB(A) and 65 dB(A) levels, respectively.

Predicted 1995 'Prevailing' Noise Levels

The prevailing, 1995, noise levels at the nearby NSRs for the current year, 1995, were modelled in accordance with the methodology outlined above. The predicted values are shown in *Table 4.6b* below.

Table 4.6b ***Predicted Prevailing Noise Levels for the Year 1995, $L_{A10,peak\text{-}hour}$ dB(A)***

NSRs	Location	First Floor	Medium Floor	Top Floor
Fu Shing Court (N1)	A	69	71 (7/F)	70 (14/F)
	B	71	73 (7/F)	72 (14/F)
	C	71	73 (7/F)	72 (14/F)
	D	68	72 (7/F)	71 (14/F)
	E	70	70 (7/F)	69 (14/F)
Fu On Court (N2)	A	68	71 (7/F)	70 (14/F)
	B	70	74 (7/F)	73 (14/F)
	C	70	72 (7/F)	71 (14/F)
Artland Court (N3)	A	75	74 (8/F)	73 (16/F)
	B	76	75 (8/F)	74 (16/F)
	C	76	75 (8/F)	74 (16/F)
	D	76	75 (8/F)	74 (16/F)
Sun Tak House (N4)	A	82	77 (14/F)	75 (28/F)
	B	78	76 (14/F)	74 (28/F)
	C	73	76 (14/F)	74 (28/F)
	D	75	76 (14/F)	74 (28/F)
Chai Wan Estate, Block 13 (N5)	A	81	79 (7/F)	77 (14/F)
	B	81	79 (7/F)	77 (14/F)
	C	81	79 (7/F)	77 (14/F)
	D	82	79 (7/F)	77 (14/F)
	E	82	79 (7/F)	77 (14/F)
Chai Wan Estate, Block 10 (N6)	A	79	N/A	79 (2/F)
	B	80	N/A	79 (2/F)
	C	79	N/A	79 (2/F)
Yue On House (N7/N8)	A	78	78 (3/F)	77 (6/F)
	B	76	76 (3/F)	76 (6/F)
	C	76	76 (3/F)	76 (6/F)
	D	77	77 (3/F)	76 (6/F)
	E	75	75 (3/F)	75 (6/F)

NSRs	Location	First Floor	Medium Floor	Top Floor
Fung Yiu Hing Memorial Primary School (N9)	A	75	76 (3/F)	76 (6/F)
	B	75	75 (3/F)	75 (6/F)
	C	75	75 (3/F)	75 (6/F)
Chai Wan Faith Love Lutheran School (N10)	A	74	75 (3/F)	75 (6/F)
	B	74	74 (3/F)	74 (6/f)
	C	73	73 (3/F)	73 (6/F)
Tsui Fuk House (N11)	A	75	75 (15/F)	73 (31/F)
	B	65	67 (15/F)	69 (31/F)
	C	61	63 (15/F)	67 (31/F)
	D	74	73 (15/F)	71 (31/F)
	E	63	63 (15/F)	66 (31/F)

It can be seen from *Table 4.6b* that the predicted prevailing $L_{A10,peak\ hour}$ noise levels at most residences and schools exceed the HKPSG 70 dB(A) and 65 dB(A) levels, respectively.

Predicted 2011 Noise Levels Assuming No Widening ('Do Nothing' Scenario)

The noise levels at the nearby NSRs for the year 2011, assuming no widening of Chai Wan and Wing Tai Roads, were modelled in accordance with the methodology outlined above. The predicted values are shown in *Table 4.6c* below.

The noise levels at the nearby NSRs for the year 2011, assuming no widening of Chai Wan and Wing Tai Roads, were modelled in accordance with the methodology outlined above. The predicted values are shown in *Table 4.6c* below.

Table 4.6c *Predicted 'Do Nothing' Noise Levels for the Year 2011 without Widening, $L_{A10,peak-hour}$ dB(A)*

NSRs	Location	First Floor	Medium Floor	Top Floor
Fu Shing Court (N1)	A	76	78 (7/F)	77 (14/F)
	B	77	80 (7/F)	79 (14/F)
	C	77	80 (7/F)	79 (14/F)
	D	74	78 (7/F)	77 (14/F)
	E	76	77 (7/F)	76 (14/F)
Fu On Court (N2)	A	75	78 (7/F)	77 (14/F)
	B	76	80 (7/F)	79 (14/F)
	C	75	78 (7/F)	77 (14/F)
Artland Court (N3)	A	80	80 (8/F)	79 (16/F)
	B	81	80 (8/F)	79 (16/F)
	C	81	80 (8/F)	79 (16/F)
	D	81	80 (8/F)	79 (16/F)
Sun Tak House (N4)	A	86	80 (14/F)	78 (28/F)
	B	81	80 (14/F)	78 (28/F)
	C	76	80 (14/F)	78 (28/F)
	D	78	80 (14/F)	78 (28/F)
Chai Wan Estate, Block 13 (N5)	A	85	83 (7/F)	80 (14/F)
	B	85	82 (7/F)	80 (14/F)
	C	85	82 (7/F)	80 (14/F)
	D	85	83 (7/F)	81 (14/F)
	E	85	83 (7/F)	80 (14/F)
Chai Wan Estate, Block 10 (N6)	A	82	N/A	82 (2/F)
	B	83	N/A	83 (2/F)
	C	83	N/A	82 (2/F)

NSRs	Location	First Floor	Medium Floor	Top Floor
Yue On House (N7/N8)	A	81	81 (3/F)	81 (6/F)
	B	80	80 (3/F)	80 (6/F)
	C	79	79 (3/F)	79 (6/F)
	D	80	80 (3/F)	79 (6/F)
	E	78	78 (3/F)	78 (6/F)
Fung Yiu Hing Memorial Primary School (N9)	A	78	79 (3/F)	79 (6/F)
	B	78	78 (3/F)	78 (6/F)
	C	77	78 (3/F)	77 (6/F)
Chai Wan Faith Love Lutheran School (N10)	A	77	77 (3/F)	77 (6/F)
	B	76	77 (3/F)	77 (6/f)
	C	76	76 (3/F)	76 (6/F)
Tsui Fuk House (N11)	A	77	76 (15/F)	75 (31/F)
	B	67	69 (15/F)	71 (31/F)
	C	63	65 (15/F)	69 (31/F)
	D	76	75 (15/F)	73 (31/F)
	E	65	65 (15/F)	68 (31/F)

It can be seen from *Table 4.6c* that the predicted 'do nothing' $L_{A10,peak\ hour}$ noise levels at most residences and schools exceed the HKPSG 70 dB(A) and 65 dB(A) levels, respectively.

4.6.4 *Evaluation of Impacts*

Analysis of *Table 4.6a: Predicted Relevant peak hour Noise Levels for the Year 2011 with Widened Roads*, indicates that the majority of the NSRs in the study area will receive impacts, from all road sections, which are in excess of the HKPSG noise criterion. *Table 4.6d*, below, shows the breakdown of exceedances by NSR. The meanings for the abbreviations used in the table are as follows:

- 'Lv': the predicted noise level at NSRs from all road sections;
- 'HK': the HKPSG noise criterion for this NSR; and
- 'Dif': the level of exceedance, if applicable.

Table 4.6d *Comparison of Predicted Noise Levels from All Road Sections (2011) with the HKPSG Criterion, $L_{A10,peak\text{-}hour}$ dB(A)*

NSRs	Location	First Floor Lv	HK	Dif	Medium Floor Lv	HK	Dif	Top Floor Lv	HK	Dif
Fu Shing Court (N1)	A	77	70	7	78	70	8 (7/F)	77	70	7 (14/F)
	B	78	70	8	80	70	10 (7/F)	79	70	9 (14/F)
	C	77	70	7	80	70	10 (7/F)	79	70	9 (14/F)
	D	75	70	5	78	70	8 (7/F)	77	70	7 (14/F)
	E	77	70	7	77	70	7 (7/F)	76	70	6 (14/F)
Fu On Court (N2)	A	75	70	5	78	70	8 (7/F)	77	70	7 (14/F)
	B	78	70	8	81	70	11 (7/F)	79	70	9 (14/F)
	C	77	70	7	79	70	9 (7/F)	77	70	7 (14/F)
Artland Court (N3)	A	82	70	12	80	70	7 (8/F)	79	70	9 (16/F)
	B	83	70	13	81	70	11 (8/F)	79	70	9 (16/F)
	C	83	70	13	81	70	11 (8/F)	79	70	9 (16/F)
	D	82	70	12	81	70	11 (8/F)	79	70	9 (16/F)
Sun Tak House (N4)	A	86	70	16	80	70	10(14/F)	77	70	7 (28/F)
	B	78	70	8	79	70	9 (14/F)	77	70	7 (28/F)
	C	76	70	6	78	70	8 (14/F)	77	70	7 (28/F)
	D	76	70	6	78	70	8 (14/F)	76	70	6 (28/F)

NSRs	Location	First Floor Lv	HK	Dif	Medium Floor Lv	HK	Dif	Top Floor Lv	HK	Dif
Chai Wan Estate, Block 13 (N5)	A	83	70	13	81	70	11 (7/F)	79	70	9 (14/F)
	B	81	70	11	80	70	10 (7/F)	78	70	8 (14/F)
	C	80	70	10	80	70	10 (7/F)	78	70	8 (14/F)
	D	79	70	9	79	70	9 (7/F)	78	70	8 (14/F)
	E	78	70	8	79	70	9 (7/F)	78	70	8 (14/F)
Chai Wan Estate, Block 10 (N6)	A	82	70	12		N/A		82	70	12 (2/F)
	B	82	70	12		N/A		82	70	12 (2/F)
	C	82	70	12		N/A		82	70	12 (2/F)
Yue On House (N7/N8)	A	81	70	11	81	70	11 (3/F)	80	70	10 (6/F)
	B	80	70	10	80	70	10 (3/F)	79	70	9 (6/F)
	C	80	70	10	80	70	10 (3/F)	79	70	9 (6/F)
	D	80	70	10	80	70	10 (3/F)	79	70	9 (6/F)
	E	78	70	8	78	70	8 (3/F)	78	70	8 (6/F)
F Y H Memorial Primary School (N9)	A	78	65	13	78	65	13 (3/F)	78	65	13 (6/F)
	B	77	65	12	78	65	13 (3/F)	78	65	13 (6/F)
	C	77	65	12	78	65	13 (3/F)	78	65	13 (6/F)
Chai Wan Faith Love Lutheran School (N10)	A	77	65	12	77	65	12 (3/F)	77	65	12 (6/F)
	B	76	65	11	77	65	12 (3/F)	77	65	12 (6/f)
	C	76	65	11	76	65	11 (3/F)	76	65	11 (6/F)
Tsui Fuk House (N11)	A	76	70	6	77	70	7 (15/F)	75	70	5 (31/F)
	B	66	70	N/A	70	70	N/A(15/F)	71.0	70	1 (31/F)
	C	62	70	N/A	66	70	N/A(15/F)	69	70	N/A(31/F)
	D	76	70	6	75	70	5 (15/F)	73	70	3 (31/F)
	E	64	70	N/A	65	70	N/A(15/F)	68	70	N/A(31/F)

Table 4.6e below indicates the areas at which direct mitigation is necessary in order to reduce predicted noise impacts to acceptable levels.

Table 4.6e *Areas Requiring Mitigation*

NSR	Mitigation Needed?	Floors	# of Units
Fu Shing Ct (N1)	Yes	1–14	112
Fu On Ct (N2)	Yes	1–10	40
Artland Ct (N3)	Yes	1–16	128
Sun Tak Hse (N4)	Yes	1–28	112
CW Est, 13 (N5)	Yes	1–14	140
CW Est, 10 (N6)	Yes	1–2	10
Yue On (N7/8)	Yes	1–6	120
FYH School (N9)	Yes	1–6	24
CW School (N10)	Yes	1–6	24
Tsui Fuk (N11)	Yes	1–31	186
Total	10		896

Should direct mitigation measures not be capable of reducing the level of exceedance predicted above, it will be necessary to consider indirect methods. To aid in this analysis it is necessary to compare prevailing traffic noise levels with post–widened, 2011 traffic noise levels. *Table 4.6f* below shows the predicted noise levels for 1995 and 2011 at the nearby NSRs, as well as the difference (2011 noise level – 1995 noise level) in these noise levels. In this table, the very first column shows the predicted HKPSG limiting noise criterion for this NSR. The other columns, under each floor level, are defined as below:

- 95: the noise level for 1995 (*prevailing* levels);
- 2011: the total 2011 predicted level with widening (*relevant* levels);
- Dif: the difference between the 2011 and the 1995 (2011–1995) levels;
- New: the predicted level in 2011, with widening, from the new road sections;
- Ex: the predicted level in 2011, with widening, from the existing road sections;
- Inc: the increase in noise, in 2011, due to the new road sections;
- I: an asterisk in this column indicates that the NSR is eligible for insulation under the three CRTN criteria.

Table 4.6f *Predicted Noise Levels for the Year 1995 (prevailing) and 2011 With Road Widening (Relevant), $L_{A10,peak-hour}$ dB(A)*

NSRs	Location	HK Limit	1st Floor						Mid Floor						Top Floor					
			95[1] 2011[2]	Dif[3]	New[4]	Ex[5]	Inc[6]	I[7]	95 2011	Dif	New	Ex	Inc	I	95 2011	Dif	New	Ex	Inc	I
Fu Shing Court (N1)	A	70	69 /77.4	8	65.1	77.1	0.3		71 /77.7	7	65.1	77.4	0.3		70 /76.7	7	65.0	76.4	0.3	
	B	70	71 /77.6	7	69.4	76.9	0.7		73 /80.3	7	70.4	79.9	0.4		72 /78.7	7	70.0	78.1	0.6	
	C	70	71 /77.4	6	68.9	76.7	0.7		73 /80.4	7	69.8	80.0	0.4		72 /78.7	7	69.4	78.1	0.6	
	D	70	68 /75.4	7	65.8	74.9	0.5		72 /78.0	6	67.3	77.6	0.4		71 /76.8	6	67.2	76.3	0.5	
	E	70	70 /77.4	7	65.4	77.1	0.3		70 /76.6	7	65.4	76.3	0.3		69 /75.9	7	65.4	75.5	0.4	
Fu On Court (N2)	A	70	68 /75.2	7	48.8	75.2	0.0		71 /78.0	7	56.7	78.0	0.0		70 /76.6	7	58.8	76.5	0.1	
	B	70	70 /78.4	8	71.1	77.6	0.8		74 /80.7	7	70.8	80.2	0.5		73 /78.8	6	70.1	78.2	0.6	
	C	70	70 /77.2	7	72.6	75.6	1.6	*	72 /78.5	7	71.3	77.5	1.0		71 /76.8	6	70.4	75.7	1.1	*
Artland Court (N3)	A	70	75 /81.7	7	73.7	80.9	0.8		74 /80.4	7	73.7	79.4	1.0		73 /78.6	6	72.4	77.4	1.2	*
	B	70	76 /82.6	7	75.4	81.7	0.9		75 /80.7	6	74.5	79.5	1.2	*	74 /78.7	5	73.0	77.3	1.5	*
	C	70	76 /82.6	7	76.6	81.4	1.2	*	75 /80.7	6	75.3	79.1	1.6	*	74 /78.7	5	73.7	77.0	1.7	*
	D	70	76 /82.0	6	76.4	80.6	1.4	*	75 /80.6	6	75.9	78.7	1.9	*	74 /78.6	5	74.3	76.6	2.0	*
Sun Tak House (N4)	A	70	81.9/85.6	4	85.3	71.9	13.7	*	76.8/79.5	2.7	79.1	69.5	10.0	*	74.5/77.2	2.7	76.6	67.7	9.5	*
	B	70	77.7/77.6	0	77.6	46.2	N/A		76.4/79.3	2.9	78.6	70.7	8.6	*	74.2/77.0	2.8	76.3	68.7	8.3	*
	C	70	72.8/76.3	3	76.2	45.1	30.8	*	76.0/78.4	2.4	77.7	70.3	8.1	*	74.1/76.7	2.6	75.9	68.7	8.0	*
	D	70	75.4/76.0	0.6	76.0	44.3	N/A		76.1/78.0	1.9	77.3	69.4	8.6	*	74.1/76.3	2.2	75.5	68.3	8.0	*
Chai Wan Estate, Block 13 (N5)	A	70	81.3/82.8	2	82.7	66.3	16.5	*	79.1/80.7	1.6	80.5	66.8	13.9	*	76.8/78.7	1.9	78.4	65.7	13.0	*
	B	70	81 / 81	0	81.0	64.9	N/A		78.8/80.2	1.4	80.0	65.4	14.8	*	76.6/78.4	1.8	78.2	64.3	14.1	*
	C	70	81 / 80	−1	79.7	64.3	N/A		78.9/79.8	0.9	79.7	64.2	N/A		76.7/78.3	1.6	78.2	63.0	15.3	*
	D	70	82 / 79	−3	78.7	63.4	N/A		79.3/78.9	0	78.9	62.7	N/A		77.0/78.1	1.1	77.9	61.4	16.7	*
	E	70	82 / 78	−4	78.2	60.9	N/A		79.4/78.6	0	78.5	61.1	N/A		77.0/77.7	0.7	77.6	60.2	N/A	
Chai Wan Estate, Block 10 (N6)	A	70	79 /82.0	3	75.7	80.8	1.2	*	N/A						78.7/81.9	3.2	76.0	80.6	1.3	*
	B	70	80 /82.1	2	73.3	81.5	0.6		N/A						79.4/81.9	2.5	73.7	81.2	0.7	
	C	70	79 /82.0	3	69.6	81.7	0.3		N/A						79.2/81.8	2.6	70.0	81.5	0.3	
Yue On House (N7/N8)	A	70	77.6/81.2	3	81.0	68.6	12.6	*	77.8/81.1	3.3	80.8	68.6	12.5	*	77.4/80.2	2.8	79.9	68.6	11.6	*
	B	70	76.3/79.6	4	79.0	70.2	9.4	*	76.4/79.7	3.3	79.2	70.2	9.5	*	76.1/79.1	3.0	78.5	69.9	9.2	*
	C	70	76.1/79.4	3	78.5	71.9	7.5	*	76.1/79.6	3.5	78.8	71.9	7.7	*	75.6/78.9	3.3	78.1	71.3	7.6	*
	D	70	77 /79.8	3	70.3	79.3	0.5		76.7/79.7	3.0	70.6	79.1	0.6		76.0/78.9	2.9	70.4	78.3	0.6	
	E	70	75 /77.9	3	65.7	77.6	0.3		74.9/77.9	3.0	66.5	77.6	0.3		74.5/77.5	3.0	66.5	77.1	0.4	

		Limit	95[1] / 2011[2]	Dif[3]	New[4]	Ex[5]	Inc[6]	I[7]	95 / 2011	Dif	New	Ex	Inc	I	95 / 2011	Dif	New	Ex	Inc	I
Fung Yiu Hing	A	65	75.4/77.7	2.3				*	75.6/77.9	2.3				*	75.5/78.0	2.5				*
Memorial Primary	B	65	74.8/77.4	2.6				*	75.0/77.5	2.5				*	75.0/77.6	2.6				*
School (N9)[8]	C	65	74.6/77.4	2.8				*	74.7/77.5	2.8				*	74.7/77.7	3.0				*
Chai Wan Faith	A	65	74.3/76.9	3				*	74.5/77.1	1.6				*	74.5/77.2	1.7				*
Love Lutheran	B	65	73.8/76.4	2				*	74.0/76.6	2.6				*	74.0/76.7	2.7				*
School (N10)[8]	C	65	73.2/75.7	3				*	73.4/75.8	2.4				*	73.4/76.0	2.6				*
Tsui Fuk House	A	70	74.9/76.2	1.3	76.2	35.2	41	*	74.5/76.6	2.1	76.6	51.5	25.1	*	72.7/75.1	2.4	75.1	52.1	2.4	*
(N11)	B	70	65.2/66.4	1.2	66.4	34.2	n/a		67 /70.1	3	70.1	38.2	n/a		68.7/71.0	2.3	70.9	41.3	2.2	*
	C	70	61.2/62.4	1.2	62.3	32.7	n/a		63 /65.8	3	65.7	33.2	n/a		67.0/68.8	1.8	68.9	38.1	n/a	
	D	70	74.4/75.7	1.3	75.7	32.3	43.4	*	73.1/75.1	2.0	75.1	32.9	42.2	*	71.0/73.1	2.1	73.1	37.4	2.1	*
	E	70	62.8/64.0	1.2	64.0	37.7	n/a		63 /65.1	3	64.9	38.1	n/a		66.1/67.7	1.6	67.6	40.2	n/a	

Prevailing / relevant

(1) 95: the noise level for 1995 (*prevailing* levels);
(2) 2011: the total 2011 predicted level with widening (*relevant* levels);
(3) Dif: the difference between the 2011 and the 1995 (2011–1995) levels;
(4) New: the predicted level in 2011, with widening, from the new road sections;
(5) Ex: the predicted level in 2011, with widening, from the existing road sections;
(6) Inc: the difference in noise levels, in 2011, between all road sections combined and existing road sections. 'N/A' indicates that the 2011 total noise levels are lower than the 1995 noise levels, 'n/a' indicates that the total 2011 noise levels are lower than the HKPSG criterion;
(7) I: an asterisk in this column indicates that the NSR is eligible for insulation under the three CRTN criteria;
(8) the two schools do not need to be compared against the 3 CRTN criteria, instead they will both be eligible for noise insulation as the predicted noise levels will exceed the HKPSG noise criterion for schools.

This analysis indicates that, in the absence of mitigation measures, nearly all residential units and all school classrooms with views of the sections proposed for widening along Chai Wan and Wing Tai Roads would show an increase in total noise levels, between 1995 and 2011, of generally 2 dB(A) or more. In particular, differences along Chai Wan Road generally fall within the range of 5-8 dB(A) while those along Wing Tai Road generally fall within the range of 2-4 dB(A). The exceptions to these generalisations include the lower floors of Chai Wan Estate Block 13 (N5) and Sun Tak House (N4), which generally show only small increases or in some cases decreases in noise levels.

However, when prevailing, 1995, levels are compared with the noise levels due to the 'new' road sections the results are somewhat different. Under this filter it is clear that the dominant noise sources at receivers are from 'existing' rather than from 'new' roads. It is generally only along Wing Tai Road that it is seen that 'new' road sections are the dominant noise sources. The only exceptions to this observation are for Chai Wan Estate Block 13 and Sun Tak House which will be heavily impacted by traffic on the new flyover. As a result, it is only these areas which would be eligible for indirect mitigation measures were it found that direct mitigation measures were incapable of reducing noise levels to acceptable levels.

Table 4.6g, below, indicates those areas which will be eligible for indirect mitigation measures should direct mitigation measures prove inadequate.

Table 4.6g *Areas Eligible for Indirect Mitigation Measures*

NSR	Eligible for Insulation?	Floors	# of Units	# of classrooms
Fu Shing Ct (N1)	No	N/A	N/A	
Fu On Ct (N2)	Yes	1-5 & 9-14	14	
Artland Ct (N3)	Yes	1-16	98	
Sun Tak Hse (N4)	Yes	1-28	102	
CW Est, 13 (N5)	Yes	1-14	58	
CW Est, 10 (N6)	Yes	1-2	4	
Yue On (N7/8)	Yes	1-6	60	
FYH School (N9)	Yes	1-6		24
CW School (N10)	Yes	1-6		24
Tsui Fuk (N11)	Yes	1-31	124	
Total	9		460	48

Therefore, this analysis indicates that a total of 460 residential units and 48 classrooms (508 units total) would be eligible for noise insulation.

'Do Nothing' Scenario

The foregoing analysis has indicated that both the future unwidened, 2011, traffic noise and the future post-widened, 2011, traffic noise have been predicted to significantly exceed the applicable HKPSG noise criteria. *Table 4.6h* below shows the predicted noise levels for 2011 'unwidened' and 2011 'widened' at the nearby NSRs, as well as the difference (2011 'widened' - 2011 'unwidened') in these noise levels. The first column shows the predicted level for 2011 'unwidened', the second shows the predicted level for 2011 'widened' and the third the difference between the levels.

Table 4.6h ***Predicted Noise Levels for the Year 2011 Unwidened Roads (do nothing levels) and 2011 Widened Roads (relevant levels), $L_{A10,peak\text{-}hour}$ dB(A)***

NSRs	Location	1st Floor // Dif		Mid Floor // Dif		Top Floor // Dif	
Fu Shing Court	A	75.9/77.4	1.5	78 / 78	0	77 / 77	0
(N1)	B	76.6/77.6	1.0	80 / 80	0	79/ 79	0
	C	76.6/77.4	0.8	80 / 80	0	79 / 79	0
	D	74.2/75.4	1.2	78 / 78	0	77 / 77	0
	E	76.3/77.4	1.1	77 / 77	0	76 / 76	0
Fu On Court	A	75 / 75	0	78 / 78	0	77 / 77	0
(N2)	B	76 / 78	2	80.1/80.7	0.6	79 / 79	0
	C	75 / 77	2	78.2/78.5	0.3	77 / 77	0
Artland Court	A	80 / 82	2	80.0/80.4	0.4	79 / 79	0
(N3)	B	81 / 83	2	80.3/80.7	0.4	79 / 79	0
	C	81 / 83	2	80.4/80.7	0.3	79 / 79	0
	D	81.4/82.0	0.6	80.4/80.6	0.2	79 / 79	0
Sun Tak House	A	86 / 86	0	80 / 80	0	78 / 77	−1
(N4)	B	81 / 78	−3	80 / 79	−1	78 / 77	−1
	C	76 / 76	0	80 / 78	−2	78 / 77	−1
	D	78 / 76	−2	80 / 78	−2	78 / 76	−2
Chai Wan	A	85 / 83	−2	83 / 81	−2	80 / 79	−1
Estate, Block 13	B	85 / 81	−4	82 / 80	−2	80 / 78	−2
(N5)	C	85 / 82	−3	82 / 80	−2	80 / 78	−2
	D	85 / 79	−6	83 / 79	−4	81 / 78	−3
	E	85 / 78	−7	83 / 79	−4	80 / 78	−3
Chai Wan	A	82 / 82	0	N/A		82 / 82	0
Estate, Block 10	B	83 / 82	−1	N/A		83 / 82	−1
(N6)	C	83 / 82	−1	N/A		82 / 82	0
Yue On House	A	81 / 81	0	81 / 81	0	81 / 80	−1
(N7/N8)	B	80 / 80	0	80 / 80	0	80 / 79	−1
	C	79 / 79	0	79.4/79.6	0.2	79 / 79	0
	D	80 / 80	0	80 / 80	0	79 / 79	0
	E	78 / 78	0	78 / 78	0	78 / 78	0
Fung Yiu Hing	A	78 / 78	0	79 / 78	−1	79 / 78	−1
Memorial	B	78 / 77	−1	78 / 78	0	78 / 78	0
Primary School (N9)	C	77 / 77	0	78 / 78	0	77.4/77.7	0.3
Chai Wan Faith	A	77 / 77	0	77 / 77	0	77 / 77	0
Love Lutheran	B	76 / 76	0	77 / 77	0	77 / 77	0
School (N10)	C	76 / 76	0	76 / 76	0	76 / 76	0
Tsui Fuk House	A	77 / 76	−1	76.4/76.6	0.2	75 / 75	0
(N11)	B	67 / 66	−1	69.1/70.1	1.0	71 / 71	0
	C	63 / 62	−1	65.0/65.8	0.8	69 / 69	0
	D	76 / 76	0	75 / 75	0	73 / 73	0
	E	65 / 64	−1	65 / 66	0	68 / 68	0

do nothing / relevant Dif = relevant – do nothing

These results indicate that the road widening scheme should tend to decrease the traffic noise levels at the nearby NSRs, when compared with those which would prevail should the proposed widening not take place.

Predicted noise levels for the HOS development next to Tsui Fuk House are slightly higher than those predicted in the Arup Acoustics, May 1994

Traffic Noise Assessment. This is manly due to the higher traffic data used for this assessment and also due to the nearer road alignment from the widened road. The recommendations of this Arup Acoustics report, a 3 metre high barrier on top of the carpark and window upgrading for the affected residences, however, are considered adequate and are recommended.

4.7 *MITIGATION MEASURES*

4.7.1 *Construction Phase*

In light of the prediction of exceedances of the recommended daytime noise criterion at most of the nearby NSRs, mitigation measures have been recommended. The general approach to mitigation has been to recommend four key measures in addition to general good site practice; these are: noise barriers, quiet plant or reduced plant teams, on-site noise management and air conditioning and noise insulation, where necessary. It should be noted that the efficiency of mitigation measures at site depends on site topography, worksite-receiver geometry, type of activity and other factors.

As a general rule, good site practice can reduce the impact of a construction site's activities on nearby NSRs. In view of the potential for cumulative impacts from various construction works in the area, the following measures should be followed during each phase of construction:

- only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;
- machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- plant known to emit noise strongly in one direction, should, where possible, be orientated so as to directed away from nearby NSRs;
- silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction programme; and
- material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.

In addition to these general measures, more specific mitigation measures for each of the construction activities assessed above are recommended, below, by stage, for the residential dwellings. Due to the predicted high exceedances (16-17 dB(A)) of the applicable daytime noise criterion for the schools it is recommended that both of the schools be properly insulated (Type II noise insulation and air conditioning) prior to any construction works.

It should be understood that the mitigation measures for the residential developments are only for daytime (0700-1900, Monday through Saturday) working; restricted hours working (1900-0700 daily and all day on public holidays) is not recommended for any activity due to the prohibitive quantity of noise mitigation which would be necessary to comply with the NCO. In addition, it should be noted that these mitigation measures outline a preferred method of mitigation and not the only solution; the Contractor should use the maximum sound power level, recommended below for each Stage, as a guideline in designing suitable mitigation and could achieve the recommended standard in any number of ways.

Generally for each stage it is recommended that, as far as is practicable, the activities assessed as simultaneous above, be separated in time so that cumulative impacts do not ensue. In general this measure should reduce the highest predicted noise levels at receivers by 2 to 4 dB(A).

In addition, the excavator-mounted breaker should be well-maintained and should be fitted with a silencing bracket to reduce noise impact during operation. Prior research has indicated that excavator-mounted breakers with a sound power level of 120 dB(A) are currently available in Hong Kong, as this sound power level is 2 dB(A) quieter than the value given in the TM, it is recommended that this type of breaker be employed. These measures taken together should reduce noise levels from each area assessed by an additional 3 to 5 dB(A).

These general measures, taken together should reduce noise levels at receivers by at least 5 dB(A) over the 'total' levels shown in *Table 4.5f* above.

More specific measures are given below. It should be noted that where barriers have been recommended it should be understood that either mobile or permanent barriers would be effective. The number in brackets following each barrier specification indicates the length of a permanent barrier or the extent for which a mobile barrier would need to be moved. All barriers (permanent or mobile) should have a minimum density of 20 kg m^{-2} and all mobile barriers should have a minimum length of 25 metres.

Stage 1

For Stage 1 the majority or road work takes place to the west of Chai Wan Estate Block 13 (N5), as a result, the worst impacted NSRs during this stage are the western NSRs nearest to the road (N5 and N8-N11). The highest predicted noise level (90 dB(A)) is at Yue On House (N8). Implementation of the general measures recommended above should reduce this noise level to approximately 85 dB(A). To protect these NSRs further the following mitigation measures are recommended for area 'a' and area 'b' (see *Figure 4.7a*):

Area 'a'

- a 5 metre high barrier (90 metre length) near NSRs N5 and N8; and
- a 3.5 metre high barrier (200 metre length) west of NSR N8.

These measures should give approximately 10 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'a' sound power level should be mitigated to an effective level of 108 dB(A).

Area 'b'

- a 4 metre high barrier (40 metre length) near NSR N5 on the east side of the site; and

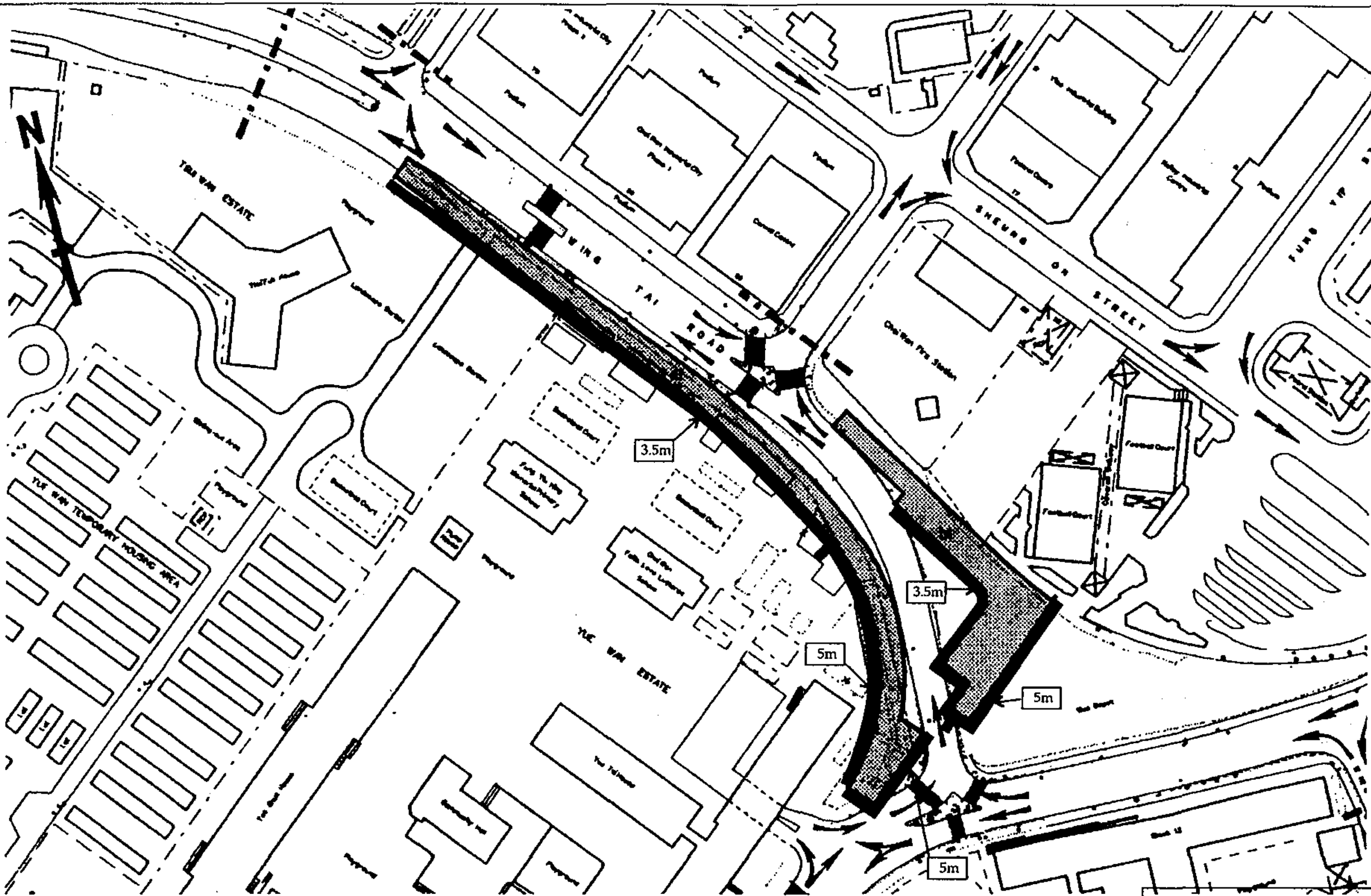

FIGURE 4.7a - RECOMMENDED BARRIERS FOR CONSTRUCTION - STAGE 1

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- a 3.5 metre high barrier (100 metre length) on the southern and western sides of the site.

These measures should give approximately 7 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'b' sound power level should be mitigated to an effective level of 114 dB(A).

The need for these high barriers arises from the close proximity of the works to buildings a minimum of 6 storeys in height. As Chai Wan Estate (Block 13) is 14 storeys high and parallels the road, high barriers for regions of area 'a' and 'b' near this block are necessary.

In addition, all active piling rigs should be surrounded on at least three sides, placed in between the rig and the nearby NSRs, by mobile 3.5 metre barriers. These barriers should be placed as close as is practicable (<3 metre separation) to the rigs during operation to maximise their benefit.

These measures taken together should afford an additional 10 dB(A) noise reduction to the worst affected receivers, which should reduce the maximum predicted noise levels at receivers to 75 dB(A).

Stage 2

As in Stage 1 above, the worst-affected NSRs are on the western side of the study area. The highest exceedance of the daytime criterion (84 dB(A)) is predicted to occur at the Chai Wan School (N10). Implementation of the general measures recommended above should reduce this noise level to approximately 79 dB(A). To protect these NSRs further the following mitigation measures are recommended for area 'a' and area 'b' (see *Figure 4.7b*):

Area 'a'

- a 4 metre barrier (125 metres in length).

This measure should give approximately 7 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'a' sound power level should be mitigated to an effective level of 115 dB(A).

Area 'b'

- a 3.5 metre barrier (175 metres in length).

This measure should give approximately 5 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'b' sound power level should be mitigated to an effective level of 120 dB(A).

In addition, all active piling rigs should be surrounded on at least three sides, placed in between the rig and the nearby NSRs, by mobile 3.5 metre barriers. These barriers should be placed as close as is practicable (<3 metre separation) to the rigs during operation.

These measures taken together should afford at least an additional 5 dB(A) noise reduction to the worst affected receivers, which should reduce the maximum predicted noise levels at receivers to below the 75 dB(A) daytime noise criterion.

