Highways Department
Highways (Hong Kong) Region

DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

ENVIRONMENTAL

IMPACT ASSESSMENT REPORT

PYPUN ENGINEERING CONSULTANTS LTD
CONSULTING CIVIL STRUCTURAL BUILDING SERVICES ENVIRONMENTAL ELECTRICAL & MECHANICAL ENGINEERS

MVA ASIA Transportation, Planning and Management Consultants

ENPAC Consultants
Environmental Assessment & Pollution Control

TEAM 73 HK
LANDSCAPE ARCHITECTS & ENVIRONMENTAL PLANNERS

acer ELECTRICAL & MECHANICAL

DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

ENVIRONMENTAL

IMPACT ASSESSMENT REPORT

FEBRUARY 1994

TABLE OF CONTENTS

1. INTRODUCTION

1.1 This EIA has been prepared following the submission in early August 1993 of the Design Review Report (Ref. 1) which presents two alternative schemes including the Loop Reversal Scheme and the Least Cost Scheme for consideration by the Government. Subsequently an Ad-hoc Project Steering Group meeting was convened on 12 August 1993 to discuss this Review Report and the Least Cost Scheme was endorsed for further investigation.

1.2 This report focuses on the likely environmental impacts resulting from the Least Cost Scheme for the Smithfield Extension. The main purposes are :

(a) to quantify the noise and air quality impacts which are likely to arise from the construction and operation of the scheme, if unmitigated;

(b) to propose and evaluate cost-effective mitigation measures aimed at alleviating environmental impacts; and

(c) to propose monitoring and audit requirements during construction and operation necessary to ensure the effectiveness of mitigation measures.

1.3 The scheme has limited impact on water quality. However its impact under this heading has been considered.

1.4 Construction waste impact assessment is also not considered a key issue in this project

1.5 The visual impact of the scheme has been considered.

2. OPERATIONAL PHASE ASSESSMENT

2.1 Noise Impact Assessment

2.1.1 Introduction

2.1.1.1 The major noise source during the operation of the proposed Smithfield Extension and the associated roads will be traffic. The likely noise impact of traffic on noise sensitive receivers in the study area has been calculated and is presented in this section.

2.1.2 Assessment Criteria and Methodology

2.1.2.1 Anticipated noise levels have been assessed with reference to the Hong Kong Planning Standards and Guidelines (HKPSG). These guidelines recommend that L_{10} (peak hour) noise from traffic at sensitive facades shall not exceed 70 dB(A) for domestic premises and 65 dB(A) for places of worship and schools.

2.1.2.2 Future traffic noise is calculated according to the procedure in the U.K. Department of Transport's publication *"Calculation of Road Traffic Noise"* (Ref 2).

2.1.2.3 This assessment has been based on the worst-case scenario for the year 2006. This entails the use of peak traffic flows and the maximum percentage of heavy vehicles present in the area. The peak-hour traffic projections in veh/hr. for the year 2006 are shown in Figure 2.1.1. The figures in brackets are the percentages of heavy vehicles as defined in the U.K. procedure. For comparison, the traffic flows in 1991 are also shown in Figure 2.1.2.

2.1.2.4 Traffic flows from the existing Smithfield, the proposed Smithfield Extension, Mount Davis Road, and Pokfulam Road are the primary sources of noise affecting the sensitive receivers and are included in the assessment. Noise contributions from local roads e.g. Pokfield Road and Lung Wah Road are excluded from future noise calculations as these roads are outside the project area of the present road scheme.

2.1.2.5 Sensitive facades have been chosen to represent both shielded and exposed receivers. These sensitive facades are designated noise sensitive receivers (NSR). Future traffic noise levels have been calculated at various elevations covering these sensitive facades.

2.1.3 Impact Assessment

Identification of Sensitive Receivers

2.1.3.1 Likely noise sensitive receivers may include the existing residential developments, Caritas Welfare Centre, and St Charles Church in the valley basin of Smithfield, and the residential developments along Old Pokfulam Road. However, it is understood that St Charles School has been air-conditioned under the Noise Abatement Measures in School and therefore is less sensitive to noise. The characteristics of these NSR and the major existing noise sources are given in Tables 2.1.1(a) and 2.1.1(b).

2.1.3.2 No planning applications have been identified which will introduce further noise sensitive receivers into the close vicinity of the site. Representative NSR have therefore been selected from the above for noise assessment, and these are shown in Figure 2.1.3.

2.1.3.3 At present, these NSR are being exposed to traffic noise from Smithfield, Lung Wah Road, Pokfulam Road and to a much lesser extent from Mount Davis Road. Based on the 1991 traffic figures, which are considered sufficiently accurate for the purpose of this EIA, the prevailing noise levels have been calculated and are shown in Table 2.1.2.

2.1.3.4 In general, the prevailing noise environment in the valley basin is acceptable. Low level receivers are exposed to noise from light traffic volume on Smithfield and Lung Wah Street and upper level receivers are exposed to noise from medium traffic volume on Pokfulam Road. Facade noise levels are either meet or marginally exceed the HKPSG noise criteria. The noise environment at NSR along Old Pokfulam Road is slightly worse with some of the NSR e.g. EG, YYM and FWM being currently exposed to noise levels higher than that recommended due to heavy traffic on Pokfulam Road. In general, the first few floors are protected by the podium of their own building but the upper floors are exposed. YYM and FWM are particularly badly affected because of their close proximity to the roadway.

Prediction of Unmitigated Noise Impact

2.1.3.5 Future unmitigated traffic noise levels at various floors resulting from the operation of Pokfulam Road, Mount Davis Road, Smithfield and the Smithfield Extension are presented in Table 2.1.3. As recommended in the EI Report (Ref. 3), the carriageway pavement of the section of Smithfield between Block D of Smithfield Terrace and Smith Court and the proposed Smithfield Extension is assumed to have a friction course surface to reduce noise. All relevant elements of the road scheme, including retaining walls and cut slopes, have been considered where these have a noise screening effect. All elevated sections of road are assumed to have a parapet wall 0.8m height on both sides.

2.1.3.6 Table 2.1.3 shows that by 2006, existing NSR along the road, particularly TG and SC, are likely to be adversely affected by traffic noise. The section of Smithfield adjacent to TG and SC has a steep gradient of 17% and this accounts for the higher predicted noise levels at TG and SC. NSR along Old Pokfulam Road would also be adversely affected because of increased traffic on Pokfulam Road. Facade noise levels at MWM and WFH are acceptable at lower floors but exceed the HKPSG noise criteria at upper floors as a result of noise contributions from both Smithfield Extension and Pokfulam Road.

2.1.3.7 St Charles Church and Caritas Welfare Centre facing Pokfield Road have only a limited angle of view of Smithfield, and for this reason are not badly affected by traffic from the new road scheme. The existing and future noise levels at these two facades are mainly due to the traffic on Pokfield Road. The other facades facing east have also very limited angles of view of Smithfield Extension, resulting in facade noise below the levels of the HKPSG.

2.1.3.8 The projected increase in traffic on Pokfulam Road will cause higher noise levels at NSR along Old Pokfulam Road. YYM is expected to have 70 dB(A) facade noise levels and FWM is predicted to have facade noise levels in excess of 80 dB(A).

2.1.4 Mitigation Measures

Criteria for Noise Mitigation

2.1.4.1 The need for noise mitigation measures has been assessed where the overall noise level at a NSR exceeds the maximum recommended noise level in the HKPSG by 1 dB(A) or more in 2006, and direct technical remedies have been considered to reduce the noise impact, where practical. In cases where such remedies appear impracticable, NSR which are eligible for indirect technical remedies e.g. sound insulation and A/C have been identified based on EXCO's directive "Equitable Redress for Persons Exposed to Increased Noise Resulting from the use of New Roads" which requires the fulfilment of all the following criteria ("Insulation Criteria") :

(a) the predicted overall noise level from the new or improved road together with other traffic noise in the vicinity must not be less than the HKPSG criteria, i.e. 70 dB(A) L_{10}(1-hr.);

(b) the predicted noise level is at least 1.0 dB(A) more than the prevailing noise level, i.e. the total traffic noise level existing before the works to construct the road were commenced;

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

Assessment of Need for Noise Mitigation

2.1.4.2 Accordingly, noise mitigation is required for all NSR represented by WK, SF, ST, TG, SC, WFH, MWM, EG, HC, GV, PC, YYM and FWM where the predicted overall noise levels exceed the HKPSG noise criteria by 1 dB(A) or more. In order to determine the most appropriate noise mitigation measures, the noise contributions from all the roads involved have been analyzed for these NSR and the results are shown in Table 2.1.4. Prevailing noise levels are also shown for comparison.

2.1.4.3 In view of EXCO's "insulation criteria", roads have been grouped into :

- Existing Roads which include Pokfulam Road and the section of Smithfield north of Smithfield Terrace;
- New Roads which include Smithfield south of Smithfield Terrace, Smithfield Extension and Mount Davis Road.

2.1.4.4 Apart from TG and SC where the main noise contribution comes from the new roads, and MWM and WFH where both new and old roads contribute, the other NSR are mainly subject to noise from the existing roads.

NSR Along Old Pokfulam Road

2.1.4.5 As shown in Table 2.1.4, the major noise source at NSR along Old Pokfulam Road will be Pokfulam Road traffic. Smithfield Extension and Mount Davis Road traffic will barely contribute to the overall noise levels. In order to reduce the noise contribution from Pokfulam Road, noise barriers have been considered for erection along the footpath of the southbound carriageway, except near the traffic junction of Pokfulam Road and the tunnel access road because of traffic engineering requirements. However, as can be seen from Sections A-A through K-K (see Figures 2.1.4(a)-(k) and the key plan in Figure 2.1.5), no barriers of a practical height would be adequate to screen the traffic for FWM, YYM, PC, PM, GV, and EG which are either situated very close to Pokfulam Road, or on elevated podia. Noise barriers could be cost-effective for the low-rise receivers, e.g. SYB and 94A; however, these NSR need no noise mitigation. Also, noise barriers could be effective for the upper level receivers in WFH and MWM.

2.1.4.6 Further investigation of the practicality of mitigating noise for WFH and MWM shows that a 2.5m high parapet wall in the form of either planter boxes or purpose-built noise barriers along the footpath of the northbound carriageway (see Figure 2.1.6) can reduce the facade noise levels at these upper floor receivers to 70 dB(A) or below, as can be seen from Table 2.1.5.

NSR Along Smithfield

2.1.4.7 NSR along Smithfield are likely to be adversely affected by traffic noise. However, options for mitigation are very limited. Noise barriers would be impractical and ineffective. A partial noise enclosure 70m long has been considered to protect TG and SC. However, such an enclosure would present considerable practical difficulties. Open sides tend to reduce the effectiveness of this enclosure for the lower floors as the opening allows noise to affect low level receivers. In veiw of this, an assessment of full height side panels on the enclosure has been made.

2.1.4.8 A meeting held in August 1993 with Fire Services Department confirmed that in order to provide access for fire fighting to the facades of these two buildings, the following is necessary :

(a) a 15m gap in the noise enclosure; or

(b) a 9m clearance from the northern building corner of TG and a 11m clearance from the southern building corner of SC.

2.1.4.9 Either requirement influences the effectiveness of an enclosure. A detailed assessment has therefore been conducted in relation to six test points at various heights on TG and SC of the effectiveness of a 65m long enclosure extending south of Smithfield Terrace to the junction

between Smithfield and Smithfield Extension with a 15m gap in the middle (see Figure 2.1.7).

2.1.4.10 In theory, a low-level receiver at 7m from the road centreline and 4m from the nearest side panel can have a direct line of sight of a 26m length of uncovered traffic due to the 15m gap (see Figure 2.1.8 for the geometry). At higher levels, the length of uncovered traffic due to the gap reduces until it reaches the value of 15m. For calculation purposes, two scenarios are presented:

- Scenario 1: A 50m length of covered and 15m length of uncovered traffic, applicable to the low-level receivers; and
- Scenario 2: A 39m length of covered and 26m length of uncovered traffic, applicable to the upper level receivers.

2.1.4.11 In both cases, sound transmission through the enclosure material is assumed negligible. Table 2.1.6 compares the overall noise levels with and without the enclosure for the two scenarios. For a 15m gap, noise reduction is in the range of 5.0-8.0 dB(A) at TG-1 and TG-2, reducing to 2.0-4.0 above the gap. For a 26m gap, the corresponding noise reductions are in the range of 3.5-6.0 and 1.5-2.0. If it can be assumed that scenario 2 applies to receivers below 7/F, and scenario 1 applies to all the upper floors, then it is estimated that facade noise levels at 16% of the dwellings at TG and 11% of the dwellings at SC would still exceed 70 dB(A), down from 93% and 74% respectively without the enclosure.

2.1.4.12 Thus in both cases FSD's access requirements render the enclosure ineffective.

Engineering Consideration

2.1.4.13 As stated in 2.1.4.8 above, Fire Services Department have pointed out that provision of a continuous 70m length of enclosure is not acceptable as it would interfere with fire fighting access to buildings. FSD's alternative requirements to overcome this problem have been described in 2.1.4.8 above, and no acceptable alternative to the adoption of one or other of these requirements has been identified (notes of the meeting held with FSD to discuss their requirements are attached as Appendix C). Either a 15m gap has to be provided, or the enclosure has to be shortened, with the consequence in either event that the objectives of the HKPSG cannot be achieved.

2.1.4.14 Other practical difficulties arise from the necessity to provide a full enclosure, with side walls. Supports would have to be accommodated in the footpaths on either side of the road outside Tresend Garden and Smith Court. Supports for an enclosure with open sides could perhaps be located in the footpath in such a way as to allow pedestrians to pass either side. However, this would not be possible for an enclosure with closed sides. The footpaths outside Tresend Garden and Smith Court vary in width between 2.5m and 3m. About 1.5m of this footpath width, from carriageway edge, would be required to accommodate a

protective barrier, the column itself, and the material forming the side wall of the enclosure (as shown in figure 2.1.9.). Residual footpath width between building facades and the external closed face of the enclosure would thus be of the order of 1m to 1.5m over the approx 70m length of the enclosure. Such a narrow footpath width is not adequate, and there is no scope for increasing it to acceptable dimensions.

2.1.4.15 The enclosure would necessitate the demolition of a canopy at Tresend Garden, and private vehicle access to/egress from this building would be via an opening in the side wall. The sightlines of vehicles passing through this opening into and out of the building would be blocked by the columns and side walls of the enclosure, and a serious safety hazard would result which could only be eliminated by denying residents vehicular access to their premises. This is not likely to be an acceptable measure. The alternative of setting the enclosure columns close to Tresend Garden and Smith Court to include the pedestrian footpath within the endosure was also found unsatisfactory as insufficient footpath width still resulted, and the enclosure obstructs access to shops on the ground floor of Smith Court.

2.1.4.16 The enclosure would pass about 1m in front of the windows of the lower floors of Tresend Garden and Smith court. In addition to the visual intrusion and blockage of light which this would imply, a security risk would also arise. This risk could not be contained by any means other than protection of the building facade itself, and would involve the introduction of security bars across all openings on the lower floors.

2.1.4.17 For these various reasons, it is concluded that not only is provision of a noise enclosure insufficiently effective as concluded in 2.1.4.12 above, it is also impracticable.

Assessment for Noise Insulation

2.1.4.18 In view of the insufficient effectiveness and impracticability of direct technical remedies, the predicted noise levels in 2006 have been further analyzed for those NSR likely to require sound insulation. As shown in Table 2.1.7, only TG and SC are eligible for sound insulation and the approximate numbers are 51 units at TG and 33 units at SC.

2.1.5 Summary and Conclusions

2.1.5.1 The Traffic Noise Impact Assessment has revealed that traffic flows for 2006 would result in high facade noise levels at all NSR along Smithfield and most of the NSR along Old Pokfulam Road. Apart from Tresend Garden, Smith Court, Mei Wah Mansion and Wah Fai House, the main noise contribution is from the existing roads.

2.1.5.2 Direct technical remedies have been considered to protect all NSR with facade noise levels in 2006 in excess of 70 dB(A) L10(1-hr.) during the peak traffic hours. It has been shown that 2.5m high parapet walls extending from Fulham Garden to the junction of Pokfulam Road and

Mount Davis Road along the footpath of the northbound Pokfulam Road would be effective in reducing the upper floor receivers facing Pokfulam Road at Mei Wah Mansion and Wah Fai House. However, no barriers of a practical height are effective for those worst-affected NSR along Pokfulam Road.

2.1.5.3 A noise enclosure of 70m length with a 15m gap in the middle has been assessed for effectiveness protecting Tresend Garden and Smith Court. However, with a gap the enclosure becomes insufficiently effective as noise levels at the affected facades at TG and SC above the HKPSG levels persist. Thus it has been concluded that such an enclosure is not sufficiently effective. It is therefore concluded that no practical direct technical remedies are available to alleviate noise impact, although the application of friction course on Smithfield and Smithfield Extension helps.

2.1.5.4 In view of the impracticality of providing direct technical remedies to these NSR, the situation affecting these NSR has been checked against Exco's directive, and this has revealed that approximately 51 units at Tresend Garden and 33 units at Smith Court are eligible for sound insulation.

TABLE 2.1.1(a)

NOISE SENSITIVE RECEIVERS IN VALLEY BASIN LIKELY TO BE WORST AFFECTED BY THE PROPOSED ROAD SCHEME

NSR I.D.	Name of Bldg./Address	Description	No. of Floors[1]	Estimated No. of Dwellings	Major Existing Noise Sources(s)
SCC	St Charles Church	A place of worship	4	N/A	Pokfield Rd
CWC	Caritas Welfare Centre	A community centre operated by Caritas	8	N/A	Pokfield Rd
WK	Wing Kwai Factory Building	An existing industrial building for future residential redevelopment	Unknown	Unknown	Smithfield
SF	Sun Fat Building	A residential building	7	14	Smithfield
ST	Smithfield Terrace	A residential development consisting of 4 tower blocks on a terrace	38	304/bk	Smithfield
PTM	Po Tak Mansion	A residential development consisting of 1 tower block	24	144	Smithfield
SC	Smith Court	A residential development consisting of 1 tower block on a podium with 2 levels for institutional and commercial uses	22	44	Smithfield
TG	Tresend Garden	A residential development consisting of 1 tower block	27	54	Smithfield
SG	Smithfield Garden	A residential development consisting of 3 medium-rise blocks on a podium	6	18/bk	Lung Wah St

WFM	Wah Fai Mansion	A residential development consisting of 1 tower block on a podium with 1 carpark level	23	92	Lung Wah St & Pokfulam Rd
MW M	Mei Wah Mansion	A residential development consisting of a tower block on a podium with 2 carpark levels	24	96	Lung Wah St & Pokfulam Rd
KLL	Kwun Loong Lau	A residential development consisting of 7 tower block on a terrace	21	Bk A 252 Bk B 312 Bk C 320 BK D 236 Bk E 316 Bk F 218 Bk G 419	Lung Wah St

1. Excludes ground floor

TABLE 2.1.1(b)

NOISE SENSITIVE RECEIVERS ALONG OLD POKFULAM ROAD LIKELY TO BE WORST AFFECTED BY THE PROPOSED ROAD SCHEME

NSR I.D.	Name of Bldg./Address	Description	No. of Floors[1]	Estimated No. of Dwellings	Major Existing Noise Sources
EG	Emerald Garden	A residential development consisting of 1 tower block on a podium with 1 carpark level	20	40	Pokfulam Rd
PH	Pokfulam Height	A residential development consisting of 2 medium-rise blocks on a podium	4	8/bk	Pokfulam Rd
HC	Honey Court	A residential development consisting of 1 medium-rise block on a podium	10	20	Pokfulam Rd
GV	Green Villas	A residential development consisting of 1 medium-rise block on a podium	4	8	Pokfulam Road
LC M	La Clare Mansion	A residential development consisting of 2 tower blocks on a podium	12	24/bk	Pokfulam Rd
SYB	Sylvanbrook	A residential development consisting of 1 medium rise block on a podium	4	8	Pokfulam Rd
94A	94A	A residential development consisting of 1 low-rise block	3	3	Pokfulam Rd
PM	Pokfulam Mansion	A residential development consisting of 1 tower block on a podium with 1 carpark level	12	24	Pokfulam Rd

PC	Pokfulam Court	A residential development consisting of 1 tower block on a podium with 1 carpark level	12	48	Pokfulam Rd
YYM	Yue Yan Mansions	A residential development consisting of 3 tower blocks on a podium with 1 carpark level	12	24/bk	Pokfulam Rd
FWM	Foo Wai Mansions	A residential development consisting of 1 low-rise block on a podium with 2 carpark levels	3	9	Pokfulam Rd
FG	Fulham Garden	A residential development consisting of 4 tower blocks on a podium with 2 carpark levels	12	24/bk	Pokfulam Rd

Notes: [1]Excludes ground floor

TABLE 2.1.2

PREVAILING TRAFFIC NOISE LEVELS IN 1991

NSR ID	L_{10} Facade Noise Level (dB(A)) at Storey[1] :								
	1/F	4/F	7/F	10/F	13/F	16/F	19/F	22/F	25/F or above
CWC/E-facade	60	60							
CWC/W-facade[2]	57	56							
SCC/E-facade	58	59	59	60					
SCC/W-facade[3]	52	53	54	54					
WK	70	68	67	66	65				
SF	70	69	67						
ST/Bk C	69	68	67	66	66	66	65	66	66-65
ST/Bk B	67	67	66	66	65	65	65	66	66
ST/Bk A	66	66	66	65	65	64	65	65	65-66
TG	71	69	68	67	66	66	66	67	67
SC	68	67	66	66	66	68	68	68	
PTM	69	67	67	66	66	67	67	66	66
WFH	60	62	62	63	65	67	68	69	69
MWM	61	61	62	63	65	67	68	69	69
SG/Bk B	60	60	60						
SG/Bk C	60	60	60						
KLL	68	66	65	65	64	64	64	64	
EG	72	72	72	72	71	71	71	71	
HC	71	70	70	70					
GV	70	70							
LCM	69	69	69	69	69	69			
SYB	69	69							
94A	69	69							
PM	69	69	69	69	68				

PC	70	70	70	70	69				
YYM/N-facade	71	70	70	71	70				
YYM/W-facade	61	72	74	74	74				
FWM	80	79							

Notes: [1]Assumes 2.75m per floor except ground floor which is 3m.
[2]Noise contribution from Pokfield Road is 69 dB(A).
[3]Noise contribution from Pokfield Road is 74 dB(A).

