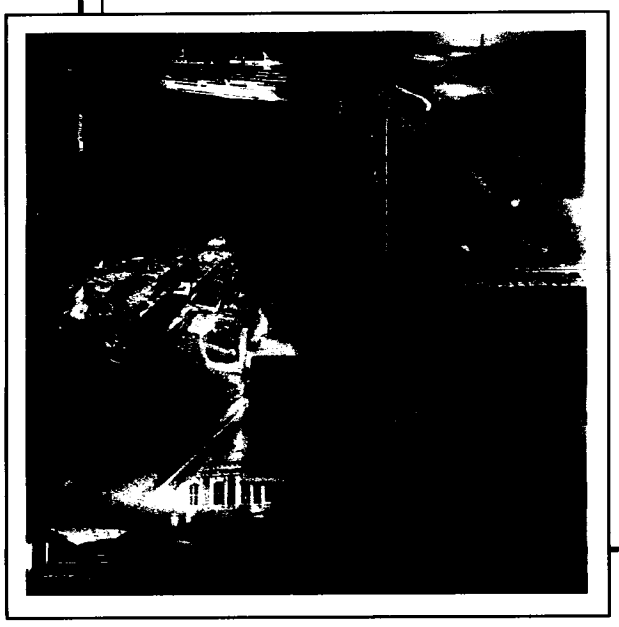
Appendix A



MVA

APPENDIX A
附件 A
Fortune Street UC Site
Environmental Design Assessment Study
Draft Final Report, November 1996
幸 福 街UC地盤 －環境設計評估研究 －
草擬最終報告，96年11月

FORTUNE STREET UC SITE
ENVIRONMENTAL DESIGN ASSESSMENT STUDY
DRAFT FINAL REPORT

Prepared by : MVA Asia Limited

Prepared for : Hong Kong Housing Authority

Date : November 1996

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1. INTRODUCTION

1.1 Background

1.1.1 Hong Kong Housing Authority (HKHA) plans to develop a Public Rental Housing and Home Ownership Scheme (HOS) development at Fortune Street UC Site in West Kowloon (Figure 1). In an Environmental Review (ER) conducted by the Environmental Planning Department (EPD), concerns were raised on the potential traffic noise impact of the road network surrounding the proposed development.

1.1.2 The ER concluded that from the environmental point of view the development following under category II, is considered acceptable with the following conditions :

i) domestic setback of 65m from Cheung Sha Wan Road if there is no development for the cultural complex or the like (with 4 storey or higher) at the G/IC site between the office building and the fire station facing Cheung Sha Wan Road.

ii) domestic setback of 70m from Hing Wah Street if there are noise sensitive rooms with openable windows overlooking both the Cheung Sha Wan Road and Lai Chi Kok Road.

1.1.3 MVA Asia Limited was commissioned by HKHA in August 1996 to carry out an Environmental Design Assessment Study for the proposed Public Rental Housing and HOS development. The purpose of the study was to assess the traffic noise impact on the proposed development and suggest practical noise mitigation measures.

1.2 Proposed Development

1.2.1 The proposed Development consists of 1 no. 41-storey Harmony block, 2 nos. 38-storey New Cruciform HOS blocks, 2 nos. double aspect buildings, 1 no. commercial centre , 2 nos. carpark buildings and 1 no. ARC Station.

1.3 Study Area

1.3.1 The development site as shown in Figure 1 is located in Cheung Sha Wan and is at present zoned as District Open Space, which is indicated in the Outline Development Plan number D/K5B/1A. It is bounded by Fat Tseung Street, Fortune Street, Hing Wah Street and a planned road.

1.3.2 Hing Wah Street is a local distributor, Fat Tseung Street and Fortune Street are local roads and a new road is planned as an access road for the development. Traffic data such as flows and vehicle composition for these distributors and roads are discussed in Chapter 2 and given in Figure 2.

1.4 Layout Formulation

1.4.1 In the stage of formulating the layout plan, HKHA intended to locate non-noise sensitive buildings such as carpark at the site boundary along Hing Wah Street. However, several constraints would have to be considered when formulating the layout plan.

1.4.2 Time is one of the constraints. In order to meet the completion date for the development. The development has to be splited into two phases with standard domestic blocks (New Cruciform, Harmony, etc.) grouped into Phase 1 as standard blocks require a longer construction period but shorter time period for design and preparation of tender documents, contracts etc. so that target completion date could be met. Non-standard block such as carpark have to be in a separate phase and cannot be used as podiums for domestic blocks since that would increase design and construction time.

1.4.3 The need to maximize the use of the site to produce flats is the second constraint. The maximum Gross Floor Area (GFA) permitted by the domestic plot ratio has to be achieved in both HOS and rental portions of the estate. Minimum area permitted by the plot ratio has to be kept for HOS portion, so that as much land as possible can be released for the production of rental flats. The shape and location of the HOS carpark will also affect the size of the HOS site. The proposed layout (Figure 3) will allow the HOS site area to be kept to a minimum.

1.4.4 To minimize the number of flats facing the carpark and to maintain a reasonable distance between the flat windows and the carpark is the last constraint. The proposed layout is able to avoid this constraint.

1.5 Study Objective

1.5.1 The primary objective of the study is to identify potential impacts from traffic noise on the site and to recommend mitigation measures where necessary.

1.5.2 Within the framework of this study objectives, the following specific tasks shall be undertaken :

a) assess the extent of potential noise impacts
b) propose effective and acceptable mitigation measures. Mitigation measures considered for investigation are listed below :

- site boundary noise barrier
- road side noise barrier

2

2. METHODOLOGY

2.1 Noise Criteria

2.1.1 There are currently no statutory controls to limit the impacts from road traffic noise, however the Hong Kong Planning Standards and Guidelines (HKPSG) provide criteria which are shown in the following table.

Summary of Noise Standards (from HKPSG)

Receiver	Road Traffic $L_{A10\ (Peak\ Hour)}$ dB(A)
Dwelling	70
Hotel and Hostels	70
Offices	70
Technical Institute or School	65
Hospital	55

Note : These standard apply to receivers that rely on windows for ventilation.

2.2 Noise Assessment

2.2.1 Calculations were carried out using the UK Department of Transport 'Calculation of Road Traffic Noise' 1988 (CRTN) which is the method acceptable to the EPD for use in Hong Kong. Assumptions are as follows :

- design year of 2011, including of the traffic generated by the maximum development potential, representing the highest traffic forecast,;
- the CRTN methodology stated that vehicles over 1525 kg unladen weight should be considered as heavy goods vehicles, which includes the PLB category of vehicles.

2.2.2 The traffic data from the 'WCRCTAR' was originally intended to use. However, as advised by TD and PM that the traffic data cannot be endorsed for this study. Hence, MVA's 'Reclamation Area Model' was therefore adopted. The 2011 traffic forecasts used for this assessment were extracted from "Reclamation Area Model" with the updated development parameters. The traffic generated by the proposed development was included. The predicted peak hour traffic flow, percentage of heavy goods vehicles (HGVs) and vehicular speed on each road are shown in Figure 2.