Stage 3

The worst-affected NSRs during this stage are in the central region and eastern side of the study area. The highest exceedance of the daytime criterion (92 dB(A)) is predicted to occur at the Chai Wan Estate, Block 13 (N5). Implementation of the general measures recommended above should reduce this noise level to approximately 87 dB(A). To protect these further NSRs the following mitigation measures are recommended for area 'b', area 'c' and area 'd' (see *Figure 4.7c*):

Area 'b'

- a 5 metre high barrier (100 metres) for Chai Wan Estate, Block 13 (N5);
- a 4 metre high barrier (50 metres) for Chai Wan Estate, Blocks 10 (N6) and 13 (N5); and,
- a 5 metre high barrier (100 metres) for Yue On House (N7/N8).

These measures should give approximately 10 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'b' sound power level should be mitigated to an effective level of 106 dB(A).

Area 'c'

- a 4 metre high barrier (100 metres in length) for Chai Wan Estate, Block 13 (N5) and Yue On House (N7).

This measure should give approximately 7 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'c' sound power level should be mitigated to an effective level of 113 dB(A).

Area 'd'

- no mitigation other than good site practice is necessary for this area.

These measures taken together should afford an additional 10–15 dB(A) noise reduction to the worst affected receivers, which should reduce the

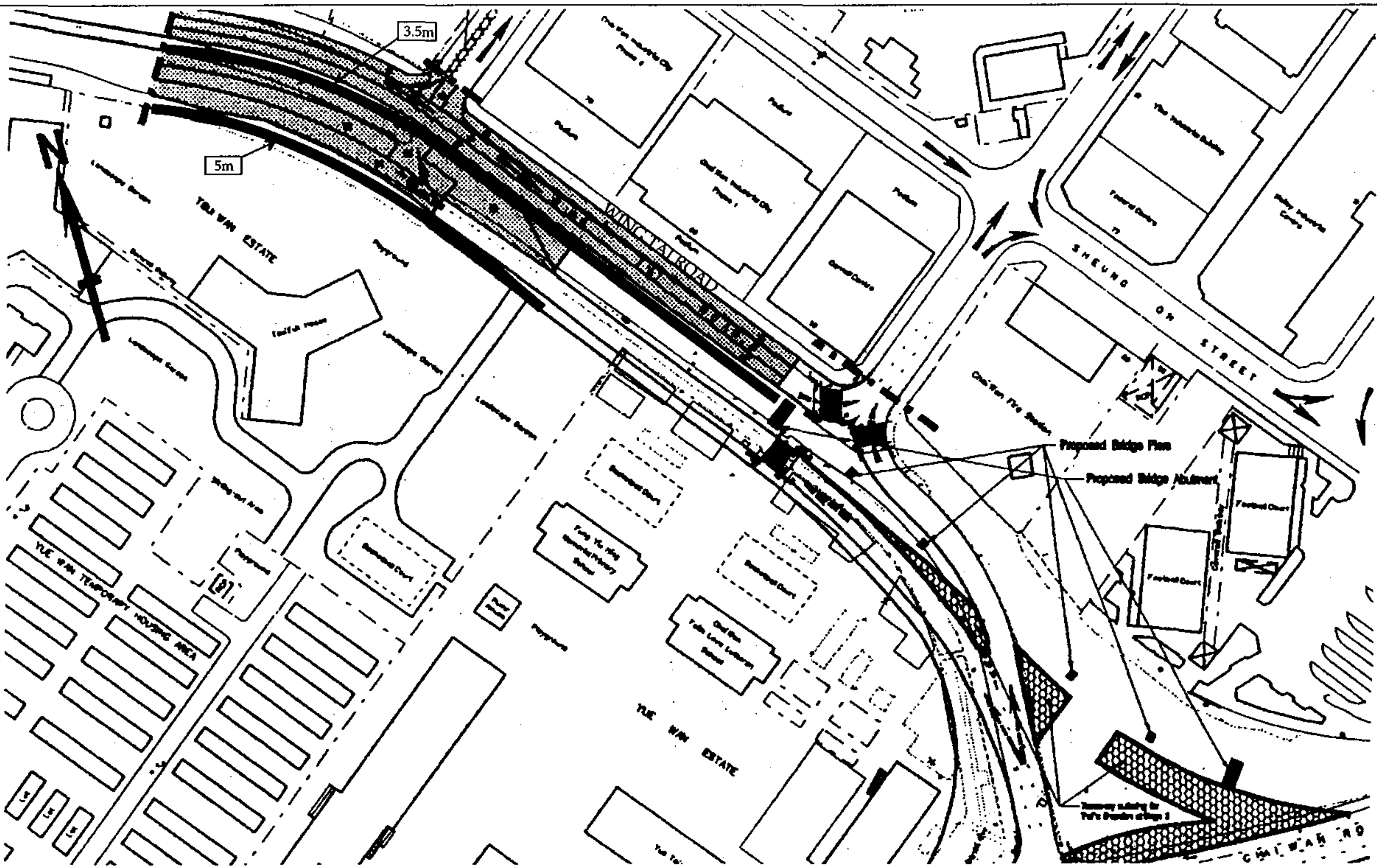

FIGURE 4.7b - RECOMMENDED BARRIERS FOR CONSTRUCTION - STAGE 2

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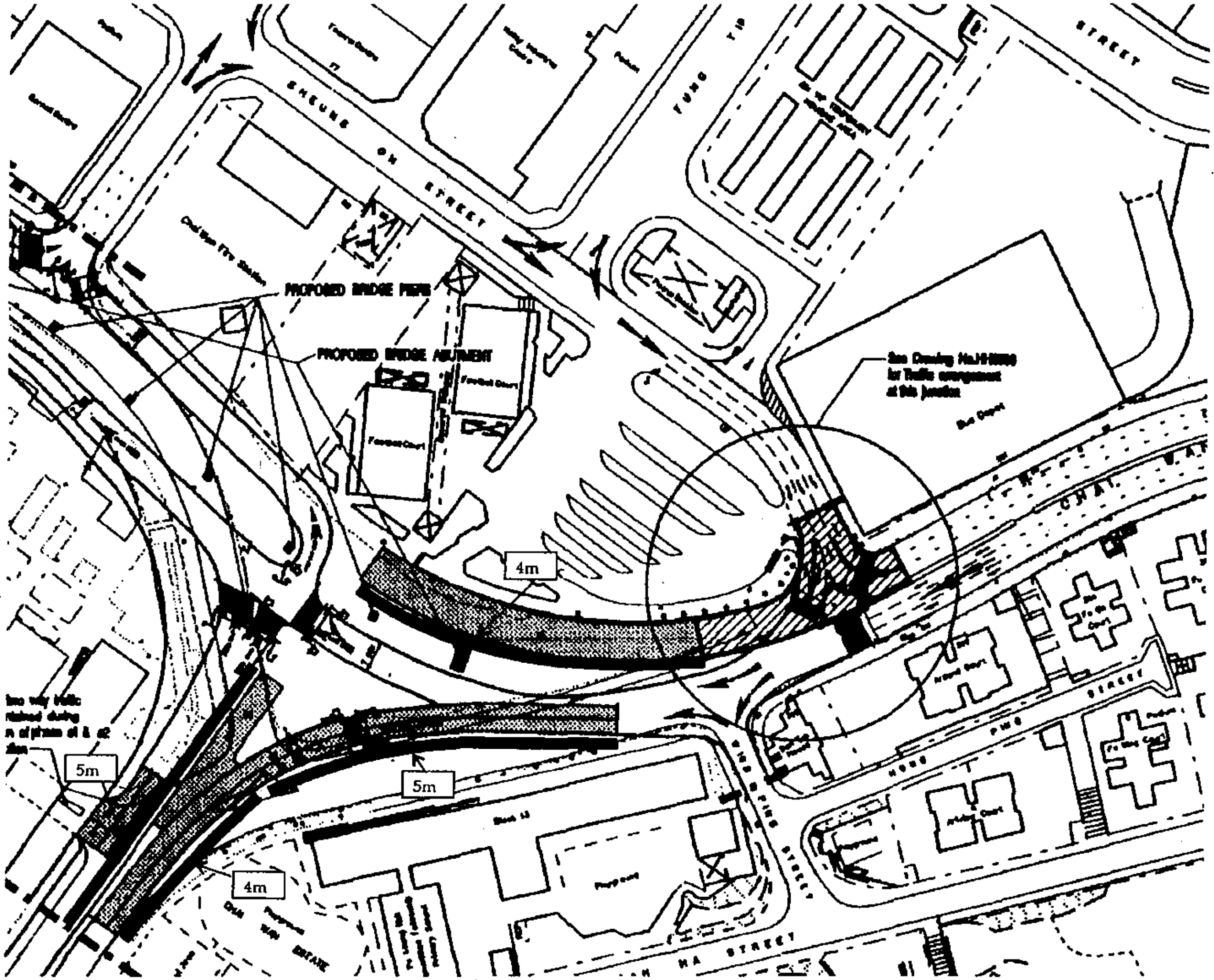

FIGURE 4.7c - RECOMMENDEDBARRIERS FOR CONSTRUCTIONS - STAGE 3

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maximum predicted noise levels at receivers to approximately the 75 dB(A) daytime noise criterion.

Stage 4

The worst-affected NSRs during this stage are in the central region of the study area, however significant impacts in the eastern and western sides of the study area have also been predicted. The highest exceedance of the daytime criterion (94 dB(A)) is predicted to occur at the Sun Tak House (N4). Implementation of the general measures recommended above should reduce this noise level to approximately 89 dB(A). To protect these NSRs further the following mitigation measures are recommended for area 'a', area 'b' and area 'c' (see *Figure 4.7d*):

Area 'a'

- 3.5 metre high barrier (50 metres in length).

This measure should give approximately 5 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'a' sound power level should be mitigated to an effective level of 117 dB(A).

Area 'b'

- a 5 metre high barrier (50 metres in length) for Sun Tak House (N4);
- a 4 metre high barrier (50 metres in length) for Chai Wan Estate, Block 13 (N5); and
- a 3.5 metre high barrier (20 metres in length) for Artland Court;

These measures should give more than 10 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'b' sound power level should be mitigated to an effective level of 103 dB(A).

Area 'c'

- a 3.5 metre high barrier (30 metres in length) for Fu Shing Court; and,
- a 3 metre high barrier (30 metres in length) for the TWGHs Lee Chi Hung Memorial Primary School.

This measure should give approximately 5 dB(A) of attenuation.

The Contractor should note that to comply with the daytime noise criterion the maximum Area 'c' sound power level should be limited to 120 dB(A).

These measures taken together should afford an additional 10–15 dB(A) noise reduction to the worst affected receivers, which should reduce the maximum predicted noise levels at receivers to below the 75 dB(A) daytime noise criterion.

In light of the predicted exceedances and the need for mitigation measures, noise monitoring is recommended at the NSRs to check the effectiveness of the mitigation measures adopted. In addition the recommended noise mitigation measures should be duly written into all contract documents to bring the potential for noise exceedance to the Contractor's attention and to give the Contractor suitable guidance in planning adequate mitigation. A generalised action plan is included below in *Table 4.7a* to give guidance to the Contractor in terms of relevant actions in case of complaints or exceedance of the applicable noise criteria.

Table 4.7a *Noise Monitoring Event Contingency Plan*

Event	Resident Engineer (HyD)	Contractor
One complaint received	Inform Contractor. Discuss with the Contractor remedial actions required. Review noise monitoring data and the Contractor's working methods. Assess the effectiveness of remedial actions and keep Contractor informed.	Discuss with the Resident Engineer remedial actions required. Rectify any unacceptable practice to the approval of the Resident Engineer. Consider changes to working methods.
More than one complaint received within 2 weeks time	Inform Contractor immediately. Discuss with the Contractor remedial actions required. Review noise monitoring data and Contractor's working methods. Assess the effectiveness of remedial actions and keep the Contractor informed.	Submit proposals within 3 working days to the Resident Engineer for remedial actions to reduce noise exposure. Amend proposals if required by the Resident Engineer. Implement immediately the agreed proposals.
Exceedance of 75* dB(A) between 0700–1900 on normal weekdays or 70 dB(A) exceeded between 0700–2300 on holidays and 1900–2300 on all other days or 55 db(A) exceeded between 2300–0700	Inform Contractor immediately. Discuss with the Contractor remedial actions required. Review noise monitoring data and the Contractor's working methods. Assess the effectiveness of remedial actions and keep Contractor informed.	Take immediate action to avoid further exceedance. Submit a further proposal for remedial actions to the Resident Engineer immediately. Implement immediately the agreed proposals. Resubmit proposals if problem still not resolved.

* reduce to 70 dB(A) for schools and 65 dB(A) at schools during the school examination period

4.7.2 *Operational Phase*

As the buildings in the study area already exist, it is not possible to increase their setback distance from the road. As these setback distances cannot be changed, Section 4.3.1 of the HKPSG recommends the following guidelines to reduce noise exposure at receivers in this instance:

In situations where adequate separations between sensitive uses and noise emitters cannot be provided, the following methods, which are described in details in sections 4.3.3 to 4.3.10, should find applications in the Hong Kong context:

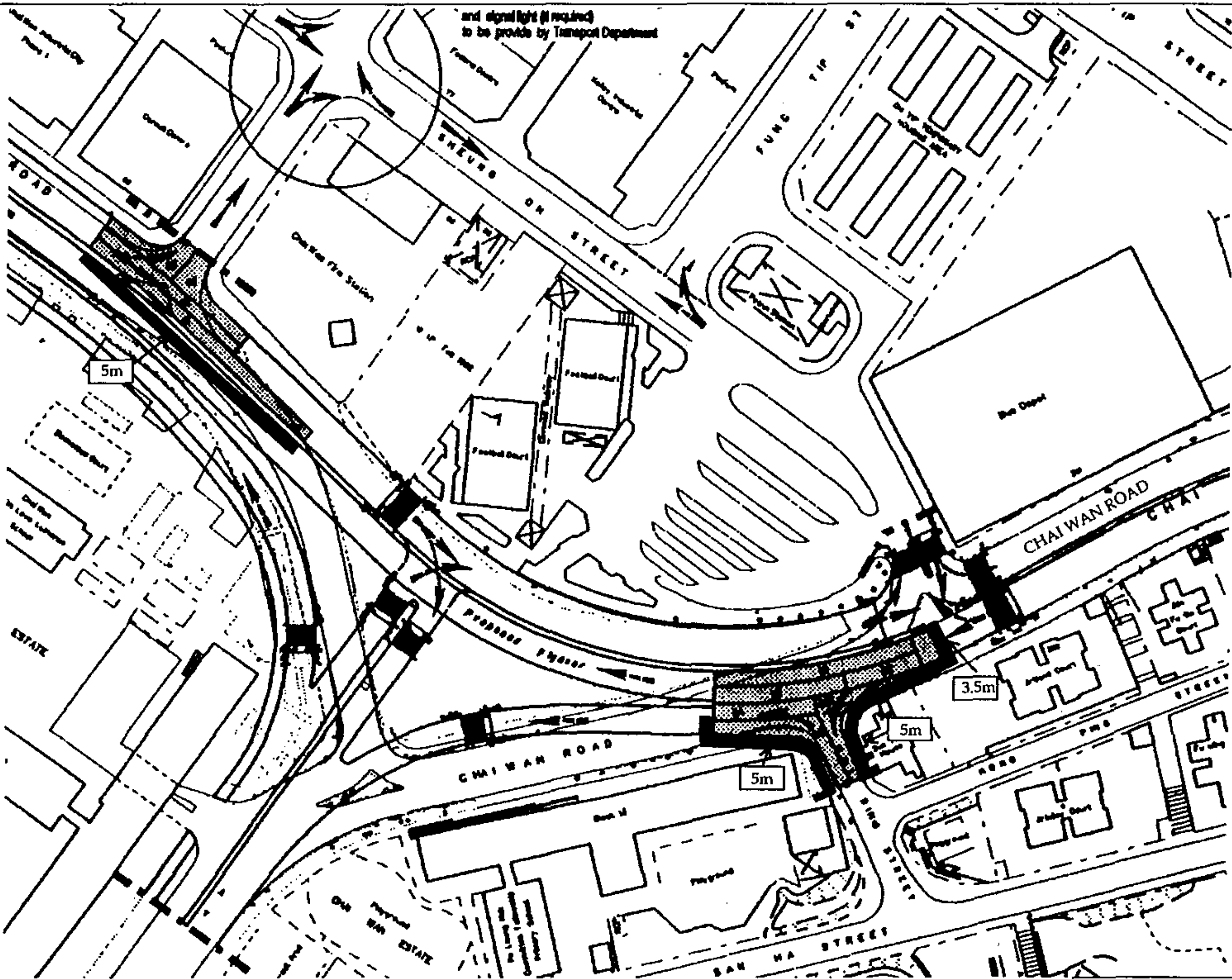

FIGURE 4.7d - RECOMMENDED BARRIERS FOR CONSTRUCTION - STAGE 4

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(a) self-protecting building design and arrangement;
(b) integrated building and noise source design (eg. decking over);
(c) purpose-built noise barriers; and
(d) acoustic insulation of buildings.

As the buildings in question already exist, it is clear that (a) above cannot be followed as it relates to changing the building layout. However, the other measures are relevant and in following these guidelines three separate types of mitigation have been considered in order to reduce road traffic noise levels at sensitive regions of the existing residential towers to acceptable levels:

- Noise barriers at the roadside;
- Low noise road surfaces; and
- Window insulation and air conditioning.

Test cases, incorporating the different mitigation measures listed above, have been modelled and the results are summarised below.

Noise Barriers

Barriers were modelled at a minimum distance of 3.5m from kerbside where the roads have sidewalls and space is available. It is considered impractical to locate barriers closer to the roads because of conflicts with bus stops, taxi drop-off areas, road safety and underground services near the road edge. It should be noted that no barriers were added to the fly-over for this particular assessment.

For this exercise barrier the maximum potential extent of barriers was modelled in order to maximise their effectiveness. As a result, barriers were modelled in the following locations:

- the entire southern side of Wing Tai Road, from near Tsui Fuk House (N11) to the intersection with Chai Wan Road near Yue On House (N7/8);

- the entire eastern side of Chai Wan Road--the section in front of Yue On House (N7/8);

- the entire western side of Chai Wan Road--the section in front of Chai Wan Estate Block 10 (N6); and

- the entire southern side of Chai Wan Road, from near Chai Wan Estate Block 13 (N5) to the intersection with Sun Yip Street.

For this assessment only one type of barrier was assessed, a barrier of 3 metre height. Higher barriers were considered to be impractical due to the highly urban environment; it is believed that placement of high barriers in this environment would lead to many problems ranging from visual impairment to drivers and residents to conflicts with transportation services. The predicted $L_{A10,peak\ hour}$ noise levels for the year 2011 with 3m high barriers along the proposed roads are shown in *Table 4.7b*. The difference column indicates the difference in noise level between the widened road without noise barriers and that with noise barriers.

Table 4.7b *Predicted $L_{A10,peak\ hour}$ Noise Levels for the Year 2011 with 3m High Barriers, dB(A)*

NSRs	Location	1st Floor//Dif		Mid Floor//Dif		Top Floor//Dif	
Fu Shing Court	A	75	2	78 (7/F)	0	77 (14/F)	0
	B	77	1	80 (7/F)	0	79 (14/F)	0
	C	76	1	80 (7/F)	0	79 (14/F)	0
	D	74	1	78 (7/F)	0	77 (14/F)	0
	E	73	4	77 (7/F)	0	76 (14/F)	0
Fu On Court	A	74	1	78 (7/F)	0	77 (14/F)	0
	B	78	0	81 (7/F)	0	79 (14/F)	0
	C	76	1	79 (7/F)	0	77 (14/F)	0
Artland Court	A	77	5	80 (8/F)	0	79 (16/F)	0
	B	78	5	81 (8/F)	0	79 (16/F)	0
	C	79	4	81 (8/F)	0	79 (16/F)	0
	D	79	3	81 (8/F)	0	79 (16/F)	0
Sun Tak House	A	86	0	80 (14/F)	0	77 (28/F)	0
	B	78	0	79 (14/F)	0	77 (28/F)	0
	C	76	0	79 (14/F)	0	77 (28/F)	0
	D	76	0	78 (14/F)	0	76 (28/F)	0
Chai Wan Estate (Block 13)	A	78	5	81 (7/F)	0	79 (14/F)	0
	B	77	4	80 (7/F)	0	78 (14/F)	0
	C	77	3	80 (7/F)	0	78 (14/F)	0
	D	76	3	79 (7/F)	0	78 (14/F)	0
	E	75	3	79 (7/F)	0	78 (14/F)	0
Chai Wan Estate (Block 10)	A	74	8	N/A		81 (2/F)	1
	B	73	9	N/A		81 (2/F)	1
	C	71	11	N/A		80 (2/F)	2
Yue On House	A	76	5	81 (3/F)	0	81 (6/F)	-1
	B	79	1	80 (3/F)	0	80 (6/F)	-1
	C	74	5	78 (3/F)	2	80 (6/F)	-1
	D	71	9	77 (3/F)	3	81 (6/F)	-2
	E	69	9	72 (3/F)	6	79 (6/F)	-1
Fung Yiu Hing Memorial Primary School	A	74	4	74 (3/F)	4	76 (6/F)	2
	B	74	3	74 (3/F)	4	75 (6/F)	3
	C	73	4	74 (3/F)	4	75 (6/F)	3
Chai Wan Faith Love Lutheran School	A	73	4	74 (3/F)	3	75 (6/F)	2
	B	73	3	73 (3/F)	4	74 (6/F)	3
	C	72	4	72 (3/F)	4	74 (6/F)	2
Tsui Fuk House	A	71	5	77 (15/F)	0	75 (31/F)	0
	B	61	5	70 (15/F)	0	71 (31/F)	0
	C	57	5	66 (15/F)	0	69 (31/F)	0
	D	70	6	75 (15/F)	0	73 (31/F)	0
	E	59	5	65 (15/F)	0	68 (31/F)	0

The results from the *difference column* in *Table 4.7b* above have indicated that 3m high barriers provide attenuation of between 0 and 11 dB(A) for residents on the first floor levels. However, with the exception of Yue On House and the schools, residents on mid-floor and higher levels would generally receive no benefit from this mitigation measure.

Though the barriers have been modelled for nearly the entire extent of the proposed widened section of roads, it is considered that the use of roadside barriers would most probably not be practical at many locations for a number of reasons. These reasons include the following:

- barriers may affect business on ground floor levels and commercial premises and may prevent access of passengers to bus stops, taxi stands, etc;

- barriers may also impinge on drivers' sight-lines on curved road sections, and present difficulties with traffic signalling and therefore may potentially endanger traffic and pedestrian safety;

- here will also be restrictions to lower floor window sightlines, curtailed road access from properties, and the addition of highly visible and aesthetically unpleasing structures to the development boundaries.

Annex D shows photographs of typical street scenes in the area. Furthermore, barriers will only benefit a relatively small proportion of floors, only those at low level. Medium and high level receivers would not benefit significantly from the barriers but would still have to cope with their negative aspects. It is therefore not considered practicable to construct noise barriers in this typical urban, residential area.

Low Noise Road Surfaces

Low noise road surfaces, from a strictly environmental perspective, would be an effective form of noise mitigation for this project. Noise levels could be reduced by up to 2.5 dB(A) (CRTN specifies 2.5 dB noise reduction, although larger reductions are achievable in some situations), depending on how much of the road network is suitable for their use. In Hong Kong, however, problems associated with maintaining 'friction course' (the current approved low noise road surface type in Hong Kong) make it generally unsuitable for roads with tight bends or which have steep gradients. As a result, friction course is generally only laid on straight, high-speed roads, like highways; local roads are rarely, if ever, recommended for resurfacing. Therefore, considering that much of the road network within the Study Area contains tight bends or steep gradients (the fly-over) and is made up solely of local roads, it is unlikely that much of the road network would be suitable for low noise surfacing.

It should be noted, however, that Highways Department are currently carrying out a programme of testing modified friction course mixes, and it is hoped that a more durable and effective low noise road surface design can be approved in the near future. If this proves to be the case, the new low noise road surface should be considered for as much of the road network as possible so as to maximise the noise reduction at nearby receivers.

With the assumption that a new low noise road surface will be devised for local roads, modelling of a suitable low noise surface has been carried out. The noise levels at the nearby NSRs predicted assuming a low noise surface on the entire road section within the Study Area, with the exception of the fly-over, are shown in *Table 4.7c*. It should be noted that the first number in each column shows the contribution to the noise level from all roads, while the second number in each column shows the contribution to the noise level from the new roads.

Table 4.7c *Predicted $L_{A10,peak\ hour}$ Noise Levels for the Year 2011 with Low Noise Surface, dB(A)*

NSRs	Location	First Floor	Medium Floor	Top Floor
Fu Shing Court	A	75 / 64	75 / 64 (7/F)	75 /64 (14/F)
	B	75 / 68	78 / 69 (7/F)	77 /68 (14/F)
	C	75 / 67	78 / 68(7/F)	76 /67 (14/F)
	D	73 / 64	76 / 65 (7/F)	75 /65 (14/F)
	E	75 / 65	74 / 64 (7/F)	74 /64 (14/F)
Fu On Court	A	73 / 41	76 / 40 (7/F)	74 /50 (14/F)
	B	76 / 69	78 / 69 (7/F)	76 /68 (14/F)
	C	75 / 70	76 / 69 (7/F)	75 /68 (14/F)
Artland Court	A	79 / 71	78 / 71 (8/F)	76 /70 (16/F)
	B	80 / 73	78 / 72 (8/F)	77 /71 (16/F)
	C	80 / 74	78 / 73 (8/F)	77 /71 (16/F)
	D	80 / 74	78 / 74 (8/F)	76 /72 (16/F)
Sun Tak House	A	83 / 83	77 / 77 (14/F)	75 /74 (28/F)
	B	76 / 75	77 / 76 (14/F)	75 /74 (28/F)
	C	74 / 74	76 / 75 (14/F)	75 /74 (28/F)
	D	74 / 74	76 / 75 (14/F)	74 /73 (28/F)
Chai Wan Estate (Block 13)	A	81 / 81	79 / 78 (7/F)	77 /76 (14/F)
	B	79 / 79	79 / 78 (7/F)	77 /76 (14/F)
	C	79 / 78	79 / 78 (7/F)	77 /77 (14/F)
	D	77 / 77	78 / 78 (7/F)	77 /77 (14/F)
	E	77 / 77	77 / 77 (7/F)	76 /76 (14/F)
Chai Wan Estate (Block 10)	A	80 / 74	N/A	80 / 74 (2/F)
	B	80 / 72	N/A	80 / 72 (2/F)
	C	80 / 69	N/A	79 / 68 (2/F)
Yue On House	A	79 / 79	79 / 79 (3/F)	78 /78 (6/F)
	B	77 / 77	78 / 77 (3/F)	77 /77 (6/F)
	C	77 / 76	77 / 77 (3/F)	77 /76 (6/F)
	D	77 / 68	77 / 69 (3/F)	77 /69 (6/F)
	E	76 / 64	75 / 65 (3/F)	75 /65 (6/F)
Fung Yiu Hing Memorial Primary School	A	76 / 76	76 / 76 (3/F)	77 / 77 (6/F)
	B	76 / 76	76 / 76 (3/F)	76 / 76(6/F)
	C	76 / 76	76 / 76 (3/F)	76 / 76 (6/F)
Chai Wan Faith Love Lutheran School	A	75 / 75	76 / 76 (3/F)	76 / 76 (6/F)
	B	75 / 75	75 / 75 (3/F)	75 / 75 (6/F)
	C	74 / 74	74 / 74 (3/F)	75 / 75 (6/F)
Tsui Fuk House	A	74 / 74	75 / 75 (15/F)	73 /73 (31/F)
	B	64 / 64	68 / 68 (15/F)	71 /71 (31/F)
	C	60 / 60	64 / 63 (15/F)	67 /67 (31/F)
	D	73 / 73	73 / 73 (15/F)	71 /71 (31/F)
	E	62 / 62	63 / 63 (15/F)	66 /66 (31/F)

Except for some lower floors, these results indicate that the low noise surface would be superior to the use of 3 metre barriers along the roadway in reducing noise impacts at the nearby NSRs. Low noise road surfaces do not create the same practical disadvantages as barriers and so are considered a preferred mitigation measure.

Indicative costs for the low noise road surface have been calculated based on cost estimates from similar recent projects. The indicative cost for the low noise surface, based on HK$76 m^{-2}, is approximately HK$2.3 million.

Enclosure/Screening of the Fly-over

Calculations have shown that enclosure/screening of the fly-over, if this is the only mitigation measure employed, would provide limited reduction in noise impacts at nearby NSRs. The maximum attenuation that could be achieved by this measure is approximately 1 dB at a limited number of locations, primarily NSRs N5, N6, N7/N8, N9 and N10. The results of modelling are shown in *Table 4.7d* below. It should be noted that the first number in each column shows the contribution to the noise level from all roads in 1995, the second number shows the contribution to the noise level from all roads in 2011 without a barrier on the flyover, the third number in each column shows the contribution to the noise level from all roads in 2011 with the addition of a 3m barrier on the fly-over and the fourth number (in brackets) indicates the difference between these two levels (2011 no barrier-2011 barrier). It should be noted that an extra column has been added, in square brackets, for comparison purposes for the mid and high levels of Chai Wan Estate Block 13. This extra column indicates the noise level from new roads in 2011 with a 3m barrier on the fly-over.

Table 4.7d ***Comparison of Predicted $L_{A10,peak\ hour}$ Noise Levels for the Year 2011 without and with a 3m Barrier on the Fly-Over, dB(A)***

NSRs	Location	First Floor 95[1] nb[2] bar[3] dif[4]	Medium Floor 95 nb bar dif	Top Floor 95 nb bar dif
Chai Wan	A	81/ 83 / 83 (0)	79.1/81/80.8[80.5] 0	76.8/79/78.7[78.3]0
Estate	B	81/ 81 / 80 (1)	78.8/80/80.2[79.9] 0	76.6/78/78.4 [78] 0
(Block 13)[5]	C	81/ 80 / 79 (1)	78.9/80/79.9[79.6] 0	76.7/78/78.4[78.2]0
	D	82/ 79 / 78 (1)	79.3/79/78.6[78.3] 0	77/78/78.2 [78] 0
	E	82/ 78 / 78 (0)	79.4/79/78.3[78.2] 1	77/78/77.8 [77.6] 0
Chai Wan	A	79/ 82 / 82 (0)	N/A	79/ 82 / 82 (0)
Estate	B	80/ 82 / 82 (0)	N/A	79/ 82 / 82 (0)
(Block 10)	C	79/ 82 / 82 (0)	N/A	79/ 82 / 82 (0)
Yue On	A	78/ 81 / 81 (0)	78/ 81 / 81 (0)	77/ 80 / 80 (0)
House	B	77/ 80 / 80 (0)	76/ 80 / 80 (0)	76/ 79 / 79 (0)
	C	76/ 80 / 79 (1)	76/ 80 / 79 (1)	76/ 79 / 79 (0)
Fung Yiu	A	78 / 77 (1)	78 / 78 (0)	78 / 78 (0)
Hing	B	77 / 77 (0)	78 / 77 (1)	78 / 78 (0)
Memorial Primary School	C	77 / 77 (0)	78 / 77 (1)	78 / 77 (1)
Chai Wan	A	77 / 76 (1)	77 / 76 (1)	77 / 77 (0)
Faith Love	B	76 / 76 (0)	77 / 76 (1)	77 / 76 (1)
Lutheran School	C	76 / 75 (1)	76 / 75 (1)	76 / 76 (0)

1 1995 prevailing noise level
2 Noise levels from all roads without a barrier on the fly-over
3 Noise levels from all roads with a 3m barrier on the fly-over
4 Difference in noise levels (2011 without barrier-2011 with barrier)
5 The extra column for Chai Wan Blk 13, in square brackets, is for the noise level due to 'new' roads in 2011 with a 3m barrier on the fly-over.

However, if screening of the fly-over is employed in addition to the low noise road surface assessed above, then nearly all locations benefit by at least 1 dB(A); while Chai Wan Estate, Block 13 (N5), Chai Wan School (N10) and FYH Memorial School would benefit by 3 or 4 dB(A). The noise levels with a low noise surface/barrier combination are shown in *Table 4.7e* below. The first number in each column is for a 3 metre barrier (the 3 metre barrier is required only on the south side of the fly-over and was modelled at the kerb) on the fly-over, while the second number is for a partial enclosure on the fly-over. It should be noted that the partial enclosure was modelled by deleting the road segments, and therefore the noise, from the fly-over. As a result, the noise levels given below for the use of the partial enclosure indicate the most effective reduction in noise possible on the fly-over section. The location of the barrier/enclosure is shown in *Figure 4.7e*.

Table 4.7e *Predicted Noise Levels for Widened Roads in the Year 2011 with Low Noise Surface and Screening on the Fly-Over, $L_{A10,peak\ hour}$ dB*

NSRs	Location	First Floor	Medium Floor	Top Floor
Fu Shing Court	A	75 / 75	75 / 75 (7/F)	75 / 75 (14/F)
	B	75 / 75	78 / 78 (7/F)	77 / 76 (14/F)
	C	75 / 75	78 / 78 (7/F)	76 / 76 (14/F)
	D	73 / 73	76 / 76 (7/F)	75 / 74 (14/F)
	E	75 / 75	74 / 74 (7/F)	74 / 74 (14/F)
Fu On Court	A	73 / 73	76 / 76 (7/F)	74 / 74 (14/F)
	B	76 / 76	78 / 78 (7/F)	76 / 76 (14/F)
	C	75 / 75	76 / 76 (7/F)	75 / 74 (14/F)
Artland Court	A	79 / 79	78 / 78 (8/F)	76 / 76 (16/F)
	B	80 / 80	78 / 78 (8/F)	77 / 76 (16/F)
	C	80 / 80	78 / 78 (8/F)	77 / 76 (16/F)
	D	80 / 80	78 / 78 (8/F)	77 / 76 (16/F)
Sun Tak House	A	83 / 83	78 / 77 (14/F)	75 / 75 (28/F)
	B	76 / 75	77 / 77 (14/F)	75 / 75 (28/F)
	C	75 / 73	76 / 76 (14/F)	75 / 74 (28/F)
	D	74 / 74	76 / 76 (14/F)	74 / 74 (28/F)
Chai Wan Estate (Block 13)	A	81 / 80	79 / 78 (7/F)	77 / 76 (14/F)
	B	79 / 78	79 / 77 (7/F)	77 / 75 (14/F)
	C	77 / 76	78 / 76 (7/F)	77 / 74 (14/F)
	D	76 / 75	77 / 75 (7/F)	77 / 74 (14/F)
	E	76 / 75	76 / 76 (7/F)	76 / 74 (14/F)
Chai Wan Estate (Block 10)	A	80 / 79	N/A	80 / 79 (2/F)
	B	80 / 79	N/A	80 / 79 (2/F)
	C	80 / 79	N/A	79 / 79 (2/F)
Yue On House	A	79 / 79	79 / 79 (3/F)	78 / 78 (6/F)
	B	77 / 77	78 / 77 (3/F)	77 / 76 (6/F)
	C	77 / 77	77 / 77 (3/F)	77 / 76 (6/F)
	D	77 / 77	77 / 77 (3/F)	76 / 76 (6/F)
	E	75 / 75	75 / 75 (3/F)	75 / 75 (6/F)
Fung Yiu Hing Memorial Primary School	A	75 / 74	75 / 75 (3/F)	76 / 75 (6/F)
	B	75 / 74	75 / 75 (3/F)	76 / 75 (6/F)
	C	75 / 74	75 / 75 (3/F)	75 / 75 (6/F)
Chai Wan Faith Love Lutheran School	A	74 / 74	74 / 74 (3/F)	75 / 74 (6/F)
	B	73 / 73	74 / 74 (3/F)	74 / 74 (6/F)
	C	73 / 72	73 / 73 (3/F)	73 / 73 (6/F)
Tsui Fuk House	A	74 / 74	74 / 74 (15/F)	73 / 72 (31/F)
	B	64 / 64	67 / 67 (15/F)	69 / 68 (31/F)
	C	60 / 60	63 / 63 (15/F)	67 / 65 (31/F)
	D	73 / 73	73 / 73 (15/F)	71 / 71 (31/F)
	E	62 / 62	63 / 63 (15/F)	66 / 64 (31/F)

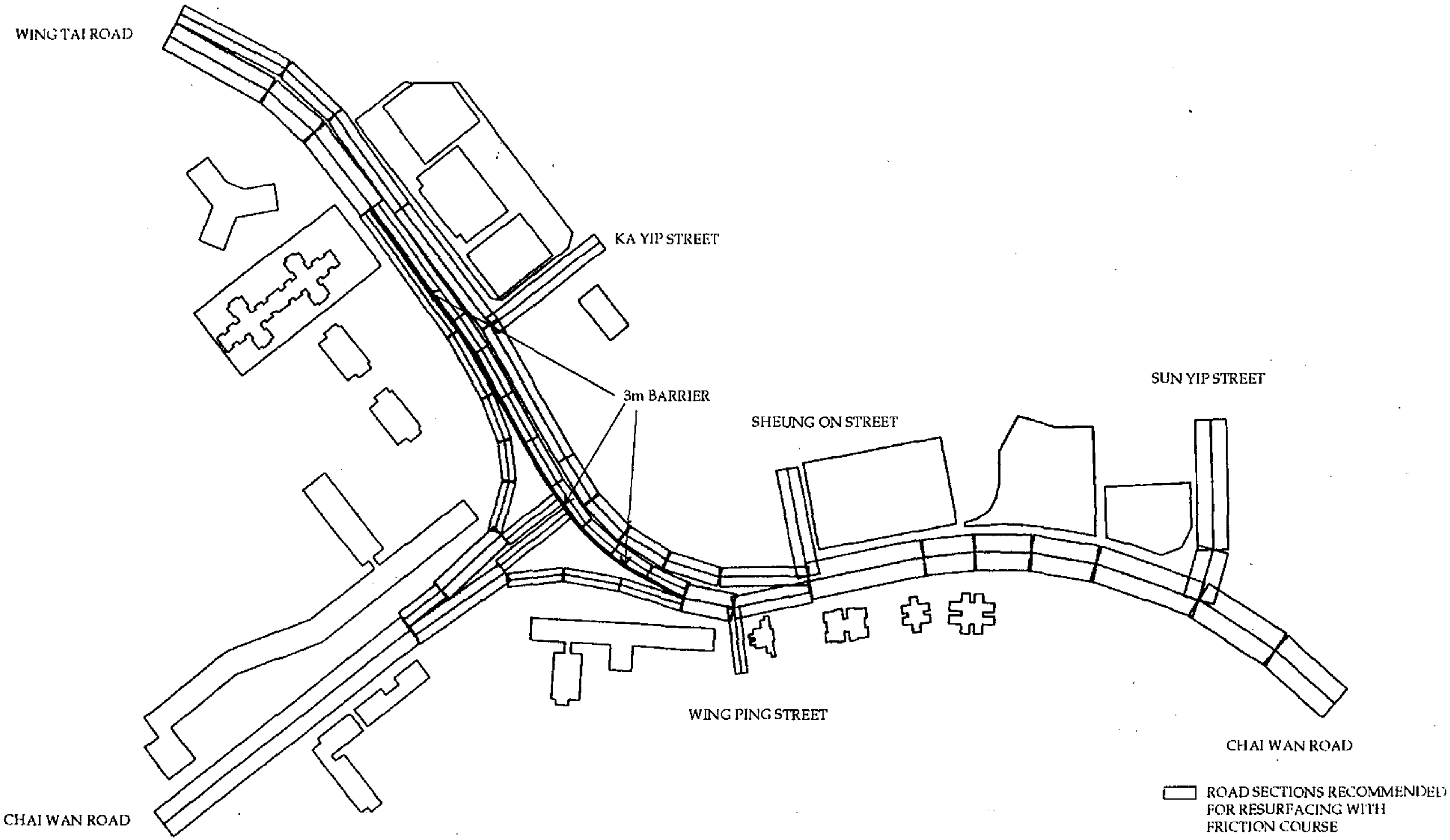

FIGURE 4.7e - ROAD SECTIONS RECOMMENDED FOR RESURFACING WITH FRICTION COURSE

ERM Hong Kong

6th Floor,
Hecny Tower
9 Chatham Road
Tsimshatsui, Kowloon
Hong Kong

ERM

This table indicates that, in general, a partial enclosure is only marginally more effective than a 3 metre barrier in attenuating noise from the proposed fly-over; decreases in levels generally being about 1 dB(A) in only a few locations. The sole exception to this observation is at Chai Wan Estate Block 13, where differences are 2-3 dB(A); however, Chai Wan Estate is to be demolished before the year 2000, so this exception is not relevant to this study. As a result, it is not considered necessary to investigate higher barriers than the 3 metre barrier, as these cases would provide less noise reduction than the partial enclosure which, as indicated above, is only marginally more effective than the 3 metre barrier.