TABLE 2.1.3

UNMITIGATED TRAFFIC NOISE LEVELS FOR 2006

Receiver ID	L_{10} Facade Noise Level (dB(A)) at Storey[1] :								
	1/F	4/F	7/F	10/F	13/F	16/F	19/F	22/F	25/F or above
CWC/E-facade	65	65							
CWC/W-facade[2]	61	61							
SCC/E-facade	61	61	62	62					
SCC/W-facade[3]	58	58	59	59					
WK	73	72	70	69	69				
SF	74	72	71						
ST/Bk C	72	71	71	70	69	69	69	69	68-67
ST/Bk B	71	71	70	70	69	69	68	68	68
ST/Bk A	71	70	70	69	69	68	68	68	68
TG	77	76	74	73	72	71	71	71	71
SC	74	72	72	71	71	71	71	71	
PTM	66	66	66	67	68	69	69	69	69
WFH	68	68	69	69	70	71	71	72	72
MWM	67	68	68	69	71	71	72	72	72
SG/Bk B	66	66	66						
SG/Bk C	65	66	66						
KLL	63	63	63	64	65	65	65	66	
EG	73	73	73	73	73	73	73	72	
HC	72	72	72	72					
GV	71	72							
LCM	70	70	70	70	70	70			
SYB	71	70	71						
94A	71	71							
PM	71	71	71	71	71				

PC	73	73	73	72	72				
YYM/N-facade	73	73	73	74	73				
YYM/W-facade	64	75	77	77	77				
FWM	83	82							

Notes: [1]Assumes 2.75m per floor except ground floor which is 3m.
[2]Noise contribution from Pokfield Road is 69 dB(A).
[3]Noise contribution from Pokfield Road is 74 dB(A).

TABLE 2.1.4

NOISE CONTRIBUTIONS FROM DIFFERENT ROADS IN 2006

NSR I.D.	Floor Level	Prevailing Noise Level, dB(A)	Predicted L10(1-hr.), dB(A)		
			New Road (Smithfield Extension, Smithfield and Mount Davis Rd)	Existing Road (Pokfulam Road & Smithfield)	Overall
WK	1/F	70	59	73	73
	4/F	68	59	71	72
SF	1/F	70	64	74	74
	4/F	69	63	72	72
	7/F	67	62	70	71
ST-A	1/F	66	64	70	71
ST-B	1/F	67	62	71	71
	4/F	67	62	70	71
ST-C	1/F	69	61	72	72
	4/F	68	61	71	71
	7/F	67	61	70	71
TG-2	1/F	71	77	64	77
	4/F	69	75	63	76
	7/F	68	74	63	74
	10/F	67	72	63	73
	13/F	66	71	63	72
	16/F	66	71	64	71
	19/F	66	70	65	71
	22/F	67	69	66	71
	25/F	67	69	66	71
SC-2	1/F	68	74	60	74
	4/F	67	72	61	72
	7/F	66	71	61	72
	10/F	66	70	62	71
	13/F	66	70	65	71

	16/F	68	69	67	71
	19/F	68	69	67	71
	22/F	68	68	67	71
WFH	16/F	67	68	67	71
	19/F	68	68	69	71
	22/F	69	68	69	72
	25/F	69	68	69	72
MWM	13/F	65	69	65	71
	16/F	67	69	67	71
	19/F	68	69	69	72
	22/F	69	68	70	72
	25/F	69	68	70	72
EG	1/F	72	61	73	73
	4/F	72	61	73	73
	7/F	72	61	73	73
	10/F	72	61	73	73
	13/F	71	61	72	73
	16/F	71	61	73	73
	19/F	71	60	72	73
	22/F	71	60	72	72
HC	1/F	71	56	72	72
	4/F	70	58	72	72
	7/F	70	60	72	72
	10/F	70	60	71	72
GV	1/F	70	58	71	71
	4/F	70	59	71	72
94A	1/F	69	61	70	71
	4/F	69	61	70	71
PM	1/F	69	62	70	71
	4/F	69	63	70	71
	7/F	69	63	70	71
	10/F	69	63	70	71
	13/F	68	63	70	71

PC	1/F	70	66	72	73
	4/F	70	65	72	73
	7/F	70	65	72	73
	10/F	70	65	71	72
	13/F	69	65	71	72
YYM-W	4/F	72	60	75	75
	7/F	74	62	77	77
	10/F	74	61	77	77
	13/F	74	61	77	77
YYM-N	1/F	71	65	73	73
	4/F	70	65	72	73
	7/F	70	65	73	73
	10/F	71	65	73	74
	13/F	70	65	73	73
FWM	1/F	80	59	83	83
	4/F	79	60	82	82

TABLE 2.1.5

COMPARISON OF NOISE LEVELS IN 2006 WITH AND WITHOUT PARAPET WALLS

NSR ID	Floor Level	Predicted Facade Noise Level, dB(A)		
			With Parapet Wall	
		Without Parapet Walls	1.5m	2.5m
WFH	16/F	71	70	69
	19/F	71	70	69
	22/F	72	71	70
	25/F	72	71	70
MWM	13/F	71	69	69
	16/F	71	70	70
	19/F	72	70	70
	22/F	72	71	70
	25/F	72	71	70

TABLE 2.1.6

COMPARISON OF NOISE LEVELS IN 2006 WITH AND WITHOUT NOISE ENCLOSURE

NSR ID	Floor Level	Without Enclosure, dB(A)	With Enclosure, dB(A)	
			15m Gap	26m Gap
TG-1	1/F	77	70	72
	4/F	76	68	70
	7/F	74	67	69
	10F	73	67	68
	13/F	72	66	67
	16/F	72	66	67
	19/F	71	66	66
	22/F	71	66	66
TG-2	1/F	77	70	73
	4/F	76	69	72
	7/F	74	68	70
	10/F	73	67	69
	13/F	72	67	68
	16/F	71	66	68
	19/F	71	66	67
	22/F	71	66	67
	25/F	71	67	68
TG-3	1/F	77	73	75
	4/F	75	71	74
	7/F	74	70	72
	10/F	73	69	71
	13/F	72	68	70
	16/F	71	67	69
	19/F	71	67	69
	22/F	71	67	69
	25/F	71	68	69
	27/F	71	68	69

SC-1	1/F	74	71	73
	4/F	73	70	71
	7/F	72	69	70
	10/F	71	68	70
	13/F	71	68	69
	16/F	71	68	69
	19/F	71	68	69
	22/F	71	69	69
SC-2	1/F	74	69	70
	4/F	72	68	69
	7/F	72	67	68
	10/F	71	67	68
	13/F	71	67	68
	16/F	71	66	67
	19/F	71	67	68
	22/F	71	68	69
SC-3	1/F	72	70	71
	4/F	71	69	69

TABLE 2.1.7

ASSESSMENT OF ELIGIBILITY FOR INDIRECT TECHNICAL REMEDIES

NSR ID	Floor Level	Exceedance of Overall Noise Level over Prevailing Level, dB(A)	Contribution from New Road, dB(A)	Eligibility for Indirect Technical Remedies
WK	1/F	3.5	0.2	N
	4/F	3.3	0.2	N
SF	1/F	3.6	0.4	N
	4/F	3.6	0.5	N
	7/F	3.6	0.6	N
ST-A	1/F	4.3	0.9	N
ST-B	1/F	3.9	0.6	N
	4/F	3.9	0.7	N
ST-C	1/F	3.5	0.4	N
	4/F	3.7	0.5	N
	7/F	3.6	0.5	N
TG-1	1/F	6.4	10.6	Y
	4/F	6.4	10.2	Y
	7/F	6.3	9.4	Y
	10F	6.2	8.8	Y
	13/F	6.0	8.0	Y
	16/F	5.3	6.4	Y
	19/F	4.7	5.2	Y
	22/F	3.8	4.2	Y
TG-2	1/F	6.4	13.2	Y
	4/F	6.4	12.5	Y
	7/F	6.2	11.2	Y
	10/F	6.1	10.1	Y
	13/F	5.9	9.1	Y
	16/F	5.2	7.1	Y
	19/F	4.6	7.9	Y

	22/F	3.8	4.7	Y
	25/F	3.4	4.3	Y
TG-3	1/F	6.4	14.0	Y
	4/F	6.4	13.2	Y
	7/F	6.4	11.9	Y
	10/F	6.2	10.7	Y
	13/F	5.9	9.4	Y
	16/F	5.2	7.2	Y
	19/F	4.7	6.0	Y
	22/F	3.8	4.7	Y
	25/F	3.5	4.4	Y
	27/F	3.4	4.1	Y
SC-1	1/F	6.2	13.8	Y
	4/F	6.0	11.9	Y
	7/F	5.7	10.2	Y
	10/F	5.5	8.8	Y
	13/F	4.7	6.4	Y
	16/F	3.7	4.6	Y
	19/F	3.7	4.1	Y
	22/F	3.3	3.8	Y
SC-2	1/F	5.9	14.1	Y
	4/F	5.7	11.9	Y
	7/F	5.5	10.3	Y
	10/F	5.1	8.6	Y
	13/F	4.5	6.2	Y
	16/F	3.5	4.3	Y
	19/F	3.4	3.8	Y
	22/F	3.1	3.5	Y
SC-3	1/F	3.8	12.6	Y
	4/F	3.8	10.4	Y
EG	1/F	1.4	0.2	N
	4/F	1.5	0.3	N
	7/F	1.5	0.3	N

	10/F	1.4	0.3	N
	13/F	1.4	0.3	N
	16/F	1.5	0.3	N
	19/F	1.5	0.3	N
	22/F	1.4	0.3	N
HC	1/F	1.4	0.1	N
	4/F	1.5	0.2	N
	7/F	1.6	0.3	N
	10/F	1.6	0.3	N
GV	1/F	1.6	0.3	N
	4/F	1.6	0.3	N
94A	1/F	1.9	0.5	N
	4/F	1.9	0.5	N
PM	1/F	2.1	0.5	N
	4/F	2.2	0.7	N
	7/F	2.2	0.7	N
	10/F	2.3	0.8	N
	13/F	2.4	0.9	N
PC	1/F	1.7	0.8	N
	4/F	2.7	0.9	N
	7/F	2.7	0.9	N
	10/F	2.7	0.9	N
	13/F	2.8	0.9	N
YYM-W	4/F	2.8	0.2	N
	7/F	2.8	0.1	N
	10/F	3.1	0.1	N
	13/F	3.0	0.1	N
YYM-N	1/F	2.8	0.8	N
	4/F	3.0	0.9	N
	7/F	2.9	0.7	N
	10/F	3.0	0.6	N
	13/F	3.1	0.7	N

FWM	1/F	3.1	0.0	N
	4/F	3.0	0.0	N

2.2 Air Quality Impact Assessment

2.2.1 Introduction

During the operational phase, the major source of air pollution will be vehicle emissions. Principal components include CO (carbon monoxide, NO_x (nitrogen oxides, principally NO and NO_2), and RSP (respirable suspended particulates). Past experience with similar assessments shows that CO is unlikely to be a major problem. This assessment has therefore excluded CO impacts, except near the underpass portal.

2.2.2 Assessment Criteria and Methodology

2.2.2.1 The Hong Kong Air Quality Objectives (AQO) stipulate maximum acceptable concentrations of pollutants in air. These concentrations are shown in Table 2.2.1.

2.2.2.2 The CALINE4 air pollution model (Ref. 6) has been used to predict the concentrations of NO_x and RSP near the roads. The gases are assumed to be inertial and 20% of the NO_x gases produced are considered as NO_2.

2.2.2.3 The TOP model (Ref. 7) has been used to predict the air quality impact near the portals of the underpass. A background concentration of NO_2 of 81 μg/m3 has been added to the predicted results in order to obtain the total NO_2 levels. This background concentration is the 90th percentile measured hourly concentration at the Fixed Site Air Quality Monitoring Station at High Street in 1991. Hourly background concentrations of RSP and CO are unavailable from the above station for inclusion in the predicted results.

2.2.2.4 Vehicle emission factors for NOx have been derived from PIARC 91 and those for RSP were provided by EPD.

2.2.2.5 Assessment is based on traffic flows predicted for 2006. An approximate breakdown by vehicle type is given in Table 2.2.2. Link speeds are based on the design speed of 50 kph, with reductions for uphill gradients based on steepness of road and percentages of heavy vehicles. Appropriate speed reductions were obtained from Chart 5, "Calculation of Road Traffic Noise" (Ref. 2).

2.2.2.6 Sensitive facades have been chosen to represent shielded and exposed receivers. These sensitive facades are designated as air sensitive receivers (ASR). Future air pollutant concentrations have been calculated at elevations representing the top floor receivers in the valley basin and the first floor receivers above the Pokfulam Road.

Meteorological Conditions

2.2.2.7 Worst-case meteorological conditions were used

Wind Speed	2 m/sec
Wind Direction	Worst Case for Individual Receiver
Stability Class	Neutral (D)
Directional Variability	20°

2.2.3 Impact Assessment

Identification of Sensitive Receivers

2.2.3.1 Air sensitive receivers in the close vicinity of the proposed road scheme include those given in Tables 2.1.1(a) and 2.1.1(b) and the UC Pokfulam Playground. For the purpose of this assessment, the same set of representative receivers as for noise assessment has been selected in additional to the UC playground. (See Figure 2.2.1 for locations of additional assessment points)

Prediction of Air Quality Impact Near Roads

2.2.3.2 ASRs near the proposed road scheme and the existing Pokfulam Road are subject to vehicle emissions. Under the worst meteorological conditions expected, the hourly pollutant concentrations for NO_2 are presented in Table 2.2.3, and for RSP in Table 2.2.4.

2.2.3.3 It can be seen from this Table that, the predicted concentrations of the air pollutants are all well below the maximum allowable concentrations for Nitrogen Dioxide and Respirable Suspended Particulates, which are 300 and 180 $\mu g/m^3$ respectively.

2.2.3.3(a) Further calculations for receptor points at 5m from the western edge of the UC playground on Pokfulam Road show that the NO_2 concentrations would be in the range of 180-200 $\mu g/m^3$ including background. At 10m from the edge, the concentrations would drop to 160-175 $\mu g/m^3$. As such, the AQO should be well met beyond 5m from the road edge.

Prediction of Air Quality Impact Near Tunnel Portal

2.2.3.4 As stated in the Design Review Report, the Pokfulam Road Underpass will be operated with the southern portal under a negative pressure and the western portal under a positive pressure using a series of exhaust fans inside the tunnel. As such, it is considered that impact from air emissions from the southern portal should be negligible. The major concern will be the emissions venting from the western portal.

2.2.3.5 The dispersion of tunnel pollutants from the western portal, has been approximated using a model such as the TOP Model, where the pollutants are treated first as an air jet and then as a plume.

Input Assumptions

2.2.3.6 The TOP Model provides estimated pollutant concentrations at downwind distances, using as input the parameters shown in Table 2.2.5.

2.2.3.7 The portal jet pollutant concentrations have been taken to be the maximum pollutant concentrations permitted under the underpass air quality standards adopted for this project. These standards meet the recommendations provided in the Technical Committee on Road Tunnels Report (PIARC 1991). The portal cross section area and the portal jet speed are as described in the Smithfield Extension Design Review Report (Appendix 1). Values for outside wind speed and temperature rise have been assumed.

Model Results and Assessment

2.2.3.8 Downwind pollutant concentrations at the specified distances and wind directions are anticipated, and are shown in Table 2.2.6.

2.2.3.9 Assessed against the AQO hourly standards of 30,000 $\mu g/m^3$ for CO and 300 $\mu g/m^3$ for NO_2, it is anticipated that excessive pollutant concentrations should be restricted to an area within a small radius of the underpass portal. Impacts are negligible at the residential receivers in the Study Area, the nearest of which is about 80 m from the western portal. At this sensitive receiver (Emerald Garden), portal emissions of NO_2 would be about 11 $\mu g/m^3$, assuming that the wind was 180° to the axis of the western tunnel exit. At the extreme western edge of the Pokfulam Road Playground, the maximum NO_2 concentration resulting from the underpass emissions is about 65 $\mu g/m^3$.

Cumulative Impacts

Tables 2.2.3 and 2.2.4 identify predicted concentrations of NO_2 and Respirable Suspended Particulates (RSP) respectively at sensitive receiver locations. Table 2.2.3 includes background polution levels, whereas Table 2.2.4 does not. However background RSP levels are considered to be negligible as there are no major RSP background sources in the area.

Tables 2.2.3 and 2.2.4 demonstrate that the cumulative impact of background and traffic air pollution levels will be within the acceptable AQO limits at all sensitive receivers.

It should be noted also that Tables 2.2.3 and 2.2.4 represent "worst case" scenarios. For instance, the worst wind direction has been assumed in assessing pollution levels at Emerald Garden arising from emission at the tunnel portal. This gives an NO_2 concentration of 11 $\mu g/m^3$,and this figure has been combined with the NO_2 level predicted to arise from traffic on Pokfulam Road adjacent to Emerald Garden. However in practice, the wind direction resulting in maximum concentrations at Emerald Garden from the tunnel portal will be different from that giving rise to maximum concentrations from traffic.

The Pokfulam Road Playground is the nearest sensitive receiver to the underpass portal. If the worst-case NO_2 underpass emissions (occurring at 124° to the axis of the underpass exit) are combined with the background concentration and the worst-case concentration from Pokfulam Road, the pollution level at 5m from the carriageway would be 280 $\mu g/m^3$ and therefore within the AQO limit.

2.2.4 Mitigation Measures

The air pollution concentrations during the operation phase have been determined to be within the AQO standards. No mitigation measures are therefore necessary to reduce the concentration of air pollutants for the Smithfield Extension.

2.2.5 Conclusion

The air pollution concentrations for Nitrogen Dioxide and Respirable Suspended Particulates have been predicted using the CALINE4 model. The results show that the air pollution levels due to the Smithfield extension are within the acceptable limits established by the EPD and AQO. The tunnel portal is unlikely to have a significant air quality impact on ASR in the valley basin. No air quality mitigation measures are considered necessary for this project.

TABLE 2.2.1

HONG KONG AIR QUALITY OBJECTIVES

POLLUTANT	Concentration μg/m3	
	1 hour[1]	24 hours[2]
Sulphur Dioxide	800	350
Total Suspended Particulates (TSP)	-	260
Respirable Suspended Particulates (RAP)	-	180
Nitrogen Dioxide (NO_2)	300	150
Carbon Monoxide (CO)	30,000	-
Photochemical Oxidant	240	-

Notes :

- Concentrations measured at 298° K and 101.325 kPa.
- [1] One-hour criteria not to be exceed more than three times per year.
- [2] 24-hour criteria not to be exceeded more than once per year.

TABLE 2.2.2

TRAFFIC PROJECTIONS AND A BREAKDOWN BY VEHICLE TYPE FOR 2006

Road & Direction	Vehicle Breakdown							
	M/C	Car	Taxi	Van	PLB	LGV	HGV	DD Bus
South of Mt. Davis Rd.								
Pokfulam Rd N/B	57	889	627	111	449	92	113	176
Pokfulam Rd S/B	52	821	579	102	414	85	104	163
North of Mt. Davis Rd								
Pokfulam Rd N/B	47	731	515	91	369	76	93	145
Pokfulam Rd S/B	32	496	350	62	250	51	63	98
Mt. Davis Rd. N/B	5	78	55	10	39	8	7	4
Mr. Davis Rd. S/B	2	29	21	4	15	3	3	2

TABLE 2.2.3

PREDICTED NITROGEN DIOXIDE (NO_2) CONCENTRATIONS

Receiver	Pollutant Concentration ($\mu g/m^3$)
WK	125.7
SF	125.7
ST	108.1
TG	132.1
SC	130.3
PTM	99.0
SG	101.7
MWM	102.1
EG	93.8
90	88.1
PM	84.8
PC	86.3
YYM	89.3
FWM	92.3
KLL	93.0
Playground w/o Tunnel	162.6
Playground e/o Tunnel	109.2
SCC	99.4
CWC	96.8

TABLE 2.2.4

PREDICTED CONCENTRATIONS OF RESPIRABLE SUSPENDED PARTICULATES

Receiver I.D.	RSP Concentration ($\mu g/m^3$)
WK	57.6
SF	59.5
ST	25.6
TG	47.1
SC	49.2
PTM	16.8
SG	18.8
MWM	18.9
EG	10.9
90	6.1
PM	3.2
PC	4.5
YYM	7.1
FWM	9.5
KLL	11.2
Playground w/o Tunnel	69.1
Playground e/o Tunnel	24.9
SCC	16.9
CWC	14.8

1 Excluded background level

TABLE 2.2.5

TOP MODEL INPUT ASSUMPTIONS

Parameter	Description	Input Value
$S_{g\ (CO)}$	Portal jet concentration of CO ($\mu g/m^3$)	115,000
S_g (NO_2)	Portal jet concentration of NO_2 ($\mu g/m^3$)	1,800
V_g	Portal jet speed (m/s)	1.52
Area	Portal area (m^3)	115
U	Outside wind speed (m/s)	2
ΔT	Temperature rise of tunnel gas (°C)	2
Θ	Horizontal angle between jet direction and wind direction (°)	(varied)

TABLE 2.2.6

POKFULAM ROAD UNDERPASS: DOWNWIND POLLUTANT CONCENTRATIONS

Distance from Underpass Portal	Downwind Pollution Concentration ($\mu g/m^3$) at Orientation:			
	0°	45°	90°	180°
CO Concentrations				
1 m	76,600	67,700	67,200	83,800
5 m	37,100	26,300	25,800	47,700
10 m	19,800	11,600	11,200	29,300
20 m	7,500	3,300	3,100	13,700
30 m	3,400	1,100	1,100	7,300
NO_2 Concentrations				
1 m	1,280	1,140	1,130	1,390
5 m	660	490	480	830
10 m	390	260	260	540
20 m	200	130	130	300
30 m	130	100	100	200

3. CONSTRUCTION PHASE ASSESSMENT

3.1 Noise Impact Assessment

3.1.1 Introduction

Construction of the Smithfield Extension will generate noise from the use of powered mechanical equipment. According to the construction programme given in Figure 3.1.1, the work will take about 34 months to complete, commencing July 1994. The main activities will include construction of an Underpass beneath; construction of an elevated structure for Mount Davis Road, and construction of elevated structures and cuttings on the hillside Pokfulam Road.

3.1.2 Assessment Criteria and Methodology

3.1.2.1 The Noise Control Ordinance provides for the control of construction noise other than from percussive piling in the hours between 1900 and 0700 hours on weekdays and all hours on public holidays (including Sundays). Contractors are required to obtain a Construction Noise Permit from the EPD to carry out works in this period and the relevant noise limits must be observed. The Acceptable Noise Level and the procedure for assessing construction noise are given in the Technical Memorandum on Noise from Construction Work other than Percussive Piling.

3.1.2.2 At present, there is no legislative control on construction noise other than from percussive piling. However, for government contracts, it is common to include a noise limit of 75 dB(A) Leq(5-mins) in the contracts for construction works in urban areas. For the purpose of this assessment, this maximum has been adopted. The procedures used are as described in the above Technical Memorandum.