2.3 Sensitive Receivers

2.3.1 A number of noise sensitive facades were chosen for analysis within the development for each scheme. Calculations for the Harmony block was undertaken from the first floor level (assumed to be 4.6m above ground level) and then every six floors up to the thirty-seventh floor level (based on 2.7m interfloor spacing). For the Double Aspect blocks, noise predictions were made at each floor level from first floor level (assumed to be 4.6m above ground level) and then every six floors up to the top floor level (based on 2.7m interfloor spacing). Noise prediction for HOS blocks were undertaken from first floor level (assumed to be 4.8m above ground level) and then every six floors up to the thirty-seventh floor (based on 2.8m interfloor spacing), all receivers are assumed to be located 1m in front of windows which are at 1m from floor. The location of sensitive receivers are shown in Figure 3.

3

3. TRAFFIC NOISE IMPACT

3.1 Testing Scenarios

3.1.1 Pervious road surfacing was not chose for this assessment because surrounding road networks are low speed roads (50 kph); and effectiveness of pervious road surfacing on low speed road is being under reviewed by Environmental Protection Department and Highway Department and hence could not be applied here.

3.1.2 The cultural complex or the like at the G/IC Site between the office building and the fire station facing Cheung Sha Wan Road was not assumed in the noise model since Urban Services Department could not confirm the completion year of the Cultural Complex.

3.1.3 The future widening of Hing Wah Street was taken into account for the noise model.

3.1.4 The testing scenarios are therefore concluded as follows :

Scenario

1. Reference Case (no mitigation measures)
2. 18m high noise barrier along site boundary (Full Compliance)
3. 10m to 7m high tapered noise barrier along road kerb of Hing Wah Street (Full compliance)
4. 7m high noise barrier along site boundary
5. 5m high noise barrier along site boundary
6. 3m high noise barrier along site boundary
7. 5m high noise barrier along road kerb of Hing Wah Street

3.2 Assessment Results

3.2.1 Scenario 1 - Reference Case (No mitigation measures) (Figure 4)

The calculated noise levels are given in Table 1. Noise level exceedances were found at the facades facing Hing Wah Street. The noise levels were up to 73 dB(A) for NSR 9,10,14 and 15.

3.2.2 Scenario 2 - 18m high noise barrier along site boundary (Figure 5)

The calculated noise level are given in Table 2. Full compliance with noise criterion was achieved, however, noise barrier up to 18m high is not acceptable.

3.2.3 Scenario 3 - 10m to 7m high tapered noise barrier along road kerb of Hing Wah Street (Figure 6)

The calculated noise levels are given in Table 3. Full compliance with stipulated standard of 70 dB(A) was achieved. Nevertheless, noise barrier up to 10m high along the road side is considered not acceptable for Highway Department.

3.2.4 Scenario 4 - 7m high noise barrier along site boundary (Figures 7 and 8)

The calculated noise levels are given in Table 4. The noise levels were up to 73 dB(A) for NSR 10. A total of 146 flats out of 2,558 flats exceeded the noise criterion which represents 5.7% of the whole developments.

3.2.5 Scenario 5 - 5m high noise barrier along site boundary (Figures 9 and 10)

The calculated noise levels are given in Table 5. The noise levels were up to 73 dB(A) for NSRs 9 and 10. A total of 173 flats out of 2,558 flats exceeded the noise criterion which represents 6.8% of the whole developments.

3.2.6 Scenario 6 - 3m high noise barrier along road kerb of Hing Wah Street (Figures 11 and 12)

The calculated noise levels are given in Table 6. The noise levels were up to 73 dB(A) for NSRs 9, 10 and 15. A total of 197 flats out of 2,558 flats exceeded the noise criterion, representing 7.7% of the whole development.

3.2.7 Scenario 7 - 5m high noise barrier along road kerb of Hing Wah Street (Figures 13 and 14)

The calculated noise levels are given in Table 7. The noise levels were up to 73 dB(A) for NSR 9 and 10. A total of 78 flats out of 2,558 flats exceeded the noise criterion, representing 3% of the whole development.

4

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

4.1.1 Without any mitigation measures, facades facing Hing Wah Street will experience serious traffic noise from highly trafficked Hing Wah Street. Exceedances up to 3 dB(A) over the noise criterion is found at NSRs 9, 10, 14 and 15. There will be 215 flats with noise level exceed the criterion of 70 dB(A), representing 8.4% of the whole development.

4.1.2 Scenario 2 can give full compliance with HKPSG noise criterion but the height of noise barrier required (18m) will not be acceptable and practical.

4.1.3 Scenario 3 can give full compliance with the stipulated standard of 70 dB(A). However, to build 10m high noise barrier along road kerb of Hing Wah Street will not be acceptable to Highway Department.

4.1.4 Scenario 4 involves building a 7m high noise barrier along site boundary. This cannot give full compliance with the requirement of HKPSG, as it can reduce the exceedances from 215 flats to 146 flats, representing 5.7% of the whole development.

4.1.5 Scenario 5 involves building a 5m high noise barrier along site boundary. This cannot give full compliance with the stipulated standard of 70 dB(A) as it can reduce the exceedances from 215 flats to 173 flats, representing 6.8% of the whole development.

4.1.6 Scenario 6 involves building a 3m high noise barrier along site boundary. This cannot give full compliance with HKPSG requirement, and it can only reduce the exceedances from 215 flats to 197 flats, representing 7.7% of the whole development.

4.1.7 Scenario 7 involves building a 5m high noise barrier along road kerb of Hing Wah Street. This cannot give full compliance with the noise criterion stated in HKPSG, although it will reduce the exceedances from 215 flats to 78 flats which represents 3% of the whole development.

4.1.8 Due to that roadside noise barriers will be subjected to agreement with Highways Department they cannot be considered as a good solution to noise intrusion problem.

4.1.9 In addition giving full compliance with HKPSG requirement the noise barrier will require a boundary noise barrier of 18m which is not practical.

4.1.10 The location of the HOS blocks in the proposed layout plan is so chosen to take advantage of the view over the Cheung Sha Wan Sports Ground on the other side of Hing Wah Street. Noise barrier with height over 5m will create visual intrusion to the flats at first floor. Therefore, Scenario 4 cannot be considered as a practical and reasonable solution.

4.1.11 To build a 5m high noise barrier will require foundation work for the barrier and the barrier can only provide 42 flats with full compliance of HKPSG noise criterion. While there are still have 173 flats exceeding the criterion. Hence from the point of view of cost and benefit Scenario 5 is not a practical solution to the noise intrusion problem.

4.1.12 3m high noise barrier along site boundary (Scenario 6) will only provide 18 flats with full compliance for the stipulated standard of 70 dB(A) while leaving 197 flats expose to the serious traffic noise from Hing Wah Street. Therefore it is impractical to build 3m high noise barrier along the site boundary from the cost and benefit point of view.

4.2 Recommendations

4.2.1 It can be concluded that the above mitigation measures are not acceptable due to :

i) Impractical height of noise barrier (Scenario 2)

ii) visual intrusion (Scenario 4)

iii) In effectiveness of the noise barrier (Scenarios 5 and 6)

4.2.2 The only practical and effective measures that can bring the noise level for the High Wah Street facade down to acceptable level as stipulated in the HKPSG for Environmental Guidelines are tabled below :

Suitable Window Types for Traffic Noise

window types / **Exceedance over standard** / **Noise source**	**I**	**II**	**III**
Road Traffic	$\beta < 10$	$10 < \beta < 15$	$\beta > 15$

WINDOW TYPES

I. openable well-gasketted window, 6mm pane

II. openable double-glazed window in well gasketted separate frames with a configuration of 6mm : 150mm : 6mm (exterior glaze : air-gap : interior glaze)

III. openable double-glazed window, in well gasketted separate frames with a configuration of 10mm : 150mm : 6mm (exterior glaze : air-gap : interior glaze)

* Suitable window type when the estimated noise level will exceed the relevant standard by β value.