In determining the most cost-effective form of mitigation for the fly-over, the increase in effectiveness of the potential screening measures must be weighed against the cost implications of each type of screening. The cost of barriers or partial enclosures on the fly-over is difficult to estimate as these structures on an elevated road add additional weight and wind loading in addition to material and labour costs. However, reference to cost estimates for similar structure proposed on elevated viaducts for the Lantau and Airport Railway (LAR), suggest the following costs as an 'order of magnitude' estimate:

- 3 metre barrier: HK$5 million @ HK$20,000 m^{-1}; and
- partial enclosure: HK$18.75 million @ HK$75,000 m^{-1}.

As the partial enclosure would be roughly 4 times more expensive than the 3 metre barrier and yet would only deliver marginal increases (1 dB(A)) in only a few locations, it is recommended that the 3 metre barrier be adopted for the fly-over rather than the partial enclosure.

Table 4.7f below details the effectiveness of the recommended combination of direct mitigation measures, namely a low noise surface on most road segments with a 3 metre barrier on the fly-over, in reducing noise impacts at the nearby NSRs.

In the table below the abbreviations used are as follows:

- 2011: Predicted noise levels from all roads in the Study Area with mitigation in the form of a low noise surface on most roads and a 3 m barrier on the fly-over;
- 95: Predicted prevailing noise levels;
- New: only contributions from 'new' roads, in 2011, are included;
- Ex: only contributions from 'existing' roads, in 2011; and
- I: An asterisk in this column indicates that the NSR is eligible for insulation and insulation is required (direct mitigation measures are inadequate).

Table 4.7f *Predicted Noise Levels for Study Area Roads in the Year 2011 with Low Noise Surface and a 3m barrier on the Fly-Over Compared to Prevailing Levels (1995),* $L_{A10,peak\ hour}$ *dB*

NSRs	Location	First Floor 2011 95 New Ex I	Medium Floor 2011 95 New Ex I	Top Floor 2011 95 New Ex I
Fu Shing Court	A	75.1/69 64.4 74.7	75.4/71 64.1 75.0	74.5/70 63.6 74.1
	B	75.4/71 67.6 74.6	78.0/73 68.5 77.5	76.5/72 68.1 75.8
	C	75.2/71 66.6 74.5	78.0/73 67.5 77.6	76.4/72 67.2 75.8
	D	73.2/68 64.2 72.6	75.6/72 64.9 75.3	74.6/71 65.0 74.1
	E	75.1/70 64.6 74.7	74.4/70 64.4 73.9	73.7/69 63.9 73.2
Fu On Court	A	72.7/68 41.0 72.7	75.5/71 40.2 75.5	74.1/70 50.0 74.1
	B	76.0/70 69.0 75.1	78.3/74 68.4 77.8	76.5/73 68.0 75.9
	C	74.9/70 69.7 73.3 *	76.2/72 69.2 75.2	74.7/71 68.6 73.4 *
Artland Court	A	79.2/75 71.1 78.5	78.1/74 71.4 77.1	76.4/73 70.0 75.2 *
	B	80.2/76 72.6 79.4	78.4/75 72.0 77.3 *	76.5/74 70.8 75.2 *
	C	80.2/76 73.7 79.2	78.4/75 72.9 77.0 *	76.5/74 71.6 74.9 *
	D	79.7/76 73.5 78.5 *	78.4/75 73.6 76.6 *	76.5/74 72.2 74.4 *
Sun Tak House	A	83.3/81.9 82.8 72.0 *	77.5/76.8 76.7 69.7	75.2/75 74.3 67.9
	B	75.8/78 75.4 66.3	77.3/76.4 76.2 70.3	75.1/74.2 74.0 68.4
	C	74.5/72.8 74.2 62.2 *	76.5/76 75.4 69.9	74.7/74.1 73.6 68.3
	D	74.4/75 74.2 61.7	76.1/76 75.1 69.2	74.4/74 73.2 68.0
Chai Wan Estate (Block 13)	A	80.5/81.3 80.0 66.6	78.8/79 78.4 68.2	76.9/77 76.3 67.6
	B	78.6/81 78.4 64.8	78.8/79 78.5 67.2	77.1/77 76.6 66.6
	C	76.8/81 76.6 63.4	78.4/79 78.1 66.2	77.2/77 76.8 65.8
	D	75.6/82 75.4 61.9	77.1/79 76.8 64.8	76.7/77 76.5 64.6
	E	75.5/82 75.4 59.4	76.4/79 76.2 63.4	76.2/77 75.9 63.8
Chai Wan Estate (Block 10)	A	79.6/78.9 73.6 78.3	N/A	79.5/78.7 73.8 78.1
	B	79.7/79.6 71.0 79.0	N/A	79.5/79.4 71.7 78.7
	C	79.5/79.4 68.0 79.2	N/A	79.4/79.2 68.5 79.0
Yue On House	A	79.1/77.6 78.9 66.2 *	79/77.8 78.8 66.1 *	78.3/77.4 77.9 66.8
	B	77.4/76.3 76.7 67.7 *	77.6/76.477.1 67.6*	77 /76.1 76.4 67.7
	C	77.0/76.1 76.0 69.4	77.1/76.1 76.3 69.4	76.5/75.6 75.7 69.0
	D	77.3/77 67.9 76.8	77.2/77 67.8 76.6	76.4/76 67.7 75.8
	E	75.4/75 62.8 75.1	75.3/75 63.5 75.1	74.9/75 63.4 74.6
FYH Memorial Primary School	A	75.0/75 75.0 53.7	75.3/76 75.2 54.9	75.7/76 75.6 60.3
	B	74.7/75 74.7 53.8	75.0/75 75.0 55.1	75.5/75 75.3 60.3
	C	74.5/75 74.5 48.9	74.8/75 75.0 53.0	75.3/75 75.2 60.8
Chai Wan Faith Love Lutheran School	A	73.9/74 73.9 49.3	74.2/75 74.1 53.1	74.6/75 74.5 60.6
	B	73.3/74 73.3 49.1	73.6/74 73.6 52.9	74.1/74 73.9 59.6
	C	72.7/73 72.6 48.6	73.0/73 73.0 52.1	73.4/73 73.3 58.7
Tsui Fuk House	A	73.7/75 73.6 36.0	74.4/75 74.4 56.3	73.2/73 73.1 56.4
	B	63.9/65 63.9 35.3	67.4/67 67.1 56.0	69.4/69 69.2 56.2
	C	59.9/61 59.8 34.3	63.3/63 62.7 53.7	67.4/67 67.2 53.7
	D	73.2/74 73.2 32.4	72.6/73 72.6 32.5	70.6/71 70.6 37.8
	E	61.5/63 61.5 36.2	62.7/63 62.7 36.6	65.7/66 65.7 40.8

This table indicates that use of the combination of the low noise surface and the 3 metre barrier on the fly-over should ensure that ambient noise levels in the year 2011 will be approximately the same as those which currently exist at the local NSRs. This analysis indicates that NSRs along Wing Tai Road should experience no increase or a decrease in noise levels, while those along Chai Wan Road should see a small increase or in some cases a decrease in noise levels.

Window Insulation and Air Conditioning

As the use of direct mitigation measures has been shown to be inadequate in reducing impacts at nearby NSRs to levels in compliance with the HKPSG noise criterion, it is necessary that indirect mitigation measures be investigated.

Reference to *Table 4.7e* indicates that four NSRs, Fu On Court (N2), Artland Court (N3), Sun Tak House (N4) and Yue On House (N7/8) would be eligible for noise insulation; as determined by the three CRTN criteria, if the recommended direct mitigation measures are employed.

All NSRs would be eligible for Type I noise insulation with a few units in Sun Tak House (at the lower floors) being eligible for Type II noise insulation. The breakdown of insulation requirements is as given in *Table 4.7g* below.

Table 4.7g *Areas Eligible for Indirect Measures with Direct Measures in Place*

NSR	# of Units	# of Classrooms	Floors	Type of Insulation
Fu Shing Ct (N1)	N/A		N/A	N/A
Fu On Ct (N2)	10		1-5 & 9-14	Type I
Artland Ct (N3)	88		1-14	Type I
Sun Tak Hse (N4)	10		1-5	Type I & II
CW Est, 13 (N5)	N/A		N/A	N/A
CW Est, 10 (N6)	N/A		N/A	N/A
Yue On (N7/8)	40		1-4	Type I
FYH School (N9)		24	1-6	Type II
CW School (N10)		24	1-6	Type II
Tsui Fuk (N11)	N/A		N/A	N/A
Total	148	48		

Analysis of *Table 4.7d* indicates that if only the barrier on the fly-over is used without the low noise surface, the insulation needs for NSRs affected by the road widening would be identical to the case in which no direct mitigation measures are employed (2011 base case). Table 4.7d indicates that the 3m barrier on the fly-over would lead to significant (1 dB(A)) decreases in noise levels only at Chai Wan Estate Block 13 and the two schools. As the two schools will need to be insulated in any case there is only the potential that dwellings in Chai Wan Estate Block 13 may receive some benefit from the barrier. Comparison of 1995 prevailing noise levels with noise levels from the new roads in 2011 (with the 3m barrier on the fly-over), however, indicates that the insulation requirement would be identical to that for the case in which no direct mitigation measures were employed (see *Table 4.6f*). As a result, it can be concluded that the use of the 3m barrier on the fly-over, without the use of the low noise surface on the surrounding roads, would not be a cost-effective mitigation measure.

If it is not possible for direct mitigation measures to be employed, then the NSRs and units detailed in *Table 4.6g*, will be eligible for some noise insulation. The noise insulation requirements would be as given in *Table 4.7h* below.

Table 4.7h *Areas Eligible for Indirect Mitigation Measures*

NSR	# of Units	# of classrooms	Floors	Type of Insulation
Fu Shing Ct (N1)	N/A		N/A	N/A
Fu On Ct (N2)	14		1-5 & 9-14	Type I
Artland Ct (N3)	98		1-16	Type I
Sun Tak Hse (N4)	102		1-28	Type I & II
CW Est, 13 (N5)[1]	58		1-14	Type I & II
CW Est, 10 (N6)[1]	4		1-2	Type I & II
Yue On (N7/8)	60		1-6	Type II
FYH School (N9)		24	1-6	Type II
CW School (N10)		24	1-6	Type II
Tsui Fuk (N11)	124		1-31	Type I
Total	460	48		

[1]These buildings are scheduled to be demolished by the year 2000 and so may not need to be insulated.

The insulation types are specified by the HKPSG and are as given below:

- Type I: openable, well-gasketted window, 6mm pane; and
- Type II: openable, double-glazed window in well-gasketted separate frames with a configuration of 6mm:150mm:6mm.

It should be noted that where Type I and Type II insulation have been recommended together, Type II is generally for the mid to lower floors, while Type I is for the upper floors.

It should be noted that the two schools in the Study Area are due to be insulated under the Education Department's (ED) school insulation programme. As a result, there is the possibility that these buildings will be insulated prior to the construction works for the widening of the roads in the Study Area. If these schools are insulated prior to the construction of the widened road, then the total number of units in the Study Area to be insulated would be 460 (reduction by 48 units). If these schools are not insulated prior to the construction or operation of the widened road, however, the responsibility for the funding of their insulation will be borne by the road widening project.

In addition, if the Chai Wan Estate Blocks 10 (N6) and 13 (N5) are to be demolished prior to the completion of road widening works, then the 62 units (58 units in Block 13 and 4 units in Block 10) at these blocks would not need to be insulated.

4.8 CONCLUSIONS AND RECOMMENDATIONS

4.8.1 *Construction Phase*

Noise impacts during the construction phase have been predicted to produce impacts in exceedance of the recommended daytime noise criterion at most of the nearby receivers. Noise mitigation measures in the form of packages of barriers and limiting plant total sound power levels have been recommended for each construction stage to reduce the noise impact at the residential receivers as far as possible. Noise insulation (Type II) and air conditioning are recommended for both of the schools in the study area; it is recommended that the insulation and air conditioning be installed prior to any construction works associated with the road widening. In addition, it has been recommended that the relevant noise mitigation measures and action plan be written into all contract documents and that noise monitoring be carried out during the construction works to check for compliance with the appropriate criteria.

4.8.2 *Operational Phase*

The peak-hour 2011 noise levels at most NSRs have been predicted to be significantly above 70 dB(A) at most residences and above 65 dB(A) at the schools. As a result, noise mitigation measures have been recommended.

The foregoing analysis has indicated that from a strictly environmental point of view, excluding engineering considerations, two direct mitigation measures would have the potential to generate reductions in noise levels at the NSRs within the Study Area during the operational phase of the widened road. These direct measures are:

- a low noise road surface on all sections of Chai Wan and Wing Tai Road in the Study Area, with the exception of the fly-over;
- and a 3 metre barrier on the south-side of the fly-over.

These two measures acting in combination would decrease noise levels by approximately 2-3 dB(A) at most locations.

It should be noted, however, even though noise levels would be reduced by 2-3 dB(A) at most locations, the prevailing noise level in 2011, with these two direct mitigation measures in place would still be significantly above the HKPSG noise criterion, generally in the range of 75-80 dB(A) at most locations. As a result, these mitigation measures cannot be considered effective in reducing noise levels at the receivers in the Study Area to acceptable levels.

In addition, if engineering considerations are taken into account, low noise surfacing is found to not be a viable surface for the roads in the Study Area. Low noise surfacing would be inappropriate for the Study Area primarily due to the fact that it is not a structural layer (as currently designed and produced in Hong Kong), and so as a result cannot resist braking, accelerating and centrifugal forces induced by running traffic. As a result of this weakness, it is not appropriate for roads with difficult geometry, such as that exhibited by the roads in the Study Area; the surfacing is not appropriate for roads which exhibit curves, 90-degree bends, signal junctions and pedestrian crossings. Specifically, the current design for friction course (ie Island Eastern Corridor [IEC] format) is suitable primarily for high speed roads (speeds above 70 kph), as a result it is inappropriate for low speed local roads.

It should be noted that HyD/EPD are currently conducting a joint trial study for the application of friction course to low speed local roads. This study will look into the durability and maintenance aspects of the surface as well as noise reduction ability, with a view to developing a suitable specification of friction course for the Hong Kong situation. However, the specification for this new surface will not be available for at least two years time, upon the completion of this trial test. In projects like Tung Chung New Town and West Kowloon Reclamation where there were long lead times, in order to allow these projects to progress, IEC format has been adopted in the road design with provision in the contract to incorporate a new specification for friction course once it is available. Due to the tight programme of this project, however, which is scheduled to commence early next year, this interim arrangement mentioned above is not applicable. The use of friction course is therefore not recommended.

However, should low noise surfacing ('friction course') be laid on the roads within the Study Area, it would be subject to many forces from stop-and-go traffic, continuous braking and acceleration and deceleration of traffic which have the potential to reduce its life from the normal 5 year period to approximately 1 year. Therefore, laying low noise road surface on the roads within the Study Area would incur a high level of social cost due to public inconvenience and disruption caused by the need for yearly resurfacing work on the roads within the Study Area. In short, the gains in reduction in operational noise could easily be erased by the need for yearly construction works and the subsequent traffic disruption and public inconvenience.

Without the possibility for the laying of low noise surfaces within the Study Area, the noise reduction potential for a barrier on the fly-over becomes insignificant. As a result, without a low noise surface on the roads, it is not recommended that a barrier be designed into the fly-over. In short, no form of direct mitigation measure is therefore possible.

Considering all of the foregoing analysis, it is concluded that no viable direct mitigation measures will be effective in reducing noise levels in the Study Area to acceptable noise levels under the HKPSG. As a result, it is recommended that in order to redress the noise impacts on the affected dwellings in accordance with the established government policy, indirect mitigation measures in the form of good quality/window and air-conditioning would be required for the Study Area. In addition, after Exco approval, it is recommended that a further detailed study be carried out to determine the exact number and locations of dwellings for the implementation of the insulation scheme.

For the HOS development, the predicted noise levels are slightly higher than those predicted in the Arup Acoustics, May 1994 Traffic Noise Assessment. This is manly due to the higher traffic data used for this assessment and also due to the nearer road alignment from the widened road. The recommendations of this Arup Acoustics report, a 3 metre high barrier on top of the carpark and window upgrading for the affected residences, are considered adequate and are recommended.

5 AIR QUALITY ASSESSMENT

5.1 *INTRODUCTION*

This section presents the impact of the air quality upon the sensitive receivers in the Study Area. Both the impact at the construction and operation phase have been assessed.

The proposed road network connects Island Eastern Corridor to the industrial area near Chai Wan cargo handling basin and the residential development at Siu Sai Wan. Several estates, including Tsui Wan Estate, Yue Wan Estate and Chai Wan Estate, are located to the west of the Study Area. Recreational areas within the study area will also be potentially affected by the proposed road network.

5.2 *BASELINE CONDITIONS*

There are currently no fixed monitoring station near the Study Area. To establish the baseline conditions of the study area, ambient air quality was monitored at the roof of Chai Wan Fire Services station (Location A1 in *Figure 4.2a*). Concentrations of Total Suspended Particulate (TSP), Respirable Suspended Particulate (RSP), Nitrogen Dioxide (NO_2), Nitrogen Monoxide (NO) and Carbon monoxide (CO) were monitored at the station for two weeks between 21.12.94 and 05.01.95. The results of the baseline air quality monitoring are presented in *Table 5.2a*. It can be seen that both the average and 90-percentile of hourly and daily concentrations of the air pollutants concerned are below the statutory requirements as described in *Section 5.4*.

Table 5.2a ***Baseline Ambient Air Quality***

Pollutant	Average Concentration (Microgram per cubic metre)		90-percentile Concentration (Microgram per cubic metre)	
	Hourly Average	24-hour Average	Hourly Average	24-hour Average
Total Suspended Particulates (TSP)	-	55.8	-	77.4
Respirable Suspended Particulates (RSP)	-	39.8	-	52.6
Nitrogen Dioxide (NO_2)	63.3	-	114.9	-
Nitrogen Oxide (NO)	24.8	-	54.1	-
Carbon Monoxide (CO)	943.3	-	1,600	-

5.3 AIR SENSITIVE RECEIVERS

Locations of air sensitive receivers (ASRs) were selected according to the criteria set out in the Hong Kong Planning Standards and Guidelines (HKPSG) and the Air Pollution Control Ordinance (APCO). These air sensitive receivers have been identified by initial site inspections and review of development plans at the Study Area. The locations of the ASRs are presented in *Table 5.3a* and are shown in *Figure 5.3a*.

Table 5.3a ***Location of Air Sensitive Receivers***

Sensitive Receivers	Locations
R1	Chai Wan Swimming Pool and Park
R2	Fu Shing Court
R3	Sun View Industrial Building
R4	Block 13 of Chai Wan Estate
R5	Block 10 of Chai Wan Estate
R6	Yue On House
R7	Football court near road junction
R8	Chai Wan Faith Love Lutheran School
R9	Tsui Fuk House (Tsui Wan Estate)
R10	Chai Wan Industrial City Phase 1
R11	The two basketball courts in front of the Chai Wan Faith Love Lutheran School and Fung Yiu Hing Memorial Primary School
R12	The proposed infill HOS housing blocks within Tsui Wan Estate

5.4 STATUTORY REQUIREMENTS

The principal legislation for the management of air quality is the Air Pollution Control Ordinance (APCO) (Cap 311). The whole of the Hong Kong Territory is covered by the Hong Kong Air Quality Objectives (HKAQOs) which stipulate the statutory limits of some typical air pollutants and the maximum allowable numbers of exceedance over specific periods. The HKAQOs are shown in Table 5.4a below.

Table 5.4a *Hong Kong Air Quality Objectives*

Pollutant	Concentration in micrograms per cubic metre (i) Averaging Time			
	1 Hour (ii)	8 Hours (iii)	24 Hours (iii)	1 Year (iv)
Total Suspended Particulates (TSP)			260	80
Respirable Suspended Particles (v) (RSP)			180	55
Nitrogen Dioxide (NO_2)	300		150	80
Carbon Monoxide (CO)	30,000	10,000		

Note:

(i) Measured at 298°K (25°C) and 101.325 kPa (one atmosphere).
(ii) Not to be exceeded more than three times per year.
(iii) Not to be exceeded more than once per year.
(iv) Arithmetic means.
(v) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 micrometres and smaller.

In addition, EPD recommended a maximum level of hourly TSP of 500 $\mu g/m^3$ at the boundary of any construction site.

5.5 CONSTRUCTION PHASE IMPACTS

5.5.1 Assessment Methodology

The likely air quality impact arising from improvement works on Chai Wan Road and Wing Tai Road is related to dust nuisance, and gaseous emissions from construction plant and vehicles.

SO_2 and NO_2 will be emitted from the diesel-powered equipment used. However, since the amount of such plant required on-site will be limited, their gaseous emissions will be insignificant. It is therefore not expected to cause the Air Quality Objectives for these gases to be breached from the limited construction plant. Potential dust nuisance will be the major concern from the improvement works.

Concrete drilling and aggregate material handling are the major sources of dust source on site. It is assumed that there is no stockpile or haul road within the site. Amount of gaseous pollutants generated will be insignificant in the construction phase.

Fugitive Dust Model (FDM) has been used to predict the likely dust impacts at the receivers for the improvement of road networks. It has been assumed that all activities are carried out in parallel in the model. In reality, the activities are of limited duration and could vary in time. A more conservative situation will be simulated by this approach.

TSP includes all sizes of particulates. It is assumed that 10% of the particulates are respirable with size less than 10μm. Average density of

2500 kg/m^3 have been assumed in this study. Particulate emission rates for the identified potential dusty sources have been determined based on the US EPA publication *Compilation of Air Pollutant Emission Factors (AP-42) 1985* which are presented in *Annex B.*

Meterological data for the year 1993 at Kai Tak International Airport and King's Part have been employed to modelled pollutant levels at the receivers. Both the worst case scenario of one hour and 24-hour average concentrations of TSP at the receivers have been calculated.

5.5.2 *Assessment Results*

Concentration of dust generated during the construction of Chai Wan Road/Wing Tai Road have been modelled and the results are shown in *Table 5.5a*. Construction works will be carried out in phases. The working area for each phase is fairly small and is less than 3000m^2. Major dust source like stockpile and haul road will not be presented within the site. Hence dust emissions from the site should be kept at a low level. As a result, dust impact due to construction works upon the receivers will be insiginificant.

Table 5.5a *Predicted TSP Levels at Air Sensitive Receivers*

Location	Predicted Hourly TSP Averages ($\mu g/m^3$)		Predicated Daily TSP Averages ($\mu g/m^3$)	
	Ground Level	10m Above Ground Level	Ground Level	10m Above Ground Level
R1	0.2	-	0 (77.4)	-
R2	0.4	0.3	0.2 (77.6)	0.1 (77.5)
R3	0.9	0.2	0.5 (77.9)	0.1 (77.5)
R4	2.4	0.8	1.4 (78.8)	0.3 (77.7)
R5	1.0	0.4	0.5 (77.9)	0.2 (77.6)
R6	0.6	0.4	0.4 (77.8)	0.2 (77.6)
R7	2.1	-	1.3 (78.7)	-
R8	0.9	0.4	0.6 (78.0)	0.2 (77.6)
R9	1.3	0.5	0.7 (78.1)	0.3 (77.7)
R10	3.7	0.8	2.0 (79.4)	0.3 (77.7)
R11	1.5	-	1.0 (78.4)	-
R12	1.6	0.6	0.3 (78.4)	0.3 (77.7)

NOTE:Cumulative level with the background are shown in bracket.
Background levels are taken as the 90-percentile of all the monitored data.

The modelled TSP levels suggested that dust generation from construction of the road network will not cause significant impacts to the receivers. At ground level, the hourly averages will be increased by 2 $\mu g/m^3$; while the increase in daily averages will be insignificant. At higher level, the impact is negligible.

The cumulative level also indicate that the dust levels at the receivers are well below the criteria stipulated by HKAQOs.

5.6 *OPERATIONAL PHASE IMPACTS*

5.6.1 *Assessment Methodology*

In the operational phase of the proposed road junction improvement, vehicular emissions are the major pollutants. NO_2, CO and RSP are the major composition of the pollutants. Projected morning peak hour traffic flows and vehicular mix for the year 2011 were obtained from the transport model data provided by the Transport Department; this data have been presented in Section 2.

CALINE4 has been used to predicted the pollutants levels attributed to the traffic within the Study Area. Concentrations of NO_2, RSP and CO have been modelled and superimposed on baseline conditions to predict the total pollutant levels for worst case meterological conditions. It is assumed that any pollutant generated by vehicles outside the Study Area would be included in the background levels obtained from the baseline monitoring programme. It has been agreed with EPD that 90-percentile of the monitoring results would be employed as the background level of the Study Area.

Emissions factors of NOx, RSP and CO for each vehicular type in 2011 were supplied by EPD and compound emission factors were calculated to represent average emission rates for the traffic within the Study Area. Gaseous pollutants have been assumed to be inert and levels of NO_2 have been taken as 20% of total NOx emission as recommended by EPD.

As the peak hour traffic occurs during daytime, neutral meterological conditions have been assumed. Typical input parameters for the model are listed below:

· Wind Speed	2 m s^{-1}
· Wind Direction	worst case for each receivers
· Stability Class	D
· Mixing Height	500 m
· Standard Deviation	20 degree
· Temperature	25 deg C

Assessment Results

Hourly averages of pollutants at three levels: ground level, flyover level and 10 m above ground, have been modelled. Results show that pollutant levels at ASRs are low and the results are presented in *Table 5.6a*.

At ground level, levels of nitrogen dioxide at ASRs range from 22 $\mu g/m^3$ to 143 $\mu g/m^3$. Higher levels of pollutants are expected at Sunview Industrial Building (R3), Block 10 of Chai Wan Estate (R5) and the football court near road junction (R7). The higher levels of pollutants are attributed to the close proximity of the receivers to the road network. However, the impact is greatly reduced with height. NO_2 level of 42 $\mu g/m^3$ is predicted at the worst affected receivers at 10 m above the ground level. Traffic flow over the flyover is comparatively less than the associated road netweork. Concentrations of pollutants are higher at the ground level.

The behaviour of CO and RSP behave in a similar pattern with that of

NO_2.

Table 5.6a ***Predicted Pollutant Levels at ASRs***

Location	Predicted hourly averages ($\mu g/m^3$)								
	NO_2			CO			RSP		
	0 m	Flyover	10 m	0 m	Flyover	10 m	0 m	Flyover	10 m
R1	23 (137)	-	-	219 (1818)		-	10 (62)	-	-
R2	105 (220)	53 (168)	41 (156)	977 (2578)	483 (2083)	380 (1980)	45 (98)	22 (75)	18 (70)
R3	143 (258)	56 (171)	41 (156)	1346 (2946	506 (2106)	403 (2023)	62 (11 5)	23 (76)	18 (71)
R4	75 (190)	53 (168)	41 (156)	679 (2279)	483 (2083)	403 (2023)	32 (84)	22 (75)	18 (71)
R5	113 (228)	41 (156)	30 (145)	1058 (2658)	380 (1980)	288 (1888)	49 (10 2)	18 (70)	13 (66)
R6	45 (160)	34 (149)	26 (141)	426 (2026)	311 (1911)	253 (1853)	20 (72)	14 (67)	12 (64)
R7	102 (216)	-	-	932 (2532)	-	-	43 (96)	-	-
R8	49 (164)	45 (160)	41 (156)	460 (2060)	403 (2003)	368 (1968)	22 (74)	19 (71)	17 (70)
R9	42 (156)	34 (149)	34 (149)	391 (1991)	334 (1934)	299 (1899)	18 (71)	15 (68)	14 (67)
R10	56 (171)	38 (153)	30 (145)	541 (2141)	334 (1934)	288 (1888)	25 (77)	16 (68)	13 (66)
R11	49 (164)	-	-	460 (2060)	-	-	21 (74)	-	-
R12	45 (160)	38 (153)	34 (149)	437 (2037)	357 (1957)	322 (1922)	20 (73)	17 (69)	15 (68)

Note: Cumulative levels with background are shown in brackets.
Background levels are taken as the 90-percentile level of all the monitored data.

Prediction results shown in *Table 5.6a* indicate that the cumulative impact (i.e. background plus predicted hourly averages) is within the HKAQOs.

It is indicated that the hourly RSP are within the daily RSP criteria of $180\mu g/m^3$. As a result the daily RSP levels will also be complied with the criteria.

As indicated in *Section 4* that a 3 m acoustic barrier has been proposed along the flyover to reduce the noise impact at the receivers. Dispersion of pollutants will be obstructed by the barrier and they will be accumulated at the flyover. When the wind is blowing along the floyover, the accumulated pollutants will be dispersed and the ASRs will receive a higher pollution impacts. As the traffic flow over the flyover is small in volume (less than 1000 veh/hr), the air quality impact attributed to the vehicular emissions of flyover will be small compared with the road network. Hence, the bluff effect due to the 3m barrier will not be vital in this assessment.

5.7 MITIGATION MEASURES

5.7.1 *Construction Phase*

The road works are not expected to cause significant dust impact in relation to the criteria presented above. Nevertheless, the following dust control measures as part of the design and good site housekeeping practices should be implemented to minimise any dust nuisance arising from the works:

- Where breaking of oversize rock/concrete is required, watering should be implemented to control dust.
- The dropping heights for excavated materials should be controlled to a practical minimum to minimize the fugitive dust arising from unloading.
- During transportation by truck, materials should not be loaded to a level higher than the side and tail boards, and should be dampened or covered before transport.
- Effective water sprays should be used on the site at potential dust emission areas such as unpaved area.
- To ensure that the dust levels do not exceed the AQOs, environmental monitoring and audit of dust should be undertaken at appropriate selected ASRs throughout the road works.

5.7.2 *Operational Phase*

Vehicular emissions from vehicles on the proposed network will not have significant environmental impacts on receivers at 2011. Special mitigatory measures will therefore not be required.

5.8 CONCLUSIONS AND RECOMMENDATIONS

5.8.1 *Construction Phase*

The construction work for the widening of Chaiwan Road and Wing Tai Road will inevitably lead to dust emissions, mainly from excavation of soil and rock. The dust generated from excavation and drilling is predicted to be well within the limits of the AQOs and therefore significant impacts are not expected. However, dust control measures should be implemented as part of good site housekeeping practice to minimise any dust nuisance.

5.8.2 *Operational Phase*

Levels of NO_2, RSP and CO have been modelled and the bluff effect due to the proposed 3m noise barrier has been studied. It is indicated that the HKAQOs will not be exceeded in the design year at any receivers.

6 VISUAL AND LANDUSE IMPACT ASSESSMENT

This section of the report assesses the perceived visual and landuse impacts which shall be experienced during the construction and operational phases of the proposed road widening scheme.

6.1 VISUAL IMPACT ASSESSMENT

6.1.1 *Introduction*

The visual impact assessment is achieved by :

- investigation of the landscape context of the development site in terms of the surrounding topography, vegetation, land use and landscape character;
- identification of the major zones of visual influence of the development;
- identification of the potential visual receivers who will be affected by the development;
- synthesis of the above information leading to a comparative evaluation of the landscape and visual impacts.
- identification of potential mitigation measures.

6.1.2 *Existing Landscape Context*

Topography

The site lies within a low lying flat area at the north eastern coastline of Hong Kong island. Glimpses of the surrounding mountains encircling the west, south and east of Chai Wan are seen between the buildings. The visible summits include Pak Ka Sham (Mount Parker 531 mpD) and Mount Collinson (347 mpD) to the north west and south east respectively.

Vegetation

Figure 6.1a illustrates existing vegetation of the site.

Within the site, the existing vegetation comprises mostly roadside trees. Some of these are semi mature, however most are newly planted.

There is a small sitting out area outside Yue Wan Estate containing environmental trees, shrubs and palms in moveable planters.

Immediately adjacent to the site are a few groups of mature and semi mature trees at Yue Wan Estate boundary and Chai Wan Estate Playground. There is a vegetated slope beneath Chai Wan Swimming baths which is covered with grass, scrub and low trees.

The findings of the vegetation survey reveal that a large number of trees shall be affected by the road widening works. These are illustrated in Figure 6.1 a and described below:

No. 1–20	A line of recently planted street trees ranging between 2.5 to 5 metres in height including Spathodea campanulata, Cassia siamea and Dalbergia balansae. All of these are in good health, however have moderate form and a medium amenity value. All of these trees shall be affected by the road widening works and should be transplanted.
No. 21–26	A line of semi-mature street trees outside Chai Wan Estate Block 13, including Albizzia lebbeck, Bombax malabaricum and Callistemon viminalis. One of the trees is dead and should be removed. The remainder should be retained within the proposed pavement widening.
No. 27–29	A line of newly planted street trees at the southern kerb of Chai Wan Road and the central reservation beneath Chai Wan swimming baths include Acacia mangium and Cassia siamea and one dead tree. The living trees are in good health and have moderate form and medium amenity value.
	All of the trees shall be affected by the road widening works. Six trees should be transplanted and the dead tree removed.
No. 35–38	A line of semi-mature trees including Aleurites moluccana, Spathodea campanulata and Hibiscus tiliaceus. All of these trees are in good health and have moderate form.
	These trees have a moderate amenity value, and they should be retained in their existing locations.
Group A	Newly planted trees at the central reservation which shall be affected by the realignment of the road.
Group B	A line of newly planted trees and structure planting (trees and shrubs) outside Tsui Wan Estate which shall be affected by the road widening proposals. The trees have good form and moderate amenity value and should be transplanted where possible.
Group C	Continuous groups of semi-mature and mature trees at Yue Wan Estate boundary. Species include Casuarina and Acacia. The trees form a valuable visual buffer at the residential estate and schools boundary. A large number of these trees shall be affected by the road widening works and where feasible should be transplanted to alternative locations.
Group D	A line of newly planted feature trees in removable planters, and kerbside trees and shrubs at Yue Wan Estate sitting out area. All of these shall be affected by the road

widening proposals and where feasible, the existing trees should be transplanted.

Group E	Existing semi-mature kerbside trees outside Chai Wan Estate playground. These trees have a higher amenity value and are in good health and should be retained in their existing locations.
Group F	Several groups of trees and shrubs in planters at the boundary and at the kerbedge outside Sheung On football grounds. These have moderate to high amenity value and should be retained.
Group G	A line of existing semi-mature feature trees including Palm trees which are in good health and have high amenity value. These trees should be retained in their existing locations.
Group H	A group of low bushy trees and shrubs growing naturally on the slope beneath Chai Wan swimming baths. These trees shall not be affected by the road widening works.
Group I	A line of semi-mature existing trees outside Chai Wan Fire Station including Macaranga. These trees have a moderate amenity value and should be retained at their existing locations where possible

Landuse

Existing Land Use

The existing land uses along the proposed road alignment are GIC, residential and industrial (see Figure 6.1b). There are seven private residential buildings in the study area. These are located adjacent to Hong Ping Street and are Fu Shing Court, Fu On Court, Artland Court, Sun Tak House, Artview Court, Fu Ming Court and Wah Yu Court. There are also three Housing Authority estates namely Yue Wan Estate, Chai Wan Estate and southern part of Tsui Wan Estate.