3.1.3 Impact Assessment

3.1.3.1 Table 3.1.1 gives a list of the powered mechanical equipment, with total sound power levels, likely to be employed for the works. As it is not feasible to dictate the method of construction by the contractor, the list is indicative, for use in noise assessment. Locations and deployment of equipment on site are not certain, so resulting construction noise predictions are not necessarily accurate.

3.1.3.2 Based on the list of equipment, major noisy activities have been identified and the maximum noise levels due to these activities calculated. Table 3.1.2 shows the predicted maximum noise levels from these activities at the existing NSRs in the area, represented by the same set of NSRs as shown in Figure 2.1.3.

3.1.3.3 Compared with the prescribed noise standard of 75 dB(A), it can be seen that noise levels would be excessive at some locations and noise mitigation measures would be required. It is considered undesirable to carry out work in the evening hours because of the low background noise levels in the area.

3.1.4 Mitigation Measures

It would appear that the best practical means of controlling construction noise is to include a noise limit in the contract document, with clauses to ensure avoidance of noise nuisance. Appendix A gives sample noise control clauses.

3.1.5 Conclusion

Construction noise assessment indicates that NSRs in the area are likely to be exposed to excessive noise from the construction of the Smithfield Extension if unmitigated. All practicable noise mitigation measures, including the use of silenced equipment, quiet construction methods, scheduling of work, and use of noise barriers where appropriate, should be adopted by the contractor. Noise control requirements should be clearly specified in contract documents, including applicable noise standards to be met and noise monitoring to be carried out as part of the construction work. It is also advisable to establish of a noise complaint hot line.

TABLE 3.1.1
MAJOR CONSTRUCTION ACTIVITIES AND EQUIPMENT TO USE

TASK I - Pokfulam Road Construction

Item	Activity	Powered Mechanical Equipment To Use	Total Sound Power Level (dB)
1	Mobilization	-	-
2	Construct diversion into playground	-	-
3	Divert traffic through diversion	-	-
4	Excavate and locate 275 kV cables	Backhoes (2)	115
5	Construct caissons adjacent to cables	Winches (20)	108
6	Move cables	-	-
7	Construct remaining caissons under southbound carriageway	Winches (20)	108
8	Excavate material down to tunnel roof level	Backhoes	112
9	Construct tunnel roof	Concrete trucks Vibrating pokers Air compressor (2)	115
10	Backfill over tunnel roof and construct pavement	Backhoes (2)	115
11	Divert northbound traffic to southbound carriageway	-	-
12	Construct caissons under northbound carriageway and adjacent embankment	Winches	95
13	Plate over caissons	Mobile cranes (2)	115
14	Restore all traffic to Pokfulam Road	-	-
15	Excavate below plating to roof level	Backhoes (2)	115
16	Construct roof and backfill (northbound carriageway & playground)	Concrete trucks Vibrating pokers Air compressor (2)	115
17	Construct caissons in playground	Winches (20)	108

18	Excavate down to carriageway slab in tunnel & playground	Backhoes (6)	120 **
19	Construct carriageway slab	Concrete trucks Vibrating pokers Air compressors (2)	115
20	Install electrical & mechanical services	-	-
21	Construct 275 kV access tunnel	Minor equipment	
22	Construct Smithfield/Pokfulam Road junction	Paving equipment	109
23	Backfill Pokfulam Road playground	Dump truck	117
24	Landscape playground & construct buildings	Concrete mixer Dumper Lorry	113
25	Install cabling and lighting	Road roller	108

Figures in brackets are the numbers of items of PME.

TASK II - Mount Davis Road Construction

Item	Activity	Powered Mechanical Equipment To Use	Total Sound Power Level (dB)
1	Clear woodland at pile cap locations	Chain saw	114
2	Construct caissons to pier & Mount Davis Road	Winches (10)	105
3	Construct piers	Concrete trucks Vibrating pokers Air compressor (2)	115 **
4	Construct deck	Concrete trucks Vibrating pokers Air compressor (2)	115 **
5	Widen Pokfulam Road	Paver	109

TASK III - Elevated Structure

Item	Activity	Powered Mechanical Equipment To Use	Total Sound Power Level (dB)
1	Construct caisson sleeves	Winches	95
2	Construct retaining wall caissons	Winches	95
3	Construct piers	Concrete trucks Vibrating pokers Air compressor (2)	115 **
4	Construct abutments	Concrete trucks Vibrating pokers Air compressor (2)	115 **
5	Erect formwork	-	-
6	Construct deck	Concrete trucks Vibrating pokers Air compressor (2)	115 **
7	Apply finishes	-	-

TASK IV - Smithfield Extension To Chainage 460

Item	Activity	Powered Mechanical Equipment To Use	Total Sound Power Level (dB)
1	Place order for water pipes & equipment	-	-
2	Excavate rock, chainage 100 - 200	Excavator Dump truck	120 **
3	Excavate rock, chainage 275 - 300	Excavator Dump truck	120 **
3a	Excavate rock, chainage 350 - 370	Excavator Dump truck	120 **
4	Excavate rock, chainage 400 - 460	Excavator Dump truck	120 **
5	Construct caisson	Winches	95
6	Construct caisson struts	Concrete trucks Vibrating pokers Air compressor (2)	115
7	Construct toe retaining walls	Concrete trucks Vibrating pokers Air compressor (2)	115
8	Construct pipe bridge foundations	Concrete trucks Vibrating pokers Air compressor (2)	115
9	Construct pipe bridge decks	Concrete trucks Vibrating pokers Air compressor (2)	115
10	Install pipes & connect to existing pipes	Mobile crane	112
11	Remove existing abandoned pipes	Mobile crane	112
12	Excavate chainage 300 - 350	Excavator Dump truck	120 **
13	Excavate chainage 320-400	Excavator Dump truck	120 **
14	Construct temporary aqueduct (optional)	-	-
15	Construct stream spillway	-	-

16	Construct stream culverts	-	-
17	Construct stream culvert chainage 220	-	-
18	Construct Smithfield culvert (if required)	-	-
19	Construct carriageway drainage	-	-
20	Construct carriageway & kerbs	Paver	109
21	Construct barriers	Concrete trucks Vibrating pokers Air compressor (2)	115
22	Divert stream from aqueduct to spillway	-	-
23	Demolish aqueduct	-	-
24	Erect road future/traffic lights	-	-

TABLE 3.1.2

MAXIMUM PREDICTED CONSTRUCTION NOISE LEVELS FOR MAJOR NOISY ACTIVITIES

NSR I.D.	Predicted Construction Noise Level, Leq (5 min.), dB(a)			
	I 18	II 3,4	III 3,4,6	IV 2,3,4,5,12,13
TG	69.9	62.3	66.6	99.4
PTM	69.7	62.6	66.7	86.1
SG	70.2	64.7	68.9	80.7
MWM	72.2	65.5	71.7	83.4
EG	81.7	63.3	69.0	71.7
GV	75.2	64.9	66.5	69.2
PM	75.9	69.3	65.4	70.4
PC	78.9	72.2	66.5	71.5
YYM	89.0	75.7	68.0	73.9
FWM	95.0	78.9	66.7	73.1
KLL	65.9	59.9	61.8	74.3
SCC	71.5	60.1	64.2	80.7
CWC	71.5	58.9	62.8	72.1

3.2 Air Quality Impact Assessment

3.2.1 Introduction

3.2.1.1 Dust will be emitted during earthworks, tunnelling, and construction of the elevated road foundations. Dust will have a detrimental effect on air quality, and may cause nuisance to the sensitive receivers surrounding the construction site. Other minor air emission sources which are unlikely to have any significant impact of the air quality include asphalt emissions during laying of the road surface, and exhaust from powered mechanical equipment.

3.2.2 Assessment Criteria and Methodology

Assessment Criteria:

3.2.2.1 For construction dust, EPD's maximum acceptable TSP level in air over a one-hour period is 500 $\mu g/m^3$. There is currently no guideline for concentration of hourly RSP during construction.

Sensitive Receivers

3.2.2.2 The impact on air quality of construction dust has been assessed with reference to four sensitive residential receivers shown in Table 3.2.1.

Air Quality Modelling

3.2.2.3 Dust concentrations from stationary dust sources have been calculated using the ISC Short Term Gaussian Dispersion Model. Dust sources have been modelled as area sources, with area size, coordinates, and source strengths provided as inputs. Since simultaneous construction from both ends of the extension (eastern end around Pokfulam Road, and western end at near existing Smithfield) is expected, a worst-case scenario of construction activity along the entire alignment has been assumed.

3.2.2.4 Given the rate of dust generation, the impacts on the air quality at sensitive receivers will depend primarily on the settling rates of the particulates under both calm and windy conditions. Particles with size greater than 30 microns tend to settle out within a few metres of the source under typical wind conditions; conversely, smaller particles have much slower rates of settling, and are therefore more affected by wind turbulence.

3.2.2.5 One category of particle size (0 to 30 microns) with a particle density of 2500 kg/m^3 was assumed. According to the predictive equation in the ISC User's Guide, the gravitational settlement velocity of such particles is 2.7 cm/s, with a reflection coefficient of 0.68. This assessment has assumed concurrent construction over the entire length of the Extension. The resulting dust concentration shown below for each sensitive receiver is thus higher than that likely to be achieved in practice, since the Extension will actually be constructed in segments. Because dust settles out over distance, the contributions from construction on distant road segments is comparatively small. The contribution from the single dominant road segment is generally about 45% of the total dust concentration shown in Table 3.2.1.

3.2.2.5(a) The construction dust assessment has used the AP-42 (1985 edition) emission factor for heavy construction operations. This value is 1.2 tons per acre of construction per month of activity or 1.1 X 10 kg/m^2 sec. Construction activity along the Extension was approximated using a series of rectangular areas of varying sizes covering the alignment and slope formation areas.

3.2.2.6 It has been assumed that no batching plant or works yard will be established for this project, due to site constraints.

Meteorological Conditions

3.2.2.7 Meteorological conditions play an important role in the dispersion of dust. Dry and windy conditions have the potential to enhance wind erosion. Typical worst-case meteorological conditions have been assumed:

Wind Speed	2 m/s
Wind Direction	(worst case for individual receiver)
Stability Class	D

3.2.3 Impact Assessment

3.2.3.1 Table 3.2.2 presents the predicted concentrations of TSP at each sensitive receiver resulting from construction activities along the entire road alignment. Worst-case concentrations are shown for individual receivers, assuming different worst-case wind directions.

3.2.4 Mitigation Measures

3.2.4.1 Results shown in Table 3.2.2 show concentration levels that, though high, are within the EPD's guideline for construction dust. However, due to the inexact nature of construction dust modelling, in which such factors as meteorological and soil conditions are not accurately known, and for which construction methods and schedule are assumed, the need for mitigation measures should be considered as below.

3.2.4.2 The control of dust during earthworks is commonly achieved by wetting or covering exposed earth. Watering is the most common dust control method for the exposed surface of a site, but its effectiveness depends on the degree of coverage and the frequency of application. A twice-daily watering, with complete coverage, can reduce dust emissions by up to 50 percent, depending on a number of other factors such as ambient temperature and level of site activity. The effectiveness of wetting can be prolonged by the use of wetting agents that agglomerate dust particles; however, the use of chemical wetting agents may have adverse effects on plants and animals exposed to contaminated runoff.

3.2.4.3 Effective water sprays may be used during delivery and handling of fill when dust is likely to escape. At active cuts, excavation and fill sites, chemical stabilization is not effective because of the degree of disturbance caused by mechanical equipment. Chemical stabilizers are more useful on completed cuts and fills to reduce wind erosion.

3.2.4.4 To help control dust generated by the transport of soil by dumptruck, materials with the potential to create dust should not be loaded to a level higher than the side and tail boards, and should be dampened and covered before transport. Dust levels can be further reduced by providing a gravel surface (assumed for this assessment) or a temporary sealed surface on unpaved site roads. The speed of all traffic on unpaved roads should be regulated to as low a speed as is practical, but this measure is limited by the difficulty of enforcement. At all vehicle exit points leading from unpaved construction areas onto public roads, wheel washing troughs should be provided.

3.2.4.5 The overall dust reduction obtained by using the above measures is difficult to quantify, since it is very dependent on the weather conditions, on-site practices, and maintenance of mitigation measures. Rough estimations of the reductions that are possible are listed below:

- Twice-daily waterings can reduce dust emissions by up to 50% (assuming complete coverage).
- When handling rubble and rock, reducing the drop height by half reduces dust emission by about 50%.
- At inactive completed cuts and fills, the use of chemical stabilizers to reduce wind erosion can reduce emissions by about 80%.

3.2.4.6 Dust control measures should be incorporated in the contract documents. Possible contract provisions are provided in Appendix A to this study.

TABLE 3.2.1 SENSITIVE RECEIVERS (CONSTRUCTION PHASE)

CODE	IDENTIFICATION
EG	Emerald Garden
GV	90 Pokfulam Road
PC	Pokfulam Court
WFM	Wah Fai Mansion

TABLE 3.2.2 PREDICTED CONCENTRATION OF TOTAL SUSPENDED PARTICULATES (TSP) DUE TO CONSTRUCTION

RECEIVER	POLLUTANT CONCENTRATION ($\mu g/m^3$)
EG	480
GV	280
PC	240
WFM	390

NOTE: Shows highest hourly concentration of dust based on concurrent construction along the entire alignment and worst-case meteorological conditions for each receiver.

4. WATER QUALITY ASSESSMENT

4.1 Existing Stream and Drainage

The catchment area of the project and the drainage pattern are shown in Figures 4.1 and 4.2 respectively. The catchment covers the north west valley area of Sai Ko Shan, encompassing the natural hill slope behind Old Pokfulam Road. The catchment upstream drains through three main natural streams(S1U, S2U and S2U1) which eventually discharge to the existing drainage system downstream of the Project. The runoff from these three natural streams is collected by a 1,800mm(D3) diameter pipe running across Pokfulam Road and discharging via the stepped culvert on the west side of Pokfulam fill slope into Stream S1L. Stream S2L which is next to Stream S1L collects surface runoff from the natural hill slope at the south western portion of the Pokfulam Road, and from a subcatchment of Mount Davis. These two streams, S1L and S2L, converge to a main stream which discharges via a weir into a 1,800mm(D7) diameter pipe under existing Smithfield Road. This 1,800mm(D7) diameter pipe subsequently discharges into the 2,290mm x 1,930mm culvert(Culvert A) near the Kennedy Town Public Swimming Pool.

Site inspection of the two streams near Old Pokfulam Road reveals that the streams are unpolluted and mud free. There is no trace of contamination down stream until the squatter areas at the downhill area of the fill slope are arrived at.

4.2 Construction Stage

Any contaminated surface runoff from construction site is subject to WPCO control. Water quality in the streams will not be adversely affected during the construction stage provided proper pollution control measures are taken. Construction of the Underpass and the foundations for the elevated structures will involve a certain amount of excavation and dewatering. The Contract will require that water containing high concentrations of suspended solids not be pumped or discharged directly to the streams or drains. Silt traps or settling containers will be provided to reduce the amount of suspended solids. Wheel washing bays at all exits will be provided to avoid silt being deposited on existing roads. All materials, plant, fuel or oil delivered to site will be properly stored and maintained to prevent any pollution to the existing stream and drainage system. Grease traps shall be provided to contain any accidental spillage. Existing streams, drainage system silt and grease traps shall be adequately maintained at all times to prevent pollutants discharging to the streams or drains. The Contractor is also required to provide portable toilets for site workers and clean them regularly.

4.3 Operation Stage

The impact on water quality due to the introduction of the Smithfield Extension will be minimal. The chances of spillages due to accidents on the road will be little. However the silt trap and grease trap will be built as a safe guard during construction stage. The clearance of squatters on the downhill slope will contribute to improved water quality as the amount of improper sewage discharge and rubbish dumping will be reduced.

5. CONSTRUCTION WASTE IMPACT ASSESSMENT

Construction wastes and debris including cut timber, set concrete, packing materials etc, will be generated in the course of the construction. However, the construction of Smithfield Extension will produce only small quantities of normal such waste and no contaminated materials. Moreover, EPD as the Waste Disposal Authority should be advised of the details on the quantity of the materials (especially construction waste) and the period of the disposal such that appropriate disposal site can be advised of accordingly.

6. VISUAL AND LANDSCAPE IMPACT

6.1 The project involves construction on the hillside below Pokfulam Road in an area of both natural and filled slopes, and construction beneath the Urban Council Playground adjacent to Old Pokfulam Road. Land in the lower part of the site is in squatter and other informal occupation. Views of the project area are presented from residential developments along Pokfulam Road and from developments at the back of Western District. The area is also visible from the East Lamma Channel.

6.2 The natural slopes within the project area include both wooded areas and areas of lesser quality vegetation, and the filled slopes have tree cover. The major areas of significant vegetation are the planted woodland on the fill slopes below Pokfulam Road; the natural woodland below Mount Davis Road; the stream course area (of squatter occupation); and the Pokfulam Road Playground itself.

6.3 The project will inevitably have an impact on the landscaping and visual appearance of the hillside area. However scheme layout has been developed in such a way as to minimise visual impact and tree loss. Particular efforts have been made to limit impact on the woodland in the Mount Davis Road area, and such effects as are inevitable here and elsewhere will be screened to the greatest possible extent by soft landscaping and compensatory planting.

6.4 Cut and fill slopes will be hydroseeded and planted. Piers and columns of elevated bridge structures and faces of retaining walls will have textured finishes and will be screened to the greatest extent possible by new planting. Trailing plants and shrubs will be located along the tops of retaining walls. Squatter clearance will provide an opportunity (which will be taken) for improvement of the hillside appearance by additional landscaping and planting.

6.5 It will be possible to maintain recreational facilities at the Urban Council Playground site through the construction period. Loss of mature trees will be limited, and appropriate submissions in respect of tree loss will be made to the Urban Council. There will be little effect on the visual contribution of the Playground area to the overall landscape setting, and the Playground itself will be fully reinstated upon completion of the project.

7 MONITORING AND AUDIT REQUIREMENTS

7.1 Introduction

The objective of a monitoring and audit programme is to identify as early as possible a deterioration in noise, and air quality due to proposed construction activities, and to enact measures to reduce its impact.

7.2 Noise

7.2.1 Baseline Monitoring

7.2.1.1 The baseline noise survey should be carried out prior to the start of construction work. Noise measurements should be made at 1 m from the worst-affected external facades of the designated NSR and the Leq(1-hr.) and L90(1-hr.) should be measured continuously between 0800 and 1800 hours on at least one normal weekday. The results are to confirm that the assessment criterion of 75 dB(A) Leq(30-mins) is appropriate to protect the NSR in the area from excessive construction noise.

7.2.2 *Compliance Monitoring Schedule*

7.2.2.1 Daytime compliance monitoring should be undertaken at least three times per week, involving measurement of Leq over a 30-minute period of typical activities. Measurement should be carried out 1 m from the worst-affected external facades of the designed NSRs. Noise measurements should be made during periods of high background noise (such as during peak traffic hours), or in the presence of fog, rain, or excessive steady or gusty winds.

7.2.2.2 When complaints are received or the construction noise level exceeded, the following Action Plan is recommended:

TABLE 7.1 ACTION PLAN FOR COMPLIANCE MONITORING (NOISE)

Event	Action	
	Engineer	Contractor
If noise level exceeds 75 dB(A)	- Notify Contractor - Require Contractor to propose measures to redue noise. - Increase monitoring frequency.	- Submit noise mitigation proposals to the Engineer. - Implement noise mitigation measures.

When a complaint is received	- Notify Contractor - Conduct measurement - Investigate noisy operations	
When more than one complaint are received within 2 weeks' time	- Notify Contractor - Investigate and analyse - Require Contractor to propose measures for the analysed noise problem - Increase monitoring frequency to check mitigation effectiveness	- Submit noise mitigation proposal to Engineer - Implement noise mitigation proposal

7.3 Air Quality

7.3.1 *Baseline Monitoring*

7.3.1.1 The baseline monitoring should be carried out for at least two consecutive weeks prior to the start of construction work. Both 24-hour samples and 1-hour samples should be obtained; the 1-hour samples should be taken at least three times daily, at hours when the highest dust impact during construction is expected.

7.3.2 *Regular Impact Monitoring*

7.3.2.1 24-hour samples should be taken at least once every six days at all monitoring stations. At least three 1-hour samples should be taken every six days, at times when dust concentrations are expected to be high.

7.3.3 *Non-compliance Monitoring*

7.3.3.1 In the event that unacceptable concentrations of TSP are experienced, more frequent monitoring should be conducted within 24 hours, and should continue until the excessive dust emissions are reduced. This measure is further addressed in the next section.

7.3.4 *Trigger, Action, and Target Levels*

7.3.4.1 The Trigger Level is reached when ambient TSP concentration exceeds the baseline concentration by 30 percent. Reaching the Trigger Level indicates ambient air quality is deteriorating.

7.3.4.2 The Action Level is obtained by averaging the Trigger Level and AQO maximum permitted TSP concentration. When the Action Level is reached, remedial action becomes necessary to prevent exceedance of the AQO standard.

7.3.4.3 The Target Level is identical to the AQO maximum permitted TSP concentration.

7.3.4.4 A programme of action incorporating the Trigger, Action, and Target Levels is proposed below in Table 7.2

TABLE 7.2 ACTION PLAN FOR COMPLIANCE MONITORING (DUST)

Event	Action by Engineer	Action by Contractor
Trigger Level exceeding for one sample	Repeat measurement as soon as possible, and notify Contractor.	Identify source of emission.
Trigger Level exceeded for two or more consecutive samples	Repeat measurement as soon as possible. Notify Contractor and EPD.	Identify source of emission and impose necessary mitigation measures.
Action Level exceeded for one sample	Repeat measurement as soon as possible. Notify Contractor and EPD.	Identify source of emission and impose necessary mitigation measures.
Action Level exceeded for two or more consecutive samples	Start daily monitoring. Notify EPD. Notify Contractor and require him to make additional proposals for dust suppression.	Identify source of emission. Review plant, equipment, and working procedures. Submit proposals for reducing dust to the Engineer. Implement remedial action to reduce dust emissions immediately, and notify Engineer of action taken.

Target Level exceeded for one sample	Start daily monitoring. Notify EPD, and provide investigation report as soon as possible. Notify Contractor and require him to make additional proposals for dust suppression.	Identify source of emission. Review plant, equipment, and working procedures, and provide investigation report to Engineer. Submit proposals for reducing dust to the Engineer. Implement remedial action to reduce dust emissions immediately, and notify Engineer of action taken.
Target Level exceeded for two or more consecutive samples.	Start daily monitoring. Notify EPD, and provide report on Contractor's proposals and actions for dust suppression. Notify Contractor and require him to make additional proposals and take immediate steps for dust suppression.	If instructed by Engineer, stop work activities causing excessive dust emissions. Identify source of emission. Review plant, equipment, and working procedures. Submit proposals for reducing dust to the Engineer. Submit investigation report, including measures to prevent further AQO exceedances. Implement remedial action to reduce dust emissions immediately, and notify Engineer of action taken.