4.2.3 Therefore, as the last resort, provision of openable well gasketted windows of 6mm pane together with air-conditioner is recommended to the HOS blocks for the noise intrusion problem.

Scenario 1

Table 1 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 1 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	72	73	72	72	72	73	72	63	62
Floor 7	63	58	73	73	72	72	71	72	73	65	66
Floor 13	65	60	72	72	71	71	70	71	72	65	66
Floor 19	67	61	71	71	70	70	69	70	71	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	69	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 1 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	67	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	66	68	68
Floor 37	69	65	68	67

Scenario 2

Table 2 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	65	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 2 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	69	67	57	46	53	65	68	63	62
Floor 7	63	58	70	68	65	61	62	68	69	65	66
Floor 13	65	60	70	70	68	64	68	69	68	65	66
Floor 19	67	61	70	70	70	68	69	70	69	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	68	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 2 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

Scenario 3

Table 3 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 3 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	69	67	57	45	53	65	68	63	62
Floor 7	63	58	70	68	64	60	61	68	68	65	66
Floor 13	65	60	70	70	67	64	67	69	68	65	66
Floor 19	67	61	70	70	70	67	69	70	68	65	66
Floor 25	67	62	70	69	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	68	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 3 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

Scenario 4

Table 4 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 4 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	69	67	61	57	58	66	68	63	62
Floor 7	63	58	72	73	71	69	71	72	70	65	66
Floor 13	65	60	72	72	71	71	70	71	72	65	66
Floor 19	67	61	71	71	70	70	69	70	71	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	69	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	68	69	67	67

Table 4 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

Scenario 5

Table 5 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 5 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	69	68	64	61	62	67	68	63	62
Floor 7	63	58	73	73	72	72	71	72	72	65	66
Floor 13	65	60	72	72	71	71	70	71	72	65	66
Floor 19	67	61	71	71	70	70	69	70	71	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	69	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 5 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

Scenario 6

Table 6 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 6 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	70	70	67	65	67	69	69	63	62
Floor 7	63	58	73	73	72	72	71	72	73	65	66
Floor 13	65	60	72	72	71	71	70	71	72	65	66
Floor 19	67	61	71	71	70	70	69	70	71	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	69	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 6 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

Scenario 7

Table 7 Noise Level for Receivers at DA Block

Receiver No.	1	2	3	4	5	6	22	23	24	25	26	27
Floor 1	65	67	69	54	50	61	66	55	60	64	64	64
Floor 7	66	68	69	59	55	64	68	63	64	68	67	64
Floor 13	66	68	68	65	62	66	69	64	66	69	66	64
Floor 19	66	67	68	65	63	68	-	-	-	-	-	-

Table 7 (Cont'd) Noise Level for Receivers at NC Block

Receiver No	7	8	9	10	11	12	13	14	15	16	17
Floor 1	59	57	69	68	64	60	62	68	68	63	62
Floor 7	63	58	71	72	69	66	69	70	70	65	66
Floor 13	65	60	72	72	70	70	70	71	71	65	66
Floor 19	67	61	71	71	70	70	69	70	70	65	66
Floor 25	67	62	70	70	69	69	68	70	70	65	66
Floor 31	67	64	70	69	69	69	68	69	70	67	67
Floor 37	68	65	69	69	68	68	67	69	69	67	67

Table 7 (Cont'd) Noise Level for Receivers at Harmony Block

Receiver No.	18	19	20	21
Floor 1	66	65	66	62
Floor 7	69	66	68	66
Floor 13	70	66	69	68
Floor 19	70	66	69	68
Floor 25	69	66	69	68
Floor 31	69	65	68	68
Floor 37	69	65	68	67