The GIC uses along the proposed road alignment are listed as follows:

Along Chai Wan Road:

- Bus Depot
- Chai Wan Swimming Pool & Park
- Po Leung Kuk Committee Fellowship Primary School
- Chai Wan Estate Playground

Along Wing Tai Road:

- Chai Wan Fire Station
- Football Court
- Fung Yiu Memorial Primary School
- Chai Wan Faith Love Lutheran School

There are two sites currently under construction within the study area.

The site located adjacent to San Ha Street is being redeveloped as a secondary school. The site located adjacent to Chai Wan Road is being redeveloped under the Housing Authority Private Sector Participation Scheme. Completion is expected in March 1995.

According to the Housing Authority, the remaining blocks of Chai Wan Estate will be demolished. The vacant site will then return to the Government for school redevelopment. The clearance programme will be carried out in two phases. Phase 1, comprising the clearance of Block 9–12, is expected to commence in 1997 while Phase 2, clearance of Block 13–15, will commence in 2000.

Contaminated Land

The long term use for the bus depot has been for the storage of derelict buses. This has resulted in oil and grease spillages soaking into the ground are many years. The extent of contamination has not been determined to date.

Statutory Land Use Zoning

The statutory zoning of the study area is 'R(A)', 'R(B)', 'I', 'GIC' and 'O' as depicted on the Chai Wan OZP (No. S/H20/6). A total of two land use zonings within the study area have been recently amended and indicated under 'Item C' and 'Item D' (see Figure 6.1c). 'Item C' refers to the Chai Wan Estate bounded by Chai Wan Road and San Ha Street. The site has recently been rezoned from "Residential (Group A)" to "Open Space" and "Government/Institution/Community". 'Item D' depicted on Figure 6.1c indicated that the existing Chai Wan Swimming Pool at the eastern end of San Ha Street has been rezoned from "Open Space" to "Government/Institution/Community".

Landscape Character

The landscape can be described an urban roadscape. The surrounding buildings are large scale and are strongly predominant features of the local environment. Kerbside trees have been planted along several streets within Chai Wan.

6.1.3 *Zones of Visual Influence*

The proposed road widening development comprises the following works:

- construction of a flyover to carry through traffic from Chai Wan Road westbound to Wing Tai Road northbound;
- widening of a section of Wing Tai Road between Sheung On Street mini-bus terminus and Chai Wan Road to dual 3-lane carriageway;
- modification of the junction layout of Chai Wan Road/Wing Tai Road and Chai Wan Road/Sun Yip Street; and
- construction of the associated traffic islands, footway, landscaped open-space and traffic aids.

The assessment shall consider what can be seen during the construction phase and the operational phase.

The zone of visual influence of the development have been identified through a mixture of site investigation and desk top analysis of local topographic and land use plans (Figure 6.1d). The principle vantage points identified within the zone of visual influence are summarised below (read in conjunction with Figure 6.1e):

North of Wing Tai/Chai Wan Road

D1 Wing Tai Temporary Housing Area (zoned Industrial for future land use)

D2–4 Chai Wan Industrial City/Cornell Commercial Centre (zoned Industrial for future land use)

F1 Chai Wan Fire Station
Open Space (football courts)
Bus Depot

F2 On Yip Temporary Housing Area (zoned for future Government/Institution/Community land use)

F3 Indoor Bus Depot (zoned Industrial for future land use)

F4 Sunview/Union Industrial Buildings

G1–4 Fung Yip Street Industrial/Commercial Buildings (zone Industrial for future land use)

K1–3 Island Transfer Centre, Commercial Tower, Honour Industrial Building

West of Wing Tai/Chai Wan Road

A1 Tsui Wan Residential Estate

A2–3 Yue Wan Residential Estate

A4–5 Chai Wan Faith Love Lutheran School and Fung Yin Hing Memorial Primary School

South of Chai Wan Road

B1–3 Chai Wan Residential Estate Blocks 9–12 inclusive (zoned for future Government Institution/Community land use)

Chai Wan Playground

B4 Chai Wan Residential Estate Block 13 (zoned for future open space land use)

C1–7 Hong Ping Street Residential Area (Sun Tak House, Artland Court, Fu On Court, Fu Shing Court)

Chai Wan Swimming Pool and Park (zoned for future Government

Institution/Community land use)

Approaching North-eastwards along Chai Wan road

6.1.3.0.1 Approaching South-eastwards along Wing Tai Road

6.1.3.0.2 Approaching North-westwards along Chai Wan Road

Photomontages P1-P7 (Figures 6.1f (i-vii) illustrate the visual impacts which shall be experienced from some of the more significant vantage points (see Annex C).

6.1.4 *Visual Receptors*

For the purpose of this study, the potential visual receptors may be grouped into four main categories:

- those who view the development from their homes;
- those who view the development from their workplace;
- those who view the development whilst partaking in an outdoor leisure activity;
- those who view the development whilst travelling along a public thoroughfare.
- The sensitivity of each group is influenced by the immediate context of the receptor and location relative to the visual intrusion.

a) Those who view the road widening scheme from their homes are considered to be the most affected by any visual intrusion associated with the development. This is because the attractiveness, or otherwise, of the outlook from the home will have a very significant affect on the home dwellers' perception of quality and acceptability of their home environment and their general quality of life.

b) The second category of visual receptors, those who view the road widening scheme from their workplace, are considered to be relatively less affected by potential visual intrusion than those in the first category. This is because they are employed in activities where visual outlook plays a less important, although still significant, role in the perception of the quality of the working environment.

c) The third category of visual receptors, those who can see the road widening scheme whilst taking part in an outdoor leisure activity, are considered more or less sensitive according to the type of activity being enjoyed. Football players, for example, are usually less concerned with the quality of their surrounding environment than hill walkers.

d) The fourth category of visual receptors comprises those who view the road widening scheme whilst travelling along a public thoroughfare. The degree of sensitivity of these receptors depends to a large extent on the speed of travel and whether the view is continuous or occasionally glimpsed. Generally, the slower the speed of travel and the more continuous the viewing experience becomes then the greater the degree of sensitivity.

The significance of the visual influence on these visual receptors may vary greatly and is considered to be dependent on the complex inter-relationship of a number of factors including:

a) the nature of the road widening scheme and its compatibility with the surrounding landscape;

b) the number of visual receivers;

c) the category or type of visual receivers as discussed above;

d) the distance of the visual receiver from the road widening scheme;

e) the length of time the road widening scheme is in view;

f) the landscape context of the road widening scheme;

g) the particular visual backdrop to the development from specific important view points;

h) whether the road widening scheme blocks attractive views or screens unattractive ones.

6.1.5 *Analysis of Visual Impacts*

Having identified the principal representative vantage points within the zone of visual influence the perceived impacts can be evaluated based upon the criteria discussed in Section 6.1.4. The findings of the survey are collated in Figure 6.1g and are summarised and discussed below:

Visual Impacts During the Construction Phase

The visual impact of the proposed road widening scheme shall be greatest during the construction phase when it is anticipated that large scale machinery such as cranes may be used for erecting the elevated road structure.

In order of decreasing significance, visual impacts shall be experienced by the following receivers:

- Very high impacts shall be experienced by residents of Chai Wan Estate Block 13 and some residents of Sun Tak House who directly overlook the site area.

- High impacts shall be experienced by walking along Chai Wan/Wing Tai Road. These pedestrians shall be fully exposed to the road works.

- Moderate to high impacts shall be experienced by residents at Yue Wan Estates who shall experience semi-obscured views of the flyover construction and road works were existing vegetation is removed at the boundary and the estate.

- Moderate impacts shall be experienced by some of the residents at Yue Wan Estate, residential blocks and gardens, Chai Wan Estate Blocks 10 - 12, Tsui Wan Estate, Artland Court, Fu On Court, Fu Shing Court, Artview Court, Fu Ming Court, Wah Yu Court and users of Chai Wan Estate playground, who shall experience either semi obscured or partial views of the road works.

- Low impacts shall be experienced by students and workers at Fung Yiu Hing Memorial School, Chai Wan Faith Love Lutheran School and users of Yue Wan Estate recreation area, owing to the visual screen created by existing vegetation.

- Very low impacts may be experienced from elsewhere within the zone of visual influence where views are distant, partially obscured or restricted to oblique views from Chai Wan Swimming Baths, Chai Wan Cemetery, Wing Tai and On Yip Temporary Housing Areas, Chai Wan Fire Station and Sheung On Football Ground.

- Insignificant impacts shall be experienced by workers at Chai Wan Industrial City Phase I and II, the Cornell Centre, Chai Wan Marine Department Buildings, Chai Wan Bus Station, Sunview Industrial Centre, and the adjacent commercial/industrial complex, Yip Cheung Centre, Yan Nin Industrial Building, Casey Industrial Building, Cheung Yick Industrial Building, Prince Factory Building, the Island Transfer Centre, Honour Industrial Building and adjacent commercial tower, and finally TWGHs Lee Chi Hung Memorial Primary School.

Visual Impacts During the Operational Phase

Visual impacts experienced during the early operational phase shall be similar to, but less significant than those experienced during construction phase. The impacts shall gradually reduce over time as the proposed planting matures, eventually screening a large portion of the elevated structure. However, during the initial years of the operational phase, visual impacts shall be experienced by the following groups, listed in order of decreasing significance:

- residents of Chai Wan Estate Block 13;

- some residents at Sun Tak House;

- pedestrians walking along Chai Wan Road/Wing Tai Road within viewing distance of the flyover;

- some residents of Tsui Wan Estate, Chai Wan Estate Blocks 10 - 12, Yue Wan Estate residential blocks and gardens, Artland Court, Fu On Court, Fu Shing Court, Artview Court, Fu Ming Court, Wah Yu Court and Chai Wan Estate Playground.

The anticipated net visual impacts experienced from the primarily residential area south of Chai Wan Road/Wing Tai Road shall be a small positive impact, (ie a net improvement) once the landscaping reaches maturity. The net visual impacts experienced from the industrial area at the northern side of the Chai Wan/Wing Tai Road shall be negative. However the significance of these negative visual impacts is considered to be minor because of the small number of receptors, their distance from the development and the limited duration of their views.

Architectural Treatment to the Flyover

To alleviate the potential visual impact of the proposed flyover, the following recommendations are made:

(a) The combined length of the ramp and the flyover should be shortened to the minimum required to meet road design standards.

(b) The cross sectional profile of the flyover should be of smooth, sinuous form. Sharp, angular corners or edges should be avoided. The treatment to the abutment should be similar so as to achieve a continuity of form.

(c) The underside of the structure will be highly visible and should be carefully detailed to avoid cluttering of drainpipes and to minimise streaklines from rainwater. All drainpipes should be incorporated within the structure.

(d) The columns should be designed with round plan form and no sharp edges so as to echo the smooth lines of the flyover. They should be flared as far as possible so as to minimise their 'footprint', particularly within the landscaped area.

Finishing to the columns should be a combination of fair face concrete and textured concrete arranged in patterns which maximise the appearance of slenderness.

6.2 LANDUSE IMPACT ASSESSMENT OF THE FUTURE ROAD SYSTEM

6.2.1 *Introduction*

This section identifies the likely impacts to current and future land use resulting from the proposed widening of Chai Wan/Wing Tai roads. Widening proposals will absorb almost 2.0 hectares of land currently given to existing land uses. An area of almost 2,200 square metres abutting the northern edge of Chai Wan Estate will be gained from the proposed realignment of Chai Wan Road. Provision for the widening proposals is made within the operative OZP for the area. Cognisance is also taken of the Lands Department designation within land parcels for the area.

6.2.2 *Impacts on Existing Land Use*

The widening of western edge of Wing Tai Road will directly encroach into areas of passive open space within Yue Wan and Tsui Wan Estates. An area of almost 1,400 square metres will be lost from the present combined site area of the two estates. The land lost, however, does not fall within the present cadastral boundaries of each estate. The majority of the loss will occur within Yue Wan Estate where a portion of the playground attached to the Chai Wan Faith Love Lutheran School will be lost. The road widening will impinge on the present amenity of the estate and bring the edge of the road reserve hard against the eastern boundary of Yue On House residential block.

The Yue Wan Estate sitting out area is currently located on the Western edge of Wing Tai Road at its junction with Chai Wan Road. This facility will be lost entirely as a result of the road widening proposals. The facility could be reprovisioned within an area of land created as a result of the realignment of Chai Wan Road. This is not recommended as the likely future volume of traffic within the area would not be conducive to maintaining a sitting out facility in this location. The development of the area for amenity planting purposes is suggested for the site. The sitting out area could, however, be accommodated within the replanning of Chai Wan Estate.

A bus parking area is currently located at the north eastern edge of the junction of Chai Wan Road and Wing Tai Road. The bus park is currently operated on a short term tenancy (STT) held by CMB. The bus company is aware of the road widening proposals but has no current relocation plans. The road widening scheme will not permit continuance of bus parking within the curtilage of the new road reserve.

An area of active open space is provided to the north of Chai Wan Bus Station. Minor direct encroachment on the site will result from the widening proposals. The impact to amenity is however greater given that the existing road edge is over 60 metres from the edge of the site.

Significant disruption to the pedestrian network will result from the road widening proposals. The new road arrangement is largely free flowing which will require that defined and protected crossings will have to be established to replace existing provision. The creation of a safe and secure pedestrian network is of some importance. Several schools are located within the subject area which will require safe pedestrian crossings for children. Similarly, crossings will have to be provided to ensure safe public access to Chai Wan Bus Station. Controlled at – grade crossings would, subject to a traffic assessment, appear to be a logical option within the context of the proposed road configuration.

The proposed flyover will give rise to impacts to visual amenity. These are addressed elsewhere within this report. There is unlikely to be scope for the inclusion of land uses under the flyover. Current EPD Guidelines limit the range of uses permitted under elevated structures. To enhance the visual amenity of the area it is generally recommended that spaces beneath the proposed flyover are given to amenity planting and pedestrian refuges where appropriate.

6.2.3 *Impacts on Proposed Land Use*

The statutory planning framework for the area has had regard to the proposed road widening scheme. A reserve depicting the area of the proposed road widening has been indicated on the subject OZP.

Due regard to the proposed road widening and the construction of the proposed flyover will need to be taken in the re–planning and redevelopment of Chai Wan Estate in order to avoid impacts to the amenity of the future estate.

Elsewhere no impacts to future anticipated land use are likely to arise from the subject proposals.

6.3 ADDITIONAL LANDSCAPE MITIGATION MEASURES

Landscape Mitigation Measures

Additional landscape mitigation measures are proposed, over and above the landscape measures included on the original development proposal. These are illustrated in Figure 6.1h and are listed below:

- Tree and shrub planting and had landscape works at Tsui Wan and Yue Wan Estate boundaries to mitigate the loss of the existing tree screen and the degradation of the residential landscapes.
- Transplanting of existing trees from outside Chai Wan Industrial City Phase I and II and the Cornell Centre, to the realigned kerb edge.
- Tree and shrub planting at the central reservation at Wing Tai Road to mitigate the increased visible portion of roadway seen from Yue Wan and Tsui Wan Estate, Chai Wan Industrial City and by pedestrians, drivers and passengers in Wing Tai Road.
- Provision of a new amenity area at the widened pavement outside Chai Wan Estate Block 13, in order to mitigate the loss of the existing sitting area outside Yue Wan Estate.
- Kerbside tree planting at the northern side of Chai Wan Road from the Fire Station to Chai Wan Bus Depot to mitigate the negative visual impact created by the proposed flyover when viewed from the north.
- Kerbside tree planting and tree and shrub planting at the central reservation between Chai Wan Bus Depot and the eastern extent of the road works, to mitigate the impact of the road widening and the flyover.
- Reinstatement of a granite faced toe wall and enrichment planting at the base of the existing slope at Chai Wan Swimming Baths to mitigate the loss of parts of the existing wall.

If the additional landscape mitigation measures described above are implemented, then the residual impacts would comprise a significant positive impact (ie. an improvement) when viewed from most locations within the zone of visual influence. However, small negative impacts are still likely to be experienced by pedestrians walking and motorists and passengers in vehicles driving along Chai Wan/Wing Tai Road.

6.4 VISUAL IMPACT ASSESSMENT

6.4.1 *Visual Impact During the Construction Phase*

Negative impacts shall be experienced throughout the zone of visual influence. The most significant of these shall be experienced by the residents of the housing areas to the south of Chai Wan/Wing Tai Road, particularly residents of Chai Wan Estate Block 13 and Sun Tak House. Significant negative impacts shall also be experienced by pedestrians walking along Chai Wan/Wing Tai Road. The negative impacts experienced from the northern side of the road works shall be insignificant or very low.

6.4.2 *Visual Impact During the Operation Phase*

During the early operational phase, the groups of receptors who experience negative visual impacts shall be similar to those identified during the construction phase. However the impacts to which they are subject shall be less significant during the operational phase. As the proposed landscape planting begins to screen the flyover, some of these negative impacts shall gradually change to positive impacts (ie. net improvement) for example those experienced from Yue On House, Chai Wan Estate Block 13 and Sun Tak House.

6.4.3 *Visual Impacts Resulting from Proposed Mitigation Measures*

Positive visual impacts would be generated by the additional landscape mitigation measures described in para 6.3 resulting in a widespread improvement in the visual quality of the landscape. They would also mitigate certain negative impacts generated by the noise barriers.

6.5 *LAND USE IMPACTS*

6.5.1 *General*

The proposed Chai Wan Road/Wing Tai Road widening will have an impact on a number of existing developments. A number of existing facilities will be reduced in size or will be lost completely. The widening of the road reserve adjacent to Chai Wan Estate Block 13 will marginally improve the current situation by providing an increased distance from the road edge to Chai Wan Estate Block 13. This will be a marked improvement on the current situation wherein the Housing Block abuts the road edge.

The existing CMB bus parking area will be absorbed by the road widening proposals. An alternative site for bus parking will, therefore, be required.

The implementation of the road widening proposals will require the provision of secure pedestrian crossings to provide safe access to Public transport and G/IC facilities.

Several public residential blocks are anticipated to be redeveloped over the next 6 years. The layout of the replacement estates should take cognisance of the impact of the road widening proposals. For example, the redevelopment of these estates could adopt a self protective building design and building orientation measures which could mitigate anticipated impacts upon receptors which the study has identified in connection with the proposed development. However, Housing Authority do not have current plans in this regard.

7 CONCLUSIONS AND RECOMMENDATIONS

The present EIA study has indicated that there are some impacts associated with the construction noise of the proposed road widening project. However, the impact during the operation phase is in general not significant. This section summarises the impacts and the recommended mitigation measures.

7.1 NOISE

7.1.1 Construction Phase

Noise impacts during the construction phase have been predicted to produce impacts in exceedance of the recommended daytime noise criterion at most of the nearby receivers. Noise mitigation measures in the form of packages of barriers and limiting site sound power levels have been recommended for each construction stage to reduce the noise impact at the residential receivers as far as possible. Noise insulation (Type II) and air conditioning are recommended for both of the schools in the study area; it is recommended that the insulation and air conditioning be installed prior to any construction works associated with the road widening. In addition, it has been recommended that the relevant noise mitigation measures be written into all contract documents and that noise monitoring be carried out during the construction works to check for compliance with the appropriate criteria.

7.1.2 Operational Phase

The peak-hour 2011 noise levels at most NSRs have been predicted to be significantly above 70 dB(A) at most residences and above 65 dB(A) at the schools. As a result, noise mitigation measures have been recommended.

The foregoing analysis has indicated that from a strictly environmental point of view, excluding engineering considerations, two direct mitigation measures would have the potential to generate reductions in noise levels at the NSRs within the Study Area during the operational phase of the widened road. These direct measures are:

- a low noise road surface on all sections of Chai Wan and Wing Tai Road in the Study Area, with the exception of the fly-over;
- and a 3 metre barrier on the south-side of the fly-over.

These two measures acting in combination would decrease noise levels by approximately 2-3 dB(A) at most locations.

It should be noted, however, even though noise levels would be reduced by 2-3 dB(A) at most locations, the prevailing noise level in 2011, with these two direct mitigation measures in place would still be significantly above the HKPSG noise criterion, generally in the range of 75-80 dB(A) at most locations. As a result, these mitigation measures cannot be considered effective in reducing noise levels at the receivers in the Study

Area to acceptable levels.

In addition, if engineering considerations are taken into account, low noise surfacing is found to not be a viable surface for the roads in the Study Area. Low noise surfacing would be inappropriate for the Study Area primarily due to the fact that it is not a structural layer (as currently designed and produced in Hong Kong), and so as a result cannot resist braking, accelerating and centrifugal forces induced by running traffic. As a result of this weakness, it is not appropriate for roads with difficult geometry, such as that exhibited by the roads in the Study Area; the surfacing is not appropriate for roads which exhibit curves, 90-degree bends, signal junctions and pedestrian crossings. Specifically, the current design for friction course (ie Island Eastern Corridor [IEC] format) is suitable primarily for high speed roads (speeds above 70 kph), as a result it is inappropriate for low speed local roads.

It should be noted that HyD/EPD are currently conducting a joint trial study for the application of friction course to low speed local roads. This study will look into the durability and maintenance aspects of the surface as well as noise reduction ability, with a view to developing a suitable specification of friction course for the Hong Kong situation. However, the specification for this new surface will not be available for at least two years time, upon the completion of this trial test. In projects like Tung Chung New Town and West Kowloon Reclamation where there were long lead times, in order to allow these projects to progress, IEC format has been adopted in the road design with provision in the contract to incorporate a new specification for friction course once it is available. Due to the tight programme of this project, however, which is scheduled to commence early next year, this interim arrangement mentioned above is not applicable. The use of friction course is therefore not recommended.

However, should low noise surfacing ('friction course') be laid on the roads within the Study Area, it would be subject to many forces from stop-and-go traffic, continuous braking and acceleration and deceleration of traffic which have the potential to reduce its life from the normal 5 year period to approximately 1 year. Therefore, laying low noise road surface on the roads within the Study Area would incur a high level of social cost due to public inconvenience and disruption caused by the need for yearly resurfacing work on the roads within the Study Area. In short, the gains in reduction in operational noise could easily be erased by the need for yearly construction works and the subsequent traffic disruption and public inconvenience.

Without the possibility for the laying of low noise surfaces within the Study Area, the noise reduction potential for a barrier on the fly-over becomes insignificant. As a result, without a low noise surface on the roads, it is not recommended that a barrier be designed into the fly-over. In short, no form of direct mitigation measure is therefore possible.

Considering all of the foregoing analysis, it is concluded that no viable direct mitigation measures will be effective in reducing noise levels in the Study Area to acceptable noise levels under the HKPSG. As a result, it is recommended that in order to redress the noise impacts on the affected dwellings in accordance with the established government policy, indirect mitigation measures in the form of good quality/window and air-conditioning would be required for the Study Area. In addition, after Exco approval, it is recommended that a further detailed study be carried out to determine the exact number and locations of dwellings for the implementation of the insulation scheme.

For the HOS development, the predicted noise levels are slightly higher than those predicted in the Arup Acoustics, May 1994 Traffic Noise Assessment. This is manly due to the higher traffic data used for this assessment and also due to the nearer road alignment from the widened road. The recommendations of this Arup Acoustics report, a 3 metre high barrier on top of the carpark and window upgrading for the affected residences, are considered adequate and are recommended.

7.2 AIR QUALITY

7.2.1 *Construction Phase*

The construction work for the widening of Chai Wan Road and Wing Tai Road will inevitably lead to dust emissions, mainly from excavation of soil and rock. The dust generated from excavation and drilling is however predicted to be well within the limits of the Hong Kong Air Quality Objectives (HKAQO) and therefore significant impacts are not expected. However, dust control measures should be implemented as part of good site housekeeping practice to minimise any dust nuisance.

7.2.2 *Operational Phase*

Levels of NO_2, RSP and CO have been modelled and the bluff effect due to the proposed 3m noise barrier has been studied. It is indicated that the HKAQOs will not be exceeded in the design year at any receivers.

7.3 VISUAL AND LANDUSE

As discussed in Section 6, negative impacts shall be experienced throughout the zone of visual influence. The most significant of these shall be experienced by the residents of the housing areas to the south of Chai Wan/Wing Tai Road, particularly residents of Chai Wan Estate Block 13 and Sun Tak House. Significant negative impacts shall also be experienced by pedestrians walking along Chai Wan/Wing Tai Road. The negative impacts experienced from the northern side of the road works shall be insignificant or very low.

Positive visual impacts would be generated by the additional landscape mitigation measures described in para 6.3 resulting in a widespread improvement in the visual quality of the landscape. They would also mitigate certain negative impacts generated by the noise barriers.

With regard to landuse impact, the proposed Chai Wan Road/Wing Tai Road widening will have an impact on a number of existing developments. A number of existing facilities will be reduced in size or will be lost completely. The widening of the road reserve adjacent to Chai Wan Estate Block 13 will marginally improve the current situation by providing an increased distance from the road edge to Chai Wan Estate Block 13. This will be a marked improvement on the current situation wherein the Housing Block abuts the road edge. The existing CMB bus parking area will be absorbed by the road widening proposals. An alternative site for bus parking will, therefore, be required.

The implementation of the road widening proposals will require the provision of secure pedestrian crossings to provide safe access to Public transport and G/IC facilities.

Several public residential blocks are anticipated to be redeveloped over the next 6 years. The layout of the replacement estates should take cognisance of the predicted impacts from the road widening proposals. For example, the redevelopment of these estates could adopt a self protective building design and building orientation measures which could mitigate anticipated impacts upon receptors which the study has identified in connection with the proposed development. However, Housing Authority do not have current plans in this regard. The protection of trees retained at their existing locations during construction phase should be monitored and audited.

Annex A

Baseline Air Quality Monitoring Results

ANNEX A – BASELINE AIR QUALITY MONITORING RESULTS

Table A1 *Results of High Volume Sampling (24 Hours Average)*

Date	Total Suspended Particulate (μgm^{-3})	Respirable Suspended Particulates (μgm^{-3})
21.12.94	60	44
22.12.94	75	51
23.12.94	void	44
24.12.94	void	void
25.12.94	19	13
26.12.94	28	21
27.12.94	40	35
28.12.94	51	38
29.12.94	56	35
30.12.94	82	59
31.12.94	71	50
01.01.95	68	39
02.01.95	78	53
03.01.95	41	35
Average	55.8	39.8

"Void" indicates sample is voided due to power failure during monitoring.

Test Location: Roof Top of Chai Wan Fire Station

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
21.12.94	17:00	0.9	36	65
	18:00	0.9	33	59
	19:00	0.8	19	39
	20:00	0.8	20	40
	21:00	1.0	24	49
	22:00	0.8	26	51
	23:00	0.7	39	50
	Daily Average	0.8	28	50
22.12.94	00:00	0.7	77	52
	01:00	0.7	56	50
	02:00	0.5	18	43
	03:00	0.4	15	38
	04:00	0.3	10	35
	05:00	0.3	6	27
	06:00	0.3	17	26
	07:00	0.3	29	34
	08:00	0.3	27	27
	09:00	0.4	31	32
	10:00	0.1	54	40
	11:00	<0.1	51	41
	12:00	<0.1	19	29
	13:00	<0.1	15	31
	14:00	<0.1	21	44
	16:00	1.4	48	63
	17:00	1.8	95	78
	18:00	1.9	26	55
	19:00	1.8	153	76
	20:00	1.9	36	46

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	21:00	2.1	11	53
	22:00	1.8	56	53
	23:00	2.0	204	61
	Daily Average	0.8	47	45
23.12.94	00:00	1.6	25	43
	01:00	1.5	<2	22
	02:00	1.5	<2	11
	03:00	1.4	<2	12
	04:00	1.5	<2	19
	05:00	1.4	2	25
	06:00	1.5	16	27
	07:00	1.5	11	17
	08:00	1.5	30	37
	09:00	1.7	30	36
	10:00	1.5	22	31
	11:00	1.5	38	42
	12:00	1.7	45	46
	13:00	1.3	10	35
	14:00	1.2	27	65
	15:00	1.1	24	69
	17:00	1.0	18	62
	18:00	1.2	41	81
	19:00	1.3	27	75
	20:00	2.3	40	75
	21:00	1.8	8	43
	22:00	1.2	10	55
	23:00	1.4	9	47
	Daily Average	1.5	19	42

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
24.12.94	00:00	1.2	7	31
	01:00	1.0	<2	16
	02:00	1.0	<2	13
	03:00	0.9	<2	9
	04:00	0.9	<2	7
	05:00	0.8	3	12
	06:00	0.9	15	33
	07:00	1.5	27	39
	08:00	1.3	103	71
	09:00	1.1	104	73
	10:00	1.1	74	68
	11:00	0.9	16	39
	12:00	0.7	19	43
	13:00	0.7	18	37
	14:00	0.6	21	44
	15:00	0.5	13	28
	17:00	0.6	21	41
	18:00	0.6	14	39
	19:00	0.6	21	39
	20:00	0.6	13	32
	21:00	0.7	9	28
	22:00	0.7	5	24
	23:00	1.0	7	21
	Daily Average	0.9	23	34
25.12.94	00:00	1.2	14	35
	01:00	1.0	14	33
	02:00	0.8	5	24
	03:00	0.8	2	15
	04:00	0.6	2	12

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	05:00	0.6	3	12
	06:00	0.6	3	12
	07:00	0.5	5	18
	08:00	0.7	5	15
	09:00	0.6	12	26
	10:00	0.6	35	49
	11:00	0.8	27	42
	12:00	0.6	10	23
	13:00	0.5	3	12
	14:00	0.7	4	17
	15:00	0.5	6	23
	17:00	0.2	12	28
	18:00	0.3	4	16
	19:00	0.2	<2	6
	20:00	0.2	2	6
	21:00	0.2	<2	<2
	22:00	0.2	<2	<2
	23:00	<0.1	<2	<2
	Daily Average	0.5	8	19
26.12.94	00:00	0.2	4	12
	01:00	0.3	3	13
	02:00	0.2	2	13
	03:00	0.3	2	14
	04:00	0.2	< 2	10
	05:00	0.4	2	10
	06:00	0.3	<2	10
	07:00	0.3	4	12
	08:00	0.5	10	22
	09:00	0.3	15	23

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	10:00	0.3	14	21
	11:00	0.4	13	22
	12:00	0.4	13	24
	13:00	0.4	20	33
	14:00	0.5	21	34
	16:00	–	13	32
	17:00	0.5	12	29
	18:00	0.8	10	27
	19:00	0.5	6	21
	20:00	0.5	8	25
	21:00	0.6	8	25
	22:00	0.6	6	18
	23:00	0.6	6	14
	Daily Average	0.4	8	20
27.12.94	00:00	0.6	6	13
	01:00	0.8	7	20
	02:00	0.8	5	17
	03:00	0.8	2	10
	04:00	0.7	< 2	9
	05:00	0.8	4	14
	06:00	0.8	5	16
	07:00	1.0	12	20
	08:00	0.9	17	23
	09:00	0.9	20	25
	10:00	1.0	26	32
	11:00	0.9	20	32
	12:00	1.0	16	32
	13:00	0.9	12	31
	14:00	1.2	15	41

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	15:00	0.9	16	42
	17:00	1.1	12	28
	18:00	0.9	13	24
	19:00	0.9	17	23
	20:00	1.0	18	25
	21:00	1.0	15	24
	22:00	0.9	8	18
	23:00	0.9	8	16
	Daily Average	0.9	12	23
28.12.94	00:00	0.9	6	13
	01:00	0.9	4	11
	02:00	0.8	< 2	8
	03:00	0.8	2	10
	04:00	0.8	2	9
	05:00	0.9	2	9
	06:00	0.9	5	11
	07:00	0.9	10	16
	08:00	1.0	15	19
	09:00	1.1	22	22
	10:00	1.0	25	23
	12:00	0.7	21	34
	13:00	0.5	25	32
	14:00	0.7	36	41
	15:00	0.6	8	20
	16:00	0.7	17	37
	17:00	0.9	12	36
	18:00	1.0	25	43
	19:00	0.9	25	37
	20:00	0.8	15	28

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	21:00	0.8	12	26
	22:00	0.7	9	19
	23:00	0.7	7	18
	Daily Average	0.8	13	23
29.12.94	00:00	0.7	6	16
	01:00	0.7	4	17
	02:00	0.7	3	12
	03:00	0.6	2	12
	04:00	0.6	< 2	8
	05:00	0.6	3	12
	06:00	0.6	9	15
	07:00	0.6	12	17
	08:00	0.7	28	24
	09:00	0.8	42	37
	10:00	0.7	39	37
	11:00	0.6	11	24
	12:00	0.5	10	27
	13:00	0.6	14	28
	14:00	0.5	29	40
	15:00	0.4	17	33
	16:00	0.4	10	32
	17:00	0.4	8	29
	19:00	1.2	12	32
	20:00	0.9	6	27
	21:00	1.0	7	34
	22:00	1.0	7	33
	23:00	0.6	18	35
	Daily Average	0.7	13	25

III. RECEPTOR LOCATIONS

RECEPTOR	X (M)	Y (M)	Z (M)
1. R1	3481	4020	15.0
2. R2	3341	4097	.0
3. R3	3384	4140	.0
4. R4	3135	4080	.0
5. R5	3006	4053	.0
6. R6	3034	4028	.0
7. R7	3130	4173	.0
8. R8	3006	4205	.0
9. R9	2929	4330	.0
10. R10	3025	4319	.0
11. R11	2992	4260	.0
12. R12	2969	4288	.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A	B	C	D	E	F	G	H
			CONC/LINK (PPM)							
1. R1	297.	1.9	.1	.1	.0	.1	.1	.7	.1	.0
2. R2	286.	8.5	.0	.0	.1	.2	.4	6.3	.0	.0
3. R3	130.	11.7	.0	.0	.0	.0	.0	.0	10.1	1.6
4. R4	74.	5.9	.0	.0	.0	.0	.8	1.5	.5	.1
5. R5	28.	9.2	.0	.0	.1	.0	.0	.0	.0	.0
6. R6	5.	3.7	.0	.1	.1	.0	.0	.0	.0	.0
7. R7	232.	8.1	.0	.0	.2	1.0	.0	.0	.0	.0
8. R8	113.	4.0	.0	.0	.1	.3	.2	.5	.2	.3
9. R9	118.	3.4	.0	.3	.3	.1	.1	.4	.2	.3
10. R10	297.	4.7	.9	3.0	.6	.0	.0	.0	.0	.0
11. R11	117.	4.0	.0	.0	.3	.1	.1	.5	.2	.3
12. R12	118.	3.8	.0	.0	.3	.1	.1	.4	.2	.3

I

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: co
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxidee

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	I	J	K	L	M	N	O	P	Q	R	S	T
	CONC/LINK (PPM)											
1. R1	.1	.1	.1	.1	.0	.0	.0	.1	.0	.0	.0	.0
2. R2	.1	.2	.2	.5	.1	.0	.1	.2	.0	.0	.0	.0
3. R3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4. R4	.0	.0	.2	2.1	.8	.0	.0	.0	.0	.0	.0	.0
5. R5	.1	.4	.0	.0	.0	1.3	1.6	1.8	3.5	.1	.1	.0
6. R6	.2	.3	.0	.0	.0	.8	.8	.9	.1	.1	.1	.1
7. R7	.0	.6	.0	.0	.1	.4	2.1	2.4	1.1	.1	.0	.0
8. R8	.0	.6	.3	.3	.1	.0	.3	.3	.0	.0	.3	.0
9. R9	.9	.2	.1	.1	.0	.0	.0	.0	.0	.0	.0	.4
10. R10	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11. R11	.5	.7	.1	.2	.0	.0	.1	.1	.0	.0	.1	.5
12. R12	.9	.4	.1	.2	.0	.0	.0	.1	.0	.0	.1	.6

1

IBM-PC VERSION 1.20

SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 12-14-94 AT 23:40:21

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: CO_B
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxide

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .0 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	144.9	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	144.9	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	144.9	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	144.9	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	144.9	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	144.9	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	144.9	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	144.9	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	144.9	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	144.9	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	144.9	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	144.9	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	144.9	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	144.9	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	144.9	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	144.9	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	144.9	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	144.9	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	144.9	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	144.9	.0	14.0

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: CO_B
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. R2	3341	4097	10.0
2. R3	3384	4140	10.0
3. R4	3135	4080	10.0
4. R5	3006	4053	10.0
5. R6	3034	4028	10.0
6. R8	3006	4205	10.0
7. R9	2929	4330	10.0
8. R10	3025	4319	10.0
9. R12	2969	4288	10.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. R2	276.	3.3	.0	.0	.0	.1	.4	1.0	.0	.0
2. R3	257.	3.5	.0	.0	.0	.1	.2	1.7	.0	.0
3. R4	79.	3.5	.0	.0	.0	.0	.3	1.2	.5	.2
4. R5	39.	2.5	.0	.0	.1	.1	.0	.0	.0	.0
5. R6	8.	2.2	.0	.1	.1	.0	.0	.0	.0	.0
6. R8	113.	3.2	.0	.0	.1	.2	.2	.5	.2	.3
7. R9	123.	2.6	.0	.0	.2	.1	.1	.3	.2	.2
8. R10	161.	2.5	.0	.0	.2	.1	.0	.0	.0	.0
9. R12	122.	2.8	.0	.0	.2	.1	.1	.4	.2	.2