7.3.4.5 Guidelines for dust monitoring are provided in Appendix B.

7.4 Others Impact Monitoring

Water quality in the streams will not be adversely affected during construction with proper pollution control measures. The construction of Smithfield Extension will produce normal waste or debris which will not require special treatment and can be disposed off site. No monitoring and audit programme is required.

8. RECOMMENDATIONS

8.1 The finding of the report results in the following recommendations:

8.1.1 Operation Noise

8.1.1.1 NSRs exposed to Pokfulam Road are subject to prevailing high traffic noise levels, and the addition of Extension traffic results in some deterioration in the overall noise level. For this reason, the following direct technical remedies are recommended:

- application of friction course on Smithfield (from Block D of Smithfield Terrace to the junction with the Extension), and Smithfield Extension. Friction course is not necessary through the underpass, though it may be desirable for traffic safety reasons.

- Provision of a 2.5m parapet wall on Pokfulam Road, extending from Fulham Garden to the junction of Pokfulam Road and Mount Davis Link. The wall should run beside the footpath by the northbound lanes. In order to minimize noise reflection off the side facing NSR along Pokfulam Road, it is recommended that absorptive type barriers should be used.

- Provision of a 2.5m high barrier along the section of Smithfield facing MWM and WFH to alleviate the traffic noise impact on the lower floors of these two receivers.

8.1.1.2 Direct mitigation measures outside Tresend Garden and Smith Court were investigated and found ineffective. For this reason, indirect technical remedies, in the form of acoustic insulation and provision of air conditioning, are recommended for 51 units in Tresend Garden and 33 units in Smith Court.

8.1.2 Operational Air Quality

8.1.2.1 No exceedance of AQO standards is anticipated during the operational phase of the Extension.

Since all pollutants from the underpass are to be vented out the western portal away from the playground, air pollutant levels in the Playground are within acceptable limits beyond 5m from the western edge of the Playground. However a 5 m buffer at the western edge of the Playground for active recreational uses is recommended. Active recreational areas, such as children's play areas, basketball and volleyball courts should be located as far from Pokfulam Road as possible. Uses closer to the road may include the plant nursery, sitting out areas, and amenities such as toilets and changing rooms.

8.1.3 Construction Noise

8.1.3.1 Construction noise levels can be expected to exceed desirable levels at some receivers for limited periods of time. A package of noise mitigation measures has been proposed to minimize noise impact.

8.1.4 Construction Air Quality

8.1.4.1 Modelling results show that high dust concentrations are not expected. However, depending on the location, individual receivers may experience high dust levels for limited periods of time. For this reason, a package of dust mitigation measures has been proposed.

8.1.5 Water Quality

8.1.5.1 Water quality in the streams may be affected during construction if proper pollution control measures are not taken. Pollution measures such as wheel washing bays at all exits, properly maintained silt and grease traps to reduce amount of pollutant discharging to the streams or drains and proper storage of materials, plant fuel or oil will be specified in the contract. After the completion of construction, the impact on water quality due to the introduction of the Smithfield Extension will be minimal and no mitigation measures are necessary.

8.1.6 Construction Waste Impact

8.1.6.1 The construction of the Smithfield Extension will produce only small quantities of normal waste and no contaminated materials. The Contractor will be required to dispose of all unsuitable material outside the project site, to provide portable toilets for site workers and to maintain and clean these regularly.

8.1.7 Visual Impact

8.1.7.1 The project will inevitably have an impact on the landscaping and visual appearance of the hillside area in which it is to be constructed. However careful engineering design and and close attention to soft landscaping and compensatory planting will minimise this impact. There will be little effect on the visual contribution of the Urban Council Playground area to the overall landscape setting, and the Playground itself will be fully reinstated upon completion of the project.

FIGURES

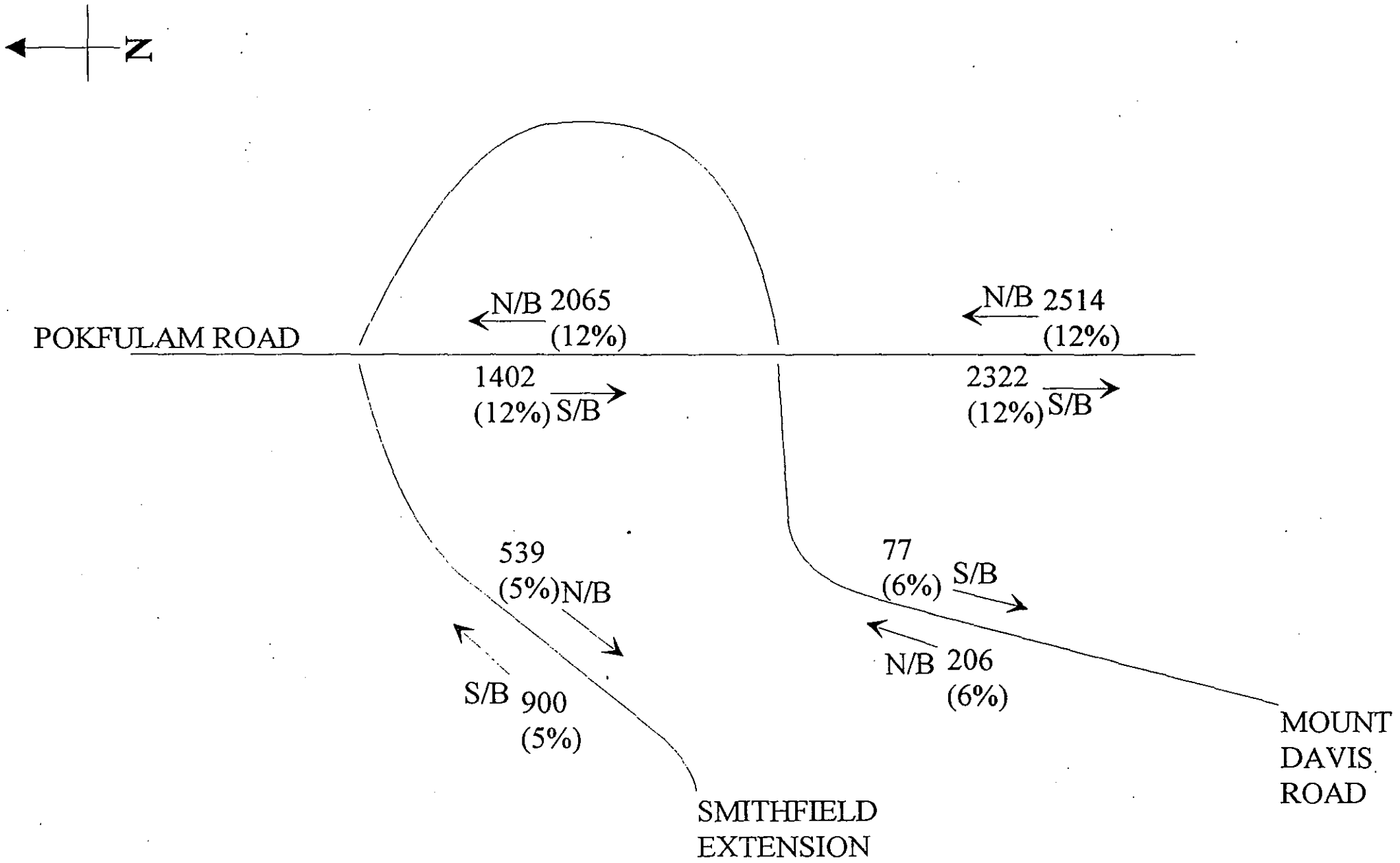
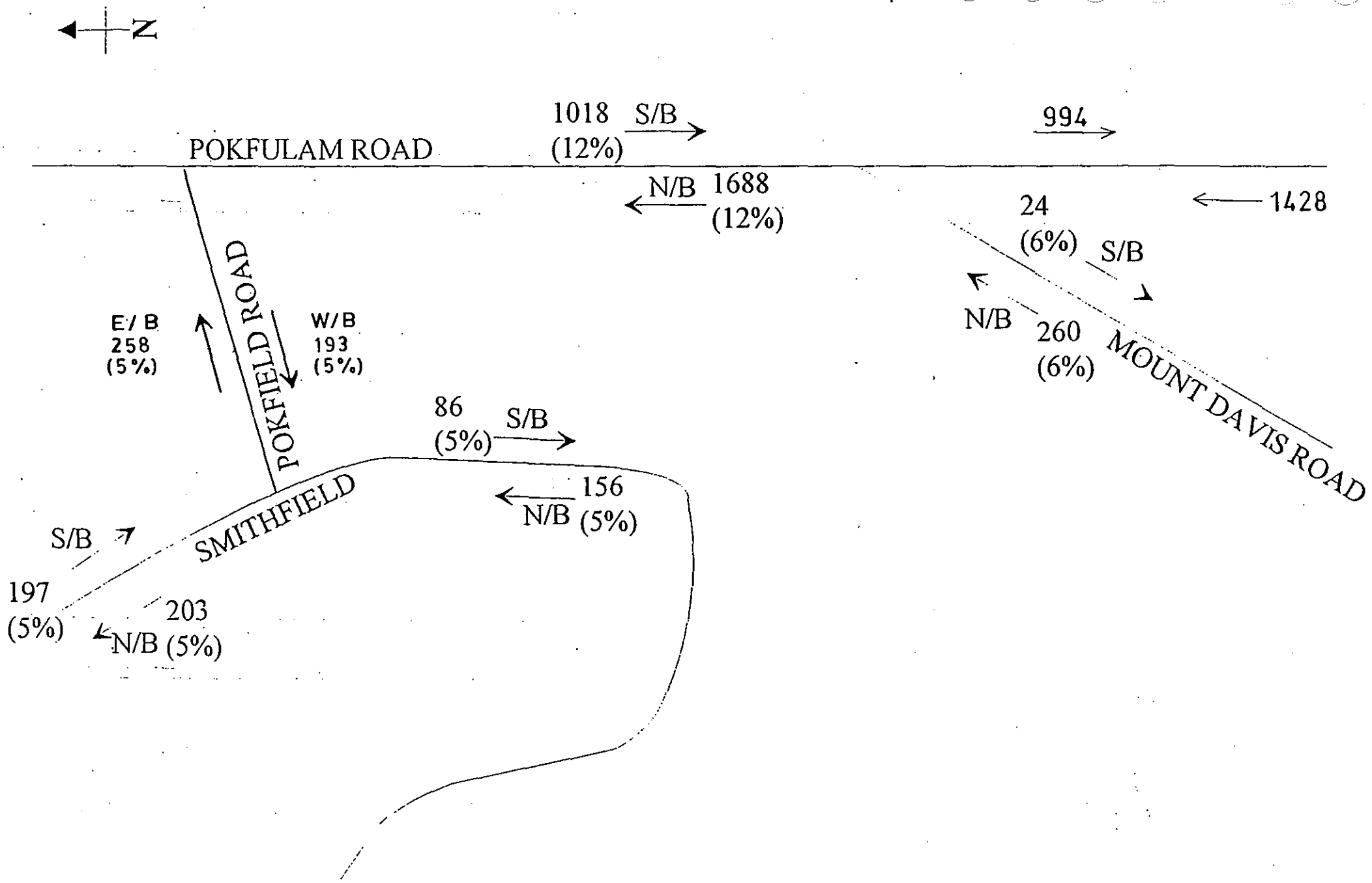
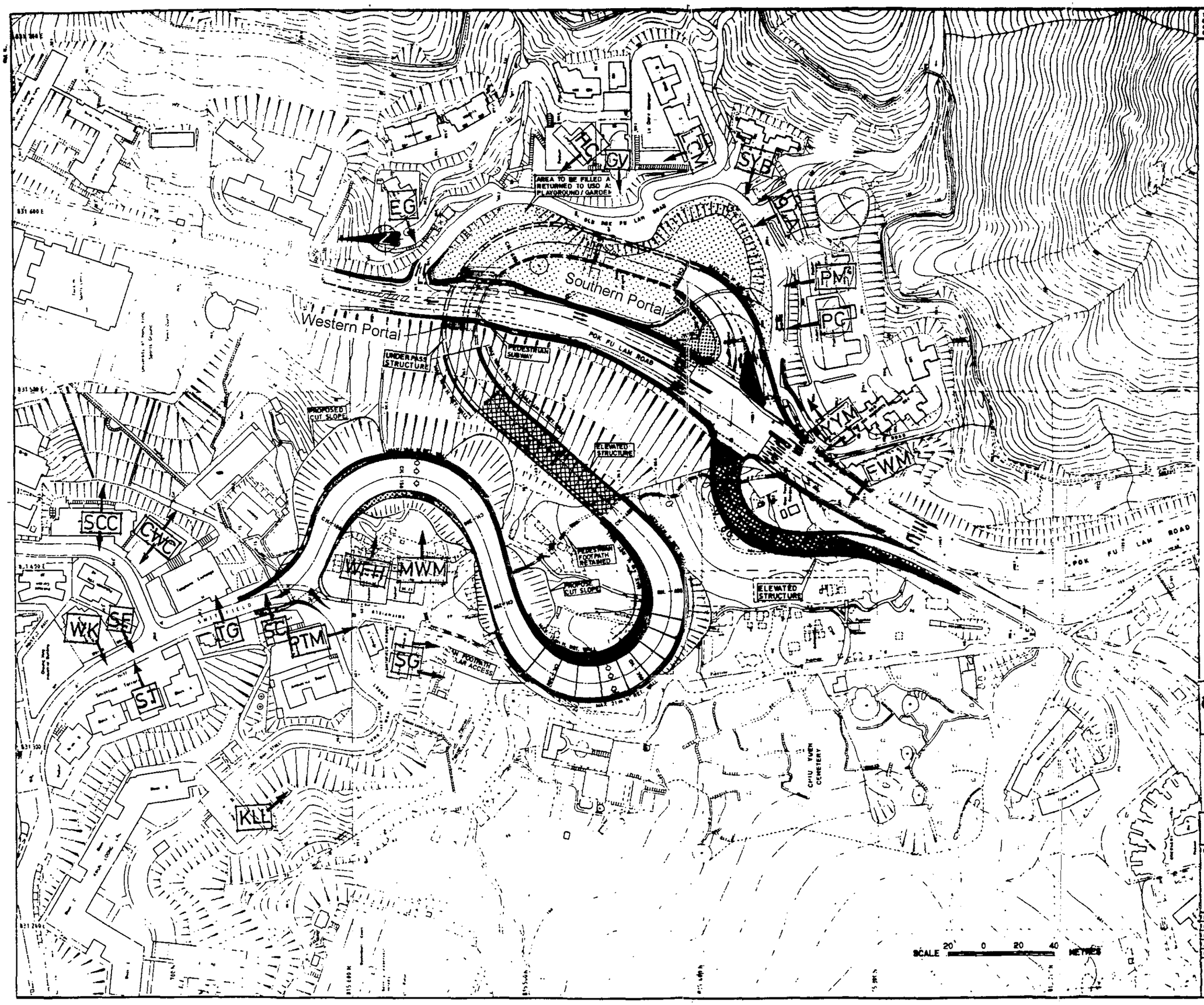


Fig 2.1.1
Peak Hour Traffic Projections for 2006



Source : EI Report

Fig 2.1.2
Peak Hour Traffic Flows in 1991



LEGEND :

- RETAINING WALL
- CUT SLOPE
- ELEVATED STRUCTURE
- UNDERPASS STRUCTURE
- FOOTPATH
- VISIBILITY SPLAYS
- PLAYGROUND OR GARDEN
- ROAD MARKING
- TRAFFIC FLOW

PHH (FINLAY-HOWARD HUMPHREYS LTD.)

Environmental Assessment & Pollution Control

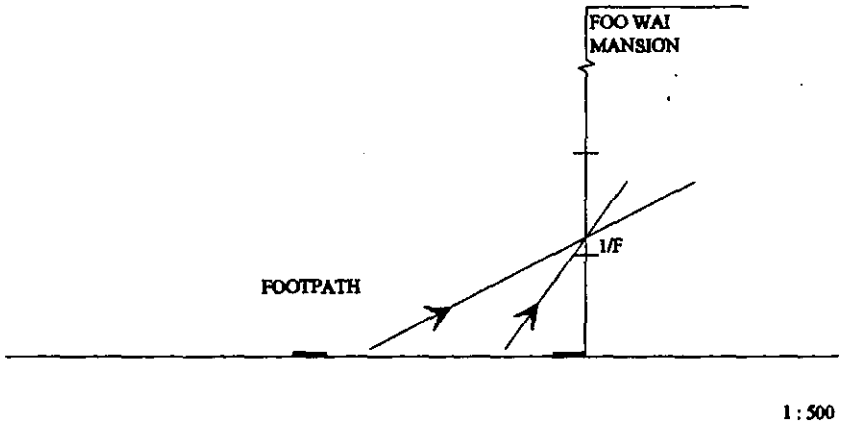
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

Locations of Representive NSR

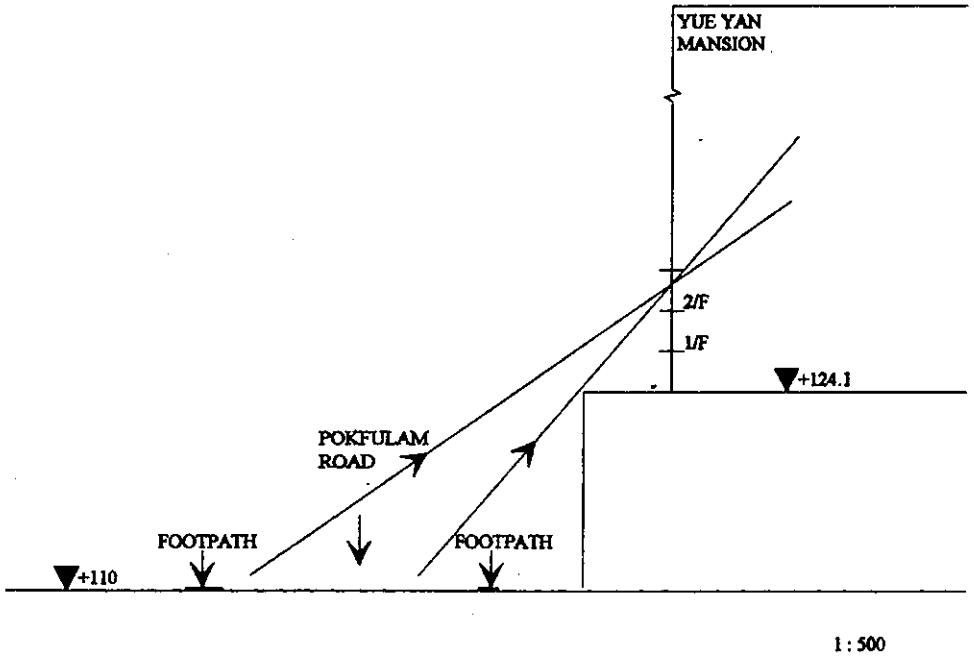
DESIGNED	DWG. No.
DRAWN	2.1.3
CHECKED	
APPROVED	DIMENSIONS ARE IN MILLIMETERS
DATE	SCALE AS SHOWN