FORTUNE STREET UC SITE
ENVIRENMENTAL DESIGN ASSESSMENT STUDY

LOCATION OF SITE

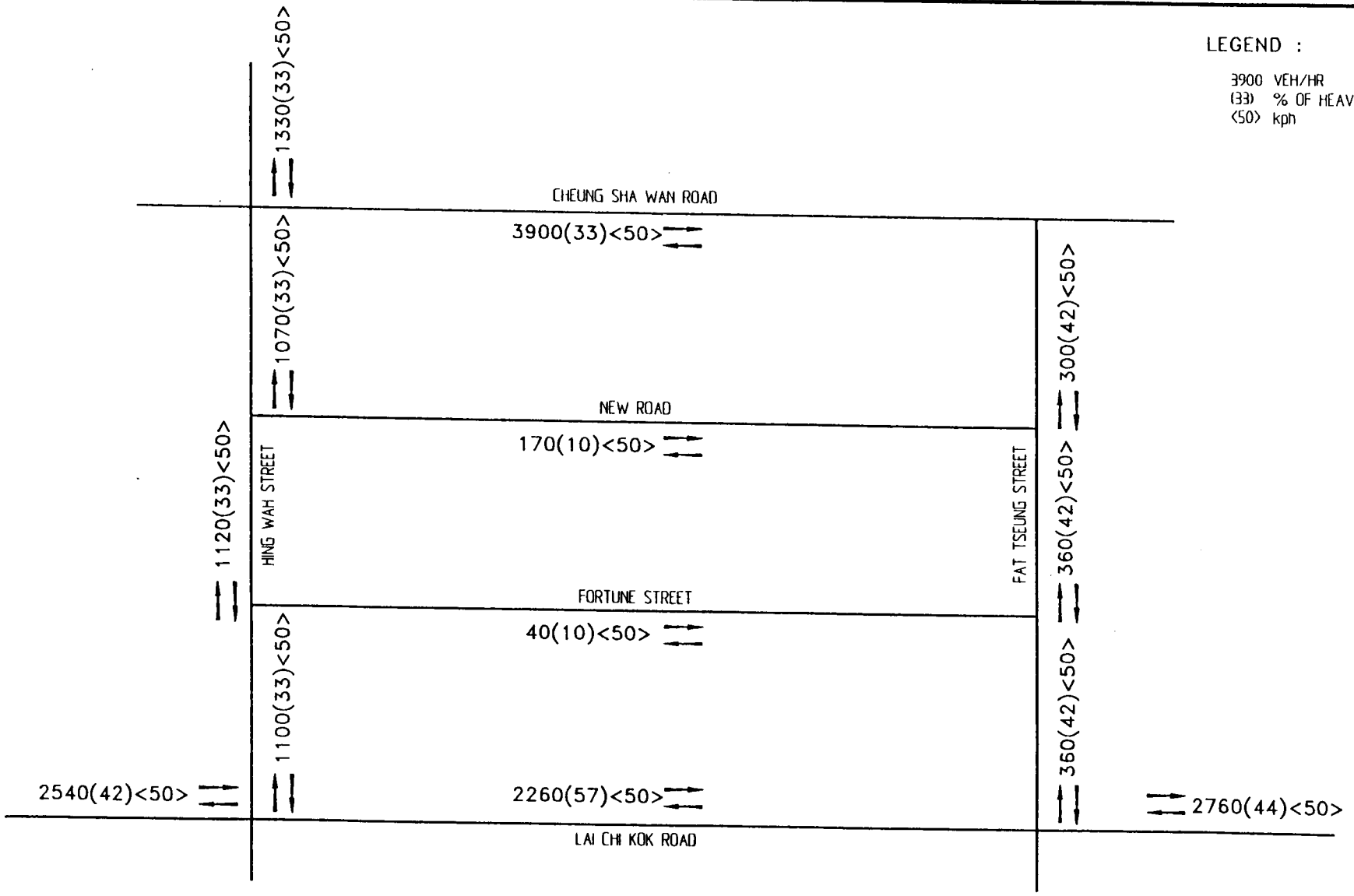
Figure No. 1

Scale 1 : 5 000

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F1.M/ECC/15-11-96



FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

TRAFFIC FLOWS AND VEHICLE COMPOSTION FOR YEAR 2011

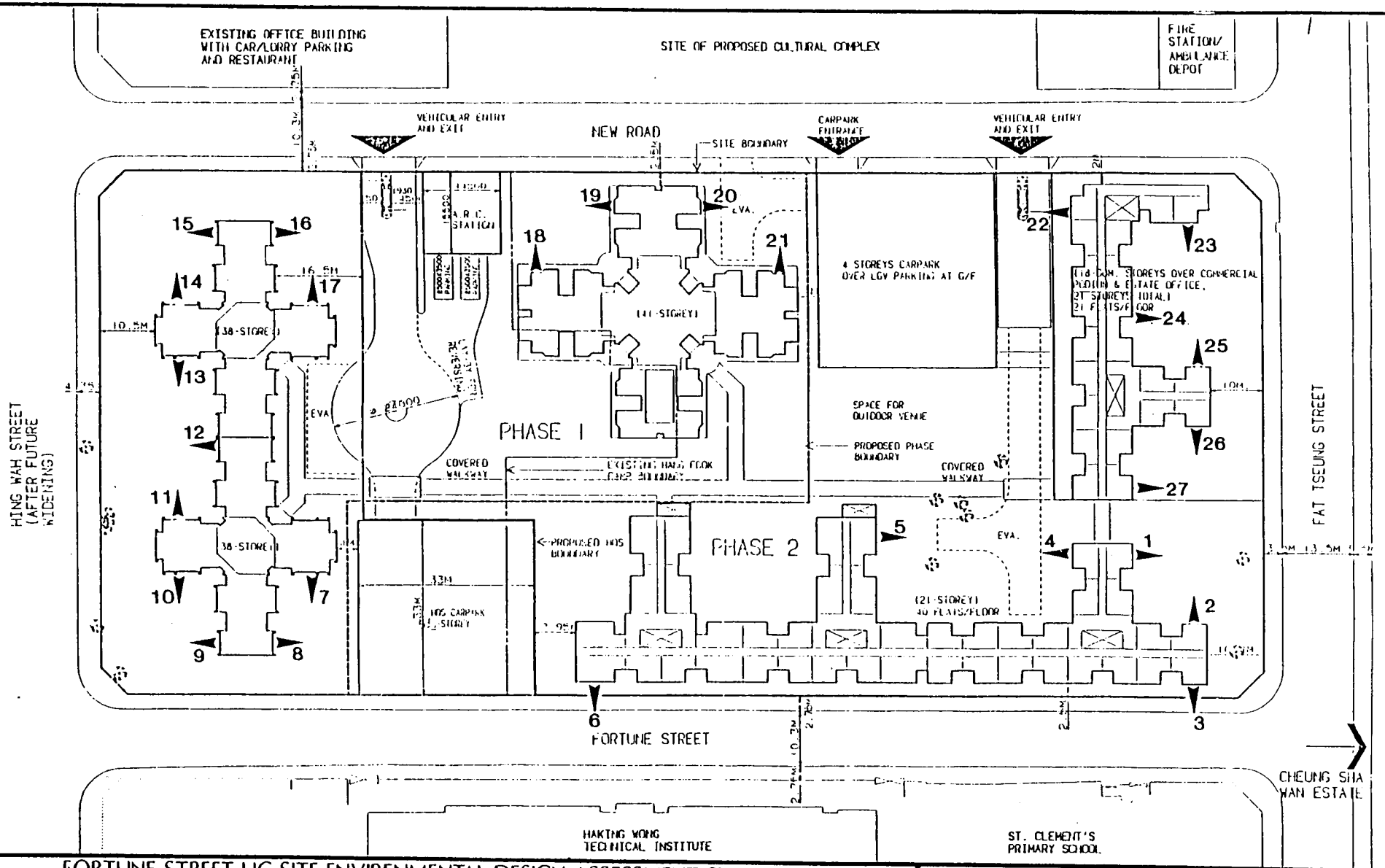
Figure No. 2

Scale : -

Date : AUG. 1996

MVA ASIA Limited

10071-4/DFR/F2.M/ECC/15-11-96



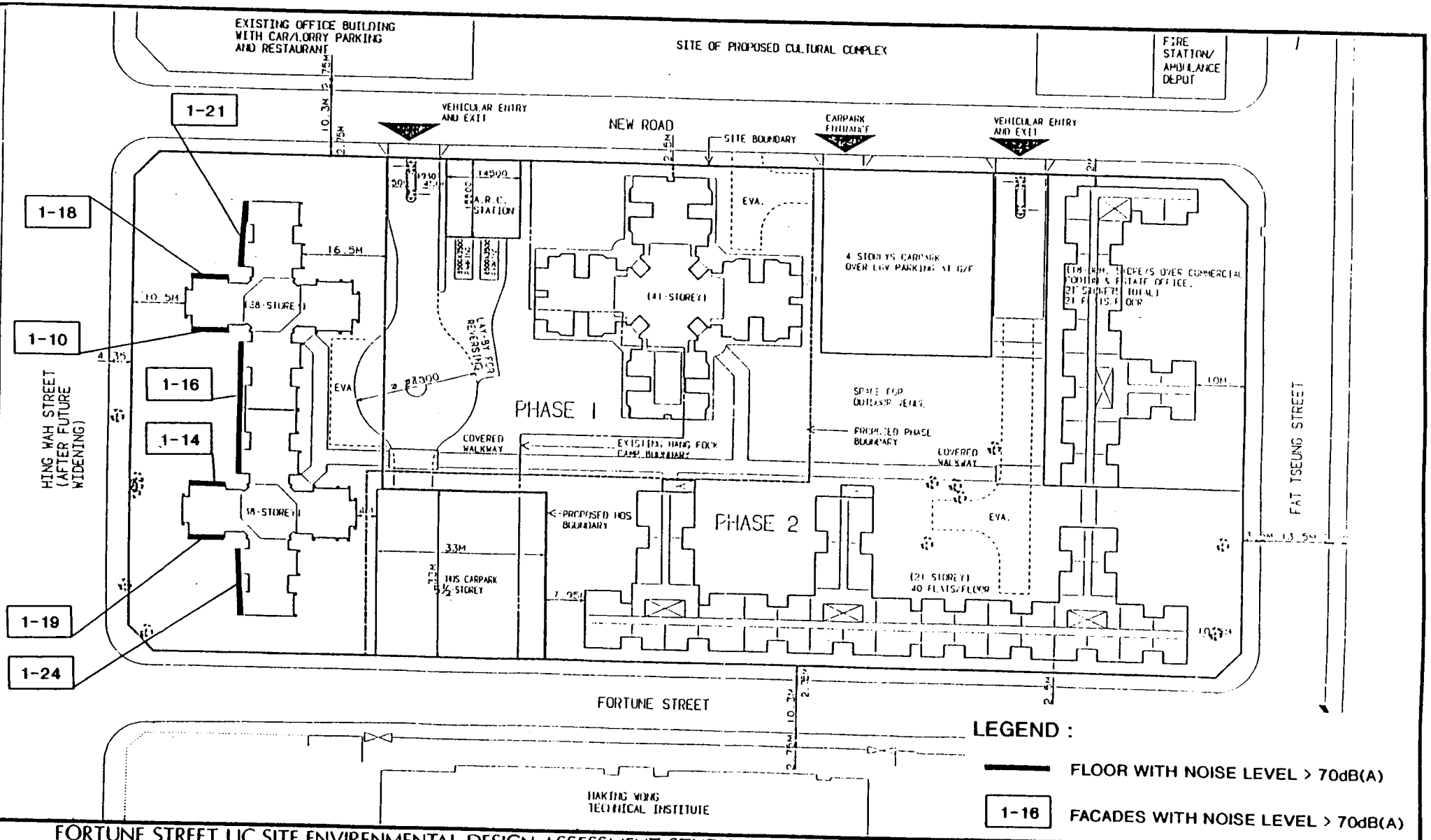
FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