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: CO_B
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. R2	.0	.1	.2	.6	.2	.1	.2	.2	.2	.0	.0	.0
2. R3	.0	.0	.1	.4	.1	.1	.1	.1	.4	.0	.0	.0
3. R4	.0	.0	.1	1.1	.1	.0	.0	.0	.0	.0	.0	.0
4. R5	.0	.3	.1	.0	.1	.5	.5	.7	.0	.1	.0	.0
5. R6	.2	.3	.0	.0	.0	.4	.4	.5	.0	.1	.1	.1
6. R8	.0	.5	.2	.3	.1	.0	.2	.2	.0	.0	.1	.0
7. R9	.6	.3	.1	.1	.0	.0	.0	.1	.0	.0	.0	.2
8. R10	.5	.5	.1	.1	.1	.1	.2	.2	.0	.0	.1	.1
9. R12	.4	.4	.1	.2	.1	.0	.1	.1	.0	.0	.1	.2

I

IBM-PC VERSION 1.20

SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 12-14-94 AT 23:12:54

I

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: NO2
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .0 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
	LINK COORDINATES (M)								
A. 1	2800	4460	2926	4399	AG	1493	78.2	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	78.2	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	78.2	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	78.2	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	78.2	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	78.2	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	78.2	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	78.2	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	78.2	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	78.2	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	78.2	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	78.2	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	78.3	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	78.3	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	78.2	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	78.3	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	78.3	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	78.4	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	78.4	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	78.4	.0	14.0

I

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: NO2
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
	COORDINATES (M)		
1. R1	3481	4020	15.0
2. R2	3341	4097	.0
3. R3	3384	4140	.0
4. R4	3135	4080	.0
5. R5	3006	4053	.0
6. R6	3034	4028	.0
7. R7	3130	4173	.0
8. R8	3006	4205	.0
9. R9	2929	4330	.0
10. R10	3025	4319	.0
11. R11	2992	4260	.0

12. R12	2969	4288	.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A	B	C	D	E	F	G	H
			CONC/LINK (PPM)							
1. R1	297.	.6	.0	.0	.0	.0	.0	.2	.0	.0
2. R2	286.	2.8	.0	.0	.0	.1	.1	2.1	.0	.0
3. R3	130.	3.8	.0	.0	.0	.0	.0	.0	3.3	.5
4. R4	74.	2.0	.0	.0	.0	.0	.3	.5	.2	.0
5. R5	28.	3.0	.0	.0	.0	.0	.0	.0	.0	.0
6. R6	5.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
7. R7	232.	2.7	.0	.0	.1	.3	.0	.0	.0	.0
8. R8	113.	1.3	.0	.0	.0	.1	.1	.2	.1	.1
9. R9	118.	1.1	.0	.1	.1	.0	.0	.1	.1	.1
10. R10	297.	1.5	.3	1.0	.2	.0	.0	.0	.0	.0
11. R11	117.	1.3	.0	.0	.1	.0	.0	.2	.1	.1
12. R12	118.	1.2	.0	.0	.1	.0	.0	.1	.1	.1

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: NO2
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	I	J	K	L	M	N	O	P	Q	R	S	T
	CONC/LINK (PPM)											
1. R1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2. R2	.0	.1	.1	.2	.0	.0	.0	.1	.0	.0	.0	.0
3. R3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4. R4	.0	.0	.1	.7	.3	.0	.0	.0	.0	.0	.0	.0
5. R5	.0	.1	.0	.0	.0	.4	.5	.6	1.1	.0	.0	.0
6. R6	.1	.1	.0	.0	.0	.3	.3	.3	.0	.0	.0	.0
7. R7	.0	.2	.0	.0	.0	.1	.7	.8	.4	.0	.0	.0
8. R8	.0	.2	.1	.1	.0	.0	.1	.1	.0	.0	.1	.0
9. R9	.3	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
10. R10	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11. R11	.2	.2	.0	.1	.0	.0	.0	.0	.0	.0	.0	.2
12. R12	.3	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.2

RUN ENDED ON 12-14-94 AT 23:14:05

1 IBM-PC VERSION 1.20

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SERIAL NUMBER 5540

SOLD TO ERM HONG KONG

RUN BEGAN ON 05-31-95 AT 09:54:32

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL

JULY 1985 VERSION

PAGE 1

JOB: Chai Wan Road Widening: co, flyover ht

RUN: co (WORST CASE ANGLE)

POLLUTANT: Carbon monoxide

I. SITE VARIABLES

U= 2.0 M/S	Z0= 200. CM
BRG= WORST CASE	VD= .0 CM/S
CLAS= 4 (D)	VS= .0 CM/S
MIXH= 500. M	AMB= .0 PPM
SIGTH= 20. DEGREES	TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	144.9	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	144.9	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	144.9	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	144.9	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	144.9	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	144.9	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	144.9	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	144.9	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	144.9	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	144.9	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	144.9	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	144.9	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	144.9	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	144.9	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	144.9	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	144.9	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	144.9	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	144.9	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	144.9	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	144.9	.0	14.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL

JULY 1985 VERSION

PAGE 2

JOB: Chai Wan Road Widening: co, flyover ht

RUN: co (WORST CASE ANGLE)

POLLUTANT: Carbon monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R1	3481	4020	15.0
2. R2	3341	4097	7.6
3. R3	3384	4140	7.6
4. R4	3135	4080	7.6
5. R5	3006	4053	7.6
6. R6	3034	4028	7.6
7. R7	3130	4173	7.6
8. R8	3006	4206	7.6
9. R9	2929	4330	7.6
10. R10	3025	4319	7.6
11. R11	2992	4260	7.6
12. R12	2969	4288	7.6

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. R1	297.	1.9	.1	.1	.0	.1	.1	.7	.1	.0
2. R2	278.	4.2	.0	.0	.0	.2	.4	1.8	.0	.0
3. R3	256.	4.4	.0	.0	.0	.1	.2	2.6	.0	.0
4. R4	78.	4.2	.0	.0	.0	.0	.5	1.3	.5	.1
5. R5	37.	3.3	.0	.0	.1	.1	.0	.0	.0	.0
6. R6	6.	2.7	.0	.1	.1	.0	.0	.0	.0	.0
7. R7	232.	4.4	.0	.0	.0	.1	.0	.0	.0	.0
8. R8	113.	3.5	.0	.0	.1	.3	.2	.5	.2	.3
9. R9	122.	2.9	.0	.1	.2	.1	.1	.3	.2	.2
10. R10	166.	2.9	.0	.0	.3	.1	.0	.0	.0	.0
11. R11	120.	3.3	.0	.0	.2	.1	.1	.5	.2	.3
12. R12	121.	3.1	.0	.0	.2	.1	.1	.4	.2	.2

RUN ENDED ON 05-31-95 AT 09:55:56

1

IBM-PC VERSION 1.20
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SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 12-14-94 AT 23:21:38

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: NO2_B
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .0 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	78.2	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	78.2	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	78.2	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	78.2	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	78.2	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	78.2	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	78.2	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	78.2	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	78.2	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	78.2	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	78.2	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	78.2	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	78.3	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	78.3	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	78.2	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	78.3	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	78.3	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	78.4	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	78.4	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	78.4	.0	14.0

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: NO2_B
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R2	3341	4097	10.0
2. R3	3384	4140	10.0
3. R4	3135	4080	10.0
4. R5	3006	4053	10.0
5. R6	3034	4028	10.0
6. R8	3006	4206	10.0
7. R9	2929	4330	10.0
8. R10	3025	4319	10.0
9. R12	2969	4288	10.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. R2	276.	1.1	.0	.0	.0	.0	.1	.3	.0	.0
2. R3	257.	1.1	.0	.0	.0	.0	.1	.6	.0	.0
3. R4	79.	1.1	.0	.0	.0	.0	.1	.4	.2	.1
4. R5	39.	.8	.0	.0	.0	.0	.0	.0	.0	.0
5. R6	8.	.7	.0	.0	.0	.0	.0	.0	.0	.0
6. R8	113.	1.1	.0	.0	.0	.1	.1	.2	.1	.1
7. R9	123.	.9	.0	.0	.1	.0	.0	.1	.1	.1
8. R10	161.	.8	.0	.0	.1	.0	.0	.0	.0	.0
9. R12	122.	.9	.0	.0	.1	.0	.0	.1	.1	.1

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: NO2_B
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. R2	.0	.0	.1	.2	.1	.0	.1	.1	.1	.0	.0	.0
2. R3	.0	.0	.0	.1	.0	.0	.0	.0	.1	.0	.0	.0
3. R4	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0
4. R5	.0	.1	.0	.0	.0	.2	.2	.2	.0	.0	.0	.0
5. R6	.1	.1	.0	.0	.0	.1	.1	.2	.0	.0	.0	.0
6. R8	.0	.2	.1	.1	.0	.0	.1	.1	.0	.0	.0	.0
7. R9	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
8. R10	.2	.2	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0
9. R12	.1	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.1

RUN ENDED ON 12-14-94 AT 23:22:33

1

IBM-PC VERSION 1.20
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SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 05-31-95 AT 09:55:57

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: NO2, flyover ht
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .0 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	78.2	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	78.2	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	78.2	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	78.2	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	78.2	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	78.2	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	78.2	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	78.2	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	78.2	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	78.2	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	78.2	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	78.2	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	78.3	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	78.3	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	78.2	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	78.3	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	78.3	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	78.4	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	78.4	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	78.4	.0	14.0

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: NO2, flyover ht
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R1	3481	4020	15.0
2. R2	3341	4097	7.6
3. R3	3384	4140	7.6
4. R4	3135	4080	7.6
5. R5	3006	4053	7.6
6. R6	3034	4028	7.6
7. R7	3130	4173	7.6
8. R8	3006	4205	7.6
9. R9	2929	4330	7.6
10. R10	3025	4319	7.6
11. R11	2992	4260	7.6

12. R12	2969	4288	7.6

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A	B	C	D	E	F	G	H
			CONC/LINK (PPM)							
1. R1	297.	.6	.0	.0	.0	.0	.0	.2	.0	.0
2. R2	278.	1.4	.0	.0	.0	.1	.1	.6	.0	.0
3. R3	256.	1.5	.0	.0	.0	.0	.1	.9	.0	.0
4. R4	78.	1.4	.0	.0	.0	.0	.1	.4	.2	.0
5. R5	37.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
6. R6	6.	.9	.0	.0	.0	.0	.0	.0	.0	.0
7. R7	232.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
8. R8	113.	1.2	.0	.0	.0	.1	.1	.2	.1	.1
9. R9	122.	.9	.0	.0	.1	.0	.0	.1	.1	.1
10. R10	166.	1.0	.0	.0	.1	.0	.0	.0	.0	.0
11. R11	120.	1.1	.0	.0	.1	.0	.0	.1	.1	.1
12. R12	121.	1.0	.0	.0	.1	.0	.0	.1	.1	.1

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: NO2, flyover ht
RUN: NO2 (WORST CASE ANGLE)
POLLUTANT: Nitrogen Dioxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	I	J	K	L	M	N	O	P	Q	R	S	T
	CONC/LINK (PPM)											
1. R1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2. R2	.0	.1	.1	.2	.1	.0	.1	.1	.0	.0	.0	.0
3. R3	.0	.0	.0	.1	.0	.0	.0	.0	.1	.0	.0	.0
4. R4	.0	.0	.0	.5	.1	.0	.0	.0	.0	.0	.0	.0
5. R5	.0	.1	.0	.0	.0	.2	.3	.3	.0	.0	.0	.0
6. R6	.1	.1	.0	.0	.0	.2	.2	.2	.0	.0	.0	.0
7. R7	.0	.2	.0	.0	.0	.1	.3	.4	.3	.0	.0	.0
8. R8	.0	.2	.1	.1	.0	.0	.1	.1	.0	.0	.1	.0
9. R9	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
10. R10	.2	.2	.0	.0	.0	.0	.1	.1	.0	.0	.0	.1
11. R11	.1	.2	.0	.1	.0	.0	.0	.0	.0	.0	.0	.1
12. R12	.2	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.1

RUN ENDED ON 05-31-95 AT 09:57:19

1

IBM-PC VERSION 1.20

SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 05-31-95 AT 11:20:55

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: RSP_A
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .3 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	* LINK COORDINATES (M) * X1	Y1	X2	Y2 *	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	* 2800	4460	2926	4399 *	AG	1493	.7	.0	30.0
B. 2	* 2926	4399	2987	4325 *	AG	1493	.7	.0	30.0
C. 3	* 2998	4333	3114	4162 *	AG	237	.7	.0	17.0
D. 4	* 3114	4162	3161	4117 *	AG	689	.7	.0	17.0
E. 5	* 3161	4117	3248	4105 *	AG	689	.7	.0	17.0
F. 6	* 3248	4105	3375	4126 *	AG	2235	.7	.0	28.0
G. 7	* 3375	4126	3495	4082 *	AG	2235	.7	.0	28.0
H. 8	* 3495	4085	3641	3940 *	AG	2235	.7	.0	28.0
I. 9	* 2987	4325	3050	4240 *	BG	921	.7	2.9	13.0
J. 10	* 3050	4240	3113	4140 *	BG	921	.7	7.6	13.0
K. 11	* 3113	4140	3173	4100 *	BG	921	.7	5.8	13.0
L. 12	* 3173	4097	3246	4097 *	AG	1546	.7	.0	17.0
M. 13	* 3173	4092	3080	4115 *	AG	625	.7	.0	13.0
N. 14	* 3080	4115	3015	4071 *	AG	625	.7	.0	13.0
O. 15	* 3010	4078	3114	4162 *	AG	561	.7	.0	21.0
P. 16	* 3006	4082	3111	4165 *	AG	768	.7	.0	15.0
Q. 17	* 2807	3915	3015	4079 *	AG	1472	.7	.0	25.0
R. 18	* 3050	4120	3068	4160 *	AG	286	.7	.0	14.0
S. 19	* 3068	4160	3056	4215 *	AG	286	.7	.0	14.0
T. 20	* 3056	4215	2980	4320 *	AG	286	.7	.0	14.0

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: RSP_A
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

III. RECEPTOR LOCATIONS

RECEPTOR	* COORDINATES (M) X	Y	Z
1. R1	* 3481	4020	15.0
2. R2	* 3341	4097	.0
3. R3	* 3384	4140	.0
4. R4	* 3135	4080	.0
5. R5	* 3006	4053	.0
6. R6	* 3034	4028	.0
7. R7	* 3130	4173	.0
8. R8	* 3006	4205	.0
9. R9	* 2929	4330	.0
10. R10	* 3025	4319	.0
11. R11	* 2992	4260	.0

12. R12 * 2969 4288 .0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A	B	C	D	E	F	G	H
1. R1	297.	9.8	.5	.5	.3	.3	.5	3.9	.7	.0
2. R2	286.	45.1	.2	.3	.4	.9	2.0	33.3	.0	.0
3. R3	130.	62.3	.0	.0	.0	.0	.0	.0	53.8	8.4
4. R4	74.	31.7	.0	.0	.0	.0	4.2	7.7	2.5	.5
5. R5	28.	48.9	.0	.0	.7	.2	.0	.0	.0	.0
6. R6	5.	19.5	.1	.6	.8	.0	.0	.0	.0	.0
7. R7	232.	43.0	.0	.0	1.3	5.2	.0	.0	.0	.0
8. R8	113.	21.5	.0	.0	.8	1.5	1.1	2.9	1.3	1.8
9. R9	118.	18.3	.0	1.6	1.6	.3	.4	1.9	1.2	1.4
10. R10	297.	24.8	4.7	15.8	2.9	.0	.0	.0	.0	.0
11. R11	117.	21.2	.0	.0	1.8	.7	.7	2.7	1.3	1.6
12. R12	118.	20.3	.0	.0	1.8	.5	.6	2.4	1.3	1.5

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: RSP_A
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	I	J	K	L	M	N	O	P	Q	R	S	T
1. R1	.4	.5	.3	.8	.2	.1	.2	.3	.1	.0	.1	.2
2. R2	.4	1.2	.9	2.4	.6	.2	.7	.9	.2	.1	.2	.2
3. R3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4. R4	.0	.0	1.1	11.4	4.3	.0	.0	.0	.0	.0	.0	.0
5. R5	.3	2.1	.1	.0	.2	7.2	8.6	9.4	18.6	.8	.5	.2
6. R6	1.1	1.5	.0	.0	.1	4.1	4.3	4.7	.6	.6	.5	.5
7. R7	.0	3.0	.2	.0	.7	2.2	11.1	12.5	6.0	.8	.1	.0
8. R8	.0	3.4	1.4	1.7	.7	.0	1.4	1.7	.0	.3	1.6	.0
9. R9	4.9	1.2	.3	.6	.1	.0	.2	.2	.0	.0	.1	2.2
10. R10	1.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
11. R11	2.5	3.9	.6	1.0	.3	.0	.3	.4	.0	.0	.5	2.7
12. R12	4.6	2.3	.4	.8	.2	.0	.2	.3	.0	.0	.3	3.0

RUN ENDED ON 05-31-95 AT 11:22:19

1

IBM-PC VERSION 1.20

SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 05-31-95 AT 11:19:48

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: RSP-b
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .3 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	.7	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	.7	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	.7	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	.7	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	.7	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	.7	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	.7	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	.7	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	.7	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	.7	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	.7	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	.7	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	.7	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	.7	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	.7	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	.7	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	.7	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	.7	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	.7	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	.7	.0	14.0

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: RSP-b
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R2	3341	4097	10.0
2. R3	3384	4140	10.0
3. R4	3135	4080	10.0
4. R5	3006	4053	10.0
5. R6	3034	4028	10.0
6. R8	3006	4205	10.0
7. R9	2929	4330	10.0
8. R10	3025	4319	10.0
9. R12	2969	4288	10.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. R2	276.	17.5	.0	.0	.2	.7	1.8	5.2	.0	.0
2. R3	257.	18.1	.0	.0	.0	.4	1.2	8.9	.0	.0
3. R4	79.	18.3	.0	.0	.0	.0	1.8	6.5	2.8	.9
4. R5	39.	13.1	.0	.0	.4	.5	.0	.0	.0	.0
5. R6	8.	11.7	.0	.3	.7	.1	.0	.0	.0	.0
6. R8	113.	17.0	.0	.0	.4	1.2	1.0	2.6	1.2	1.7
7. R9	123.	13.8	.0	.1	1.0	.4	.5	1.7	.9	1.1
8. R10	161.	13.1	.0	.0	1.3	.5	.2	.0	.0	.0
9. R12	122.	14.8	.0	.0	1.0	.5	.6	2.0	.9	1.2

I

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: RSP-b
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. R2	.1	.7	1.1	3.2	.9	.4	.9	1.1	.9	.1	.1	.1
2. R3	.0	.2	.7	2.2	.7	.4	.5	.6	2.0	.1	.0	.0
3. R4	.0	.0	.5	5.5	.4	.0	.0	.0	.0	.0	.0	.0
4. R5	.0	1.6	.4	.0	.5	2.4	2.7	3.7	.0	.5	.2	.0
5. R6	.9	1.5	.0	.0	.1	2.0	2.0	2.8	.0	.4	.4	.4
6. R8	.0	2.7	1.2	1.5	.6	.0	.9	1.2	.0	.2	.7	.0
7. R9	3.1	1.4	.4	.7	.3	.0	.3	.3	.0	.0	.2	1.3
8. R10	2.4	2.8	.6	.3	.7	.4	1.0	1.3	.2	.2	.5	.7
9. R12	2.2	2.3	.5	.9	.3	.0	.3	.4	.0	.0	.3	1.1

RUN ENDED ON 05-31-95 AT 11:20:53

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1               IBM-PC VERSION 1.20
                (C) COPYRIGHT 1987, TRINITY CONSULTANTS, INC.
                SERIAL NUMBER 5540
                SOLD TO ERM HONG KONG
                RUN BEGAN ON 05-31-95 AT 09:57:20

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: RSP_A, flyover
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