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION



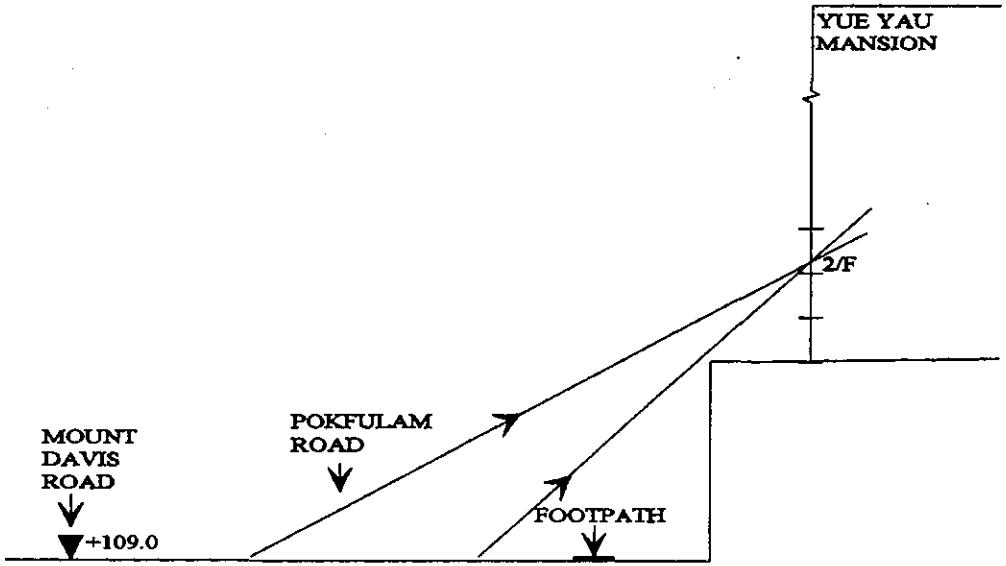
(a) **SECTION A - A**

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



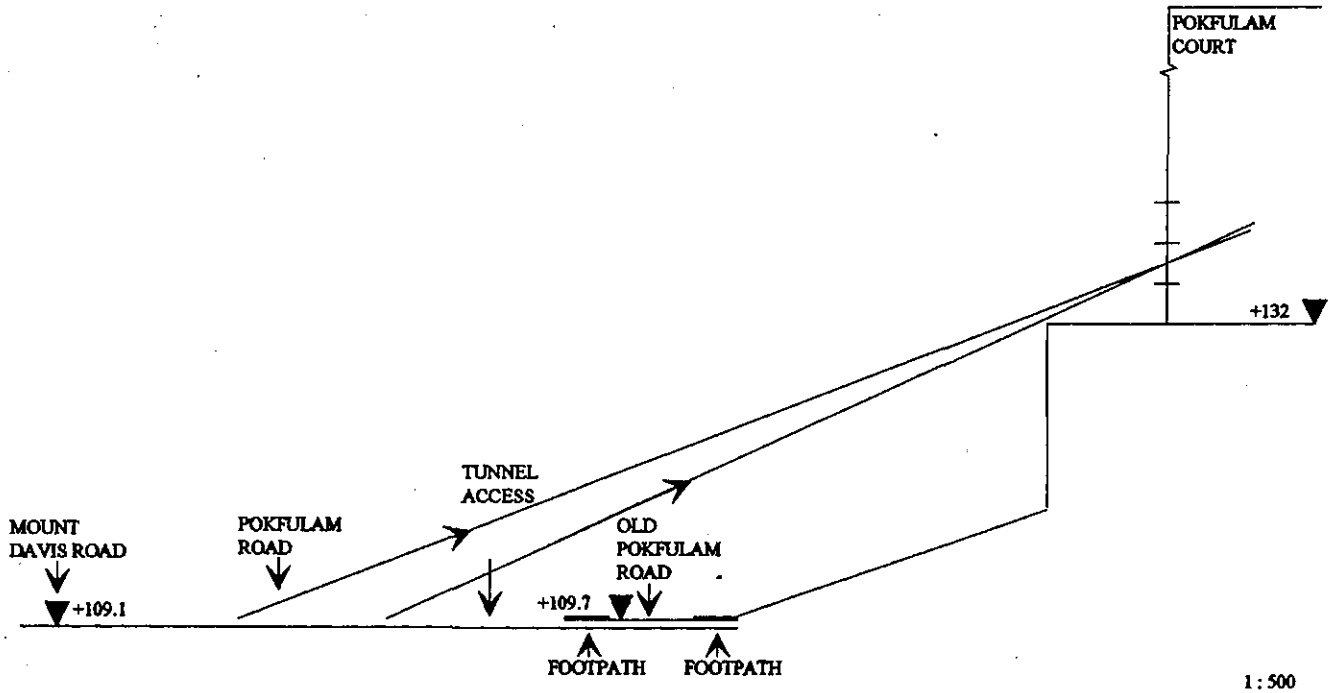
(b) SECTION B - B

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



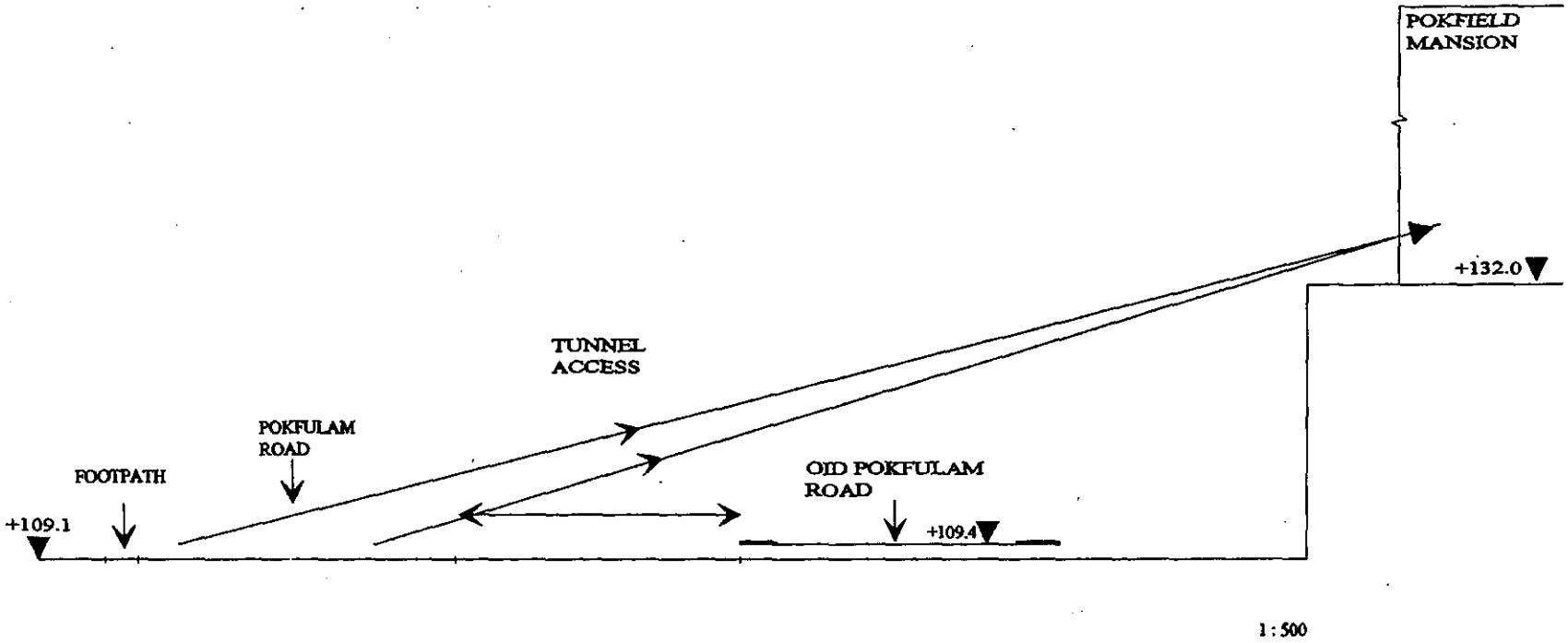
(c) SECTION C - C

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



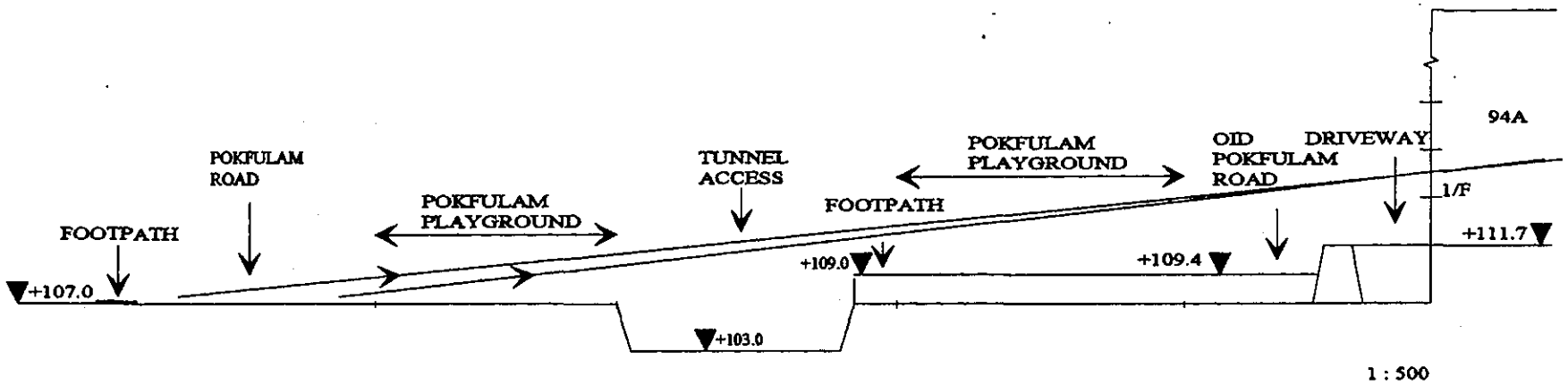
(d) **SECTION D - D**

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



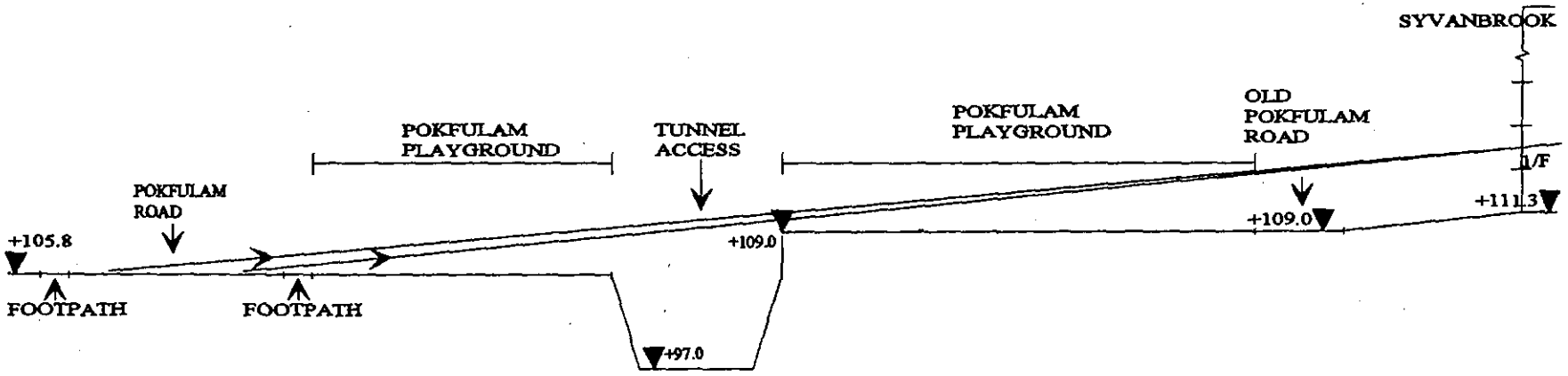
(e) SECTION E - E

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



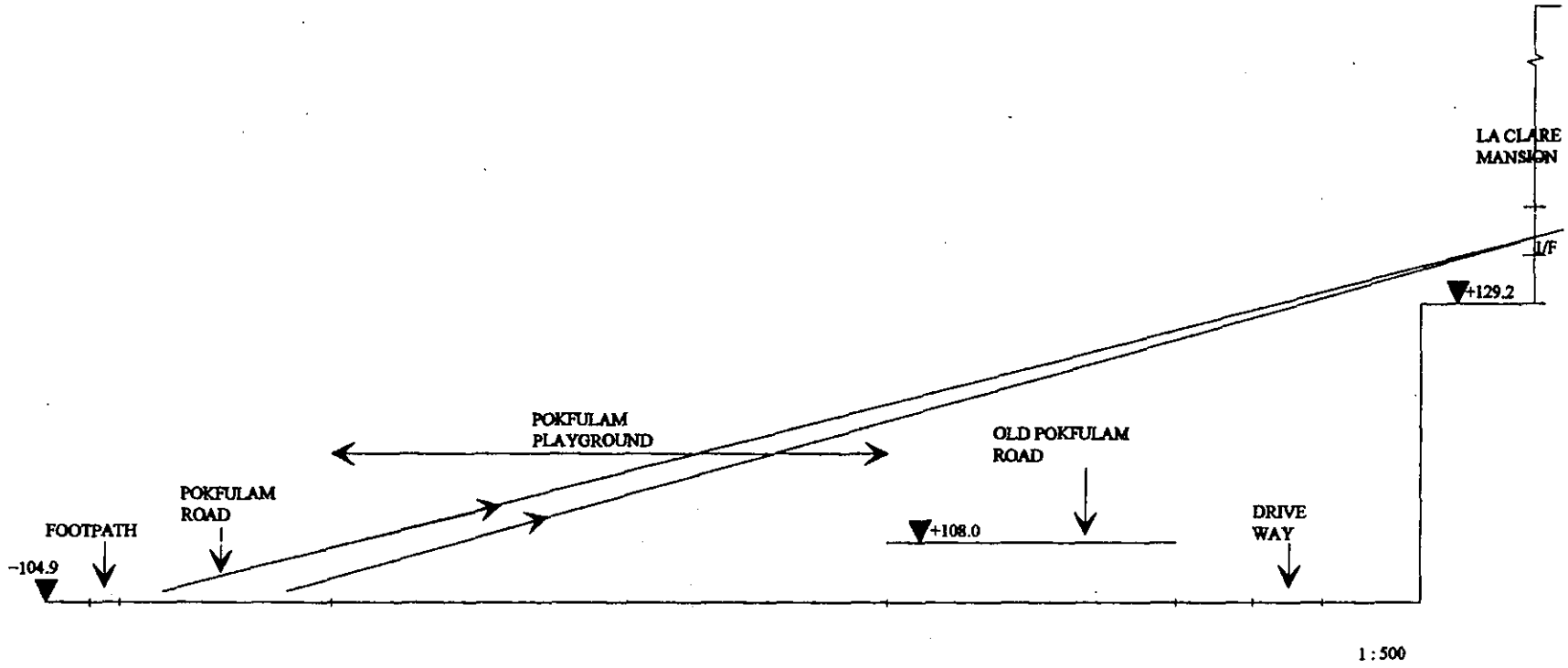
(f) **SECTION F - F**

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



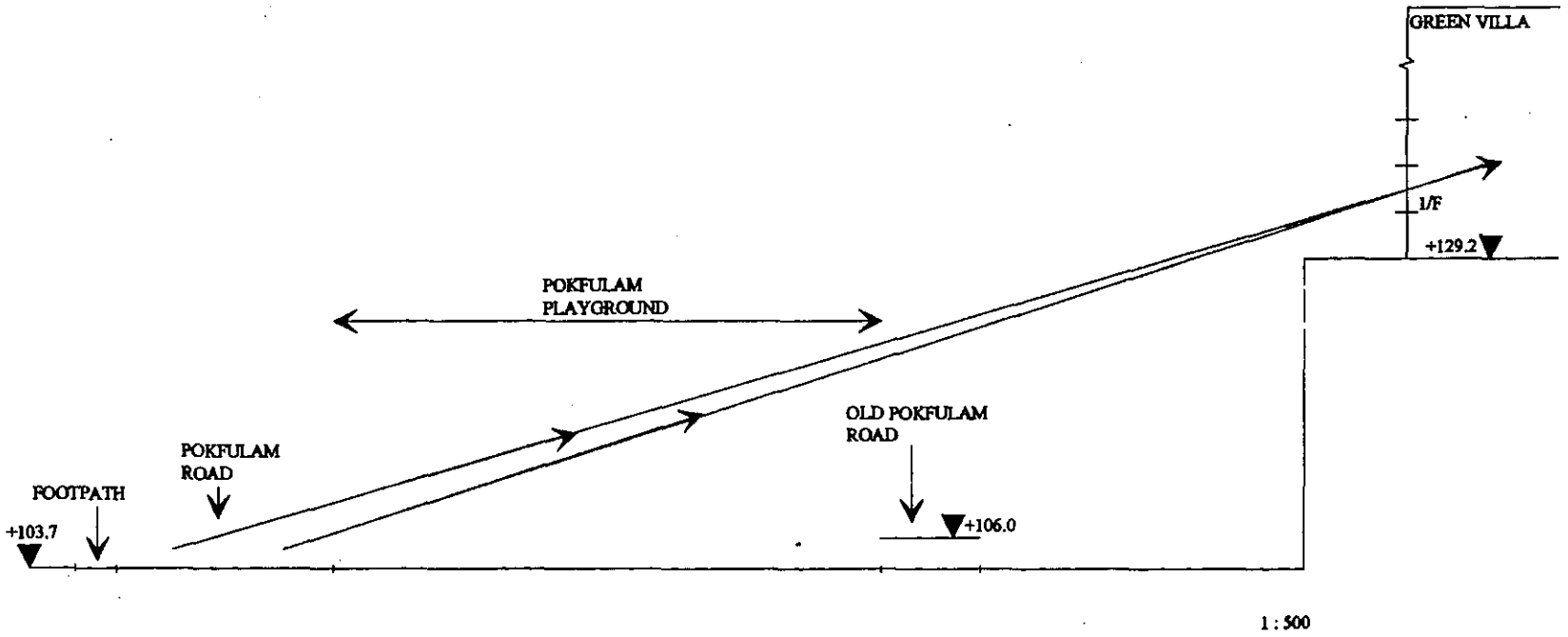
(g) SECTION G - G

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



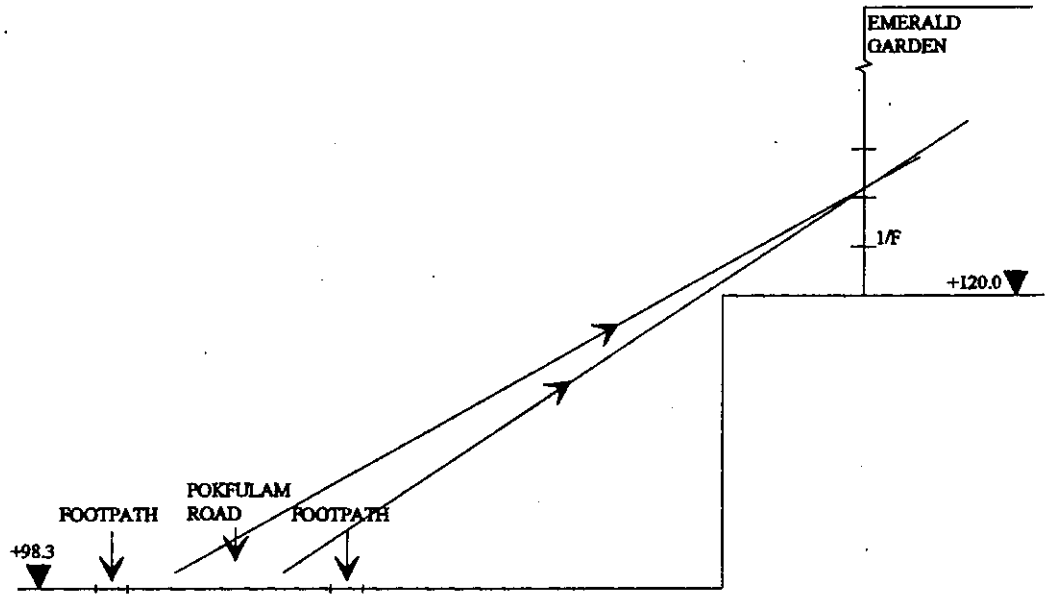
(h) SECTION H - H

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



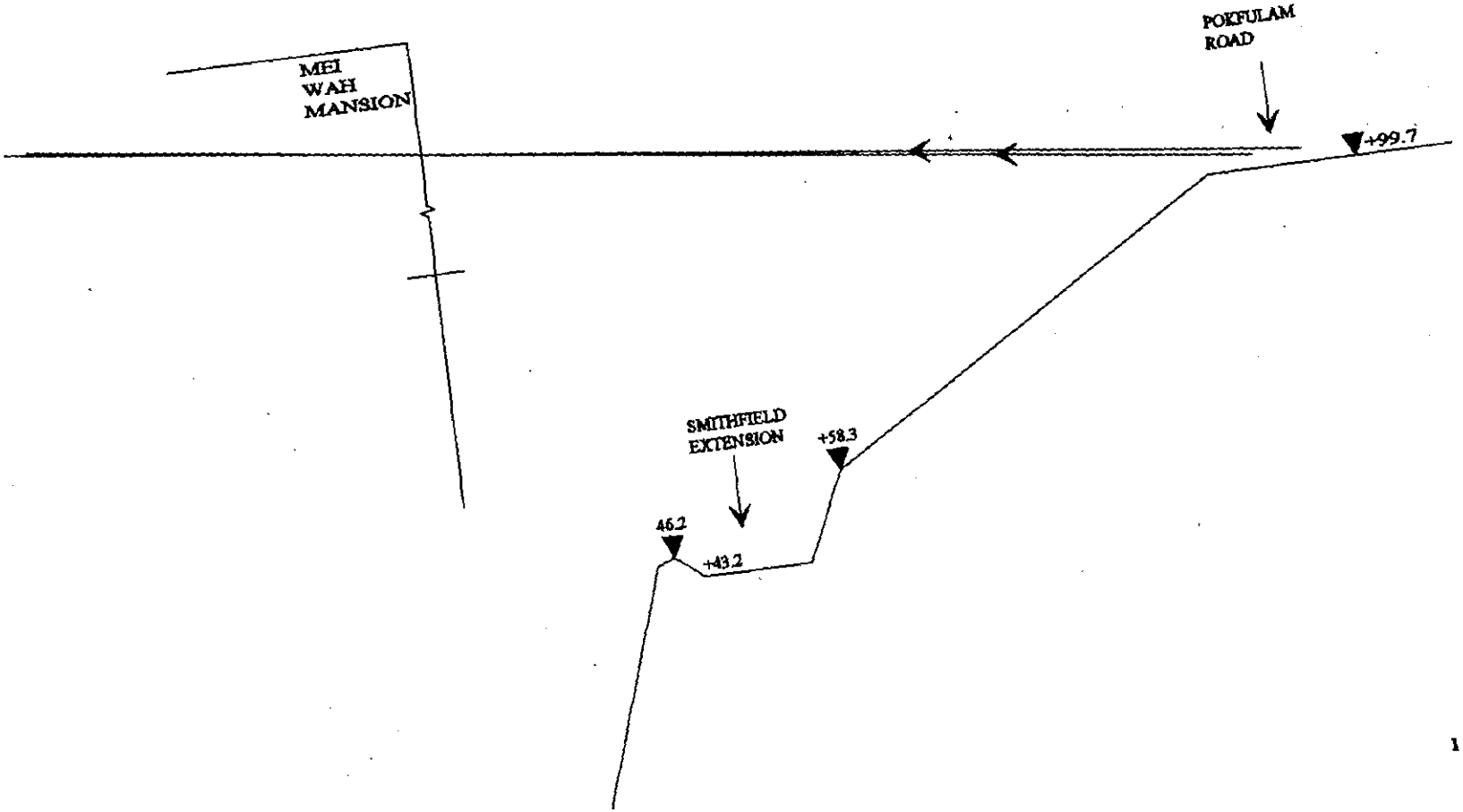
(i) SECTION I - I

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



(j) SECTION J - J

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD



(k) SECTION K - K

FIGURE 2.1.4
SECTION THROUGH POKFULAM ROAD

LEGEND :

- RETAINING WALL
- CUT SLOPE
- ELEVATED STRUCTURE
- UNDERPASS STRUCTURE
- FOOTPATH
- VISIBILITY SPLAYS
- PLAYGROUND OR GARDEN
- ROAD MARKING
- TRAFFIC FLOW

AREA TO BE FILLED AND RETURNED TO USO AS PLAYGROUND / GARDEN

UNDER PASS STRUCTURE

PROPOSED CUT SLOPE

ELEVATED STRUCTURE

PEDESTRIAN FOOTPATH RETAINED

PROPOSE CUT SLOPE

PEDESTRIAN FOOTPATH AND VEHICULAR ACCESS RETAINED

ELEVATED STRUCTURE

POK FU LAM ROAD

CHIU YUEN CEMETERY

SCALE 20' 0 20 40 METRES

Environmental Assessment & Pollution Control

PHH P.PYLIN-HOWARD HUMPHREYS LTD. CONSULTING CIVIL, STRUCTURAL & ENVIRONMENTAL ENGINEERS

301, Aston House, 1 Hennessy Road, Wanchai, Hong Kong.