LOCATION OF NSRs

Figure No.	Scale	Date
3		AUG. 1996

MVA ASIA Limited

10071-4/DFR/F3.M/ECC/15-11-96



FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

REFERENCE CASE

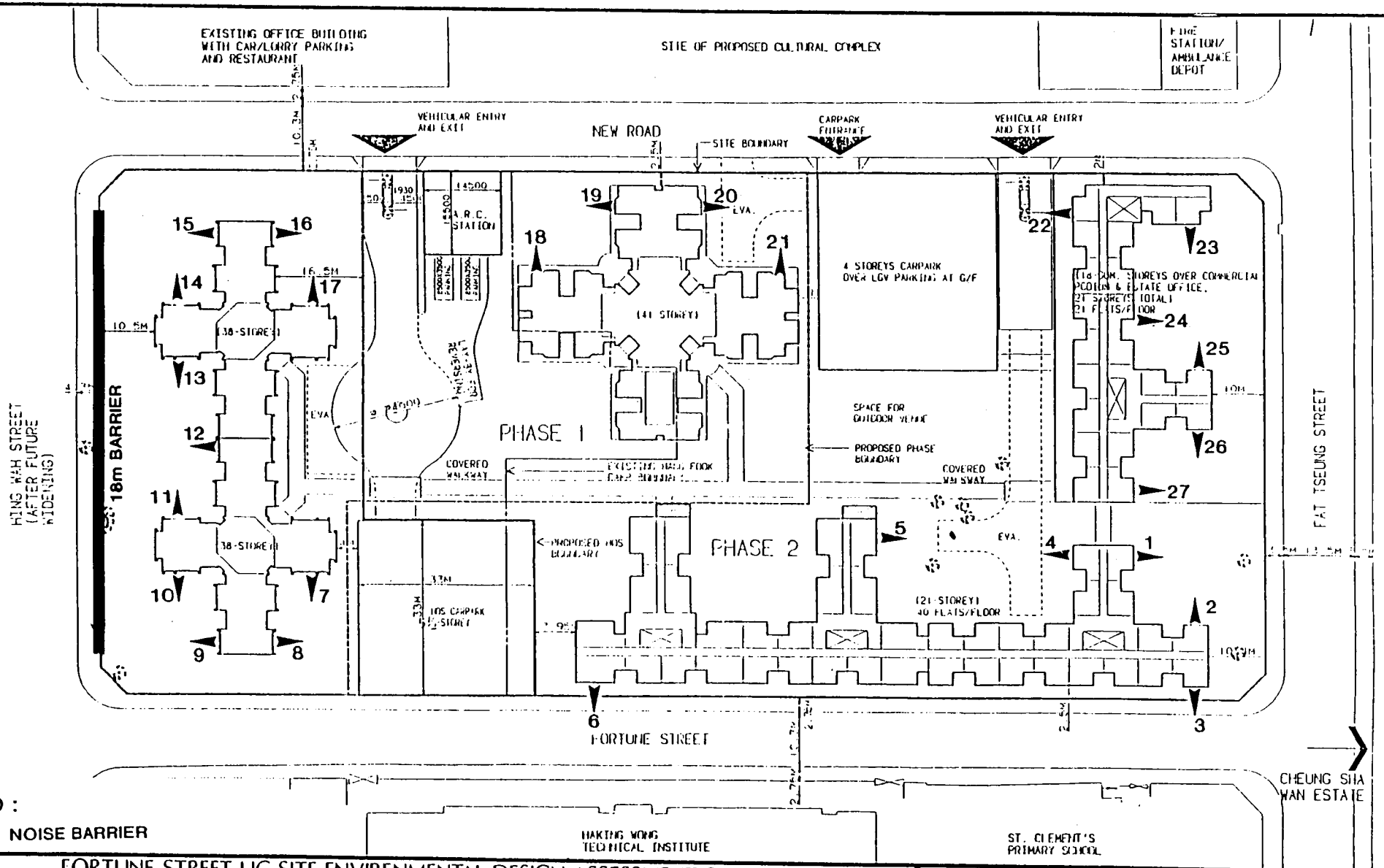
Figure No. 4

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F4 M/ECC/15-11-96



LEGEND :

NOISE BARRIER

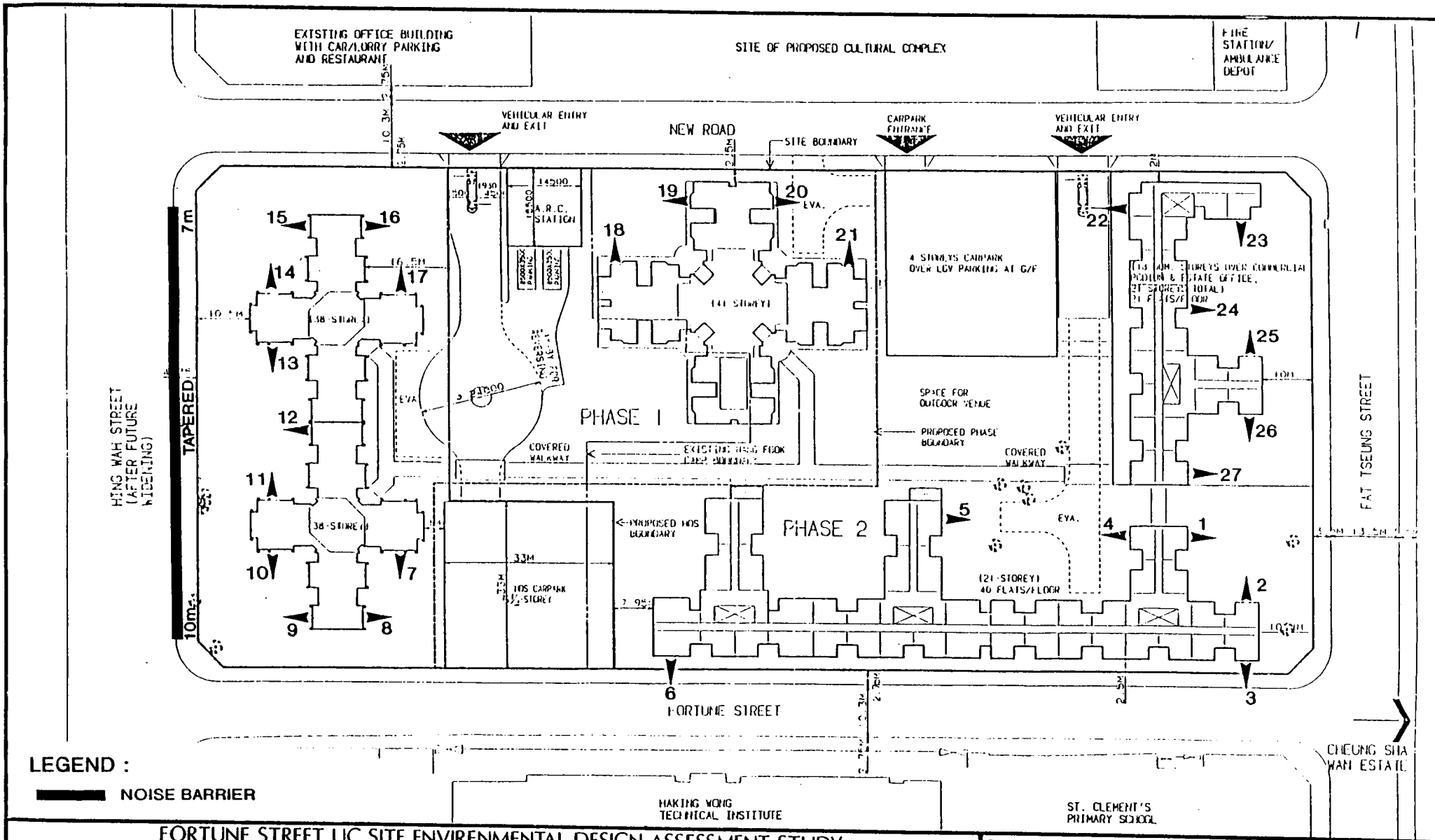
FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 1