I. SITE VARIABLES

```
  U=  2.0 M/S          Z0= 200. CM
 BRG= WORST CASE          VD=  .0 CM/S
CLAS=   4 (D)          VS=  .3 CM/S
MIXH=  500. M           AMB=  .0 PPM
SIGTH=  20. DEGREES     TEMP= 25.5 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	.7	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	.7	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	.7	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	.7	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	.7	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	.7	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	.7	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	.7	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	.7	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	.7	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	.7	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	.7	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	.7	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	.7	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	.7	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	.7	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	.7	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	.7	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	.7	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	.7	.0	14.0

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: RSP_A, flyover
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R1	3481	4020	15.0
2. R2	3341	4097	7.6
3. R3	3384	4140	7.6
4. R4	3135	4080	7.6
5. R5	3006	4053	7.6
6. R6	3034	4028	7.6
7. R7	3130	4173	7.6
8. R8	3006	4205	7.6
9. R9	2929	4330	7.6
10. R10	3025	4319	7.6
11. R11	2992	4260	7.6
12. R12	2969	4288	7.6

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A	B	C	D	E	F	G	H
1. R1	297.	9.8	.5	.5	.3	.3	.5	3.9	.7	.0
2. R2	278.	22.1	.0	.1	.2	.8	2.1	9.2	.0	.0
3. R3	256.	23.2	.0	.0	.0	.4	1.3	13.8	.0	.0
4. R4	78.	22.2	.0	.0	.0	.0	2.4	7.1	2.8	.8
5. R5	38.	17.5	.0	.0	.5	.5	.0	.0	.0	.0
6. R6	6.	14.2	.1	.5	.7	.0	.0	.0	.0	.0
7. R7	232.	23.1	.0	.0	.1	.5	.0	.0	.0	.0
8. R8	113.	18.7	.0	.0	.5	1.3	1.0	2.7	1.2	1.7
9. R9	122.	15.1	.0	.3	1.2	.4	.5	1.8	1.0	1.2
10. R10	166.	15.5	.0	.0	1.8	.3	.1	.0	.0	.0
11. R11	120.	17.2	.0	.0	1.2	.8	.7	2.4	1.0	1.4
12. R12	121.	16.6	.0	.0	1.3	.6	.6	2.2	1.0	1.3

CONC/LINK (PPM)

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 3

JOB: Chai Wan Road Widening: RSP_A, flyover
RUN: RSP (WORST CASE ANGLE)
POLLUTANT: PARTICULATE
(NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

CONC/LINK (PPM)

RECEPTOR	I	J	K	L	M	N	O	P	Q	R	S	T
1. R1	.4	.5	.3	.8	.2	.1	.2	.3	.1	.0	.1	.2
2. R2	.1	.8	1.1	3.3	.9	.4	.9	1.1	.7	.1	.1	.1
3. R3	.0	.2	.7	2.4	.7	.4	.5	.6	2.1	.1	.0	.0
4. R4	.0	.0	.7	7.4	1.0	.0	.0	.0	.0	.0	.0	.0
5. R5	.1	1.7	.4	.0	.5	3.8	4.0	5.0	.1	.6	.3	.0
6. R6	1.0	1.5	.0	.0	.1	2.7	2.7	3.5	.1	.5	.4	.5
7. R7	.0	3.4	.2	.0	.5	1.8	4.4	6.2	5.5	.5	.0	.0
8. R8	.0	3.0	1.3	1.6	.7	.0	1.1	1.4	.0	.2	1.0	.0
9. R9	3.7	1.4	.4	.7	.2	.0	.2	.3	.0	.0	.2	1.6
10. R10	3.9	2.7	.4	.2	.6	.6	1.2	1.5	.4	.3	.5	1.2
11. R11	1.2	3.7	.7	1.1	.3	.0	.4	.5	.0	.0	.5	1.2
12. R12	2.9	2.4	.5	.9	.3	.0	.3	.4	.0	.0	.3	1.6

RUN ENDED ON 05-31-95 AT 09:58:46

Annex C

Visual Impact Assessment – Photomotage and Drawings

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
30.12.94	00:00	0.8	3	16
	01:00	0.5	< 2	11
	02:00	0.4	< 2	5
	03:00	0.5	< 2	9
	04:00	0.5	< 2	7
	05:00	0.4	9	24
	06:00	0.5	12	32
	07:00	0.6	23	37
	08:00	0.6	45	46
	09:00	0.6	110	70
	10:00	0.5	56	51
	11:00	0.6	14	30
	12:00	0.4	9	24
	13:00	0.5	28	41
	14:00	0.6	39	55
	15:00	0.6	39	65
	16:00	0.7	33	66
	17:00	0.9	40	65
	18:00	0.9	46	70
	19:00	1.8	85	81
	20:00	1.5	19	56
	21:00	1.3	12	51
	22:00	1.0	44	59
	23:00	1.1	101	61
	Daily Average	0.7	32	43
31.12.94	00:00	1.0	124	58
	01:00	1.0	78	52
	02:00	1.0	50	48
	03:00	0.9	23	44

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	04:00	0.8	6	37
	05:00	0.8	16	38
	06:00	0.9	25	41
	07:00	0.9	20	35
	08:00	0.8	33	42
	09:00	0.7	15	39
	10:00	0.9	43	49
	11:00	0.9	26	44
	12:00	1.0	24	50
	13:00	1.1	21	59
	14:00	0.9	19	54
	15:00	0.7	18	54
	16:00	0.7	15	48
	Daily Average	0.9	33	47
2.1.95	17:00	0.8	13	37
	18:00	1.0	11	41
	19:00	1.0	13	36
	20:00	1.6	5	24
	21:00	1.2	8	31
	22:00	0.8	6	24
	23:00	1.0	11	26
	Daily Average	1.1	10	31
3.1.95	00:00	0.9	10	28
	01:00	0.6	2	18
	02:00	0.5	< 2	10
	03:00	0.4	< 2	7
	04:00	0.4	< 2	9
	05:00	0.4	12	26

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	06:00	0.5	22	36
	07:00	0.5	38	46
	08:00	0.5	92	64
	09:00	0.4	21	39
	10:00	0.4	13	40
	11:00	0.4	22	52
	12:00	0.5	50	68
	13:00	0.8	123	83
	14:00	1.0	149	90
	17:00	1.1	69	47
	18:00	1.1	76	42
	19:00	0.9	30	42
	20:00	0.8	20	48
	21:00	1.2	26	48
	22:00	1.7	42	49
	23:00	1.5	29	41
	Daily Average	0.8	39	42
4.1.95	00:00	1.1	16	35
	01:00	0.8	6	28
	02:00	0.7	5	21
	03:00	0.6	< 2	15
	04:00	0.6	< 2	11
	05:00	0.6	5	16
	06:00	0.6	9	24
	07:00	0.6	17	31
	08:00	0.6	27	37
	09:00	0.6	39	45
	10:00	0.6	42	53
	11:00	0.6	33	55

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	12:00	0.5	28	59
	13:00	< 0.1	27	66
	14:00	< 0.1	20	66
	16:00	0.6	14	61
	17:00	0.7	15	50
	18:00	0.9	19	62
	19:00	1.0	16	53
	20:00	1.0	10	35
	21:00	1.0	6	35
	22:00	1.0	4	19
	23:00	1.0	4	23
	Daily Average	0.7	16	39
5.1.95	00:00	1.0	3	19
	01:00	1.1	< 2	15
	02:00	1.1	< 2	12
	03:00	1.1	< 2	8
	04:00	1.1	< 2	18
	05:00	1.1	< 2	17
	06:00	1.1	< 2	13
	07:00	1.2	9	35
	08:00	1.2	17	44
	09:00	1.2	17	38
	10:00	1.2	17	38
	11:00	1.2	14	37
	12:00	1.1	10	34
	13:00	0.7	9	34
	14:00	0.6	12	41
	15:00	0.7	11	43
	16:00	0.8	7	34

Date	Time	CO (ppm)	NO (ppb)	NO_2 (ppb)
	17:00	1.0	16	62
	18:00	1.2	19	69
	19:00	1.2	12	55
	20:00	1.3	8	51
	21:00	1.2	9	52
	22:00	1.3	5	34
	23:00	1.3	4	24
	Daily Average	1.1	9	34
Remark	The detection limit of CO analyser is 0.1ppm. The detection limit of NOx analyser is 2.0 ppb.			

Annex B

Air Quality Modelling Emission Factors and Sample Output Files

ANNEX B - AIR QUALITY MODELLING EMISSION FACTORS AND SAMPLE OUTPUT FILES

Based on AP42 "Compliation of air Pollutant Emission factors"

1. Drilling

$$Emission\ Rate : 0.4\ g/Mg$$

2. Bulk Material Handling

$$Emission\ Rate = k(0.0016)\frac{(\frac{u}{2.2})^{1.3}}{(\frac{M}{2})^{1.4}}\ kg/Mg$$

where k = particle size multiplier = 0.74
u = mean wind speed = 2 m/s
M = material moisture content = 4.8%

3. Production Rate of Dust Generating Activities

Table 3.1a *Production Rate of Dust Generating Activities*

Period	Duration	Peak Production Rate (Mg/day)	
		Drilling	Bulk material Handling
Stage 1	4 months	103	206
Satge 2	6 months	140	661
Stage 3	6 months	97	625
Stage 4	6 months	100	201

1 FDM - (DATED 91109)

IBM-PC VERSION (1.01)

SERIAL NUMBER 9142 SOLD TO ERM HONG KONG
RUN BEGAN ON 5/31/95 AT 21:40:50

RUN TITLE:
Chai Wan Road Widening - Stage 1, 31 May

INPUT FILE NAME: RC1269S1.DAT
OUTPUT FILE NAME: C1269S1.LST

CONVERGENCE OPTION 1=OFF, 2=ON	1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED	1
PLOT FILE OUTPUT, 1=NO, 2=YES	1
MET DATA PRINT SWITCH, 1=NO, 2=YES	1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES	1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER	1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES	1
BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES	2
NUMBER OF SOURCES PROCESSED	6
NUMBER OF RECEPTORS PROCESSED	21
NUMBER OF PARTICLE SIZE CLASSES	2
NUMBER OF HOURS OF MET DATA PROCESSED	8760
LENGTH IN MINUTES OF 1-HOUR OF MET DATA	60.
ROUGHNESS LENGTH IN CM	100.00
SCALING FACTOR FOR SOURCE AND RECPTORS	1.0000
PARTICLE DENSITY IN G/CM**3	2.50
ANEMOMETER HEIGHT IN M	10.00

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	CHAR. DIA. (UM)	GRAV. SETTLING VELOCITY (M/SEC)	DEPOSITION VELOCITY (M/SEC)	FRACTION IN EACH SIZE CLASS
1	30.0000000	**	**	.9000
2	10.0000000	**	**	.1000

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(43481., 14020., 15.) (43341., 14097., 2.) (43341., 14097., 10.)
(43384., 14140., 2.) (43384., 14140., 10.) (43135., 14080., 2.)
(43135., 14080., 10.) (43006., 14053., 2.) (43006., 14053., 10.)
(43034., 14028., 2.) (43034., 14028., 10.) (43130., 14173., 2.)
(43006., 14205., 2.) (43006., 14205., 10.) (42929., 14330., 2.)
(42929., 14330., 10.) (43025., 14319., 2.) (43025., 14319., 10.)
(42992., 14260., 2.) (42969., 14288., 2.) (42969., 14288., 10.)

1

SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	.000006300	.00088	.000	42955.	14350.	43047.	14244.	.50	8.00
2	.000006300	.00043	.000	43047.	14244.	43070.	14180.	.50	8.00
2	.000006300	.00031	.000	43070.	14180.	43062.	14132.	.50	8.00
2	.000009390	.00024	.000	43060.	14131.	43046.	14110.	.50	12.00
2	.000008600	.00080	.000	43069.	14230.	43118.	14151.	.50	11.00
2	.000008500	.00034	.000	43110.	14156.	43080.	14130.	.50	18.00

===========
TOTAL EMISSIONS .00299

1

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION

1	12	43130.0	14173.0	619	1.8613	.1028
2	12	43130.0	14173.0	7883	1.8610	.1029
3	12	43130.0	14173.0	945	1.8602	.1031
4	12	43130.0	14173.0	2662	1.8597	.1032
5	12	43130.0	14173.0	3098	1.8595	.1033
6	12	43130.0	14173.0	5909	1.8586	.1035
7	12	43130.0	14173.0	6144	1.8586	.1035
8	12	43130.0	14173.0	3767	1.8585	.1035
9	12	43130.0	14173.0	8732	1.8194	.1008
10	12	43130.0	14173.0	2660	1.8192	.1009
11	12	43130.0	14173.0	6702	1.8191	.1009
12	12	43130.0	14173.0	6488	1.8184	.1011
13	12	43130.0	14173.0	2828	1.8183	.1011
14	12	43130.0	14173.0	3067	1.8182	.1011
15	12	43130.0	14173.0	3069	1.8182	.1011
16	12	43130.0	14173.0	4107	1.8181	.1012
17	12	43130.0	14173.0	4971	1.8179	.1012
18	12	43130.0	14173.0	8014	1.7812	.1170
19	12	43130.0	14173.0	5645	1.7806	.1173
20	12	43130.0	14173.0	5644	1.7805	.1173
21	12	43130.0	14173.0	4182	1.7802	.1175
22	12	43130.0	14173.0	5834	1.7802	.1175
23	12	43130.0	14173.0	3408	1.7800	.1176
24	12	43130.0	14173.0	3384	1.7800	.1176
25	12	43130.0	14173.0	6544	1.7799	.1176
26	12	43130.0	14173.0	4494	1.7799	.1177
27	12	43130.0	14173.0	4396	1.7799	.1177
28	12	43130.0	14173.0	4973	1.7798	.1177
29	12	43130.0	14173.0	5664	1.7797	.1178
30	12	43130.0	14173.0	93	1.7507	.1146
31	12	43130.0	14173.0	8633	1.7506	.1146
32	12	43130.0	14173.0	2935	1.7498	.1150
33	12	43130.0	14173.0	2232	1.7494	.1152
34	12	43130.0	14173.0	4293	1.7494	.1153
35	12	43130.0	14173.0	5319	1.7491	.1154
36	12	43130.0	14173.0	3702	1.7491	.1154
37	12	43130.0	14173.0	5212	1.7487	.1157
38	12	43130.0	14173.0	5672	1.7486	.1157
39	12	43130.0	14173.0	5210	1.7486	.1157
40	12	43130.0	14173.0	3935	1.7485	.1157
41	12	43130.0	14173.0	4970	1.7485	.1157
42	12	43130.0	14173.0	5179	1.7485	.1157
43	12	43130.0	14173.0	6497	1.7485	.1158
44	12	43130.0	14173.0	8625	1.6675	.0926
45	12	43130.0	14173.0	8587	1.6674	.0926
46	12	43130.0	14173.0	8634	1.6672	.0927
47	12	43130.0	14173.0	8016	1.6664	.0929
48	12	43130.0	14173.0	2922	1.6663	.0929
49	12	43130.0	14173.0	2234	1.6662	.0929
50	12	43130.0	14173.0	7446	1.6662	.0929

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR X-COORDINATE Y-COORDINATE HIGHEST VALUE ENDING HOUR DEPOSITION SECOND HIGH ENDING HOUR DEPOSTION

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.0460	8521.	.0026	.0460	8612.	.0026
2	43341.0	14097.0	.1254	8521.	.0075	.1252	8612.	.0075
3	43341.0	14097.0	.1062	8521.	.0062	.1062	8612.	.0063
4	43384.0	14140.0	.0997	3531.	.0061	.0997	3529.	.0061
5	43384.0	14140.0	.0878	3531.	.0052	.0878	3529.	.0052
6	43135.0	14080.0	.6689	387.	.0413	.6684	484.	.0415
7	43135.0	14080.0	.3000	948.	.0194	.3000	3425.	.0196
8	43006.0	14053.0	.4594	672.	.0285	.4594	8426.	.0285
9	43006.0	14053.0	.2291	672.	.0137	.2291	8426.	.0137
10	43034.0	14028.0	.3941	463.	.0243	.3940	8427.	.0243
11	43034.0	14028.0	.2208	463.	.0131	.2208	8427.	.0132
12	43130.0	14173.0	1.8613	619.	.1028	1.8610	7883.	.1029
13	43006.0	14205.0	.6375	1424.	.0404	.6374	719.	.0404
14	43006.0	14205.0	.2837	2319.	.0166	.2837	2126.	.0166
15	42929.0	14330.0	.5024	411.	.0319	.5024	1424.	.0321
16	42929.0	14330.0	.2093	3856.	.0136	.2093	5484.	.0137
17	43025.0	14319.0	.6822	596.	.0430	.6815	2140.	.0433
18	43025.0	14319.0	.2633	841.	.0158	.2633	1496.	.0158
19	42992.0	14260.0	.6238	749.	.0391	.6232	742.	.0393
20	42969.0	14288.0	.5648	435.	.0355	.5644	722.	.0357
21	42969.0	14288.0	.2332	3856.	.0152	.2332	5484.	.0153

1

TOP 50 TABLE FOR 24 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	12	43130.0	14173.0	4992C	1.0252	.0732
2	12	43130.0	14173.0	5232	.9743	.0724
3	12	43130.0	14173.0	5664C	.8862	.0625
4	12	43130.0	14173.0	5016C	.8836	.0697
5	12	43130.0	14173.0	2544	.8805	.0644
6	12	43130.0	14173.0	3768C	.8739	.0612
7	12	43130.0	14173.0	5256	.8461	.0676
8	12	43130.0	14173.0	2736	.8228	.0710
9	12	43130.0	14173.0	4920	.8185	.0654
10	12	43130.0	14173.0	6504C	.8178	.0531
11	12	43130.0	14173.0	4968	.8136	.0655
12	12	43130.0	14173.0	4800	.7885	.0704
13	12	43130.0	14173.0	3936	.7849	.0657
14	12	43130.0	14173.0	4752	.7554	.0649
15	12	43130.0	14173.0	5280C	.7458	.0604
16	12	43130.0	14173.0	4944	.7432	.0641
17	12	43130.0	14173.0	4776	.7409	.0652
18	12	43130.0	14173.0	5040	.7391	.0644
19	12	43130.0	14173.0	5304C	.7244	.0537
20	12	43130.0	14173.0	3408C	.7186	.0523
21	12	43130.0	14173.0	3792C	.7177	.0514
22	12	43130.0	14173.0	3744	.7168	.0741
23	12	43130.0	14173.0	6120C	.7141	.0537
24	12	43130.0	14173.0	1416C	.7048	.0638
25	12	43130.0	14173.0	3528C	.7048	.0583
26	12	43130.0	14173.0	3984	.6835	.0558
27	12	43130.0	14173.0	5208C	.6806	.0476
28	12	43130.0	14173.0	1128C	.6626	.0552
29	12	43130.0	14173.0	2688C	.6545	.0449
30	12	43130.0	14173.0	3720C	.6445	.0555
31	12	43130.0	14173.0	2928C	.6367	.0495
32	12	43130.0	14173.0	2712C	.6290	.0558
33	12	43130.0	14173.0	3048C	.6133	.0498
34	12	43130.0	14173.0	3960C	.6110	.0536
35	12	43130.0	14173.0	4728C	.5857	.0437
36	12	43130.0	14173.0	4824	.5607	.0465
37	12	43130.0	14173.0	6144C	.5589	.0372
38	12	43130.0	14173.0	3624	.5525	.0547
39	12	43130.0	14173.0	3072C	.5299	.0390
40	12	43130.0	14173.0	3384C	.5254	.0372
41	12	43130.0	14173.0	5688C	.5206	.0328
42	12	43130.0	14173.0	8040C	.5197	.0335
43	12	43130.0	14173.0	3648	.5176	.0688
44	12	43130.0	14173.0	5184C	.5017	.0374
45	12	43130.0	14173.0	4392C	.4895	.0380
46	12	43130.0	14173.0	8016C	.4727	.0300
47	12	43130.0	14173.0	432C	.4509	.0282
48	12	43130.0	14173.0	5856C	.4393	.0273
49	12	43130.0	14173.0	6168C	.4296	.0316
50	12	43130.0	14173.0	3096C	.4165	.0323

1

HIGHEST AND SECOND HIGHEST VALUES FOR 24 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.0127	3528.C	.0010	.0110	2544.	.0007
2	43341.0	14097.0	.0358	3528.C	.0028	.0358	6120.C	.0026
3	43341.0	14097.0	.0328	6120.C	.0024	.0323	3528.C	.0026
4	43384.0	14140.0	.0364	6120.C	.0027	.0321	3528.C	.0025
5	43384.0	14140.0	.0343	6120.C	.0026	.0300	3528.C	.0024
6	43135.0	14080.0	.3378	552.C	.0257	.3378	360.C	.0303
7	43135.0	14080.0	.1676	360.C	.0151	.1614	552.C	.0122
8	43006.0	14053.0	.2071	6600.C	.0137	.2039	8136.	.0143
9	43006.0	14053.0	.1276	6600.C	.0083	.1191	8136.	.0083
10	43034.0	14028.0	.1761	8136.	.0121	.1722	6600.C	.0115
11	43034.0	14028.0	.1102	6600.C	.0072	.1095	8136.	.0075
12	43130.0	14173.0	1.0252	4992.C	.0732	.9743	5232.	.0724
13	43006.0	14205.0	.3566	3864.	.0254	.3525	7560.	.0278
14	43006.0	14205.0	.1265	2808.	.0103	.1252	5496.C	.0087
15	42929.0	14330.0	.3014	3864.	.0215	.2892	7656.	.0228
16	42929.0	14330.0	.1232	2184.	.0102	.1179	216.	.0096
17	43025.0	14319.0	.3386	4536.C	.0239	.3312	4728.C	.0245
18	43025.0	14319.0	.1012	3024.C	.0077	.0943	2064.C	.0066
19	42992.0	14260.0	.3858	3864.	.0276	.3821	6600.C	.0264
20	42969.0	14288.0	.3854	6600.C	.0267	.3678	6384.C	.0279
21	42969.0	14288.0	.1364	2184.	.0114	.1346	2880.C	.0106

RUN ENDED ON 5/31/95 AT 23:03:52

1 FDM - (DATED 91109)

IBM-PC VERSION (1.01)

SERIAL NUMBER 9142 SOLD TO ERM HONG KONG
RUN BEGAN ON 5/31/95 AT 23:03:58

RUN TITLE:
Chai Wan Road Widening - Stage 2, may 31

INPUT FILE NAME: RC1269S2.DAT
OUTPUT FILE NAME: C1269S2.LST

CONVERGENCE OPTION 1=OFF, 2=ON	1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED	1
PLOT FILE OUTPUT, 1=NO, 2=YES	1
MET DATA PRINT SWITCH, 1=NO, 2=YES	1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES	1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER	1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES	1
BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES	2
NUMBER OF SOURCES PROCESSED	8
NUMBER OF RECEPTORS PROCESSED	21
NUMBER OF PARTICLE SIZE CLASSES	2
NUMBER OF HOURS OF MET DATA PROCESSED	8760
LENGTH IN MINUTES OF 1-HOUR OF MET DATA	60.
ROUGHNESS LENGTH IN CM	100.00
SCALING FACTOR FOR SOURCE AND RECPTORS	1.0000
PARTICLE DENSITY IN G/CM**3	2.50
ANEMOMETER HEIGHT IN M	10.00

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	CHAR. DIA. (UM)	GRAV. SETTLING VELOCITY (M/SEC)	DEPOSITION VELOCITY (M/SEC)	FRACTION IN EACH SIZE CLASS
1	30.0000000	**	**	.9000
2	10.0000000	**	**	.1000

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(43481., 14020., 15.) (43341., 14097., 2.) (43341., 14097., 10.)
(43384., 14140., 2.) (43384., 14140., 10.) (43135., 14080., 2.)
(43135., 14080., 10.) (43006., 14053., 2.) (43006., 14053., 10.)
(43034., 14028., 2.) (43034., 14028., 10.) (43130., 14173., 2.)
(43006., 14205., 2.) (43006., 14205., 10.) (42929., 14330., 2.)
(42929., 14330., 10.) (43025., 14319., 2.) (43025., 14319., 10.)
(42992., 14260., 2.) (42969., 14288., 2.) (42969., 14288., 10.)
1

SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	.000005700	.00034	.000	42898.	14423.	42949.	14393.	.50	11.00
2	.000005700	.00086	.000	42949.	14393.	43041.	14274.	.50	11.00
2	.000008900	.00047	.000	42884.	14410.	42931.	14387.	.50	17.00
2	.000008900	.00075	.000	42931.	14387.	42985.	14323.	.50	17.00
2	.000005200	.00011	.000	43233.	14098.	43254.	14100.	.50	10.00
2	.000019000	.00171	.000	42987.	14323.	43053.	14262.	.50	12.00
2	.000019000	.00265	.000	43053.	14262.	43115.	14137.	.50	12.00
2	.000019000	.00126	.000	43115.	14137.	43170.	14100.	.50	12.00

TOTAL EMISSIONS .00813

1

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK RECEPTOR X-COORDINATE Y-COORDINATE ENDING HOUR CONCENTRATION DEPOSITION

1	17	43025.0	14319.0	7917	3.6798	.2176
2	17	43025.0	14319.0	8022	3.6795	.2177
3	17	43025.0	14319.0	2519	3.6793	.2177
4	17	43025.0	14319.0	8228	3.6789	.2178
5	17	43025.0	14319.0	8229	3.6788	.2179
6	17	43025.0	14319.0	6481	3.6782	.2180
7	17	43025.0	14319.0	4227	3.6782	.2181
8	17	43025.0	14319.0	3406	3.6777	.2182
9	17	43025.0	14319.0	5205	3.6774	.2183
10	17	43025.0	14319.0	8732	3.6754	.2176