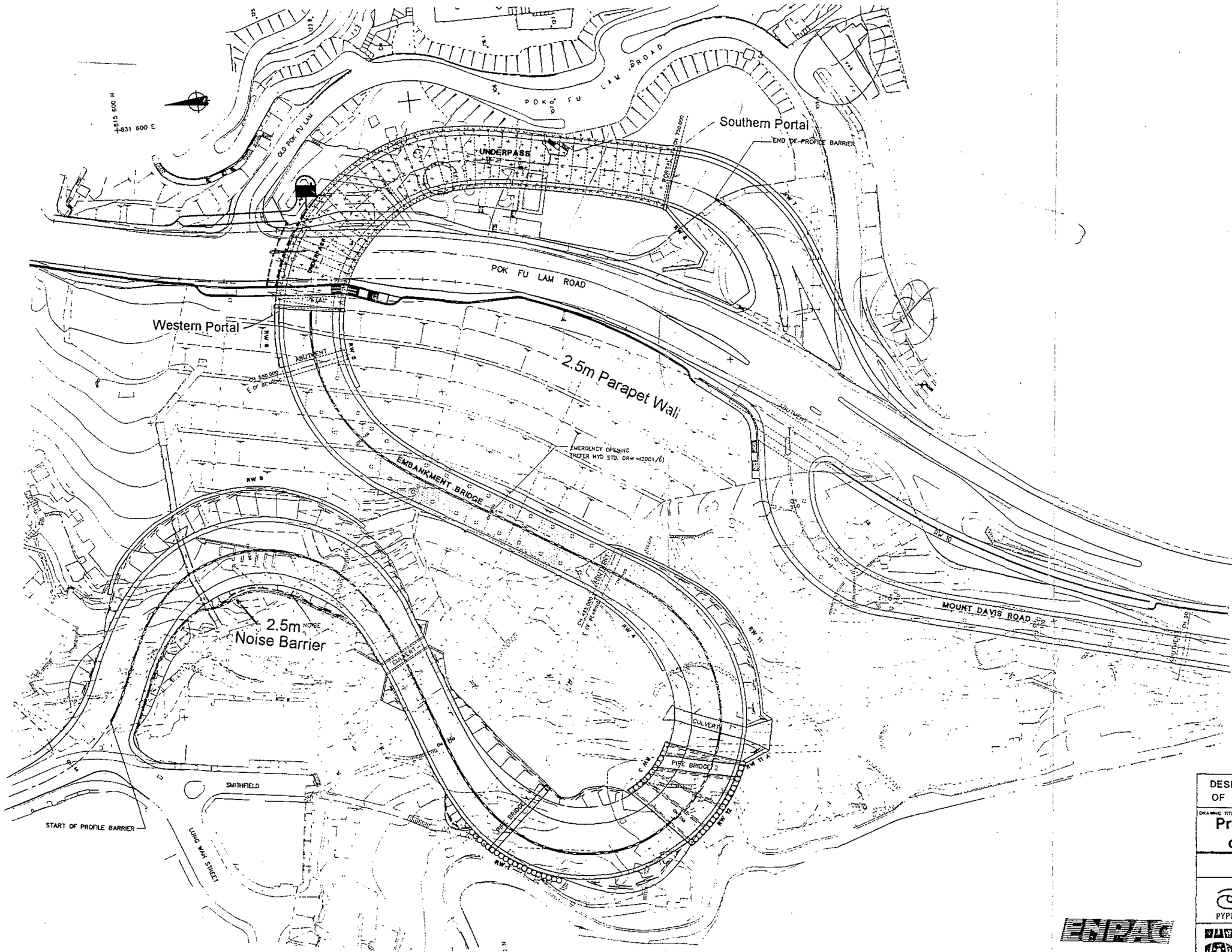
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

Key Plan for Road Sections

DESIGNED		DWG No. 2.1.5
DRAWN		
CHECKED		
APPROVED		DIMENSIONS ARE IN MILLIMETERS
DATE		SCALE AS SHOWN

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION



DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

Proposed Location of Noise Barrier

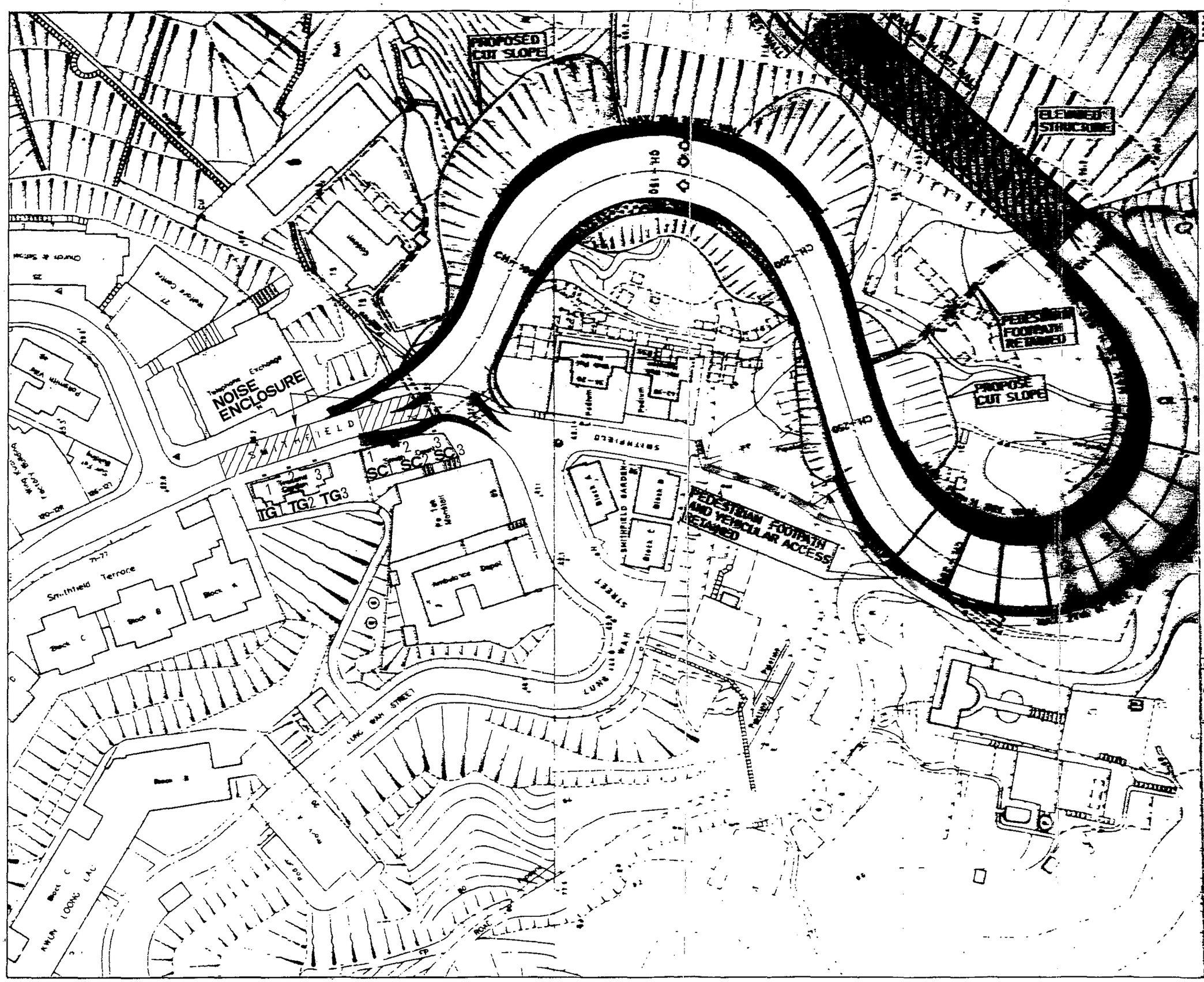
Fig. 2.1.6

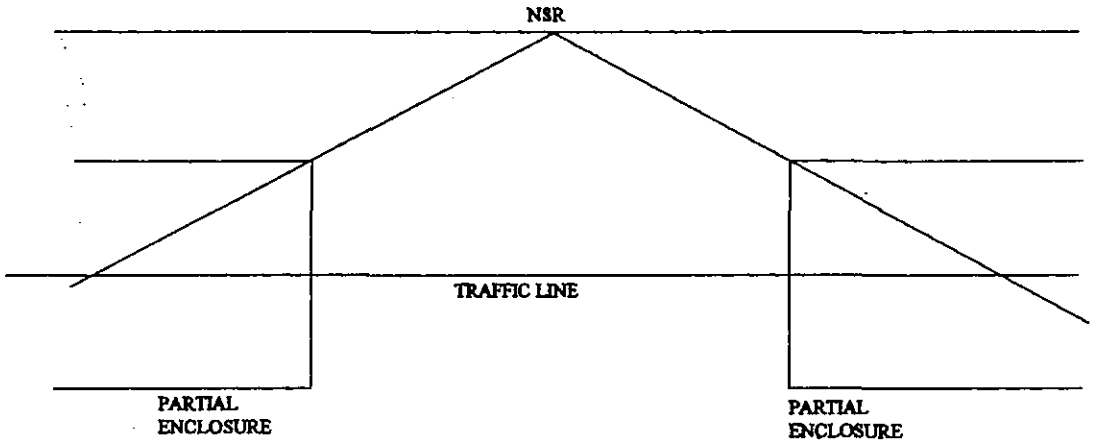
PYPUN ENGINEERING CONSULTANTS LTD

HIGHWAYS DEPARTMENT

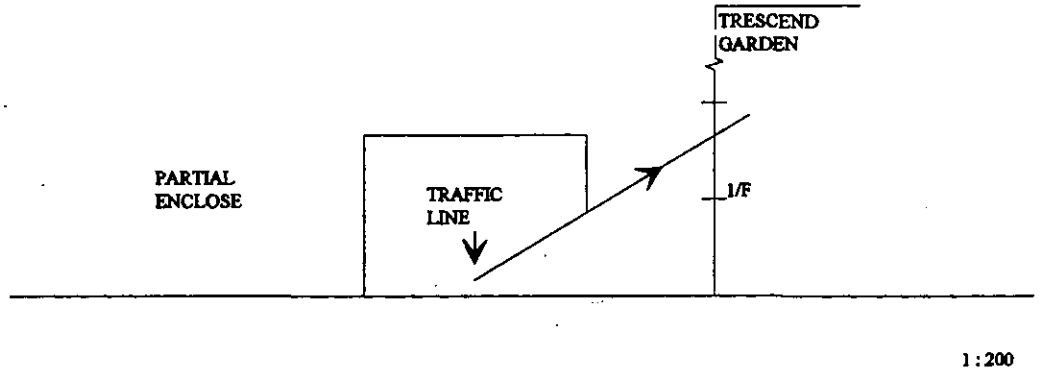
HIGHWAYS/H.K. REGION

ENPAC


PROPOSED CUT SLOPE
ELEVATED STRUCTURE
NOISE ENCLOSURE
PEDESTRIAN FOOTPATH RETAINED
PROPOSE CUT SLOPE
PEDESTRIAN FOOTPATH AND VEHICULAR ACCESS RETAINED
SMITHFIELD
SMITHFIELD GARDEN
Smithfield Terrace
LUNG WAH STREET
KWUN LOONG LAU
TG1 TG2 TG3
SC1 SC2 SC3
LEGEND :
RETAINING WALL
CUT SLOPE
ELEVATED STRUCTURE
UNDERPASS STRUCTURE
FOOTPATH
VISIBILITY SPLAYS
PLAYGROUND OR GARDEN
ROAD MARKING
TRAFFIC FLOW
Environmental Assessment & Pollution Control
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION
Noise Enclosure and Assessment Points
2.1.7
HIGHWAYS DEPARTMENT
HIGHWAYS (HK) REGION

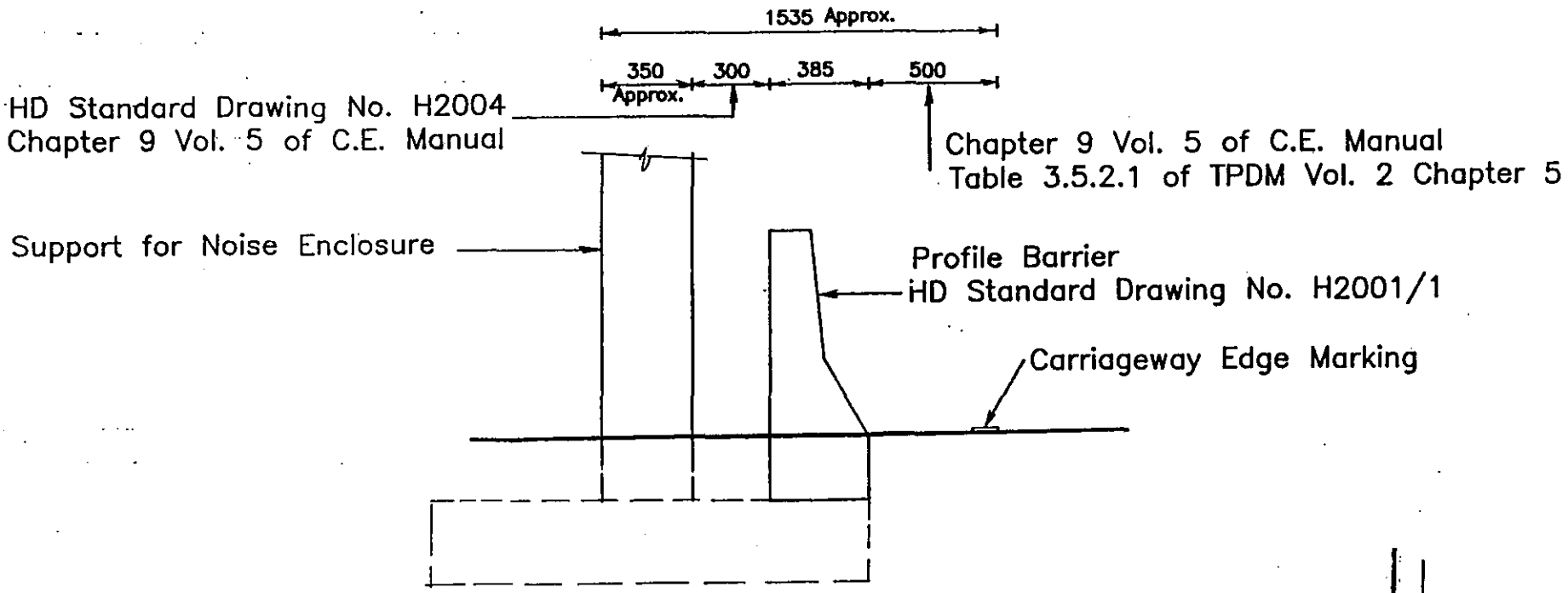


PLAN



SECTION

FIGURE 2.1.8
NOISE LEAKAGE FROM ENCLOSURE



NOISE ENCLOSURE-SECTION WITH SUPPORT ADJACENT TO PROFILE BARRIER

Scale 1:25

REV. DESCRIPTION DATE

PHH PAUL-HOWARD HUMPHREYS LTD. CONSULTING CIVIL, STRUCTURAL & ENVIRONMENTAL ENGINEERS

DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

NOISE ENCLOSURE

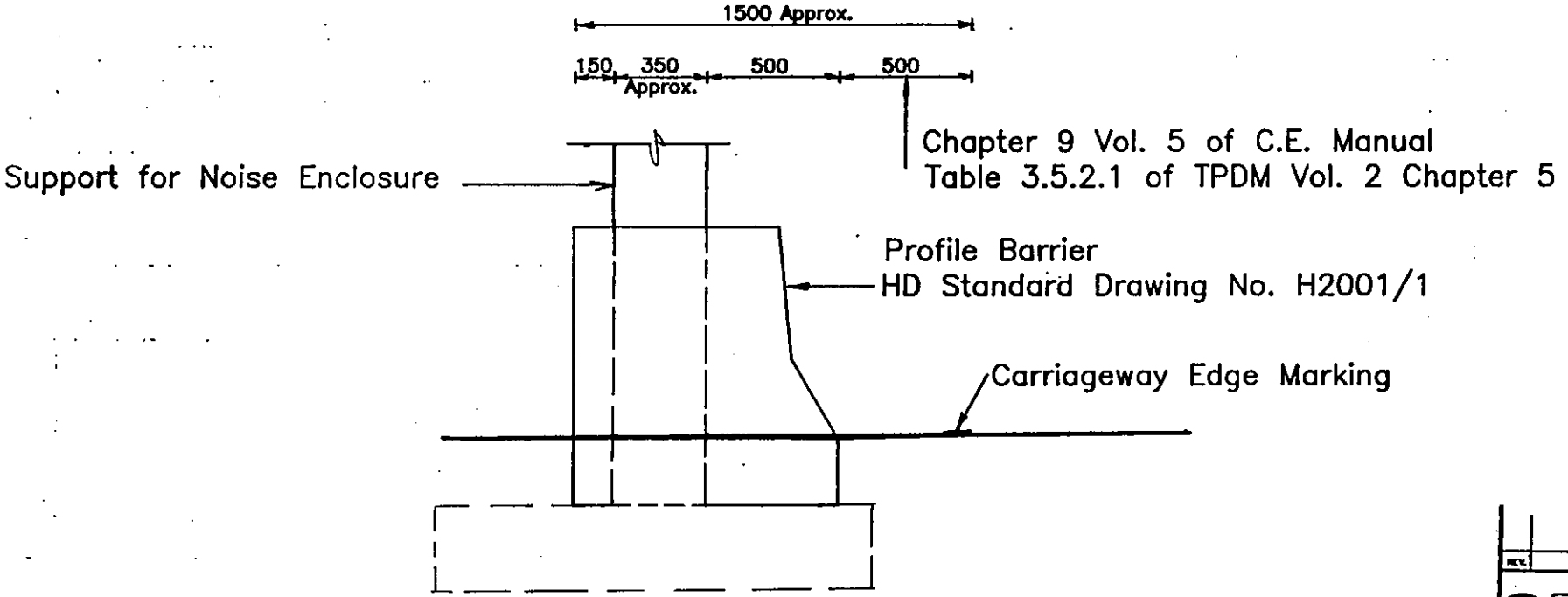
Fig. 2.1.9(A)

DESIGNED
DRAWN
CHECKED
APPROVED
DATE

DRAWING ARE IN MILLIMETERS

SCALE

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION



NOISE ENCLOSURE-SECTION WITH SUPPORT ON PROFILE BARRIER

Scale 1:25

REV. | DESCRIPTION | DATE

PHH — PAUL-HOWARD HUMPHREYS LTD.

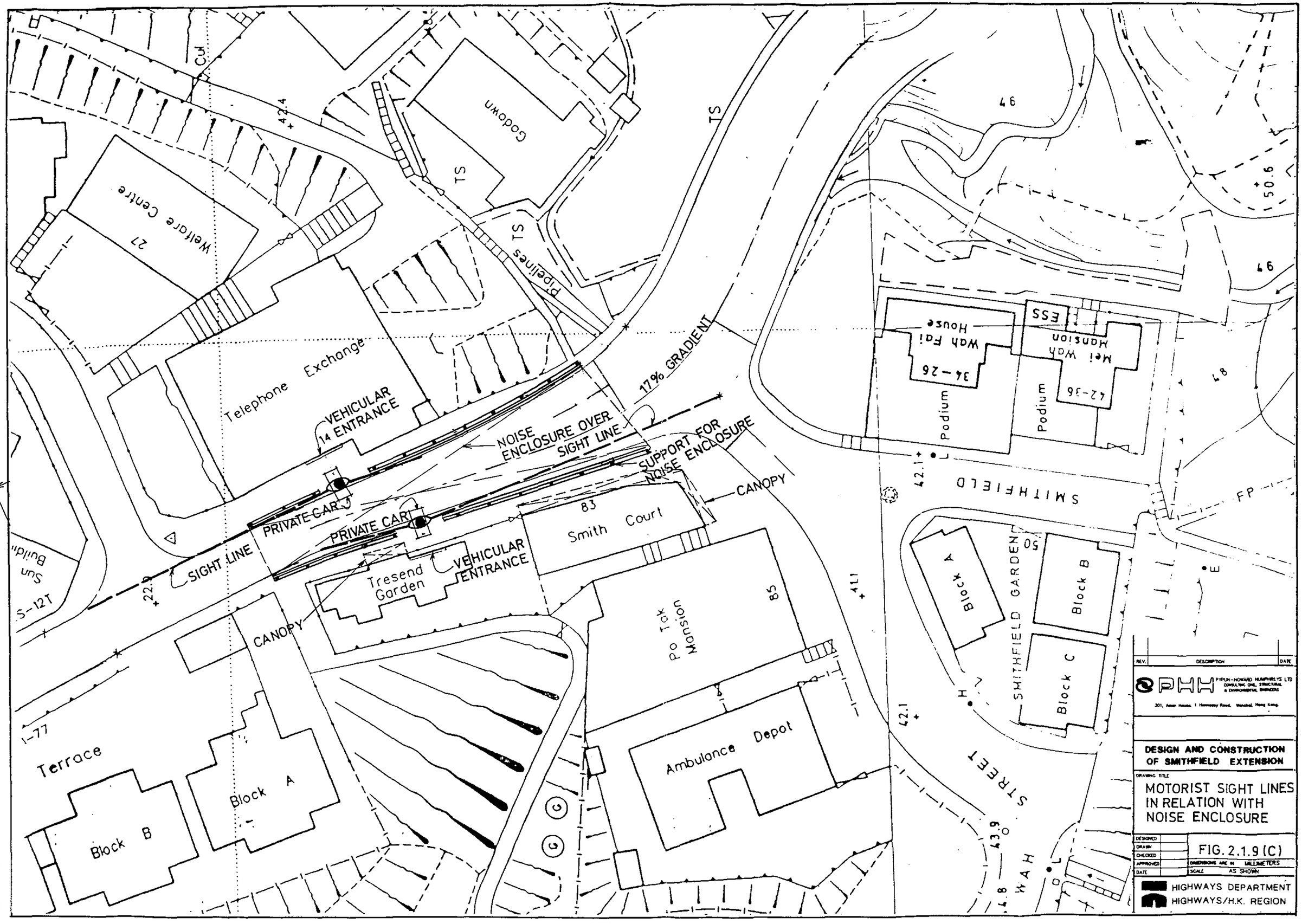
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

NOISE ENCLOSURE

Fig. 2.1.9(B)

DESIGNED | DRAWN | CHECKED | APPROVED | DATE | DIMENSIONS ARE IN MILLIMETERS | SCALE

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION



REV.	DESCRIPTION	DATE

PHH PYPUN-HOWARD HUMPHREYS LTD
CONSULTING CIVIL, STRUCTURAL & ENVIRONMENTAL ENGINEERS
301, Aston House, 1 Hennessy Road, Wanchai, Hong Kong.