Figure No.	Scale	Date
5		AUG. 1996

MVA ASIA Limited

10071-4/DFR/F5 M/ECC/15-11-96



LEGEND :

NOISE BARRIER

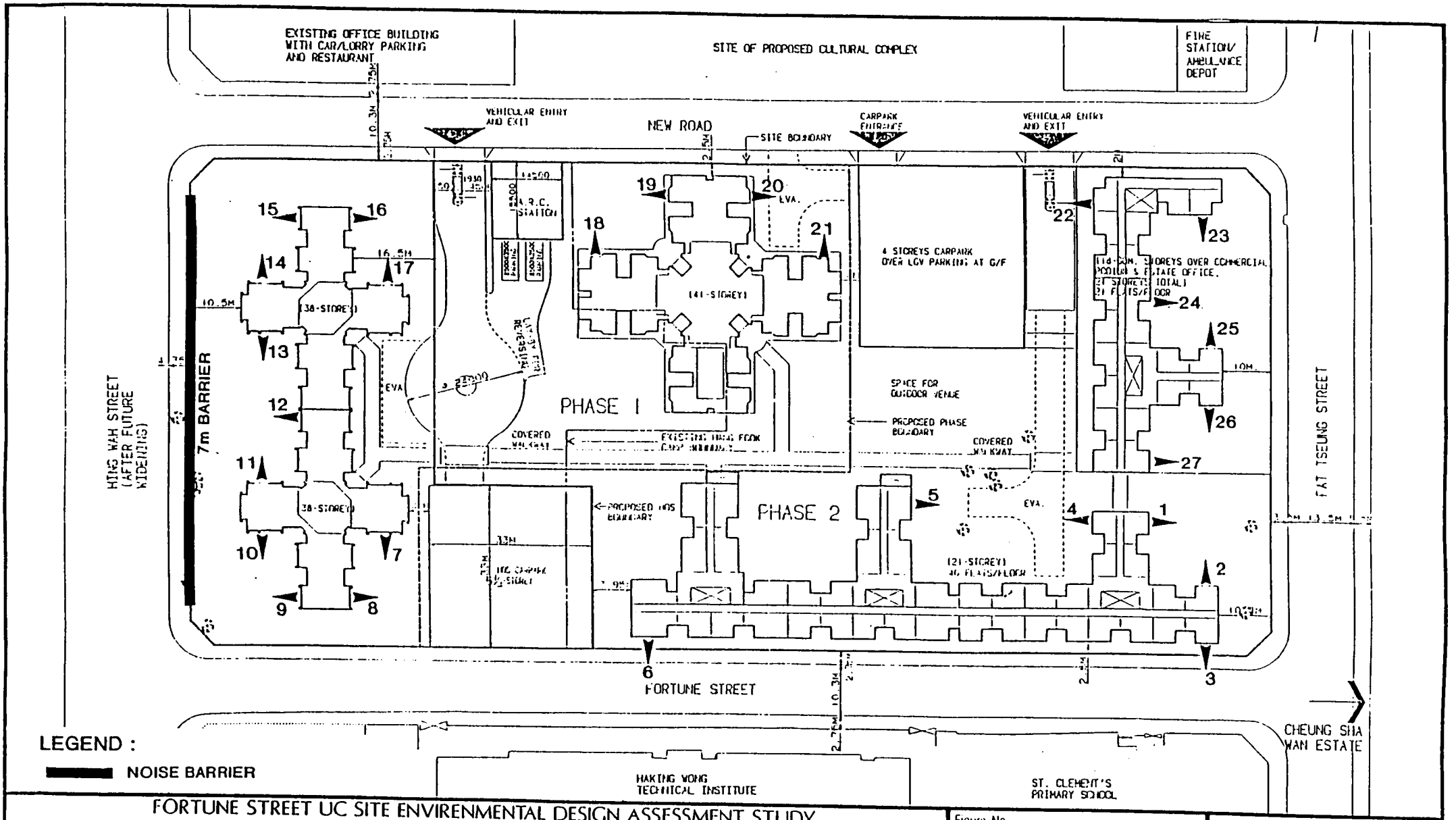
FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 2

Figure No.	Scale	Date
6		AUG. 1996

MVA ASIA Limited

10071-4/DFR/F6 M/ECC/15-11-96



LEGEND :