11	17	43025.0	14319.0	2660	3.6752	.2177
12	17	43025.0	14319.0	6702	3.6750	.2177
13	17	43025.0	14319.0	6488	3.6742	.2180
14	17	43025.0	14319.0	2828	3.6741	.2180
15	17	43025.0	14319.0	3067	3.6739	.2181
16	17	43025.0	14319.0	3069	3.6739	.2181
17	17	43025.0	14319.0	4107	3.6738	.2181
18	17	43025.0	14319.0	4971	3.6735	.2182
19	17	43025.0	14319.0	619	3.6167	.2125
20	17	43025.0	14319.0	7883	3.6164	.2126
21	17	43025.0	14319.0	945	3.6153	.2130
22	17	43025.0	14319.0	2662	3.6147	.2132
23	17	43025.0	14319.0	3098	3.6144	.2132
24	17	43025.0	14319.0	5909	3.6134	.2136
25	17	43025.0	14319.0	6144	3.6133	.2136
26	17	43025.0	14319.0	3767	3.6131	.2136
27	17	43025.0	14319.0	8527	3.6112	.2112
28	17	43025.0	14319.0	8525	3.6110	.2113
29	17	43025.0	14319.0	1126	3.6083	.2121
30	17	43025.0	14319.0	2203	3.6074	.2124
31	17	43025.0	14319.0	3750	3.6071	.2125
32	17	43025.0	14319.0	4710	3.6067	.2126
33	17	43025.0	14319.0	4105	3.6066	.2126
34	17	43025.0	14319.0	3818	3.6065	.2126
35	17	43025.0	14319.0	4471	3.6065	.2126
36	17	43025.0	14319.0	5184	3.6065	.2126
37	17	43025.0	14319.0	5904	3.6063	.2127
38	17	43025.0	14319.0	8625	3.4593	.2017
39	17	43025.0	14319.0	8587	3.4592	.2017
40	17	43025.0	14319.0	8634	3.4589	.2018
41	17	43025.0	14319.0	8016	3.4577	.2021
42	17	43025.0	14319.0	2922	3.4576	.2022
43	17	43025.0	14319.0	2234	3.4574	.2022
44	17	43025.0	14319.0	7446	3.4573	.2022
45	17	43025.0	14319.0	3469	3.4573	.2023
46	17	43025.0	14319.0	8084	3.4573	.2023
47	17	43025.0	14319.0	6480	3.4568	.2024
48	17	43025.0	14319.0	5833	3.4566	.2025
49	17	43025.0	14319.0	5908	3.4566	.2025
50	17	43025.0	14319.0	5525	3.4565	.2025

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HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.1116	417.	.0062	.1116	436.	.0062
2	43341.0	14097.0	.3031	8521.	.0181	.3025	8612.	.0183
3	43341.0	14097.0	.2404	8521.	.0141	.2404	8612.	.0142
4	43384.0	14140.0	.2113	3531.	.0129	.2112	3529.	.0129
5	43384.0	14140.0	.1823	3531.	.0109	.1823	3529.	.0109
6	43135.0	14080.0	1.8392	403.	.1145	1.8382	536.	.1149
7	43135.0	14080.0	.6008	7862.	.0386	.6008	8246.	.0391
8	43006.0	14053.0	.3525	576.	.0216	.3523	8571.	.0216
9	43006.0	14053.0	.2375	2125.	.0153	.2374	463.	.0140
10	43034.0	14028.0	.3790	463.	.0231	.3789	8427.	.0231
11	43034.0	14028.0	.2620	8425.	.0155	.2620	702.	.0155
12	43130.0	14173.0	1.7845	417.	.1125	1.7842	436.	.1126
13	43006.0	14205.0	.8249	8425.	.0517	.8248	702.	.0517
14	43006.0	14205.0	.4194	8218.	.0245	.4172	6729.	.0255
15	42929.0	14330.0	1.2927	435.	.0805	1.2917	722.	.0809
16	42929.0	14330.0	.5449	3468.	.0355	.5141	3856.	.0335
17	43025.0	14319.0	3.6798	7917.	.2176	3.6795	8022.	.2177
18	43025.0	14319.0	.7648	1666.	.0475	.7648	901.	.0476
19	42992.0	14260.0	1.4894	576.	.0954	1.4888	8571.	.0957
20	42969.0	14288.0	1.5935	437.	.1016	1.5935	8471.	.1027
21	42969.0	14288.0	.6275	8218.	.0371	.6203	2319.	.0364

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TOP 50 TABLE FOR 24 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	17	43025.0	14319.0	5208C	1.9753	.1385
2	17	43025.0	14319.0	4536C	1.9292	.1381
3	17	43025.0	14319.0	3768C	1.9170	.1341
4	17	43025.0	14319.0	4992C	1.9163	.1386
5	17	43025.0	14319.0	4728C	1.9009	.1412
6	17	43025.0	14319.0	4512	1.8127	.1388
7	17	43025.0	14319.0	5664C	1.8118	.1276
8	17	43025.0	14319.0	5232	1.7835	.1324
9	17	43025.0	14319.0	4392C	1.7824	.1352
10	17	43025.0	14319.0	3792C	1.7655	.1272
11	17	43025.0	14319.0	4848C	1.7496	.1267
12	17	43025.0	14319.0	4488	1.7284	.1301
13	17	43025.0	14319.0	2928C	1.7220	.1339
14	17	43025.0	14319.0	6504C	1.7184	.1127
15	17	43025.0	14319.0	5304C	1.6887	.1230
16	17	43025.0	14319.0	2088C	1.6485	.1250
17	17	43025.0	14319.0	5280C	1.6460	.1268
18	17	43025.0	14319.0	4416	1.6313	.1350
19	17	43025.0	14319.0	3072C	1.6043	.1169
20	17	43025.0	14319.0	4824	1.6027	.1314
21	17	43025.0	14319.0	2664C	1.5980	.1016
22	17	43025.0	14319.0	4968	1.5916	.1255
23	17	43025.0	14319.0	4080C	1.5905	.1255
24	17	43025.0	14319.0	5016C	1.5876	.1253
25	17	43025.0	14319.0	2544	1.5703	.1150
26	17	43025.0	14319.0	5256	1.5533	.1240
27	17	43025.0	14319.0	4920	1.5431	.1230
28	17	43025.0	14319.0	8016C	1.5395	.0966
29	17	43025.0	14319.0	3984	1.5262	.1269
30	17	43025.0	14319.0	6480	1.5257	.1245
31	17	43025.0	14319.0	5856C	1.5230	.0997
32	17	43025.0	14319.0	3816	1.5187	.1249
33	17	43025.0	14319.0	4440	1.5186	.1294
34	17	43025.0	14319.0	3840C	1.5023	.1099
35	17	43025.0	14319.0	4176C	1.4936	.1064
36	17	43025.0	14319.0	5184C	1.4760	.1098
37	17	43025.0	14319.0	2064C	1.4639	.1080
38	17	43025.0	14319.0	2736	1.4449	.1242
39	17	43025.0	14319.0	3936	1.4403	.1204
40	17	43025.0	14319.0	4752	1.4134	.1211
41	17	43025.0	14319.0	4896C	1.4118	.1087
42	17	43025.0	14319.0	4464C	1.3970	.1221
43	17	43025.0	14319.0	3408C	1.3944	.1012
44	17	43025.0	14319.0	3384C	1.3857	.1006
45	17	43025.0	14319.0	5688C	1.3851	.0925
46	17	43025.0	14319.0	3960C	1.3846	.1222
47	17	43025.0	14319.0	4368	1.3777	.1214
48	17	43025.0	14319.0	4104C	1.3666	.1085
49	17	43025.0	14319.0	4776	1.3625	.1195
50	17	43025.0	14319.0	4800	1.3615	.1219

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HIGHEST AND SECOND HIGHEST VALUES FOR 24 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.0320	3528.C	.0025	.0283	2544.	.0019
2	43341.0	14097.0	.1098	6120.C	.0081	.1082	2544.	.0074
3	43341.0	14097.0	.0904	6120.C	.0066	.0888	3528.C	.0071
4	43384.0	14140.0	.0908	2544.	.0062	.0863	3528.C	.0069
5	43384.0	14140.0	.0796	2544.	.0054	.0795	6120.C	.0059
6	43135.0	14080.0	.9152	8448.C	.0631	.8948	6600.C	.0613
7	43135.0	14080.0	.3208	360.C	.0297	.3070	552.C	.0233
8	43006.0	14053.0	.2258	6600.C	.0148	.2179	8136.	.0151
9	43006.0	14053.0	.1737	6600.C	.0113	.1617	8136.	.0112
10	43034.0	14028.0	.2279	6600.C	.0149	.2252	8136.	.0155
11	43034.0	14028.0	.1699	6600.C	.0110	.1624	8136.	.0111
12	43130.0	14173.0	1.0937	2544.	.0797	1.0885	4992.C	.0785
13	43006.0	14205.0	.5662	6600.C	.0383	.5322	8136.	.0377
14	43006.0	14205.0	.2419	6600.C	.0163	.2152	3480.C	.0148
15	42929.0	14330.0	.6997	6384.C	.0529	.6831	3864.	.0486
16	42929.0	14330.0	.2870	3864.	.0200	.2832	2808.	.0230
17	43025.0	14319.0	1.9753	5208.C	.1385	1.9292	4536.C	.1381
18	43025.0	14319.0	.2588	1248.C	.0188	.2582	5424.C	.0188
19	42992.0	14260.0	1.0349	6600.C	.0709	.9519	8136.	.0681
20	42969.0	14288.0	.9562	6384.C	.0727	.9242	2352.C	.0699
21	42969.0	14288.0	.2504	5952.C	.0203	.2496	3864.	.0174

RUN ENDED ON 6/01/95 AT 0:49:13

01-06-95 02:23p Directory C:\C1269*.*

Free: 2,560,000

.	CURRENT	<DIR>		
C1269S1	.DAT	1,416	31-05-95	09:34p
C1269S2	.DAT	1,580	31-05-95	09:34p
C1269S3	.DAT	1,744	31-05-95	09:34p
C1269S4	.DAT	1,334	31-05-95	09:34p
KT93	.FDM	455,521	20-12-94	11:11p
RUN	.LOG	454	01-06-95	04:15a
..	PARENT	<DIR>		
C1269S1	.LST	19,743	31-05-95	11:03p
C1269S2	.LST	19,943	01-06-95	12:49a
C1269S3	.LST	20,143	01-06-95	03:06a
C1269S4	.LST	19,643	01-06-95	04:15a
RUN	.BAT	356	31-05-95	09:38p

1 FDM - (DATED 91109)

IBM-PC VERSION (1.01)

SERIAL NUMBER 9142 SOLD TO ERM HONG KONG
RUN BEGAN ON 6/01/95 AT 0:49:19

RUN TITLE:
Chai Wan Road Widening - Stage 3, May 31

INPUT FILE NAME: RC1269S3.DAT
OUTPUT FILE NAME: C1269S3.LST

CONVERGENCE OPTION 1=OFF, 2=ON	1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED	1
PLOT FILE OUTPUT, 1=NO, 2=YES	1
MET DATA PRINT SWITCH, 1=NO, 2=YES	1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES	1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER	1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES	1
BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES	2
NUMBER OF SOURCES PROCESSED	10
NUMBER OF RECEPTORS PROCESSED	21
NUMBER OF PARTICLE SIZE CLASSES	2
NUMBER OF HOURS OF MET DATA PROCESSED	8760
LENGTH IN MINUTES OF 1-HOUR OF MET DATA	60.
ROUGHNESS LENGTH IN CM	100.00
SCALING FACTOR FOR SOURCE AND RECPTORS	1.0000
PARTICLE DENSITY IN G/CM**3	2.50
ANEMOMETER HEIGHT IN M	10.00

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	CHAR. DIA. (UM)	GRAV. SETTLING VELOCITY (M/SEC)	DEPOSITION VELOCITY (M/SEC)	FRACTION IN EACH SIZE CLASS
1	30.0000000	**	**	.9000
2	10.0000000	**	**	.1000

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(43481., 14020., 15.) (43341., 14097., 2.) (43341., 14097., 10.)
(43384., 14140., 2.) (43384., 14140., 10.) (43135., 14080., 2.)
(43135., 14080., 10.) (43006., 14053., 2.) (43006., 14053., 10.)
(43034., 14028., 2.) (43034., 14028., 10.) (43130., 14173., 2.)
(43006., 14205., 2.) (43006., 14205., 10.) (42929., 14330., 2.)
(42929., 14330., 10.) (43025., 14319., 2.) (43025., 14319., 10.)
(42992., 14260., 2.) (42969., 14288., 2.) (42969., 14288., 10.)

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SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	.000005200	.00014	.000	43025.	14095.	43045.	14112.	.50	10.00
2	.000004200	.00022	.000	43020.	14075.	43063.	14105.	.50	8.00
2	.000004200	.00021	.000	43063.	14105.	43113.	14110.	.50	8.00
2	.000004200	.00025	.000	43113.	14110.	43171.	14095.	.50	8.00
2	.000005700	.00026	.000	43120.	14153.	43155.	14123.	.50	11.00
2	.000005700	.00027	.000	43155.	14123.	43200.	14110.	.50	11.00
2	.000009900	.00061	.000	43485.	14202.	43490.	14141.	.50	19.00
2	.000019000	.00171	.000	42987.	14323.	43053.	14262.	.50	12.00
2	.000019000	.00265	.000	43053.	14262.	43115.	14137.	.50	12.00
2	.000019000	.00126	.000	43115.	14137.	43170.	14100.	.50	12.00

TOTAL EMISSIONS .00757

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TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	17	43025.0	14319.0	841	2.4973	.1594
2	17	43025.0	14319.0	1496	2.4970	.1595
3	17	43025.0	14319.0	1134	2.4965	.1597
4	17	43025.0	14319.0	21	2.4960	.1599
5	17	43025.0	14319.0	72	2.4958	.1599
6	17	43025.0	14319.0	8737	2.4957	.1600
7	17	43025.0	14319.0	244	2.4949	.1603
8	17	43025.0	14319.0	1969	2.4948	.1604
9	17	43025.0	14319.0	7991	2.4942	.1606
10	17	43025.0	14319.0	4003	2.4925	.1613
11	17	43025.0	14319.0	3679	2.4924	.1613
12	17	43025.0	14319.0	2060	2.4924	.1613
13	17	43025.0	14319.0	3169	2.4922	.1614
14	17	43025.0	14319.0	3222	2.4922	.1614
15	17	43025.0	14319.0	3216	2.4917	.1616
16	17	43025.0	14319.0	3023	2.4915	.1617
17	17	43025.0	14319.0	3823	2.4910	.1619
18	17	43025.0	14319.0	6311	2.4910	.1619
19	17	43025.0	14319.0	4513	2.4909	.1619
20	17	43025.0	14319.0	5360	2.4908	.1620
21	17	43025.0	14319.0	4509	2.4907	.1620
22	17	43025.0	14319.0	4195	2.4905	.1621
23	17	43025.0	14319.0	7917	2.4587	.1430
24	17	43025.0	14319.0	8022	2.4585	.1431
25	17	43025.0	14319.0	2519	2.4584	.1431
26	17	43025.0	14319.0	8228	2.4581	.1432
27	17	43025.0	14319.0	8229	2.4580	.1433
28	17	43025.0	14319.0	6481	2.4576	.1434
29	17	43025.0	14319.0	4227	2.4575	.1434
30	17	43025.0	14319.0	3406	2.4572	.1435
31	17	43025.0	14319.0	5205	2.4569	.1436
32	17	43025.0	14319.0	596	2.4486	.1571
33	17	43025.0	14319.0	2140	2.4465	.1580
34	17	43025.0	14319.0	142	2.4456	.1584
35	17	43025.0	14319.0	7993	2.4449	.1588
36	17	43025.0	14319.0	5159	2.4422	.1600
37	17	43025.0	14319.0	8732	2.4411	.1420
38	17	43025.0	14319.0	2660	2.4409	.1420
39	17	43025.0	14319.0	6702	2.4408	.1421
40	17	43025.0	14319.0	6488	2.4402	.1423
41	17	43025.0	14319.0	2828	2.4401	.1423
42	17	43025.0	14319.0	3067	2.4400	.1423
43	17	43025.0	14319.0	3069	2.4400	.1423
44	17	43025.0	14319.0	4107	2.4399	.1423
45	17	43025.0	14319.0	4971	2.4397	.1424
46	6	43135.0	14080.0	431	2.4235	.1535
47	6	43135.0	14080.0	574	2.4219	.1542
48	6	43135.0	14080.0	8547	2.4215	.1544
49	6	43135.0	14080.0	1425	2.4208	.1547
50	6	43135.0	14080.0	8370	2.4204	.1549

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HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.1218	8521.	.0069	.1218	8612.	.0070
2	43341.0	14097.0	.3682	3531.	.0228	.3682	3529.	.0228
3	43341.0	14097.0	.2827	3531.	.0171	.2827	3529.	.0171
4	43384.0	14140.0	.2604	7918.	.0158	.2603	2526.	.0158
5	43384.0	14140.0	.2156	7918.	.0128	.2156	2526.	.0129
6	43135.0	14080.0	2.4235	431.	.1535	2.4219	574.	.1542
7	43135.0	14080.0	.7728	7282.	.0476	.7525	6130.	.0467
8	43006.0	14053.0	.9985	576.	.0628	.9980	8571.	.0630
9	43006.0	14063.0	.3957	2125.	.0255	.3913	7017.	.0254
10	43034.0	14028.0	.6358	8425.	.0394	.6357	702.	.0394
11	43034.0	14028.0	.3640	6585.	.0236	.3331	2125.	.0214
12	43130.0	14173.0	2.0917	1421.	.1351	2.0907	1257.	.1363
13	43006.0	14205.0	.8621	435.	.0533	.8614	722.	.0535
14	43006.0	14205.0	.4379	8218.	.0256	.4360	2319.	.0252
15	42929.0	14330.0	.9663	435.	.0599	.9654	722.	.0602
16	42929.0	14330.0	.4537	3856.	.0295	.4537	5484.	.0296
17	43025.0	14319.0	2.4973	841.	.1594	2.4970	1496.	.1595
18	43025.0	14319.0	.6626	1666.	.0410	.6626	901.	.0412
19	42992.0	14260.0	1.1795	576.	.0756	1.1790	8571.	.0758
20	42969.0	14288.0	1.3019	437.	.0831	1.3019	678.	.0832
21	42969.0	14288.0	.5346	2319.	.0313	.5346	2126.	.0313

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TOP 50 TABLE FOR 24 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	17	43025.0	14319.0	4536C	1.4022	.0998
2	6	43135.0	14080.0	6600C	1.3903	.0953
3	6	43135.0	14080.0	8136	1.3568	.0967
4	17	43025.0	14319.0	4728C	1.3246	.0983
5	17	43025.0	14319.0	4512	1.3112	.0999
6	17	43025.0	14319.0	5208C	1.2944	.0903
7	6	43135.0	14080.0	8448C	1.2919	.0892
8	12	43130.0	14173.0	4728C	1.2849	.0948
9	6	43135.0	14080.0	1896C	1.2771	.0902
10	6	43135.0	14080.0	8112C	1.2701	.0895
11	17	43025.0	14319.0	4848C	1.2673	.0913
12	17	43025.0	14319.0	4992C	1.2614	.0907
13	6	43135.0	14080.0	8376C	1.2570	.0791
14	12	43130.0	14173.0	4536C	1.2491	.0890
15	17	43025.0	14319.0	4392C	1.2410	.0940
16	17	43025.0	14319.0	4488	1.2373	.0929
17	12	43130.0	14173.0	4512	1.2269	.0937
18	12	43130.0	14173.0	5208C	1.2176	.0854
19	17	43025.0	14319.0	3768C	1.2146	.0838
20	6	43135.0	14080.0	7848C	1.2090	.0889
21	6	43135.0	14080.0	6984C	1.2015	.0862
22	12	43130.0	14173.0	4488	1.1980	.0895
23	17	43025.0	14319.0	5664C	1.1927	.0823
24	12	43130.0	14173.0	4392C	1.1901	.0897
25	6	43135.0	14080.0	8520C	1.1786	.0870
26	12	43130.0	14173.0	3792C	1.1783	.0846
27	12	43130.0	14173.0	4416	1.1751	.0974
28	17	43025.0	14319.0	5232	1.1729	.0873
29	17	43025.0	14319.0	4416	1.1699	.0966
30	12	43130.0	14173.0	3768C	1.1683	.0818
31	17	43025.0	14319.0	2088C	1.1676	.0881
32	12	43130.0	14173.0	4848C	1.1639	.0839
33	17	43025.0	14319.0	2928C	1.1612	.0907
34	6	43135.0	14080.0	8424	1.1588	.0979
35	12	43130.0	14173.0	4992C	1.1569	.0835
36	12	43130.0	14173.0	5304C	1.1509	.0838
37	17	43025.0	14319.0	2064C	1.1482	.0837
38	17	43025.0	14319.0	4080C	1.1446	.0897
39	12	43130.0	14173.0	2928C	1.1439	.0893
40	17	43025.0	14319.0	4824	1.1394	.0933
41	17	43025.0	14319.0	3072C	1.1348	.0825
42	17	43025.0	14319.0	6480	1.1332	.0946
43	17	43025.0	14319.0	5280C	1.1215	.0856
44	12	43130.0	14173.0	4824	1.1141	.0912
45	12	43130.0	14173.0	5664C	1.1130	.0788
46	12	43130.0	14173.0	5232	1.1120	.0822
47	17	43025.0	14319.0	3792C	1.1102	.0798
48	6	43135.0	14080.0	7872C	1.1101	.0823
49	6	43135.0	14080.0	576C	1.1060	.0825
50	17	43025.0	14319.0	2664C	1.1020	.0700

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HIGHEST AND SECOND HIGHEST VALUES FOR 24 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.0351	3528.C	.0028	.0331	6120.C	.0024
2	43341.0	14097.0	.1323	6120.C	.0099	.1217	2544.	.0084
3	43341.0	14097.0	.1132	6120.C	.0084	.1026	3528.C	.0082
4	43384.0	14140.0	.1050	2544.	.0072	.1002	6120.C	.0075
5	43384.0	14140.0	.0920	6120.C	.0068	.0919	2544.	.0063
6	43135.0	14080.0	1.3903	6600.C	.0953	1.3568	8136.	.0967
7	43135.0	14080.0	.2879	552.C	.0219	.2871	360.C	.0267
8	43006.0	14053.0	.4761	6600.C	.0318	.4532	1896.C	.0331
9	43006.0	14053.0	.2249	6600.C	.0148	.2082	6984.C	.0146
10	43034.0	14028.0	.3764	6600.C	.0249	.3663	8136.	.0255
11	43034.0	14028.0	.2295	6600.C	.0150	.2127	8136.	.0148
12	43130.0	14173.0	1.2849	4728.C	.0948	1.2491	4536.C	.0890
13	43006.0	14205.0	.5203	6384.C	.0392	.4896	6600.C	.0332
14	43006.0	14205.0	.2439	3864.	.0170	.2411	2808.	.0197
15	42929.0	14330.0	.5055	3864.	.0359	.4573	3456.C	.0307
16	42929.0	14330.0	.2595	2184.	.0213	.2584	3864.	.0180
17	43025.0	14319.0	1.4022	4536.C	.0998	1.3246	4728.C	.0983
18	43025.0	14319.0	.2802	1248.C	.0203	.2712	3024.C	.0213
19	42992.0	14260.0	.7967	6600.C	.0547	.7462	6384.C	.0564
20	42969.0	14288.0	.7515	6384.C	.0576	.7205	7056.	.0526
21	42969.0	14288.0	.2603	3864.	.0181	.2562	2184.	.0212

1 FDM - (DATED 91109)

IBM-PC VERSION (1.01)

SERIAL NUMBER 9142 SOLD TO ERM HONG KONG
RUN BEGAN ON 6/01/95 AT 3:06:12

RUN TITLE:
Chai Wan Road Widening - Stage 4, May 31

INPUT FILE NAME: RC1269S4.DAT
OUTPUT FILE NAME: C1269S4.LST

CONVERGENCE OPTION 1=OFF, 2=ON	1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED	1
PLOT FILE OUTPUT, 1=NO, 2=YES	1
MET DATA PRINT SWITCH, 1=NO, 2=YES	1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES	1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER	1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES	1
BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES	2
NUMBER OF SOURCES PROCESSED	5
NUMBER OF RECEPTORS PROCESSED	21
NUMBER OF PARTICLE SIZE CLASSES	2
NUMBER OF HOURS OF MET DATA PROCESSED	8760
LENGTH IN MINUTES OF 1-HOUR OF MET DATA	60.
ROUGHNESS LENGTH IN CM	100.00
SCALING FACTOR FOR SOURCE AND RECPTORS	1.0000
PARTICLE DENSITY IN G/CM**3	2.50
ANEMOMETER HEIGHT IN M	10.00

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	CHAR. DIA. (UM)	GRAV. SETTLING VELOCITY (M/SEC)	DEPOSITION VELOCITY (M/SEC)	FRACTION IN EACH SIZE CLASS
1	30.0000000	**	**	.9000
2	10.0000000	**	**	.1000

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(43481., 14020., 15.) (43341., 14097., 2.) (43341., 14097., 10.)
(43384., 14140., 2.) (43384., 14140., 10.) (43135., 14080., 2.)
(43135., 14080., 10.) (43006., 14053., 2.) (43006., 14053., 10.)
(43034., 14028., 2.) (43034., 14028., 10.) (43130., 14173., 2.)
(43006., 14205., 2.) (43006., 14205., 10.) (42929., 14330., 2.)
(42929., 14330., 10.) (43025., 14319., 2.) (43025., 14319., 10.)
(42992., 14260., 2.) (42969., 14288., 2.) (42969., 14288., 10.)
1

SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	.000005700	.00047	.000	43040.	14273.	43084.	14204.	.50	11.00
2	.000009400	.00057	.000	43174.	14098.	43235.	14094.	.50	18.00
2	.000008400	.00079	.000	43400.	14115.	43489.	14085.	.50	16.00
2	.000008400	.00072	.000	43489.	14085.	43556.	14032.	.50	16.00
2	.000001300	.00006	.000	43468.	14142.	43482.	14098.	.50	25.00

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TOTAL EMISSIONS .00261