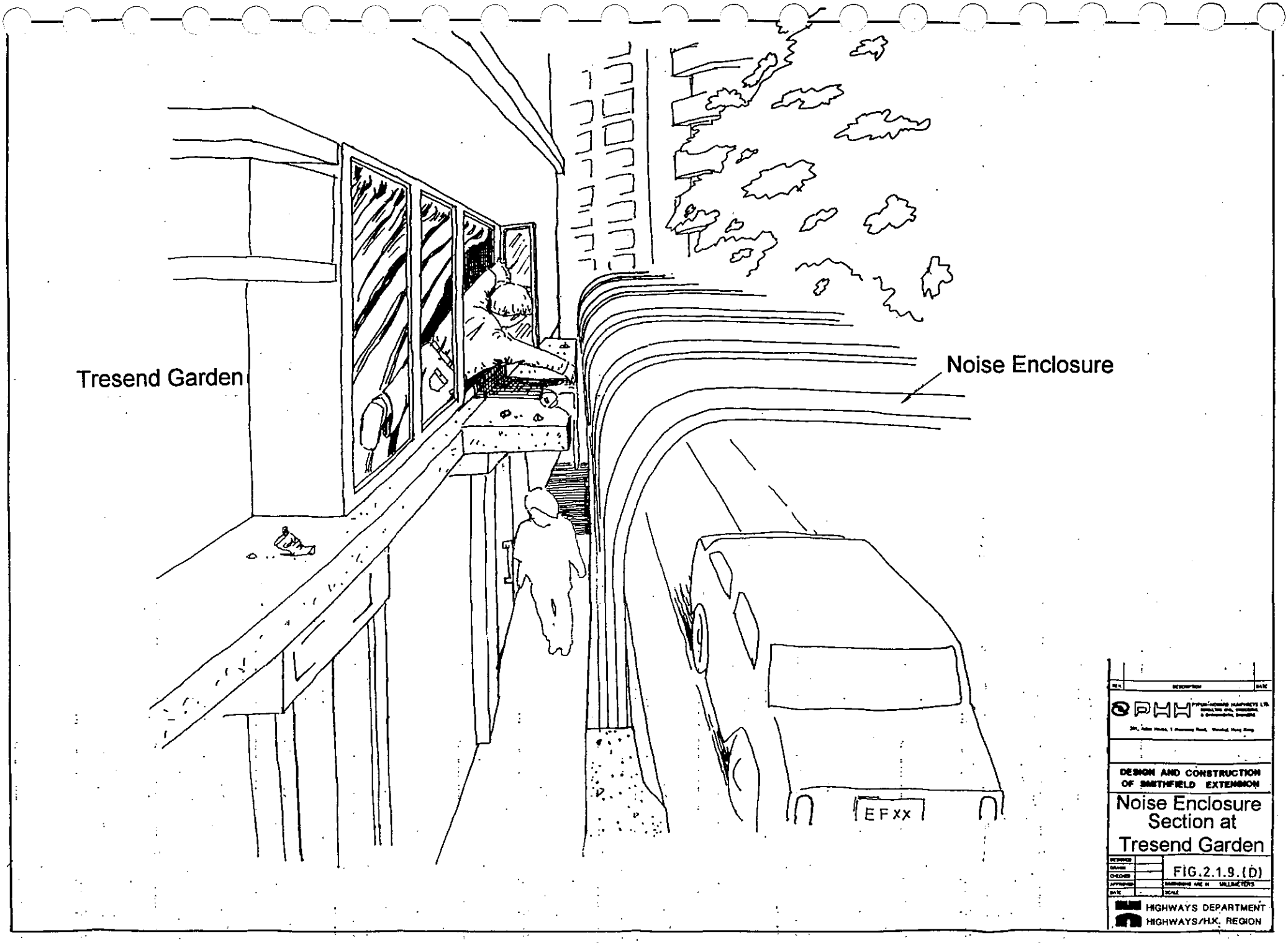
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

MOTORIST SIGHT LINES IN RELATION WITH NOISE ENCLOSURE

DESIGNED	FIG. 2.1.9 (C)
DRAWN	
CHECKED	
APPROVED	DIMENSIONS ARE IN MILLIMETERS
DATE	SCALE AS SHOWN

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION

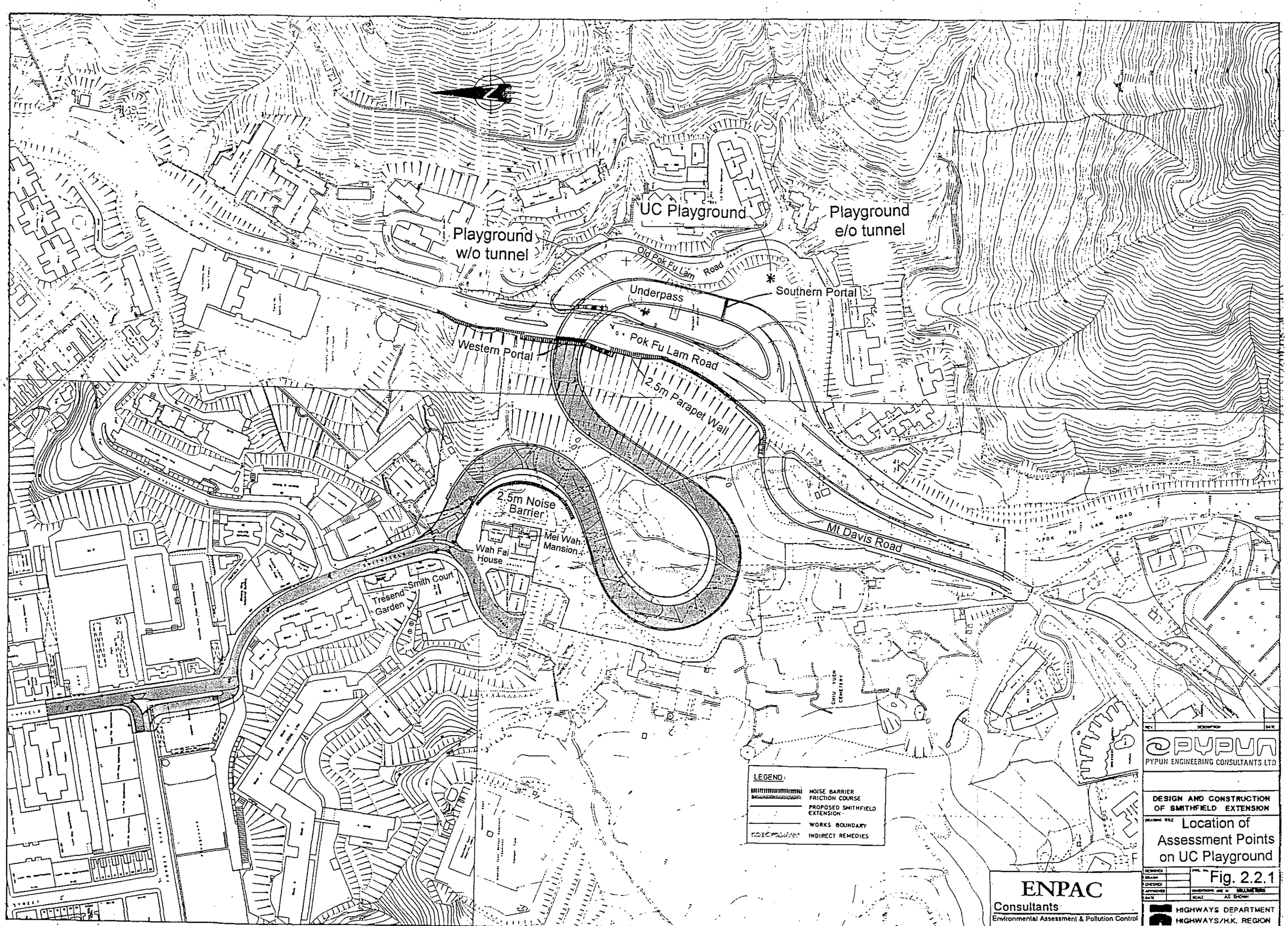


DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

Noise Enclosure Section at Tresend Garden

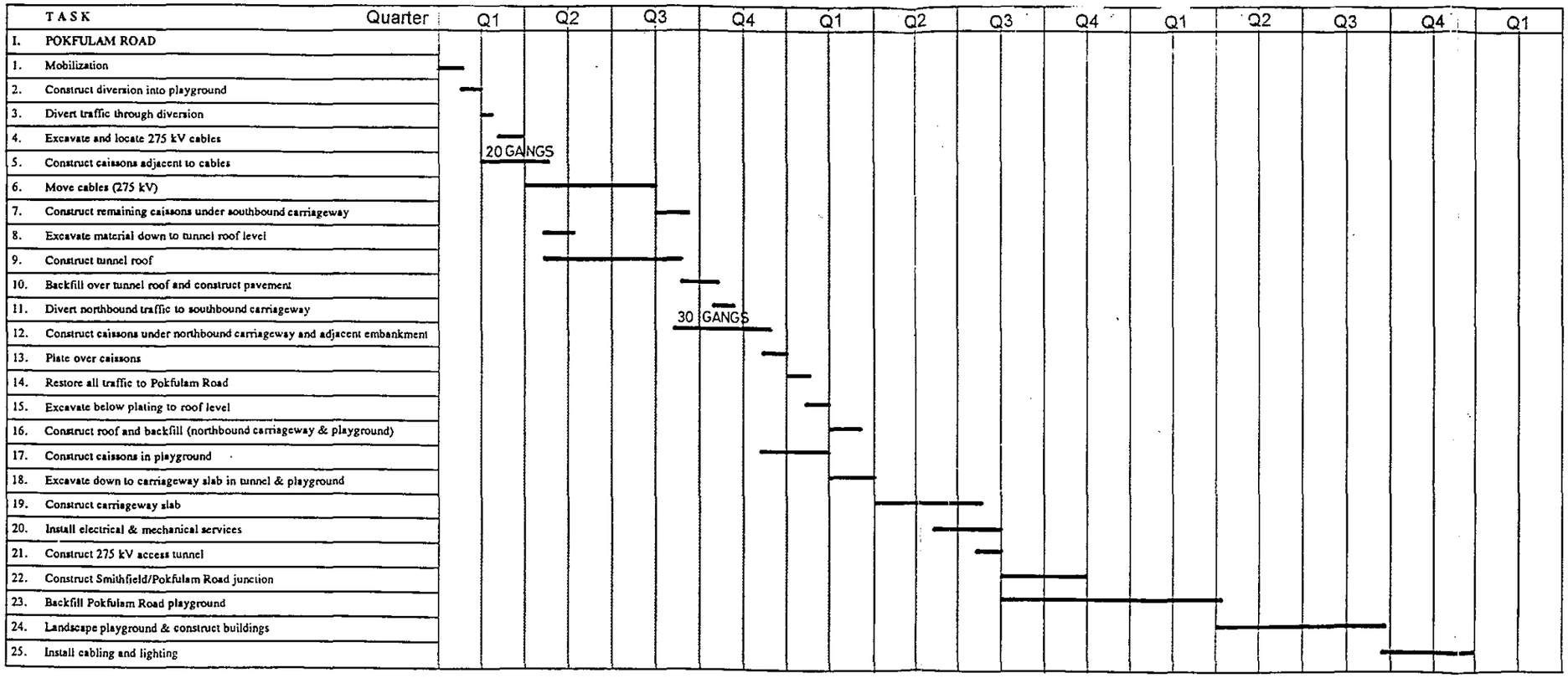
FIG.2.1.9.(D)

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION


Playground w/o tunnel
UC Playground
Playground e/o tunnel
Old Pok Fu Lam Road
Underpass
Southern Portal
Western Portal
Pok Fu Lam Road
2.5m Parapet Wall
2.5m Noise Barrier
Mei Wah Mansion
Wah Fai House
Tresend Garden
Smith Court
Mt Davis Road
POK FU LAM ROAD
CHIU YUEN CEMETERY
LEGEND
NOISE BARRIER FRICTION COURSE
PROPOSED SMITHFIELD EXTENSION
WORKS BOUNDARY
INDIRECT REMEDIES
REV.
DESCRIPTION
DATE
PYPUN
PYPUN ENGINEERING CONSULTANTS LTD
DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION
DRAWING TITLE
Location of Assessment Points on UC Playground
DESIGNED
DRAWN
CHECKED
APPROVED
DATE
DRAWING NO.
Fig. 2.2.1
DIMENSIONS ARE IN
SCALE
AS SHOWN
HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION
ENPAC
Consultants
Environmental Assessment & Pollution Control

DESIGN & CONSTRUCTION OF SMITHFIELD EXTENSION

PRELIMINARY CONSTRUCTION PROGRAMME



REV. | DESCRIPTION | DATE

PHH PYLON-HOWARD HUMPHREYS LTD. CONSULTING CIVIL, STRUCTURAL & ENVIRONMENTAL ENGINEERS

301, Admin House, 1 Hennessy Road, Wanchai, Hong Kong

DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

Construction Program

Sheet 1 of 2

DESIGNED | DRAWN | CHECKED | APPROVED | DATE

Figure No. 3.1.1.

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION

DESIGN & CONSTRUCTION OF SMITHFIELD EXTENSION

PRELIMINARY CONSTRUCTION PROGRAMME

TASK / Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
II. MOUNT DAVIS ROAD													
1. Clear woodland at pile cap locations													
2. Construct caissons to piers & Mount Davis Road													
3. Construct piers													
4. Construct deck													
5. Widen Pokfulam Road													
III. ELEVATED STRUCTURE													
1. Construct caisson sleeves													
2. Construct retaining wall caissons													
3. Construct piers													
4. Construct abutments													
5. Erect formwork													
6. Construct deck													
7. Apply finishes													
IV. SMITHFIELD EXTENSION TO CHAINAGE 460													
1. Place order for water pipes & equipment													
2. Excavate rock, chainage 100 - 200													
3. Excavate rock, chainage 275 - 300													
3a. Excavate rock, chainage 350 - 370													
4. Excavate rock, chainage 400 - 460													
5. Construct caissons													
6. Construct caisson struts													
7. Construct toe retaining walls													
8. Construct pipe bridge foundations													
9. Construct pipe bridge decks													
10. Install pipes & connect to existing pipes													
11. Remove existing abandoned pipes													
12. Excavate chainage 300 - 350													
13. Excavate chainage 320 - 400													
14. Construct temporary aqueduct (optional)													
15. Construct stream spillway													
16. Construct stream culverts													
17. Construct stream culvert chainage 220													
18. Construct Smithfield culvert (if required)													
19. Construct carriageway drainage													
20. Construct carriageway & kerbs													
21. Construct barriers													
22. Divert stream from aqueduct to spillway													
23. Demolish aqueduct													
24. Erect road furniture/traffic lights													

REV. | DESCRIPTION | DATE

PHH — PAUL-HOWARD HARTNEY'S LTD. CIVIL & STRUCTURAL ENGINEERS & ENVIRONMENTAL ADVISERS

DESIGN AND CONSTRUCTION OF SMITHFIELD EXTENSION

DRAWING TITLE

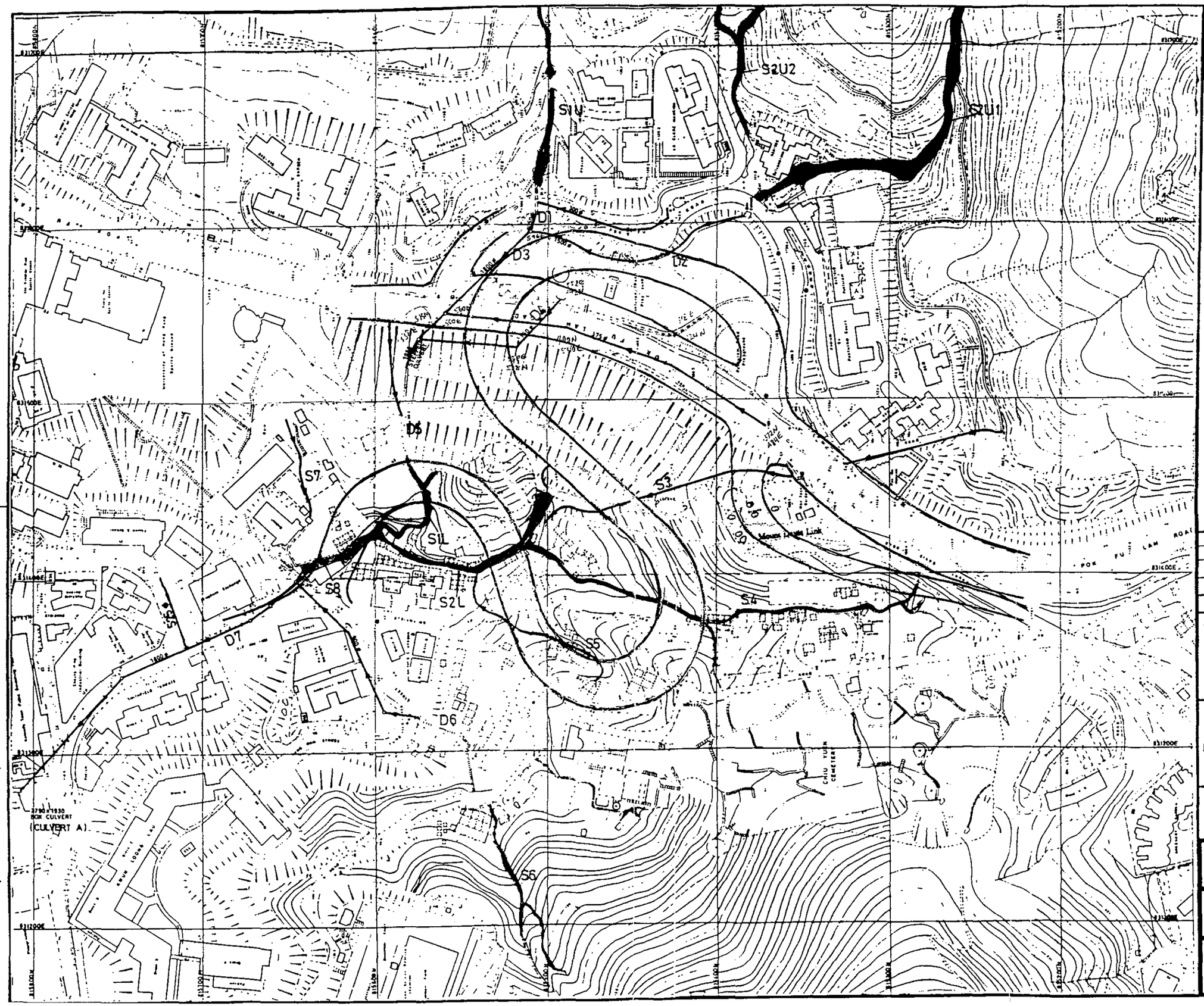
Construction Program

Sheet 2 of 2

DESIGNED | DRAWN | CHECKED | APPROVED | DATE

Figure No. 3.1.1.

HIGHWAYS DEPARTMENT
HIGHWAYS/H.K. REGION



NOTES

LEGENDS :

S1 EXISTING STREAMCOURSE (STREAM S1)

D1 1800ϕ EXISTING 1800ϕ DRAIN PIPE (DRAIN D1)

REVISIONS			
no.	date	description	initial

agreement no. CE 33/91

project title

ENGINEERING INVESTIGATION FOR SMITHFIELD EXTENSION

drawing title

EXISTING CATCHMENT DRAINAGE LAYOUT

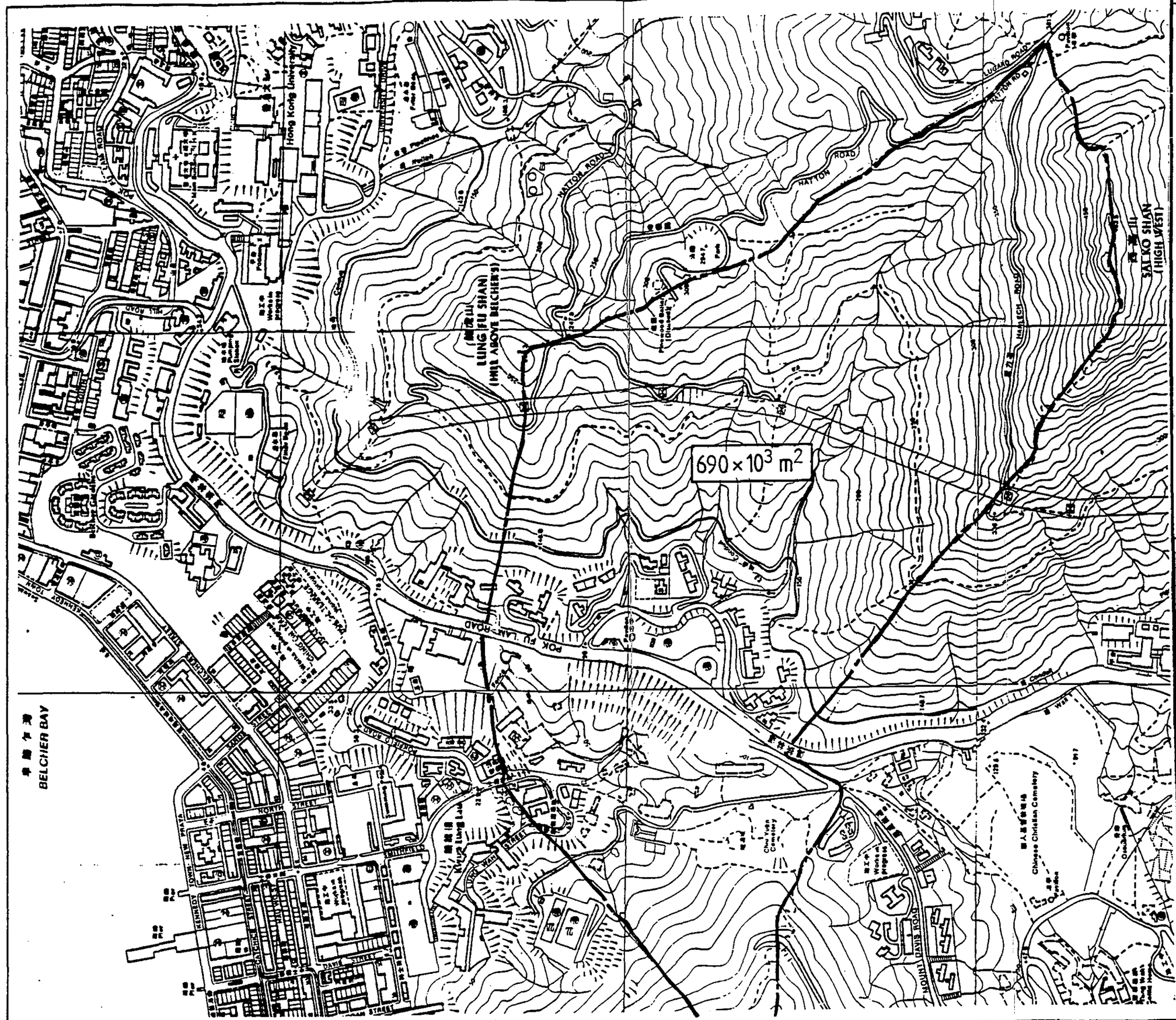
drawing no. Fig. 4.1

scale 1 : 2000

PYPUN ENGINEERING CONSULTANTS LTD

HONG KONG REGION

HIGHWAYS DEPARTMENT HONG KONG



NOTES:

REVISION			
no.	date	description	initial

agreement no. CE 33/91

project title
ENGINEERING INVESTIGATION FOR SMITHFIELD EXTENSION

drawing title
CATCHMENT AREA

drawing no.	scale
Fig. 4.2	1 :2000

PYPUN ENGINEERING CONSULTANTS LTD

HONG KONG REGION

HIGHWAYS DEPARTMENT HONG KONG

REFERENCES

&

APPENDICES

REFERENCES

1. "Design and Construction of Smithfield Extension - Design Review Report", Pypun, 1993

2. "Calculation of Road Traffic Noise", U.K. Department of Transportation, 1988

3. "Engineering Investigation for Smithfield Extension - Final Preliminary Report", Highways Department, December 1992

4. "*Compilation of Air Pollutant Emission Factors* ", US EPA publication AP-42, 1977.