NOISE BARRIER

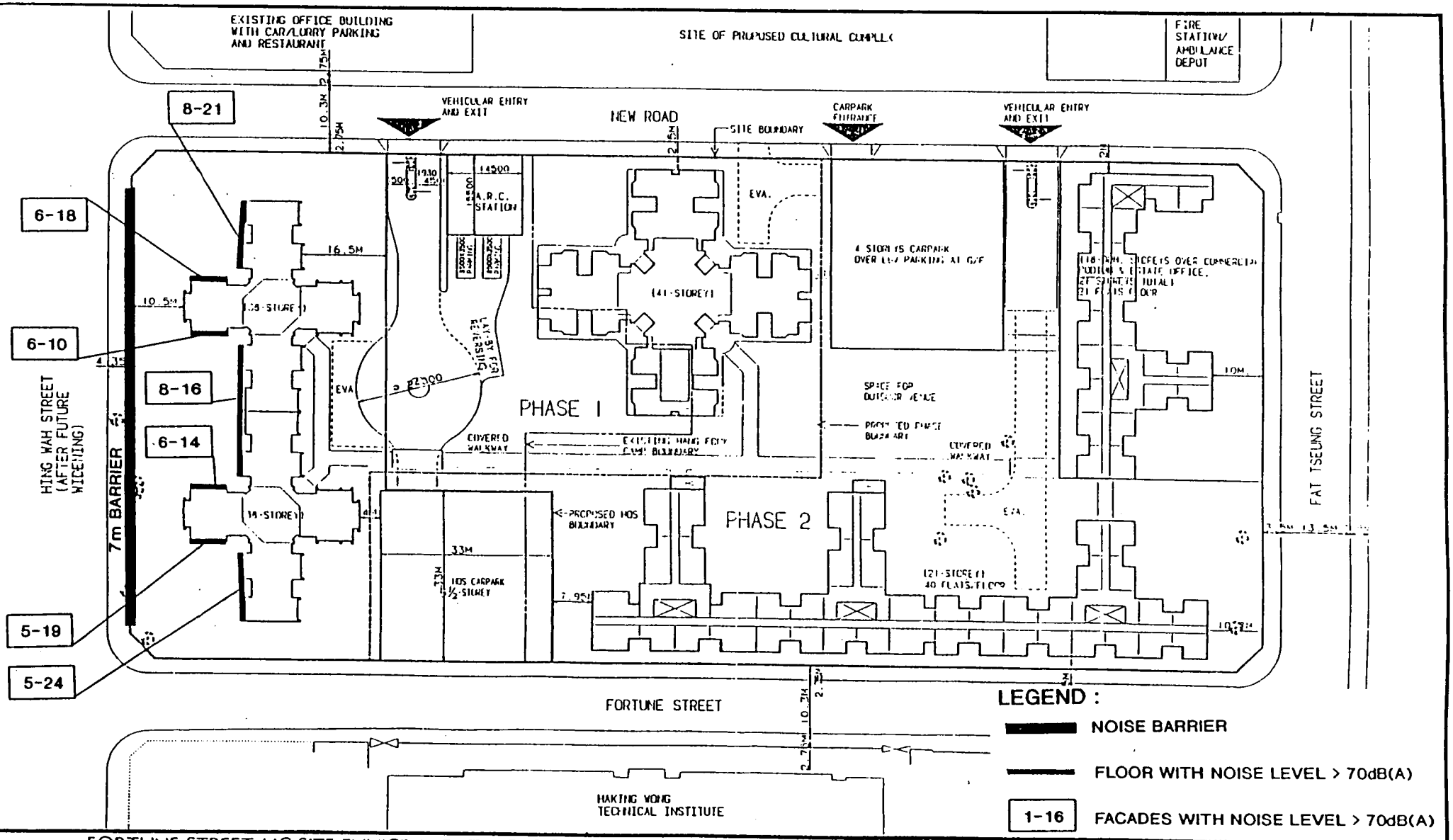
FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 3

Figure No.	7
Scale	
Date	AUG. 1996

MVA ASIA Limited

10071-4/DFR/F7 M/ECC/16-11-96



FORTUNE STREET UC SITE ENVICENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 3

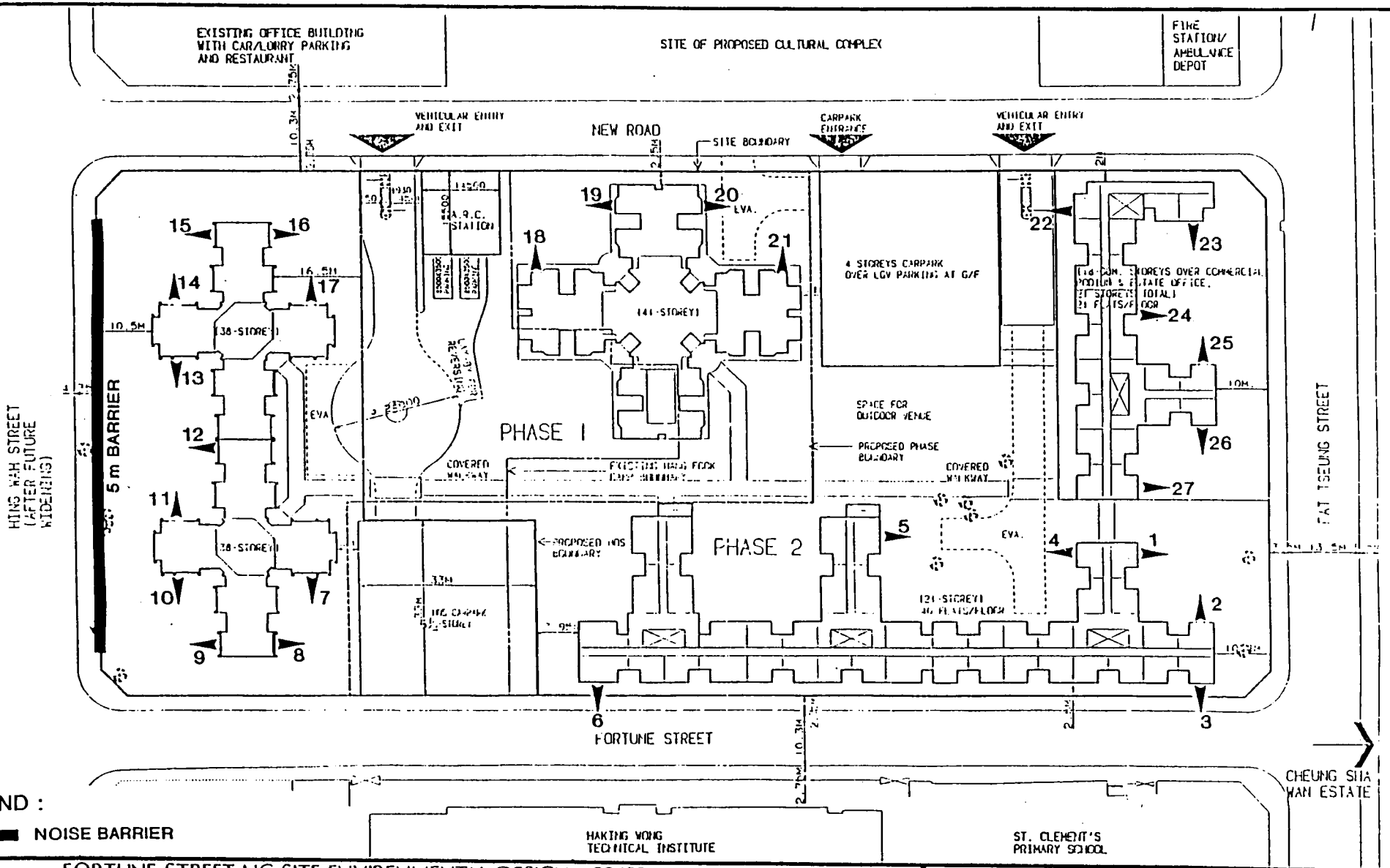
Figure No. 8

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F8 M/ECC/15-11-96



LEGEND :