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TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	4	43384.0	14140.0	8618	.8803	.0560

2	4	43384.0	14140.0	844	.8802	.0560
3	4	43384.0	14140.0	31	.8799	.0561
4	4	43384.0	14140.0	800	.8798	.0562
5	4	43384.0	14140.0	817	.8798	.0562
6	4	43384.0	14140.0	77	.8794	.0564
7	4	43384.0	14140.0	863	.8792	.0564
8	4	43384.0	14140.0	216	.8791	.0565
9	4	43384.0	14140.0	1561	.8790	.0565
10	4	43384.0	14140.0	2517	.8787	.0566
11	4	43384.0	14140.0	1557	.8786	.0567
12	4	43384.0	14140.0	7566	.8785	.0567
13	4	43384.0	14140.0	2048	.8783	.0568
14	4	43384.0	14140.0	7562	.8783	.0568
15	4	43384.0	14140.0	6743	.8782	.0568
16	4	43384.0	14140.0	3170	.8781	.0569
17	4	43384.0	14140.0	3031	.8780	.0569
18	4	43384.0	14140.0	6739	.8780	.0569
19	4	43384.0	14140.0	3433	.8779	.0570
20	4	43384.0	14140.0	3434	.8779	.0570
21	4	43384.0	14140.0	6645	.8779	.0570
22	4	43384.0	14140.0	3032	.8778	.0570
23	4	43384.0	14140.0	3432	.8778	.0570
24	4	43384.0	14140.0	6075	.8778	.0570
25	4	43384.0	14140.0	4229	.8777	.0570
26	4	43384.0	14140.0	4541	.8777	.0570
27	4	43384.0	14140.0	5334	.8777	.0570
28	4	43384.0	14140.0	4053	.8776	.0571
29	4	43384.0	14140.0	4179	.8776	.0571
30	4	43384.0	14140.0	5356	.8776	.0571
31	4	43384.0	14140.0	5720	.8776	.0571
32	4	43384.0	14140.0	4180	.8776	.0571
33	4	43384.0	14140.0	5066	.8776	.0571
34	4	43384.0	14140.0	5466	.8776	.0571
35	4	43384.0	14140.0	6524	.8776	.0571
36	4	43384.0	14140.0	5687	.8776	.0571
37	4	43384.0	14140.0	4466	.8775	.0571
38	4	43384.0	14140.0	5371	.8775	.0571
39	4	43384.0	14140.0	5354	.8775	.0571
40	4	43384.0	14140.0	5420	.8775	.0571
41	4	43384.0	14140.0	4050	.8774	.0571
42	4	43384.0	14140.0	5419	.8774	.0572
43	4	43384.0	14140.0	5898	.8773	.0572
44	4	43384.0	14140.0	5682	.8771	.0573
45	4	43384.0	14140.0	749	.8243	.0520
46	4	43384.0	14140.0	742	.8237	.0523
47	4	43384.0	14140.0	8643	.8236	.0523
48	4	43384.0	14140.0	8615	.8232	.0525
49	4	43384.0	14140.0	79	.8231	.0525
50	4	43384.0	14140.0	150	.8228	.0527

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HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR X-COORDINATE Y-COORDINATE HIGHEST VALUE ENDING HOUR DEPOSITION SECOND HIGH ENDING HOUR DEPOSTION

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.1399	7282.	.0085	.1192	6130.	.0073
2	43341.0	14097.0	.4010	411.	.0248	.4005	727.	.0249
3	43341.0	14097.0	.1733	411.	.0103	.1733	727.	.0104
4	43384.0	14140.0	.8803	8618.	.0560	.8802	844.	.0560
5	43384.0	14140.0	.2407	3856.	.0157	.2407	5484.	.0158
6	43135.0	14080.0	.5368	8471.	.0341	.5366	7906.	.0342
7	43135.0	14080.0	.1698	7690.	.0111	.1585	6586.	.0103
8	43006.0	14053.0	.0878	8471.	.0053	.0877	7906.	.0053
9	43006.0	14053.0	.0707	8471.	.0042	.0707	7906.	.0042
10	43034.0	14028.0	.0950	437.	.0057	.0950	678.	.0057
11	43034.0	14028.0	.0716	437.	.0042	.0716	678.	.0042
12	43130.0	14173.0	.2605	414.	.0162	.2604	364.	.0162
13	43006.0	14205.0	.2309	467.	.0147	.2309	526.	.0147
14	43006.0	14205.0	.0913	8218.	.0053	.0892	1864.	.0057
15	42929.0	14330.0	.1083	749.	.0065	.1082	742.	.0065
16	42929.0	14330.0	.0785	749.	.0046	.0785	742.	.0046
17	43025.0	14319.0	.3185	841.	.0202	.3185	1496.	.0202
18	43025.0	14319.0	.1107	2937.	.0072	.1073	322.	.0070
19	42992.0	14260.0	.3094	1424.	.0195	.3094	719.	.0196
20	42969.0	14288.0	.2116	749.	.0130	.2114	742.	.0131
21	42969.0	14288.0	.1082	749.	.0064	.1082	742.	.0064

TOP 50 TABLE FOR 24 HOUR AVERAGES

RANK RECEPTOR X-COORDINATE Y-COORDINATE ENDING HOUR CONCENTRATION DEPOSITION

1	4	43384.0	14140.0	240C	.4592	.0345
2	4	43384.0	14140.0	2184	.4314	.0361
3	4	43384.0	14140.0	2880C	.4309	.0342
4	4	43384.0	14140.0	1248C	.4277	.0303
5	4	43384.0	14140.0	216	.4193	.0340
6	4	43384.0	14140.0	48C	.4189	.0292
7	4	43384.0	14140.0	4560C	.4163	.0318
8	4	43384.0	14140.0	864C	.4107	.0331
9	4	43384.0	14140.0	5640	.4050	.0338
10	4	43384.0	14140.0	3456C	.4049	.0275
11	4	43384.0	14140.0	840C	.4030	.0320
12	4	43384.0	14140.0	888C	.3958	.0264
13	4	43384.0	14140.0	3864	.3914	.0282
14	4	43384.0	14140.0	3360C	.3889	.0284
15	4	43384.0	14140.0	744C	.3855	.0273
16	4	43384.0	14140.0	5928C	.3832	.0264
17	4	43384.0	14140.0	3192C	.3766	.0306
18	4	43384.0	14140.0	5496C	.3743	.0266
19	4	43384.0	14140.0	5712C	.3668	.0275
20	4	43384.0	14140.0	5352C	.3666	.0288
21	4	43384.0	14140.0	5736	.3619	.0271
22	4	43384.0	14140.0	5424C	.3580	.0265
23	4	43384.0	14140.0	5376	.3529	.0274
24	4	43384.0	14140.0	1968	.3527	.0300
25	4	43384.0	14140.0	1992C	.3519	.0283
26	4	43384.0	14140.0	3216C	.3458	.0259
27	4	43384.0	14140.0	2232C	.3450	.0293
28	4	43384.0	14140.0	4872C	.3392	.0241
29	4	43384.0	14140.0	3504C	.3382	.0239
30	4	43384.0	14140.0	5472C	.3320	.0226
31	4	43384.0	14140.0	3600C	.3303	.0300
32	4	43384.0	14140.0	4224C	.3272	.0264
33	4	43384.0	14140.0	1560	.3253	.0266
34	4	43384.0	14140.0	6192C	.3247	.0257
35	4	43384.0	14140.0	2208C	.3244	.0267
36	4	43384.0	14140.0	4656C	.3200	.0318
37	4	43384.0	14140.0	2904	.3196	.0272
38	4	43384.0	14140.0	2808	.3187	.0258
39	4	43384.0	14140.0	6312C	.3162	.0239
40	4	43384.0	14140.0	2160	.3131	.0255
41	4	43384.0	14140.0	2640C	.3111	.0249
42	4	43384.0	14140.0	96C	.3084	.0223
43	4	43384.0	14140.0	2856C	.3040	.0224
44	4	43384.0	14140.0	4032	.3022	.0247
45	4	43384.0	14140.0	2256C	.3017	.0234
46	4	43384.0	14140.0	816C	.2955	.0229
47	4	43384.0	14140.0	8640C	.2930	.0192
48	4	43384.0	14140.0	3432C	.2922	.0182
49	4	43384.0	14140.0	5952C	.2885	.0213
50	4	43384.0	14140.0	4200C	.2885	.0191

1

HIGHEST AND SECOND HIGHEST VALUES FOR 24 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	43481.0	14020.0	.0360	7344.C	.0024	.0311	7296.C	.0023
2	43341.0	14097.0	.2057	7440.	.0193	.1970	7200.	.0200
3	43341.0	14097.0	.1047	7200.	.0106	.1039	7440.	.0097
4	43384.0	14140.0	.4592	240.C	.0345	.4314	2184.	.0361
5	43384.0	14140.0	.1228	5640.	.0107	.1146	2808.	.0091
6	43135.0	14080.0	.2216	7440.	.0213	.2195	6408.	.0234
7	43135.0	14080.0	.0815	7440.	.0077	.0783	3168.	.0069
8	43006.0	14053.0	.0452	7440.	.0043	.0407	7152.	.0047
9	43006.0	14053.0	.0403	7440.	.0038	.0368	7152.	.0042
10	43034.0	14028.0	.0449	6408.	.0047	.0388	6432.	.0053
11	43034.0	14028.0	.0385	6408.	.0041	.0335	6432.	.0046
12	43130.0	14173.0	.1092	2880.C	.0087	.1091	432.C	.0070
13	43006.0	14205.0	.1125	2352.C	.0084	.1059	1824.C	.0083
14	43006.0	14205.0	.0380	7560.	.0030	.0378	6024.	.0032
15	42929.0	14330.0	.0536	2184.	.0044	.0527	5640.	.0044
16	42929.0	14330.0	.0424	2184.	.0035	.0424	5640.	.0035
17	43025.0	14319.0	.1238	1248.C	.0089	.1113	3024.C	.0086
18	43025.0	14319.0	.0569	1248.C	.0041	.0526	2880.C	.0043
19	42992.0	14260.0	.1518	1944.	.0133	.1507	7560.	.0118
20	42969.0	14288.0	.1017	3864.	.0072	.0954	3456.C	.0064
21	42969.0	14288.0	.0564	5640.	.0048	.0563	3864.	.0039

RUN ENDED ON 6/01/95 AT 4:15:51

1

IBM-PC VERSION 1.20
(C) COPYRIGHT 1987, TRINITY CONSULTANTS, INC.
SERIAL NUMBER 5540
SOLD TO ERM HONG KONG
RUN BEGAN ON 05-31-95 AT 11:22:20

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 1

JOB: Chai Wan Road Widening: co
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxidee

I. SITE VARIABLES

U= 2.0 M/S Z0= 200. CM
BRG= WORST CASE VD= .0 CM/S
CLAS= 4 (D) VS= .0 CM/S
MIXH= 500. M AMB= .0 PPM
SIGTH= 20. DEGREES TEMP= 25.5 DEGREE (C)

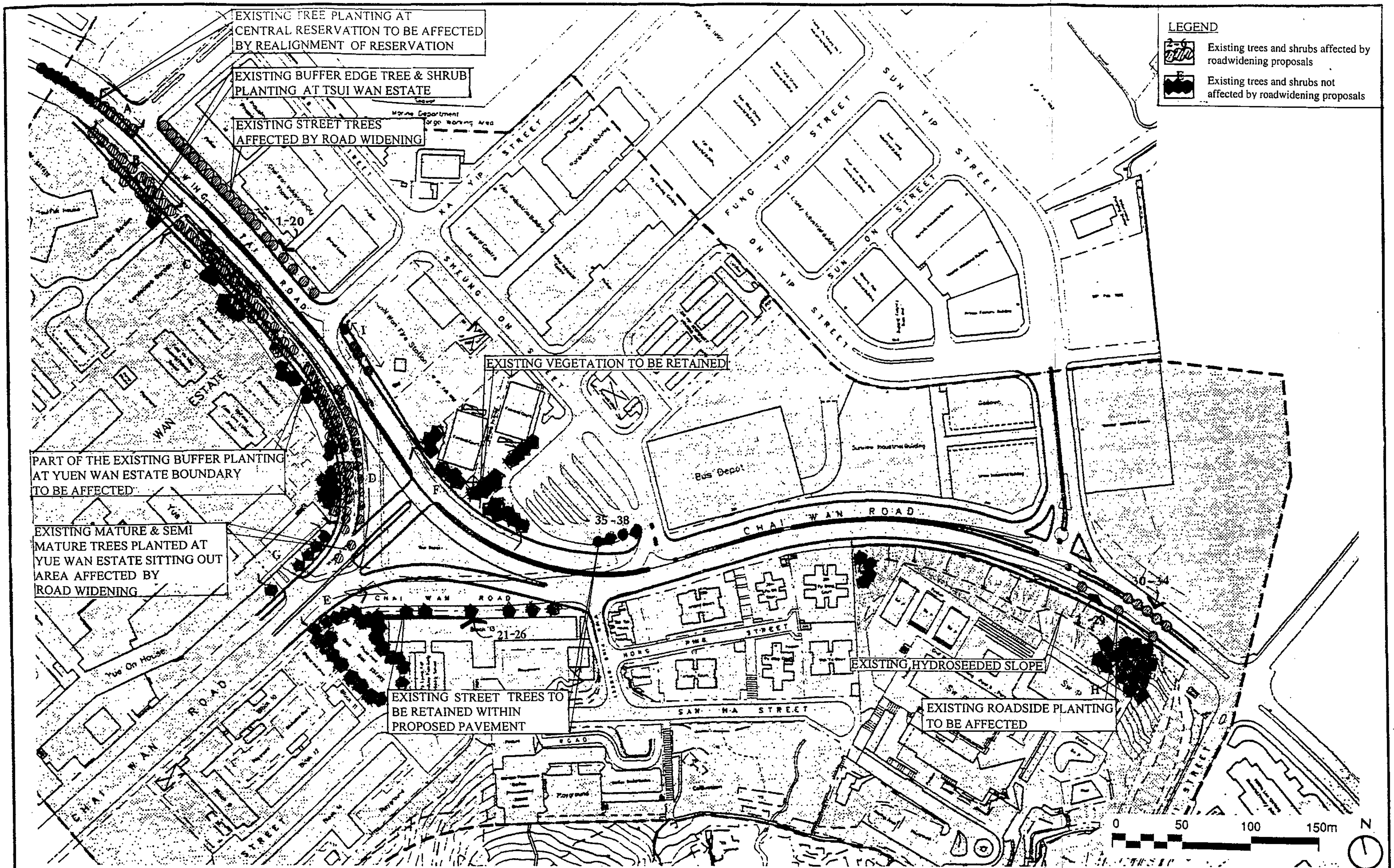
II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. 1	2800	4460	2926	4399	AG	1493	144.9	.0	30.0
B. 2	2926	4399	2987	4325	AG	1493	144.9	.0	30.0
C. 3	2998	4333	3114	4162	AG	237	144.9	.0	17.0
D. 4	3114	4162	3161	4117	AG	689	144.9	.0	17.0
E. 5	3161	4117	3248	4105	AG	689	144.9	.0	17.0
F. 6	3248	4105	3375	4126	AG	2235	144.9	.0	28.0
G. 7	3375	4126	3495	4082	AG	2235	144.9	.0	28.0
H. 8	3495	4085	3641	3940	AG	2235	144.9	.0	28.0
I. 9	2987	4325	3050	4240	BG	921	144.9	2.9	13.0
J. 10	3050	4240	3113	4140	BG	921	144.9	7.6	13.0
K. 11	3113	4140	3173	4100	BG	921	144.9	5.8	13.0
L. 12	3173	4097	3246	4097	AG	1546	144.9	.0	17.0
M. 13	3173	4092	3080	4115	AG	625	144.9	.0	13.0
N. 14	3080	4115	3015	4071	AG	625	144.9	.0	13.0
O. 15	3010	4078	3114	4162	AG	561	144.9	.0	21.0
P. 16	3006	4082	3111	4165	AG	768	144.9	.0	15.0
Q. 17	2807	3915	3015	4079	AG	1472	144.9	.0	25.0
R. 18	3050	4120	3068	4160	AG	286	144.9	.0	14.0
S. 19	3068	4160	3056	4215	AG	286	144.9	.0	14.0
T. 20	3056	4215	2980	4320	AG	286	144.9	.0	14.0

1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JULY 1985 VERSION
PAGE 2

JOB: Chai Wan Road Widening: co
RUN: co (WORST CASE ANGLE)
POLLUTANT: Carbon monoxidee



Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT
CHAI WAN ROAD /WING TAI ROAD WIDENING
AGREEMENT No. CE.24/94

Drawing No. FIGURE 6.1a

Drawing Title: EXISTING VEGETATION SURVEY PLAN

Scale 1:2000

Drawn by PS | Checked by PS | Approved by | Date DEC. '94 | Job No. ERL4

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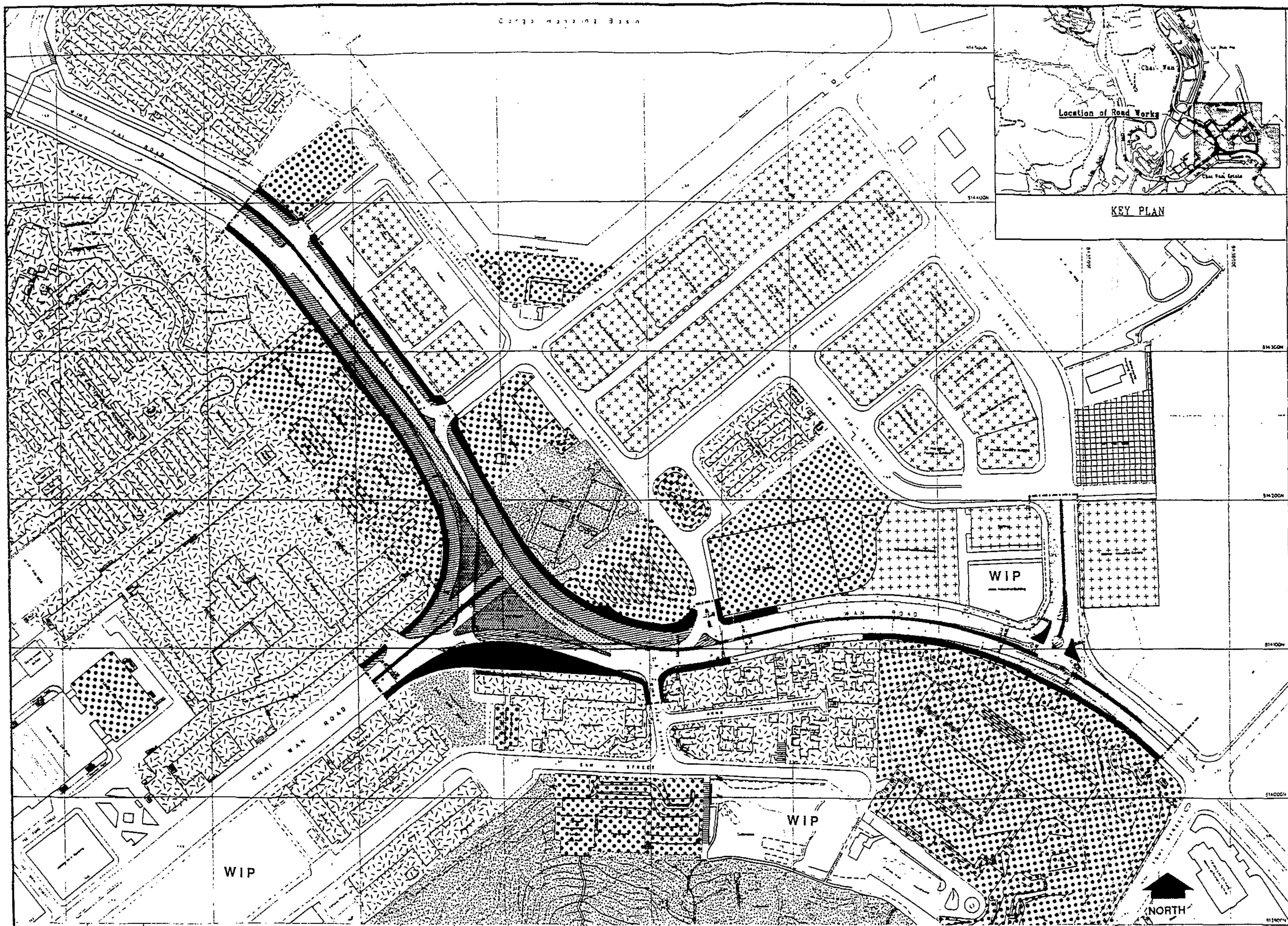

LEGEND

- Existing Carriageway to be reconstructed
- Proposed Footway / Traffic Island
- Proposed Carriageway
- Proposed Flyover
- Proposed Landscape Area
- Project Limit
- Industrial
- Residential
- GIC
- Open Space
- WIP Work In Progress
- Commercial

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: **EIA FOR CHAI WAN / WING TAI ROAD WIDENING**

Drawing No.: **FIGURE 6.1b**

Drawing Title: **EXISTING LAND USE**

Scale: 1: 2,500

Drawn by: PN | Checked by: ML | Approved by: amd | Date: Dec 94 | Job No. ERL1

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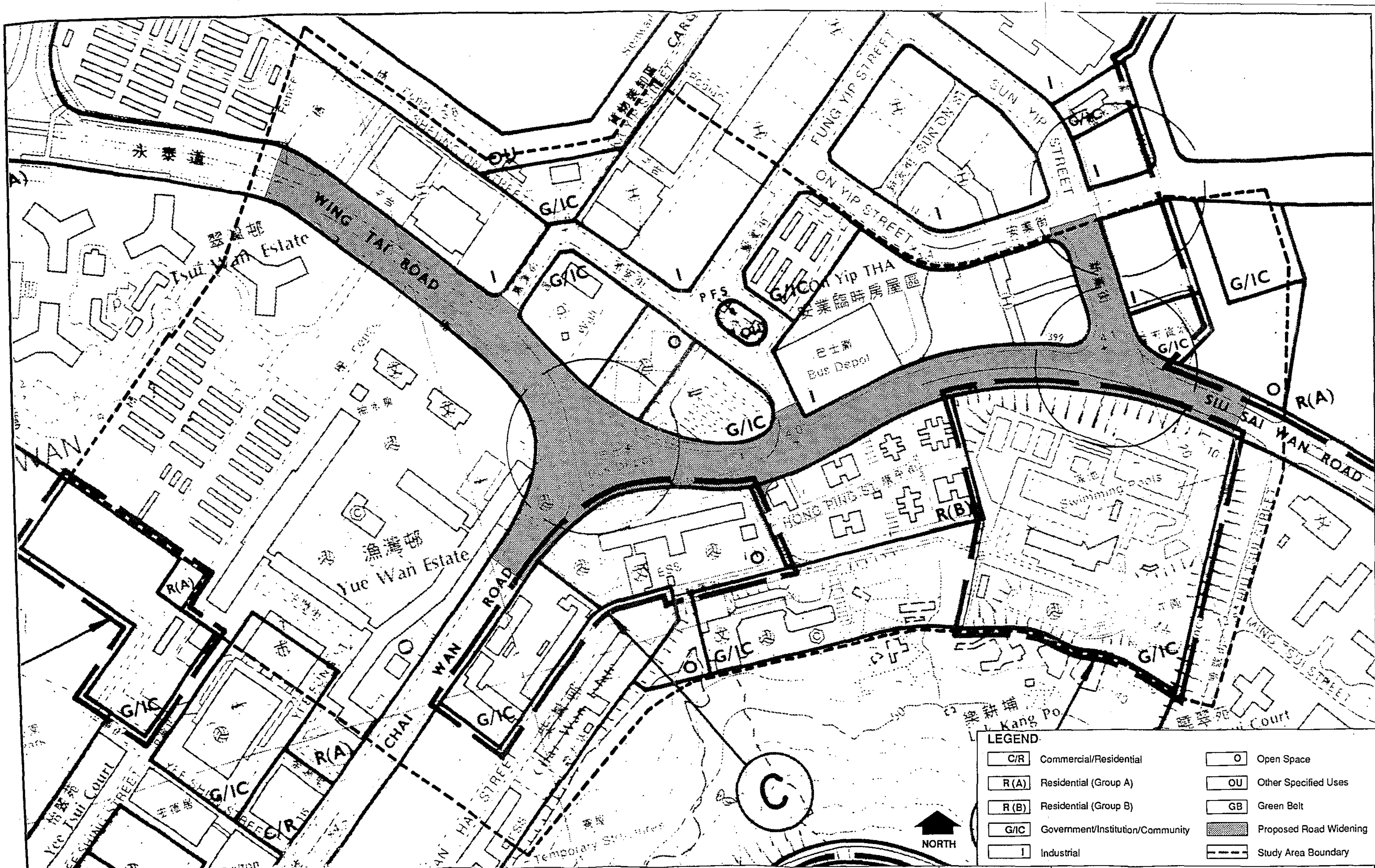

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: EIA FOR CHAI WAN / WING TAI ROAD WIDENING

Drawing No.: FIGURE 6.1c

Drawing Title: STATUTORY LAND USE ZONING

Scale: 1: 2,500

Drawn by	Checked by	Approved by	Date	Job No.
PN	ML	AM	Dec 94	ERL4

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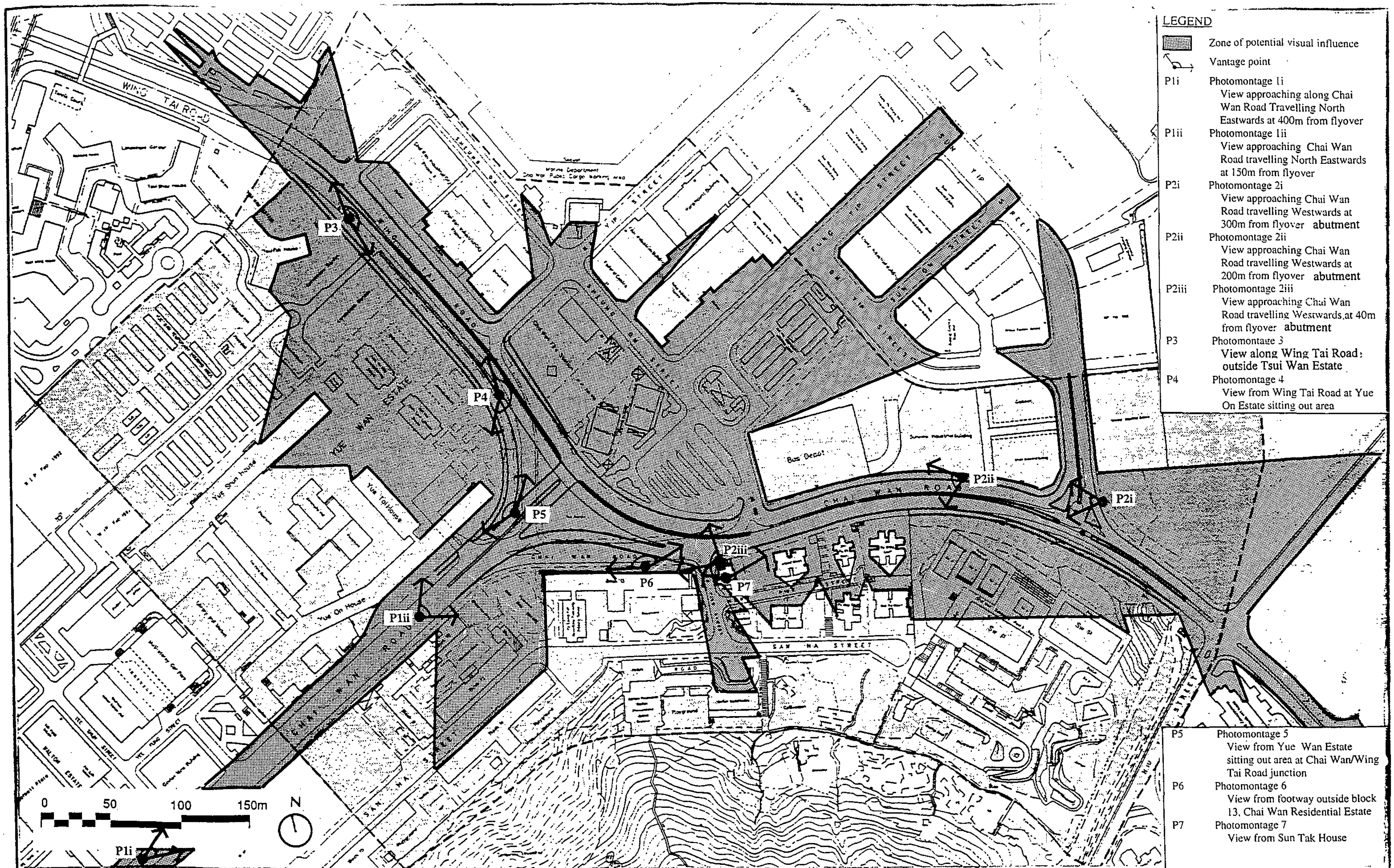

LEGEND

Zone of potential visual influence

Vantage point

P1i Photomontage 1i
View approaching along Chai Wan Road Travelling North Eastwards at 400m from flyover

P1ii Photomontage 1ii
View approaching Chai Wan Road travelling North Eastwards at 150m from flyover

P2i Photomontage 2i
View approaching Chai Wan Road travelling Westwards at 300m from flyover abutment

P2ii Photomontage 2ii
View approaching Chai Wan Road travelling Westwards at 200m from flyover abutment

P2iii Photomontage 2iii
View approaching Chai Wan Road travelling Westwards at 40m from flyover abutment

P3 Photomontage 3
View along Wing Tai Road : outside Tsui Wan Estate

P4 Photomontage 4
View from Wing Tai Road at Yue On Estate sitting out area

P5 Photomontage 5
View from Yue Wan Estate sitting out area at Chai Wan/Wing Tai Road junction

P6 Photomontage 6
View from footway outside block 13, Chai Wan Residential Estate

P7 Photomontage 7
View from Sun Tak House

Job Title	ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING - AGREEMENT No. CE.24/94	Drawing No. FIGURE 6.1d
Drawing Title	ZONE OF VISUAL INFLUENCE	Scale 1:2500

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Drawn by FT | Checked by PS | Approved by amd | Date DEC. '94 | Job No. ERL4

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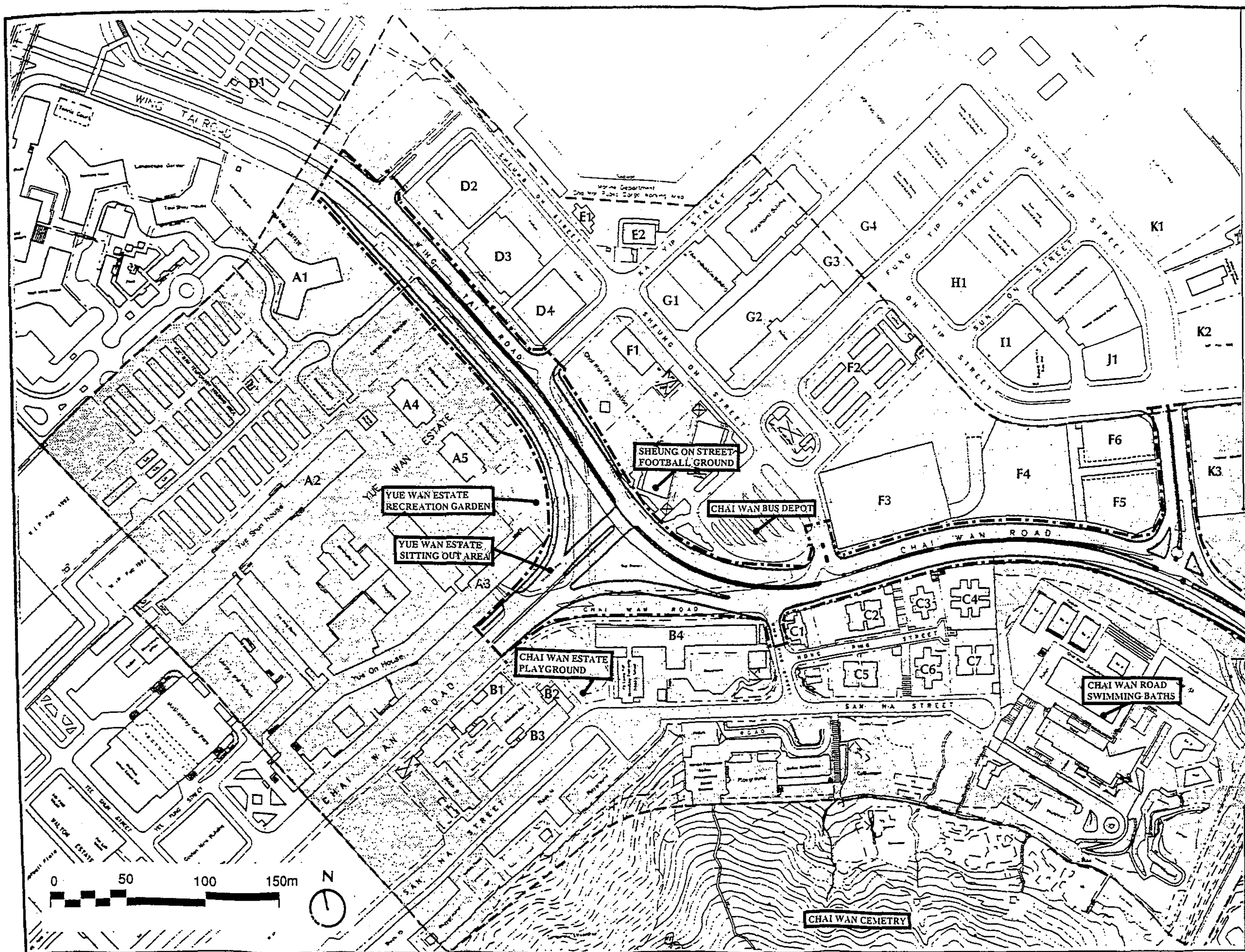

LEGEND

A1	Tsui Fuk House Residential
A2	Yue Shun House
A3	Yue On House/Yue Tai House
A4	Fung Yin Hing Memorial Primary School
A5	Chai Wan Faith Love Lutheran School
B1	Chai Wan Estate, Block 10
B2	Chai Wan Estate, Block 11
B3	Chai Wan Estate, Block 12
B4	Chai Wan Estate, Block 13
C1	Sun Tak House
C2	Artland Court
C3	Fu On Court
C4	Fu Shing Court
C5	Artview Court
C6	Fu Ming Court
C7	Wah Yu Court
D1	Wing Tai Temporary Housing Area
D2	Chai Wan Industrial City Phase II
D3	Chai Wan Industrial City Phase I
D4	Cornell Centre
E1	Chai Wan Marine Department
E2	Chai Wan Marine Department
F1	Chai Wan Fire Station
F2	On Yip Temporary Housing Department
F3	Chai Wan Bus Depot
F4	Sunview Industrial Building
F5	Commercial/ Industrial development
F6	Godown
G1	Federal Industrial Centre
G2	Kailey Industrial Centre
G3	Yip Cheung Centre
G4	Yan Nin Industrial Building
H1	Casey Industrial Building
I1	Cheung Yick Industrial Building
J1	Prince Factory Building
K1	Island Transfer Centre
K2	Commercial Tower
K3	Honour Industrial Building
L1	TWGHs Lee Chi Hung Memorial Primary School
— - —	Proposed extent of works

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT
CHAI WAN ROAD /WING TAI ROAD WIDENING
AGREEMENT No. CE 24/94

Drawing No.: FIGURE 6.1e

Drawing Title: BLOCK LAYOUT PLAN

Scale: 1:2500

Drawn by: FT | Checked by: PS | Approved by: [signature] | Date: DEC. '94 | Job No.: ERL4

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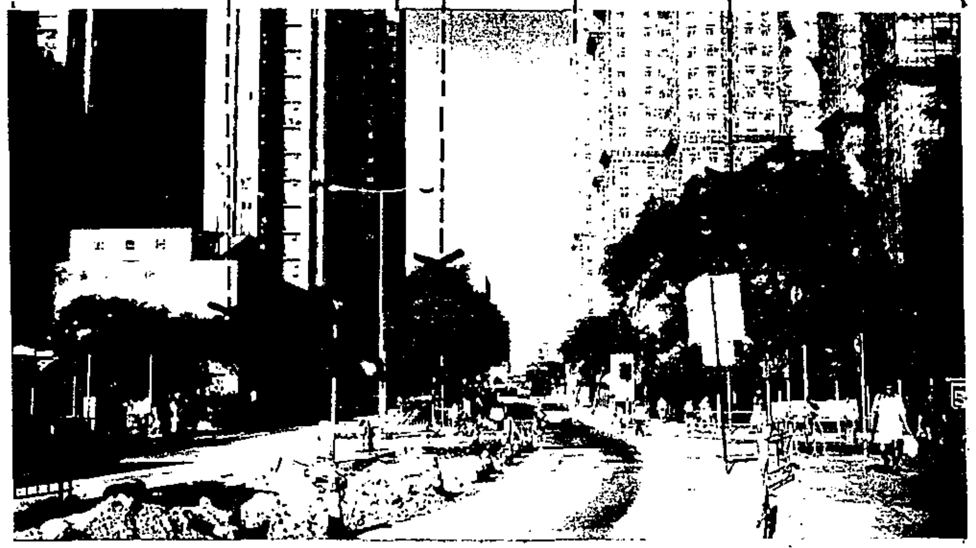
EXISTING RESIDENTIAL BUILDINGS

CHAI WAN PSPS RESIDENTIAL DEVELOPMENT

EXISTING SEMI MATURE STREET TREES



(i)

EXISTING INDUSTRIAL BUILDINGS (D4,G1-4,H1)

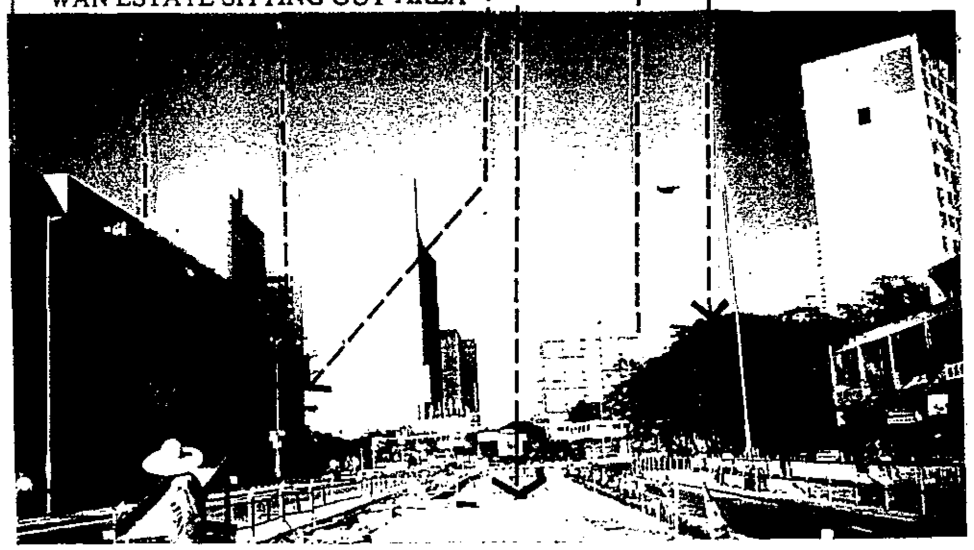
CHAI WAN RESIDENTIAL ESTATE BLOCK 13 (B4)

YUE WAN RESIDENTIAL ESTATE (A3)

EXISTING ROAD WIDENING WORKS OUTSIDE BOUNDARY

EXISTING MATURE & SEMI MATURE TREES PLANTED AT YUE WAN ESTATE SITTING OUT AREA

EXISTING MATURE STREET TREES OUTSIDE CHAI WAN PLAYGROUND



(ii)

1A EXISTING VIEWS APPROACHING ALONG CHAI WAN ROAD TRAVELLING NORTH WESTWARDS (TAKEN AT 400M AND 150M FROM THE FLYOVER RESPECTIVELY)

VIEWS TOWARDS FLYOVER ARE ALMOST TOTALLY OBSCURED BY EXISTING BUILDINGS

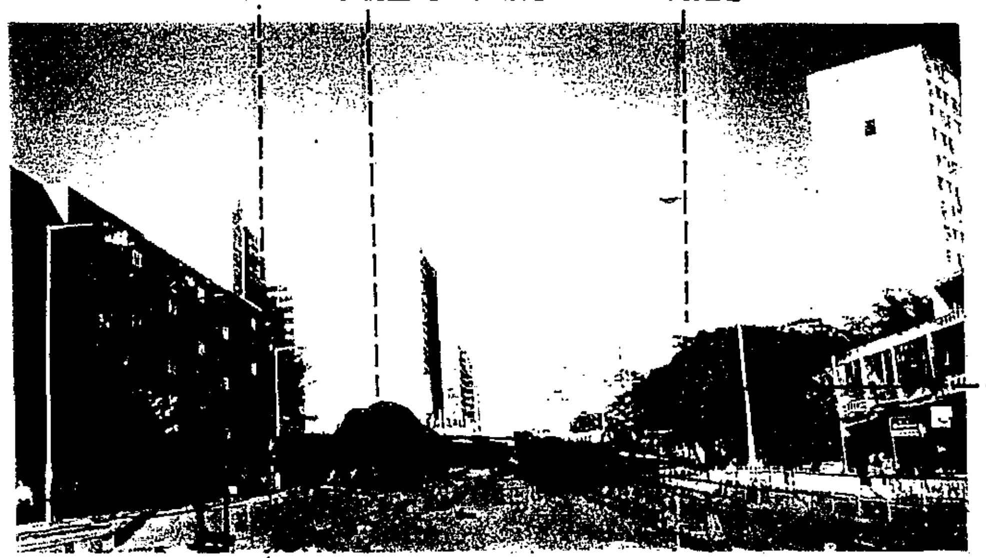
EXISTING VEGETATION

PROPOSED VEGETATION SHALL FULLY SCREEN VIEWS OF PROPOSED FLYOVER

(i)

VISIBLE EXTENT OF PROPOSED WORKS

PROPOSED LANDSCAPE PLANTING SHALL EVENTUALLY FULLY SCREEN THE PROPOSED FLYOVER WHILST PROVIDING ADDITIONAL GREENING TO THE EXISTING STREET SCAPE



EXISTING VEGETATION

(ii)

1B PROPOSED VIEWS APPROACHING ALONG CHAI WAN ROAD TRAVELLING NORTHWESTWARDS (TAKEN AT 400M AND 150M FROM THE FLYOVER RESPECTIVELY)

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94	Drawing No. FIGURE 6.1f (i)
Drawing Title: VISUAL IMPACT ASSESSMENT PHOTOMONTAGE 1i &1ii	Scale N.T.S.
Drawn by FT PS; Checked by PS; Approved by AWd; Date DEC. '94	Job No. ERL4

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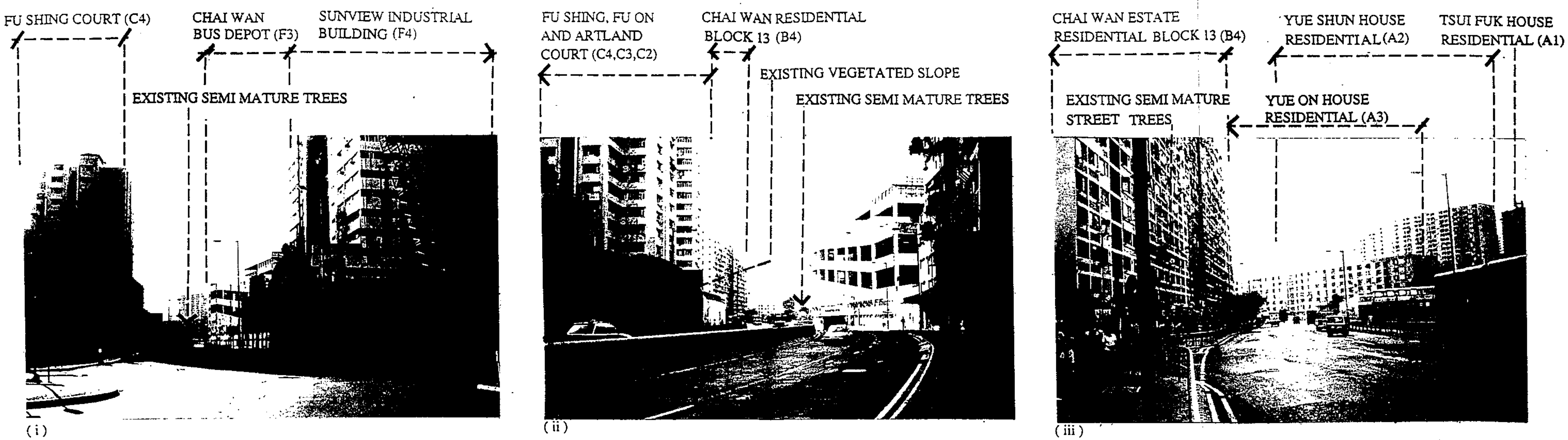
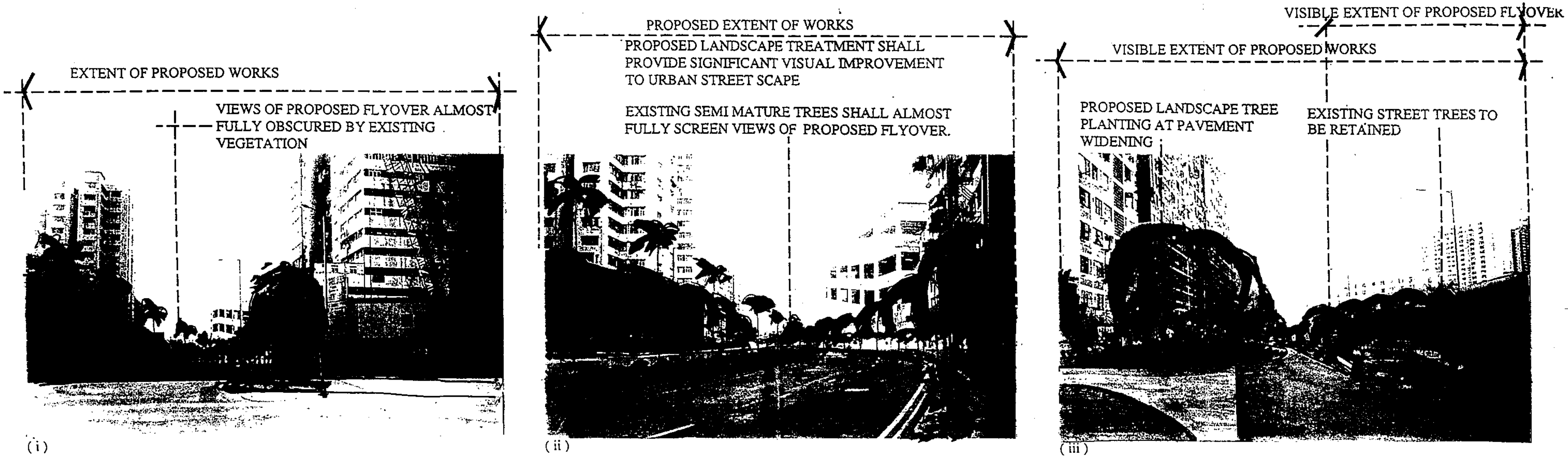


2A EXISTING VIEWS APPROACHING ALONG CHAI WAN ROAD TRAVELLING WESTWARDS TOWARDS THE ROAD JUNCTION (TAKEN AT 300M,200M, 40M, FROM THE FLYOVER TAKEOFF RESPECTIVELY)



2B PROPOSED VIEWS APPROACHING ALONG CHAI WAN ROAD TRAVELLING WESTWARDS TOWARDS THE ROAD JUNCTION (TAKEN AT 300M, 200M, 40M FROM THE FLYOVER TAKEOFF RESPECTIVELY)

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94	Drawing No. FIGURE 6.1f (ii)	
Drawing Title: VISUAL IMPACT ASSESSMENT PHOTOMONTAGE 2i, ii & iii	Scale N.T.S.	
Drawn by FT/ PS · Checked by PS · Approved by [signature] · Date DEC. '94	Job No. ERL4	

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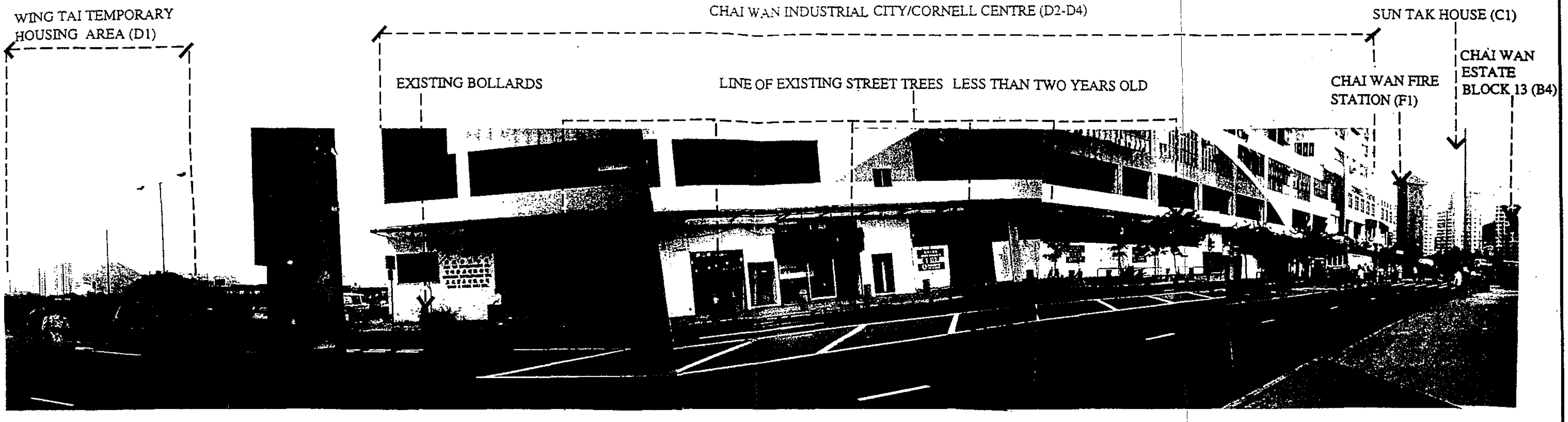

3A EXISTING VIEW AT WING TAI ROAD OUTSIDE TSUI WAN ESTATE

3B PROPOSED VIEW AT WING TAI ROAD OUTSIDE TSUI WAN ESTATE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT
CHAI WAN ROAD / WING TAI ROAD WIDENING
AGREEMENT No. CE.24/94

Drawing Title: VISUAL IMPACT ASSESSMENT
PHOTOMONTAGE 3

Drawing No.: FIGURE 6.1f (iii)

Scale: N.T.S.

Drawn by: FT/ PS | Checked by: PS | Approved by: [signature] | Date: DEC. '94 | Job No. ERL4

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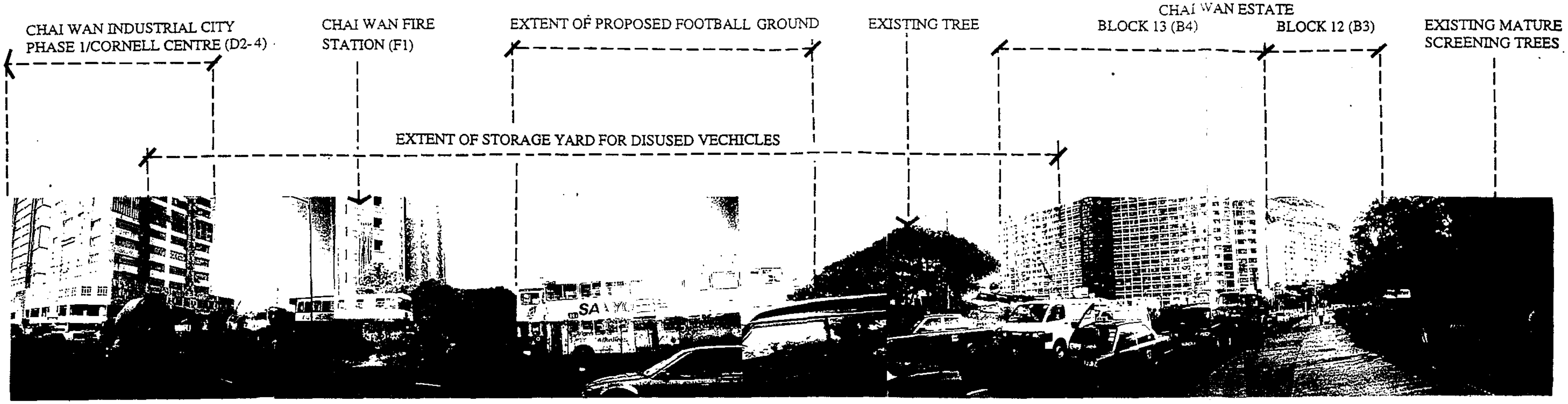
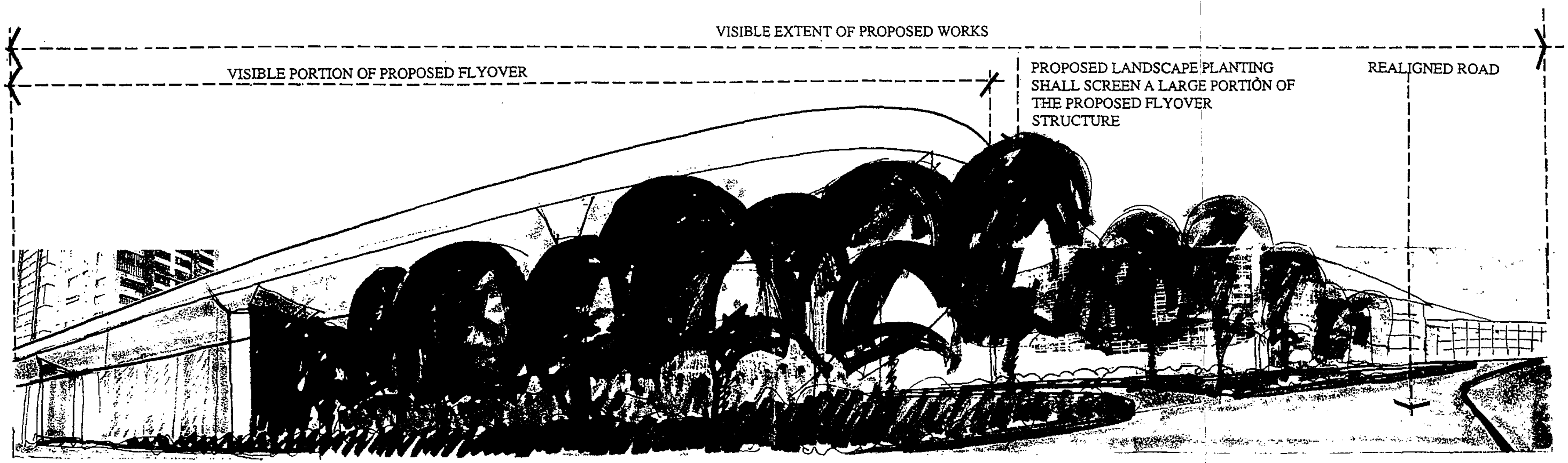


4A EXISTING VIEW FROM WING TAI ROAD AT YUE ON ESTATE SITTING OUT AREA



4B PROPOSED VIEWS FROM WING TAI ROAD AT YUE ON ESTATE SITTING OUT AREA

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title	ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94
Drawing No.	FIGURE 6.1f (iv)
Drawing Title	VISUAL IMPACT ASSESSMENT PHOTOMONTAGE 4
Scale	N.T.S.
Drawn by	FT/ PS
Checked by	PS
Approved by	[signature]
Date	DEC. '94
Job No.	ERL4

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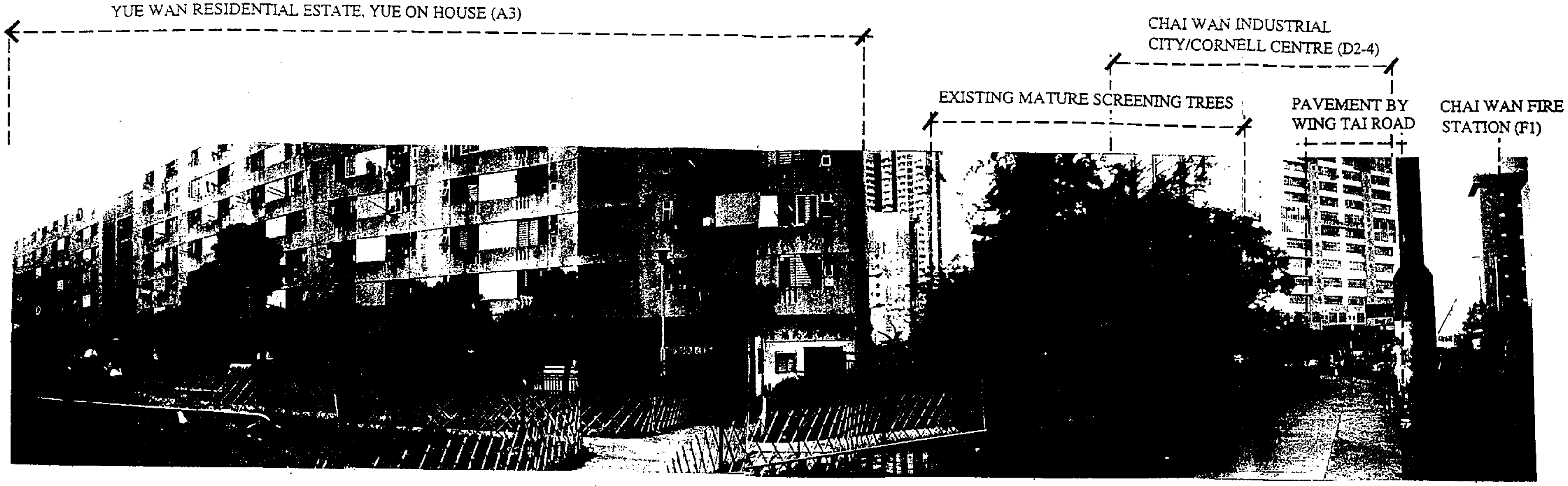
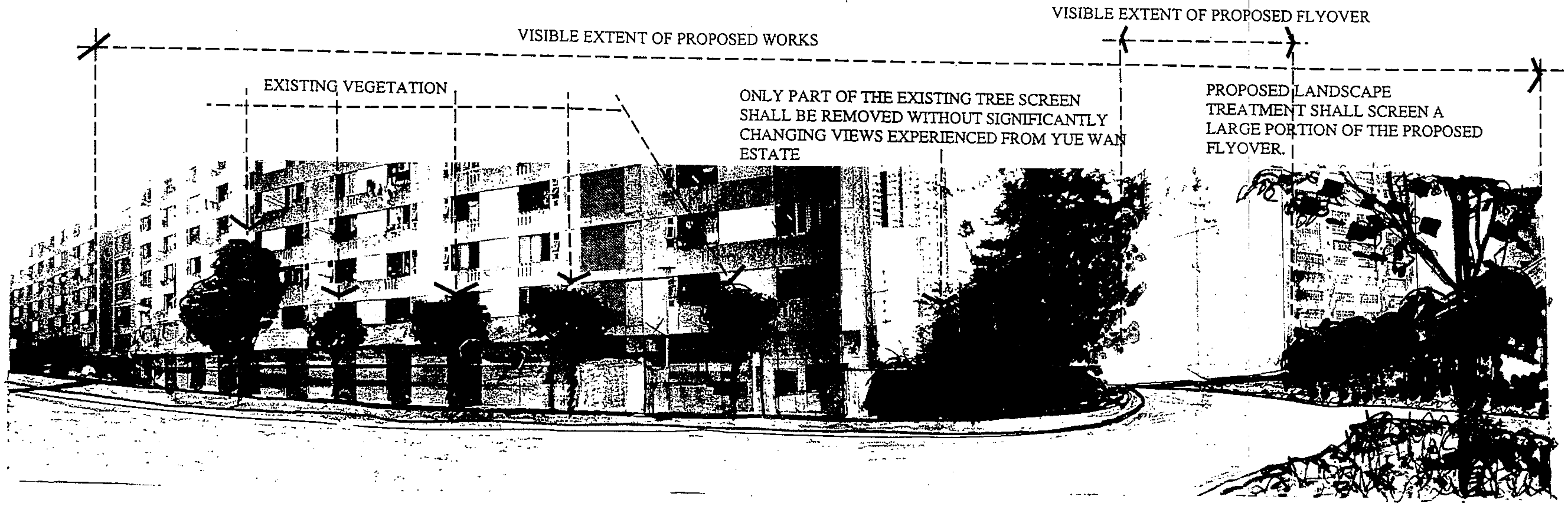


5A EXISTING VIEWS FROM YUE WAN ESTATE SITTING OUT AREA AT CHAI WAN/WING TAI ROAD JUNCTION



5B PROPOSED VIEWS FROM YUE WAN ESTATE SITTING OUT AREA AT CHAI WAN/WING TAI ROAD JUNCTION

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94		Drawing No.: FIGURE 6.1f (v)
Drawing Title: VISUAL IMPACT ASSESSMENT PHOTOMONTAGE 5		Scale: N.T.S.
Drawn by FT / PS	Checked by PS	Approved by amd
Date DEC. '94		Job No. ERL4

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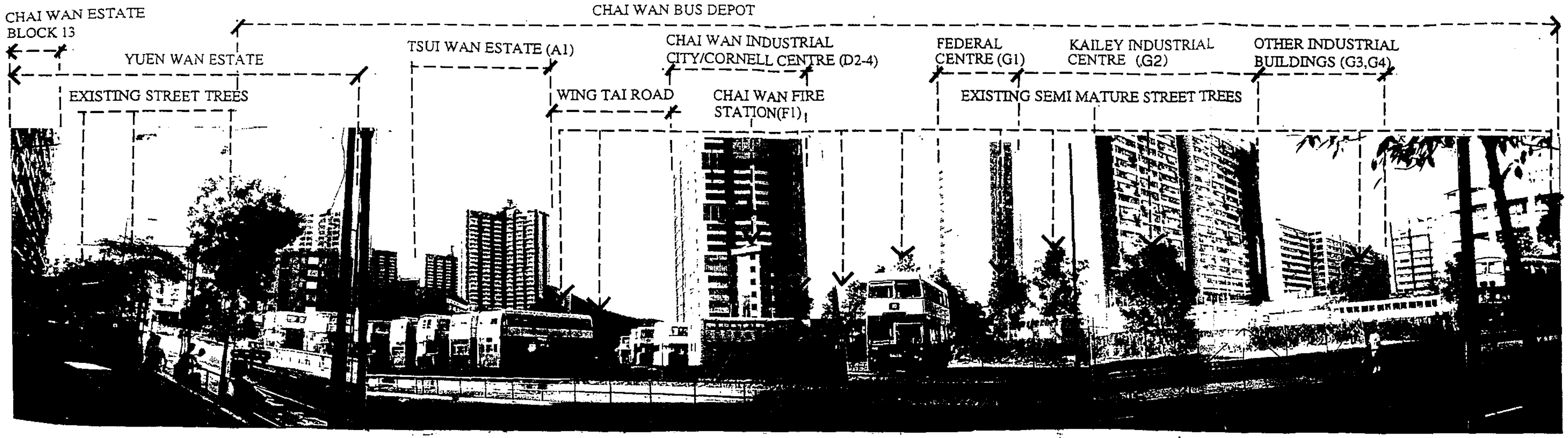
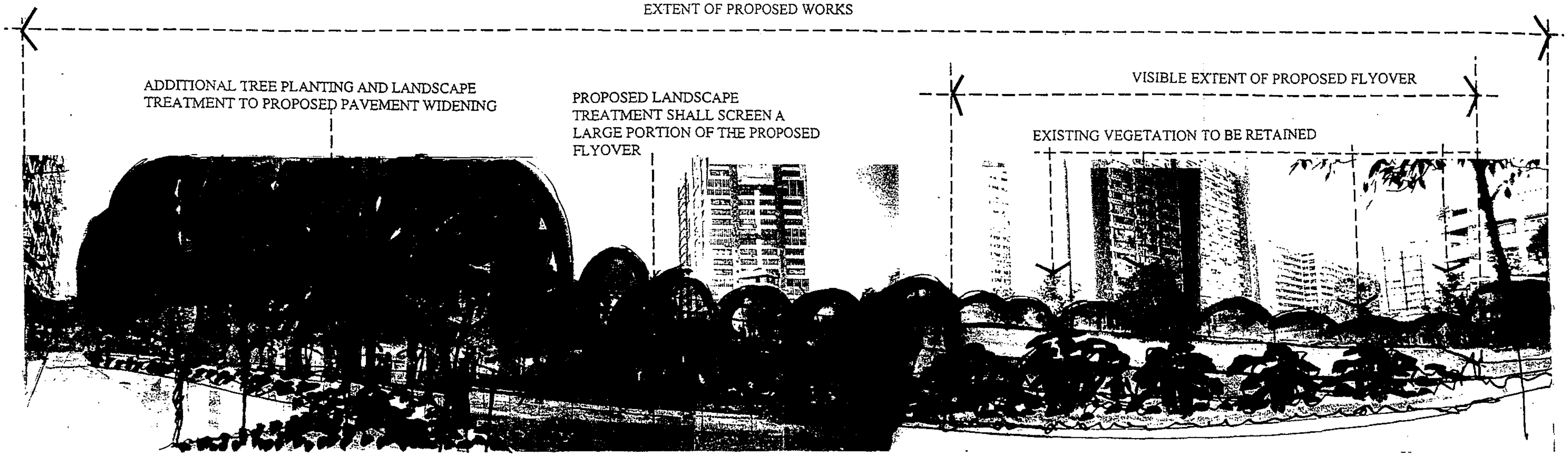


6A EXISTING VIEW FROM FOOTWAY OUTSIDE BLOCK 13, CHAI WAN ESTATE



6B PROPOSED VIEW FROM FOOTWAY OUTSIDE BLOCK 13, CHAI WAN ESTATE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.34/94		Drawing No. FIGURE 6.1f (vi)
Drawing Title: VISUAL IMPACT ASSESSMENT PHOTOMONTAGE 6		Scale: N.T.S.
Drawn by FT / PS	Checked by PS	Approved by [signature]
Date DEC. '94		Job No. ERL4

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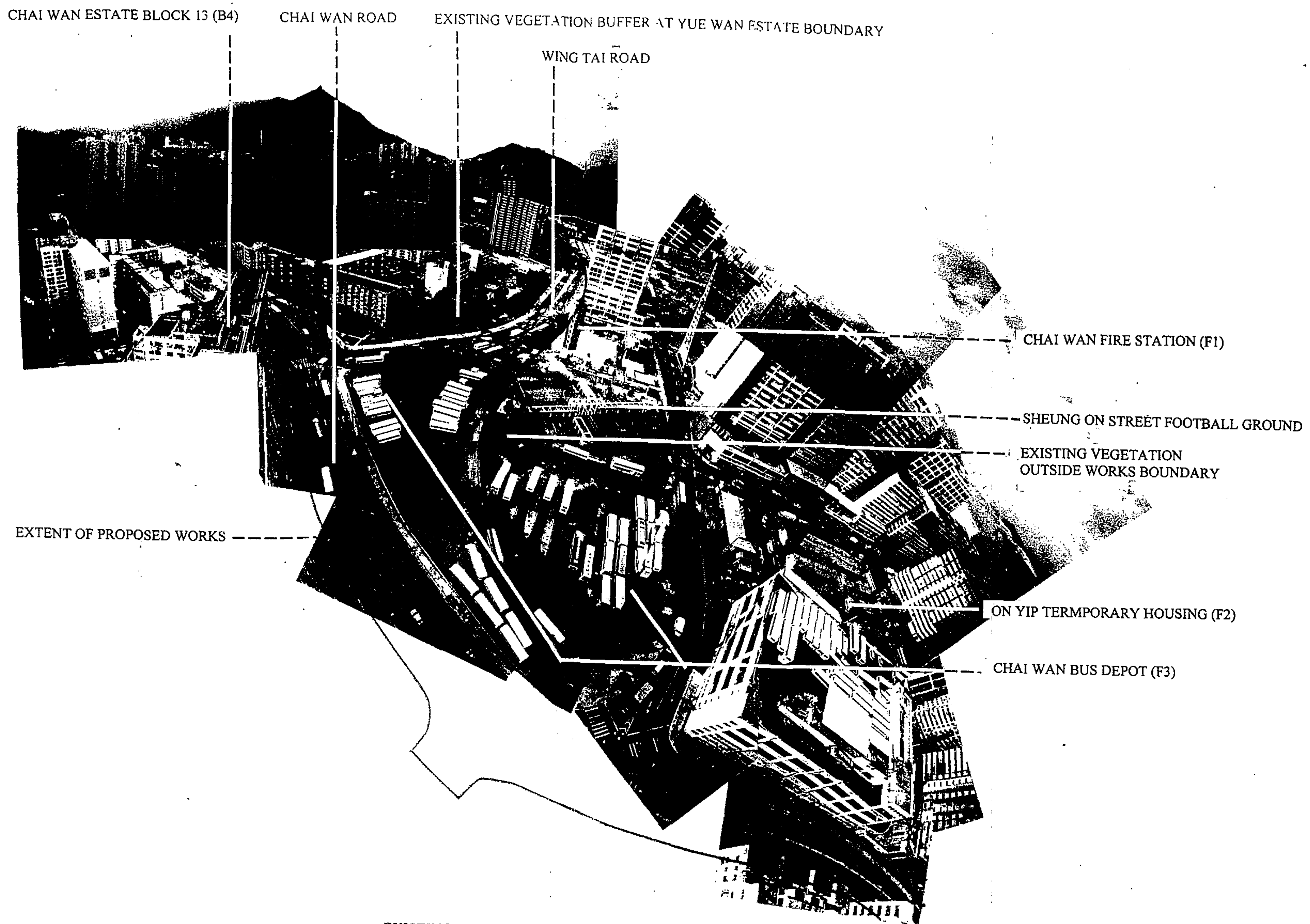

EXISTING VIEWS FROM SUN TAK HOUSE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT
CHAI WAN ROAD /WING TAI ROAD WIDENING
AGREEMENT No. CE.24/94

Drawing Title: VISUAL IMPACT ASSESSMENT
PHOTOMONTAGE 7

Drawing No. FIGURE 6.1f (vii)

Scale

Drawn by PS | Checked by PS | Approved by | Date DEC. '94 | Job No. ERL4

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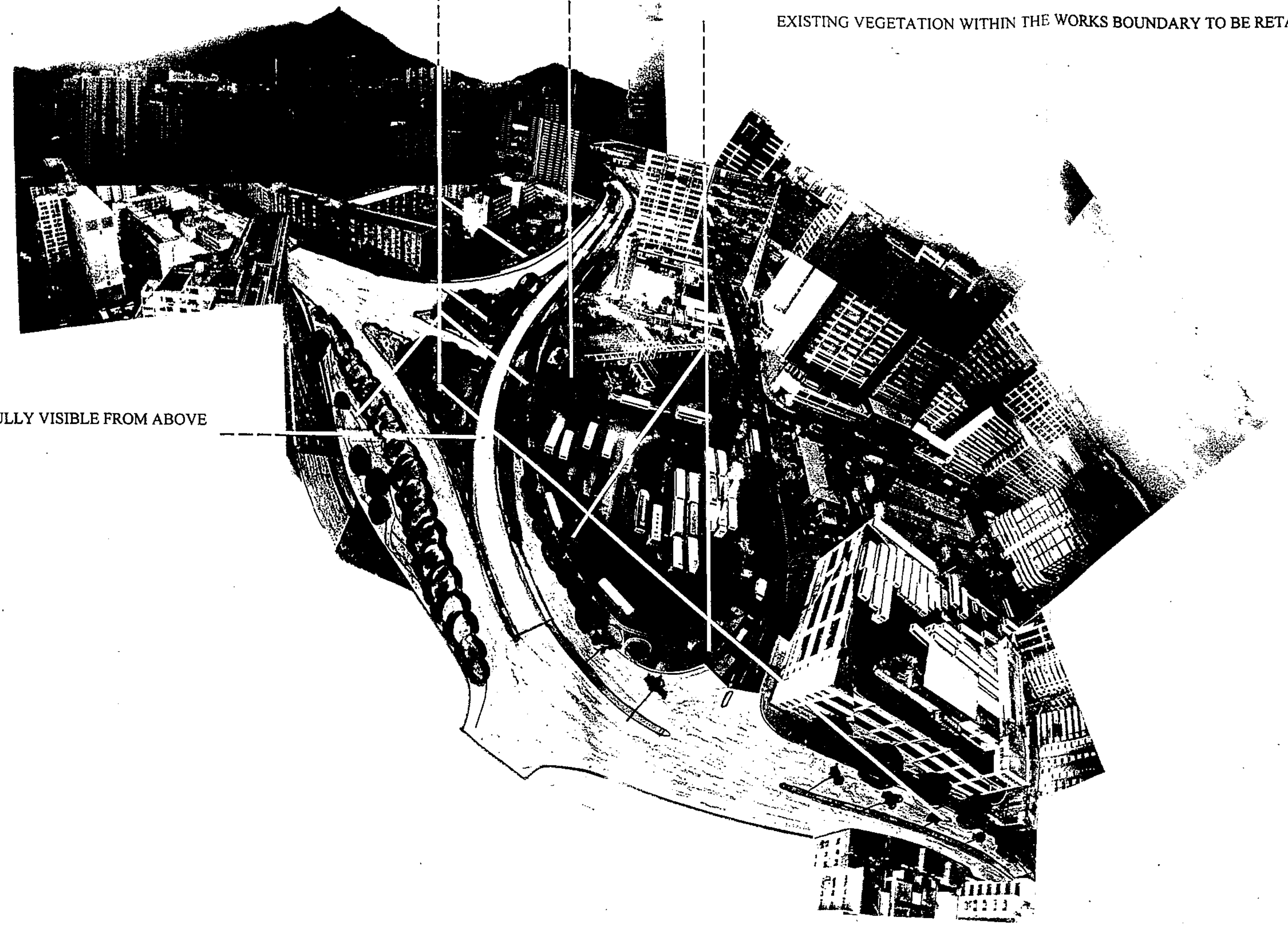

7B PROPOSED VIEWS FROM SUN TAK HOUSE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title	ENVIRONMENTAL IMPACT ASSESSMENT CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94
Drawing No.	FIGURE 6.1f (viii)
Drawing Title	VISUAL IMPACT ASSESSMENT PHOTOMONTAGE
Scale	
Drawn by	PS
Checked by	PS
Approved by	[signature]
Date	DEC. '94
Job No.	ERL4

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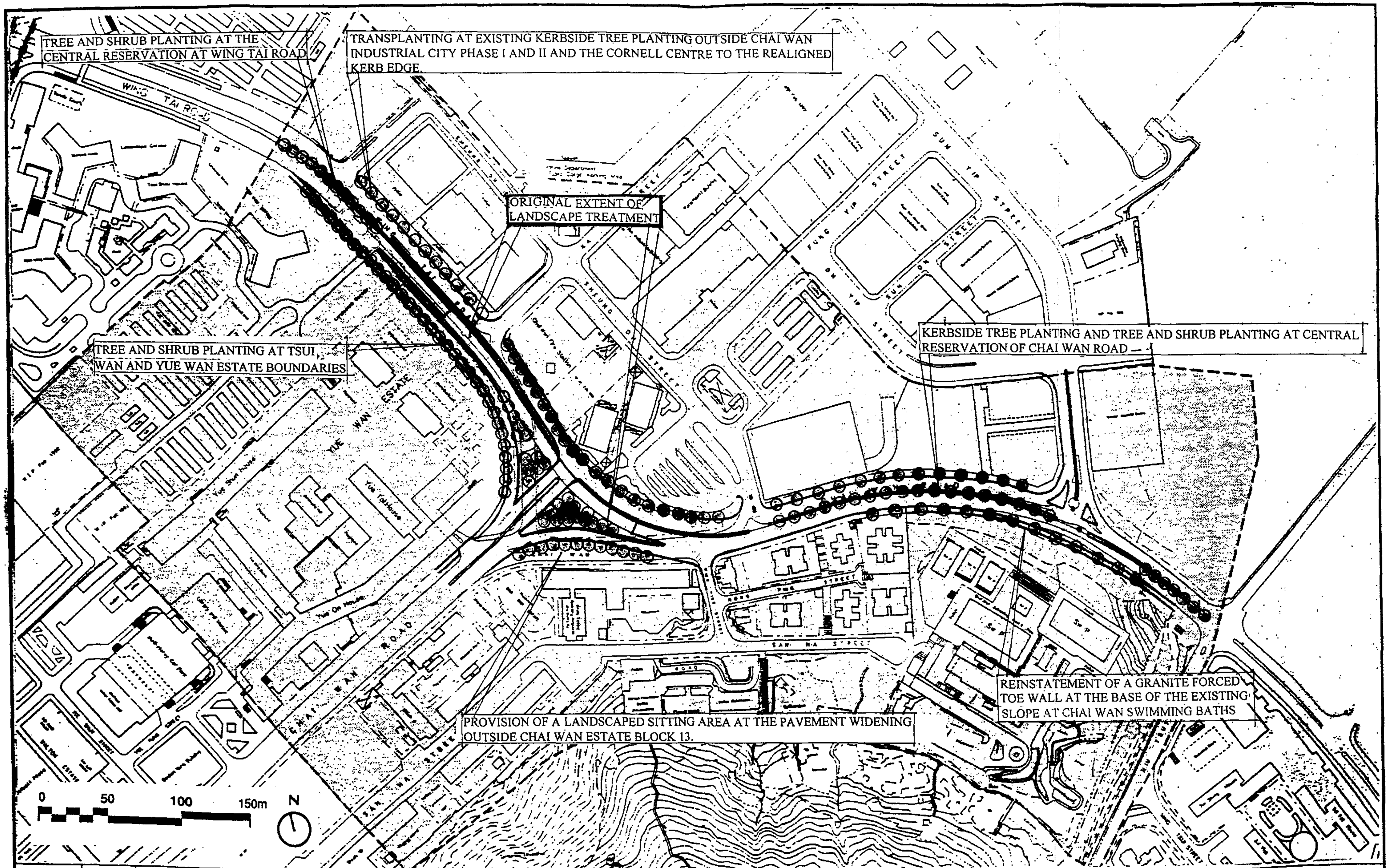

Job Title: ENVIRONMENTAL IMPACT ASSESSMENT FOR CHAI WAN ROAD /WING TAI ROAD WIDENING AGREEMENT No. CE.24/94

Drawing Title: PROPOSED LANDSCAPE MITIGATION PROPOSALS.

Drawing No.: FIGURE 6.1h

Scale: 1:2000

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Drawn by: PS | Checked by: PS | Approved by: [signature] | Date: DEC 94 | Job No.

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Annex D

Typical Street Scenes