5. "Technical Committee on Road Tunnels Report (PIARC 1991)"

6. "CALINE4 - A Dispersion Model for Predicting Air Pollutant Concentrations Near Roadways", FHWA/CA/TL-84/15, 1984.

7. Ukeguchi, N., et al "Prediction of Vehicular Emission Pollution Around a Tunnel Mouth" [TOP Model, Paper II-18 in Proceedings of the Fourth International Clean Air Congress.

APPENDIX A

RECOMMENDED POLLUTION CONTROL CONDITIONS

These conditions are generally good engineering practice to minimize inconvenience and environmental nuisance to nearby residents and other sensitive receivers. Some modifications may be necessary to suit specific site conditions.

Avoidance of Nuisance

1. All works are to be carried out in such a manner as to cause as little inconvenience as possible to nearby residents, property and to the public in general, and the Contractor shall be held responsible for any claims which may arise from such inconvenience.

2. The Contractor shall be responsible for the adequate maintenance and clearance of channels, gullies, etc., and shall also provide and maintain such pedestrian and vehicular access as shall be directed within the works site.

3. Water shall be used to prevent dust rising and the Contractor shall take every precaution to prevent the excavated materials from entering into the public drainage system.

4. The Contractor shall carry out the Works in such a manner as to minimize adverse impacts on the environment during execution of the Works.

Recommended Noise Pollution Control Clauses

a) The Contractor's attention is drawn to the Summary Offences Ordinance and to the Noise Control Ordinance.

b) Before the commencement of any work, the Contractor shall submit for the Engineer's agreement the proposed sound-reducing measures for all plant and equipment to be used on the Site.

c) The Contractor shall provide an approved integrating sound level meter to IEC 804:1985 or BS 6698:1986 Type 1 for the exclusive use of the Engineer's Representative at all times during the continuance of the Contract. The meter shall be maintained by the Contractor in proper working order throughout the Contract and shall be replaced if necessary when it is under repair.

d) The Contractor shall ensure that all plant and equipment to be used on the site shall be effectively sound-reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means, to avoid disturbance to any nearby noise sensitive receivers. Measured sound levels, other than that from percussive piling, from 0700 to 1900 hours on any day not being a general holiday shall not exceed an equivalent continuous A-weighted sound level (L_{eq}) of 75 dB(A) measured over any 30-minute period at 1 metre from the external facade of the nearest noise sensitive receiver. Any works causing excessive noise, e.g., operation of jack hammers, may be prohibited notwithstanding the above mentioned noise level restriction.

e) If a school is within close proximity to the Site, the Contractor shall liaise with School and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract. During school examination periods, the noise levels measured over any 30-minute periods due to the Contractor's equipment and construction operations shall not exceed 65 dB(A) as measured at 1 m from the closest external facade of the school.

f) Should the limits stated in the above sub-clauses (d) and (e) be exceeded, the construction operation(s) causing the excesses shall stop and shall not recommence until the Contractor has taken whatever measures, at their expense, acceptable to the Engineer that are necessary for compliance. Any stoppage or reduction in output resulting from compliance with this clause shall not entitle the Contractor to any extension of time for completion or any additional cost whatsoever.

g) Measures that are to be taken to protect adjacent schools and other adjacent noise sensitive receivers, if necessary, shall include, but not be limited to, adequate noise barriers. The barriers shall be of substantial construction and designed to reduce transmission of noise (simple plywood hoarding will not be sufficient). The barriers shall be surmounted with baffle boxes designed to reduce transmission of noise. The designs of the barriers shall be submitted to the Engineer for approval before works commence adjacent to schools and other occupied buildings.

h) The Contractor shall take reasonable precautions as instructed by the Engineer, to maintain all plant and silencing equipment in good condition in order to minimize noise emission during construction works.

i) The Contractor shall provide acoustic sheds or screens whenever applicable to shelter noisy construction works including the cutting of slope/knoll and road/rock breaking unless acoustically equivalent noise reduction measures are proposed and implemented to the satisfaction of the Engineer.

j) Notwithstanding the requirements and limitations set out in (f) above, the Engineer may, upon application in writing by the Contractor, allow the use of any equipment and the carrying out of any construction activities for any duration provided that he is satisfied with application which, in his opinion, to be of absolute necessity or of emergency nature, or adequate noise insulation has been provided to the noise sensitive receivers to be affected, and not in contravention with the Noise Control Ordinance in any respect.

k) For the purposes of the above clauses, any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law, or performing arts centre shall be considered a noise sensitive receiver.

l) *Location of Unused or Excavated Material:* The Contractor is required to submit the proposed method of working to the Engineer before commencing any excavation works. The method of working shall be designed, as far as is practicable, to ensure that a bund of material is located between the works and any schools and other occupied buildings in order to block transmission of noise.

m) *Proper Maintenance of Silenced Equipment:* The Contractor shall take reasonable precautions as instructed by the Engineer, to maintain all plant and silencing equipment in good condition in order to minimize noise emission during construction works.

a) The Contractor shall undertake at all times to prevent dust nuisance as a result of his activities. The air pollution control system installed shall be operated whenever the plant is in operation.

b) The Contractor shall at his own cost and to the satisfaction of the Engineer install effective dust suppression equipment and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver the concentration of air-borne dust shall not exceed 0.5 milligrams per cubic meter, at standard temperature (25°C) and pressure (1.0 bar) averaged over one hour, and 0.26 milligrams per cubic metre, at standard temperature (25°C) and pressure (1.0 bar) averaged over 24 hours.

c) In the process of material handling, any material which has the potential to create dust shall be treated with water or wetting agent sprays.

d) Where dusty materials are being discharged to a vehicle from a conveying system at a fixed transfer point, a three-sided roofed enclosure with flexible curtain across the entry shall be provided. Exhaust should be provided for this enclosure and vented to a fabric filter system.

e) Any vehicle with an open load-carrying area used for moving materials, and having the potential to create dust, shall have properly fitting side and tail boards. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.

f) Stockpiles of sand and aggregate greater than 20m^3 shall be enclosed on three sides, with walls extending above the pile and 2 metres beyond the front of the pile. In addition, water sprays shall be provided and used, both to dampen stored materials and when receiving raw material.

g) The Contractor shall frequently clean and water the site to minimize the fugitive dust emissions.

h) The Contractor shall restrict all motorized vehicles to a maximum speed of 8 km per hour and confine haulage and delivery vehicles to designated roadways inside the site. Areas of roadway longer than 100 m where movement of motorized vehicles exceeds 100 vehicular movements/day, or as directed by the Engineer, shall be furnished with a flexible pavement surfacing.

i) Wheel washing facilities shall be installed and used by all vehicles leaving the site. No earth, mud, debris, dust and the like shall be deposited on public roads. Water in the wheel cleaning facility shall be changed at

frequent intervals and sediments shall be removed regularly. The Contractor shall submit details of proposals for the wheel cleaning facilities to the Engineer prior to construction of the facility. The wheel washing facility shall be usable prior to the start of any earthworks excavation activity on the site. The Contractor shall also provide a hard-surfaced road between the washing facility and the public road.

j) Conveyor belts shall be fitted with windboards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimize emission of dust. All conveyors carrying materials which have the potential to create dust shall be totally enclosed and fitted with belt cleaners.

APPENDIX B

GUIDELINES FOR DUST MONITORING

B1 EPD has devised a set of dust monitoring and audit guidelines to ensure that its dust monitoring requirements are understood and met. EPD's guidelines are summarised below.

B2 *Monitoring Methodology*

Standard high volume sampling method should be used to obtain the mass concentration of TSP (total suspended particulates) in ambient air.

B3 *Monitoring Equipment*

B3.1 High volume Sampler (HVS) : The HVS should be equipped with an electronic mass flow controller and calibrated against a traceable standard at regular intervals.

B3.2 A direct reading dust meter capable of achieving a comparable results as that obtained by HVS may be used for the 1-hour sampling. The dust meter should be regularly calibrated against a primary standard.

B3.3 Wind Data Monitoring Equipment: Equipment should be set up in a non-sheltered location near dust monitoring locations to obtain wind speed and wind direction. The wind sensor should be installed on a mast 10 m above ground. Data should be stored in a data logger, and processed at least once a month. Wind direction should be divided into 16 sectors of 22.5 degrees each. Equipment should be calibrated at least every six months.

B4 *Selection of Monitoring Site*

Locations should be agreed upon with the Engineer in consultation with EPD as necessary during the EIA stage. In selecting sites, the following criteria should be considered:

- location should be at the site boundary or close to major dust emitters;
- location should be close to sensitive receivers;
- prevailing meteorological conditions should be considered.

B5 *Positioning of Sampler*

When positioning the sampler, the following points should be noted:

- Samplers should be placed at least 2 m apart.

- There must be an unrestricted airflow around the sampler:
  - If a sampler is placed near an obstruction, the height of the obstruction above the sampler must be determined. The sampler should then be placed at a distance of at least twice this height from the obstruction.
  - A minimum of 2 m separation is required between a rooftop sampler and a wall, parapet, or other rooftop structure.
- Sampler should not be placed near an incinerator or furnace flue.

B6 *Data Collection*

B6.1 a comprehensive set of field details should be recorded on the field data sheet, including temperature, pressure, weather conditions, elapsed-time meter reading for the starting and finishing times of the sampler, identification and weight of the filter paper, site activities, and any other relevant information.

B6.2 The flow rate of the sampler before and after the sampling exercise with the filter in position should be recorded in the data sheet.

B7 *Laboratory Measurement and Analysis of Filter Paper*

8" by 10" filter paper should be used, and labelled prior to sampling. The paper should be conditioned in a humidity-controlled chamber for over 24 hours and weighed prior to use. After sampling, the laden filter should be kept in a sealed plastic bag for transport to the laboratory. In the lab, the filter paper should be reconditioned in the humidity-controlled chamber, and weighed using a regularly-calibrated electronic balance accurate to 0.1 mg.

B8 *reporting and Responsibilities*

B8.1 The monitoring team should report directly to the Engineer.

B8.2 An Environmental Monitoring and Audit (EM&A) Manual should be prepared and submitted to EPD within the month that the contract is offered.

B8.3 Monthly monitoring reports should be prepared and submitted to EPD before the 10th day of the following month.

B8.4 All exceedances of air quality standards, along with information on remediation measures, should be included in the monthly monitoring report.

B9 *Monitoring Requirements*

Requirements for Baseline, Impact, and Non-compliance monitoring are provided in the main text.

B10 *Quality Control*

B10.1 "Custody Transfer Documents" should be used to ensure that a chain of custody exists from the point of sampling to the final disposal of samples. At each point in the chain, one person is responsible for the sample until the custody transfer document is signed by someone else, who then assumes responsibility. In this way, the integrity of the samples can be ensured.

B10.2 All equipment calibration and recalibration exercises should be documented.

B10.3 Each measurement report should be checked and signed by the operator, a second staff member, and a senior before it is issued.

B10.4 Data input into the database should be checked against field records prior to being sent to the Officer responsible for the audit. In case of unresolved discrepancies, the data should be flagged to indicate that it may be unreliable.

B11 *Action Plans*

Action plans are provided in the main text.

B12 *Contingency Plans*

Contingency plans for the following kinds of problems should be worked out in advance, and included in the contract. An allowance for operating additional monitoring sites or increasing the numbers of equipment should be included in budget calculations.

- Delay in setting up monitoring sites or equipment, obtaining power supply, or laboratory facilities
- Failure or theft of equipment
- Adverse weather conditions
- Prolonged absence of key personnel

Agreement No. CE 39/92
Design & Construction of Smithfield Extension

Notes of Meeting held on 2 August 1993
File H766/054.2 & 403 & 702

Present :	Mr K W Mok	FSD
	Mr P Nolan	PHH
	Mr H F Chan	PHH (Enpac)
	Mr B Chan	PHH

1. The purpose of this meeting is to discuss the proposed noise barrier partial enclosure adjacent to Smith Court and Trescend Garden.

2. Due to the need to provide fire services access to the facades fronting Smithfield Road, FSD will require access opening as follows:

   (i) Option 1 (see attached layout plan)

   A 15 metres wide opening is to be provided between Smith Court and Trescend Garden.
   *(The 15 metres opening shall refer to the entire opening up of the roof of the barrier.)

   (ii) Option 2 (see attached layout plan)

   9 metres clearance from the northern building corner of Trescend Garden and 11 metres clearance from the southern building corner of Smith Garden are required.

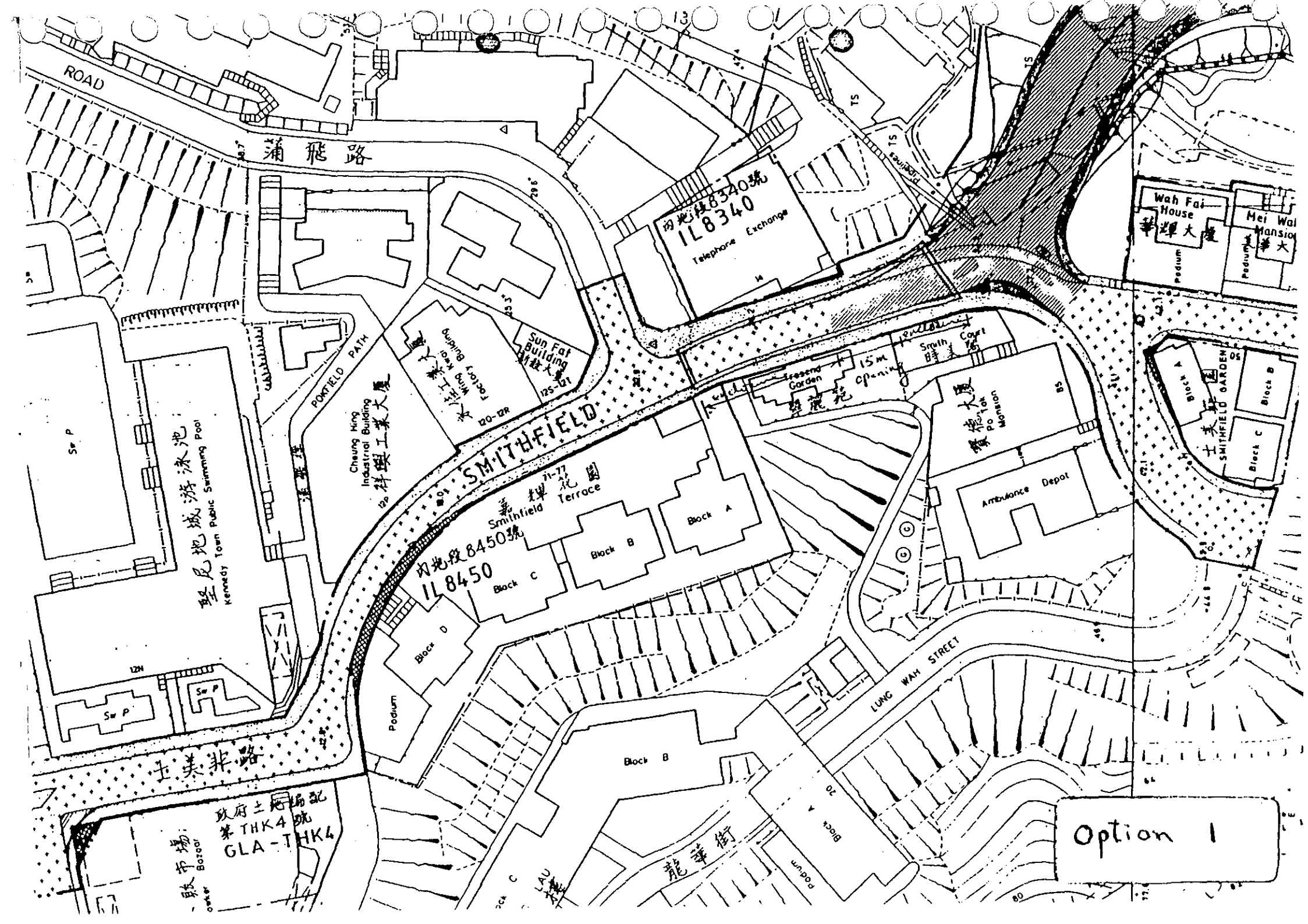
3. The opening of the partial enclosure will match with the access to the buildings. the width of the opening shall not be less than the wide of the access into the buildings.

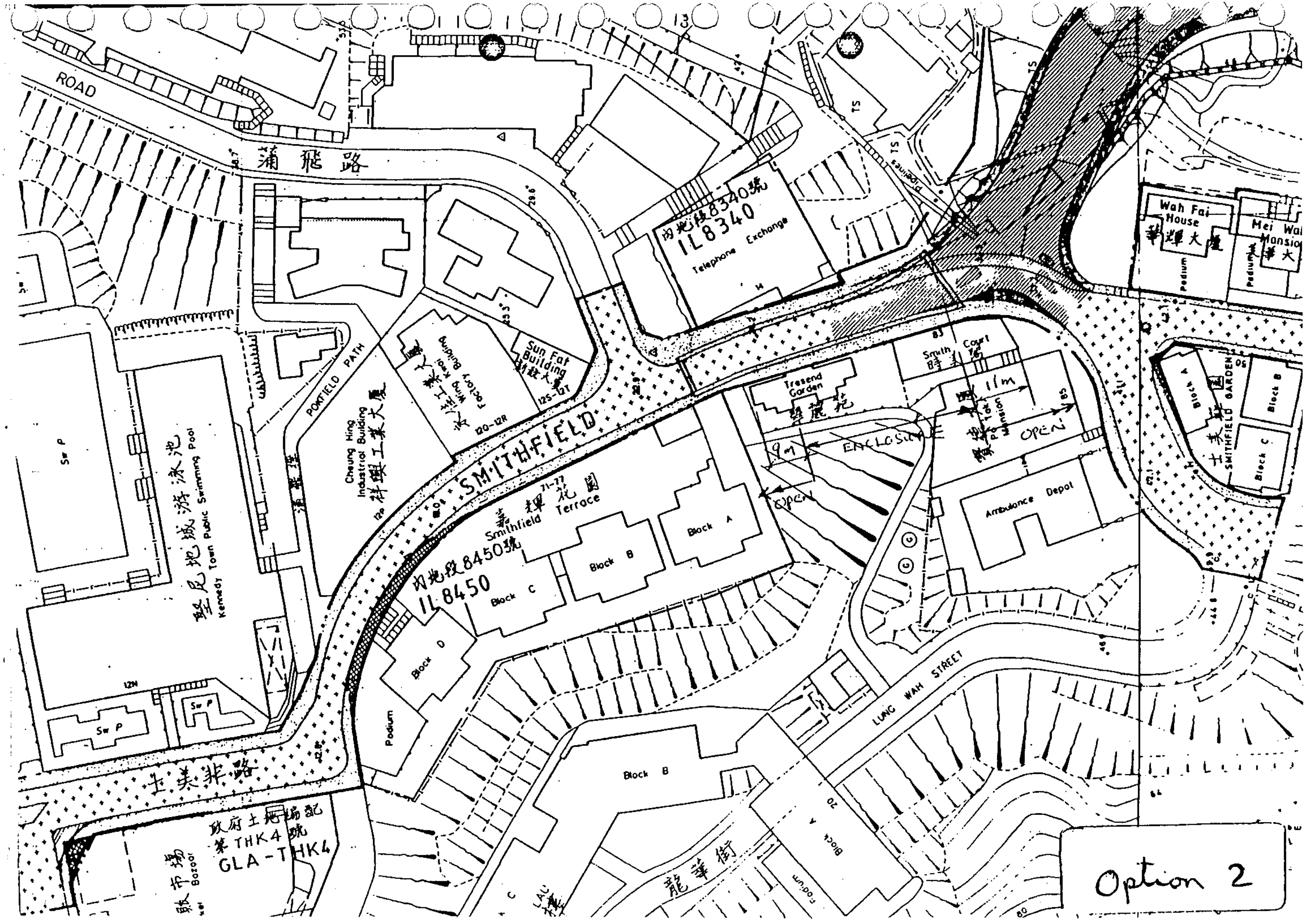
4. Fire hydrants are to be kept clear with a horizontal clearance of 2 metres at either side.

5. FSD agreed that provision of hydrants are not required for the new structure.

6. PHH is considering the option of using "baffles" forming "louvres" to the roof of the noise barrier enclosure so that smoke can be escaped in case of fire.

* FSD's comment to notes of this meeting
FSD's letter ref. (60) in FSD 13/7596/91 dated 12.8.93, refers.


ROAD
蒲飛路
Kennedy Town Public Swimming Pool
堅尼地城游泳池
Sw P
Sw P
Sw P
12N
POKFIELD PATH
Cheung King Industrial Building
祥興工業大廈
Factory Building
Sun Fat Building
新發大廈
125-127
129-129
SMITHFIELD
Smithfield Terrace
嘉輝花園
71-77
Block A
Block B
Block C
Block D
Podium
內地段8450號
IL 8450
內地段8340號
IL 8340
Telephone Exchange
14
TS
TS
TS
Wah Fai House
華輝大廈
Podium
Hei Wai Mansion
Podium
Seasons Garden
15M opening
Smith Court
85
Po Tak Mansion
Ambulance Depot
SMITHFIELD GARDEN
Block A
Block B
Block C
LUNG WAH STREET
Block B
Block A
20
Podium
龍華街
政府土地編號
第THK4號
GLA-THK4
Bazaar
Option 1



Option 2
ROAD
蒲飛路
SMITHFIELD
內地段8340號
IL8340
Telephone Exchange
內地段8450號
IL8450
嘉輝花園
Smithfield Terrace
71-77
Block A
Block B
Block C
Block D
Podium
Sun Fat Building
Wing Kwai Factory Building
Cheung Hing Industrial Building
祥興工業大廈
POKFIELD PATH
堅尼地城游泳池
Kennedy Town Public Swimming Pool
Sw P
士美非路
政府土地撥配
第THK4號
GLA-THK4
Bazaar
Trasend Garden
翠麗花
Smith Court
時美閣
Po Tak Mansion
ENCLOSURE
OPEN
11m
9m
Ambulance Depot
SMITHFIELD GARDEN
士美菲園
Wah Fai House
華輝大廈
Mei Wah Mansion
LUNG WAH STREET
龍華街