NOISE BARRIER

FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 4

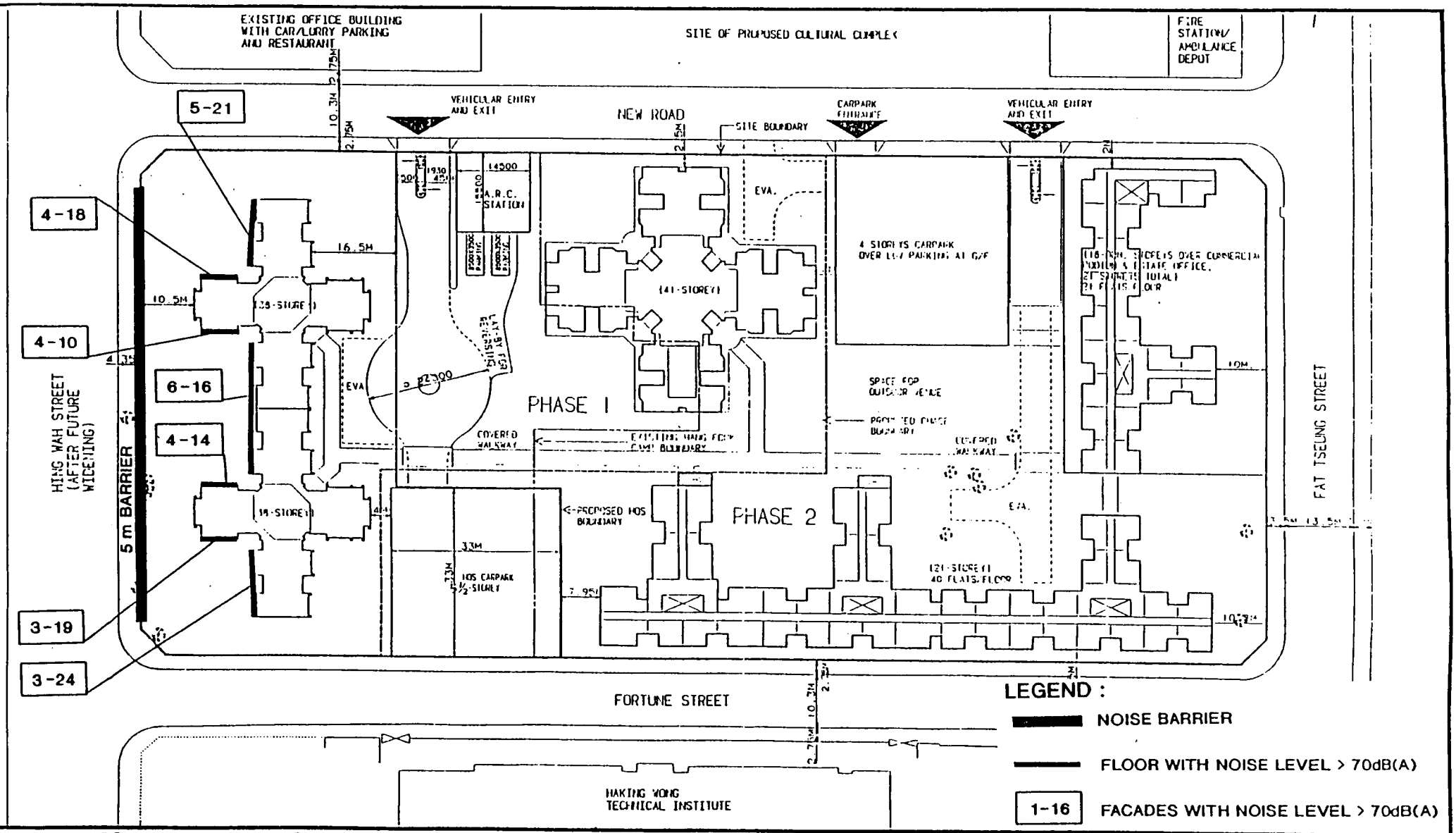
Figure No. 9

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F9 M/ECC/15-11-96



FORTUNE STREET UC SITE ENVICENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 4

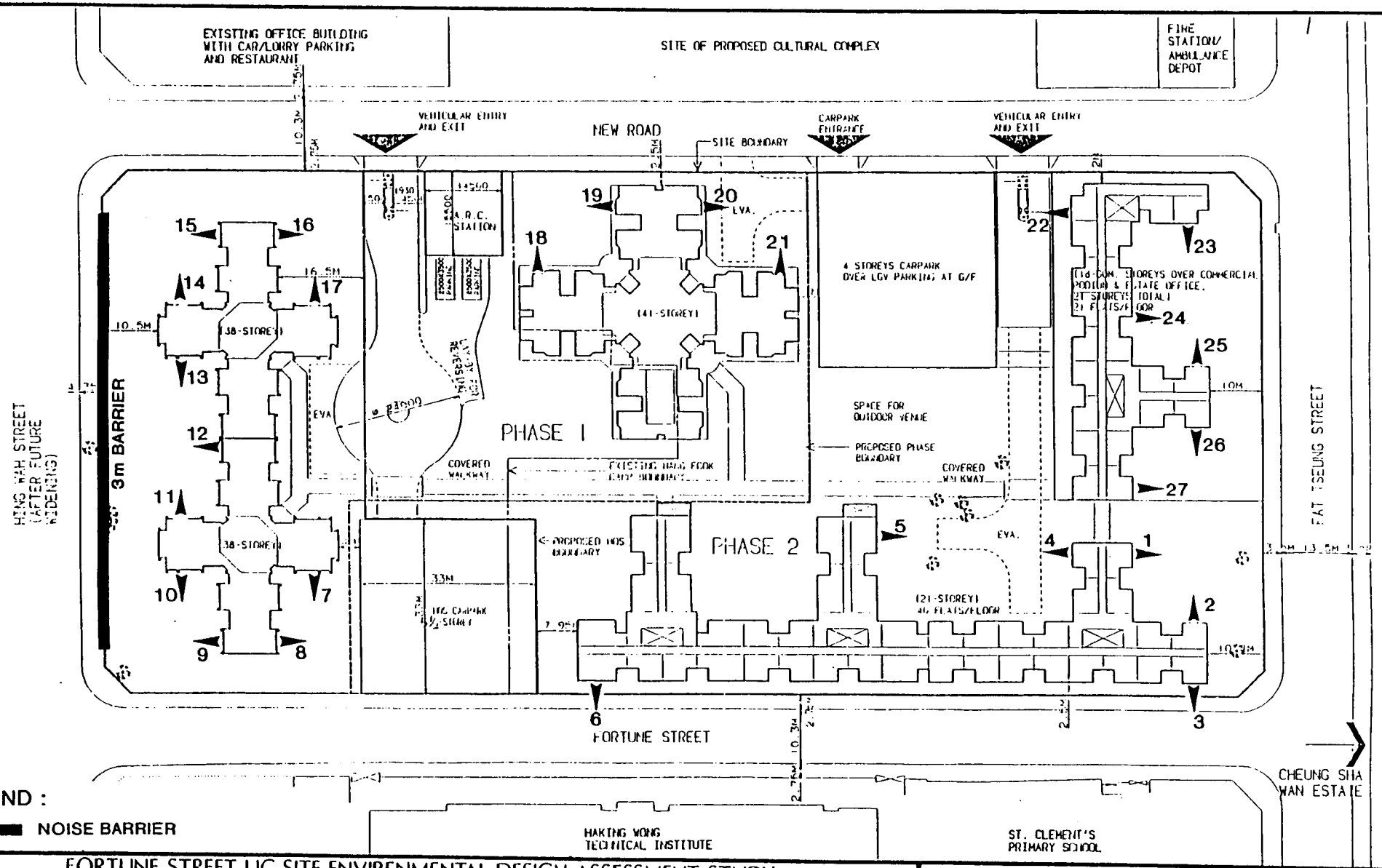
Figure No. 10

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F10.M/ECC/15-11-96



FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 5

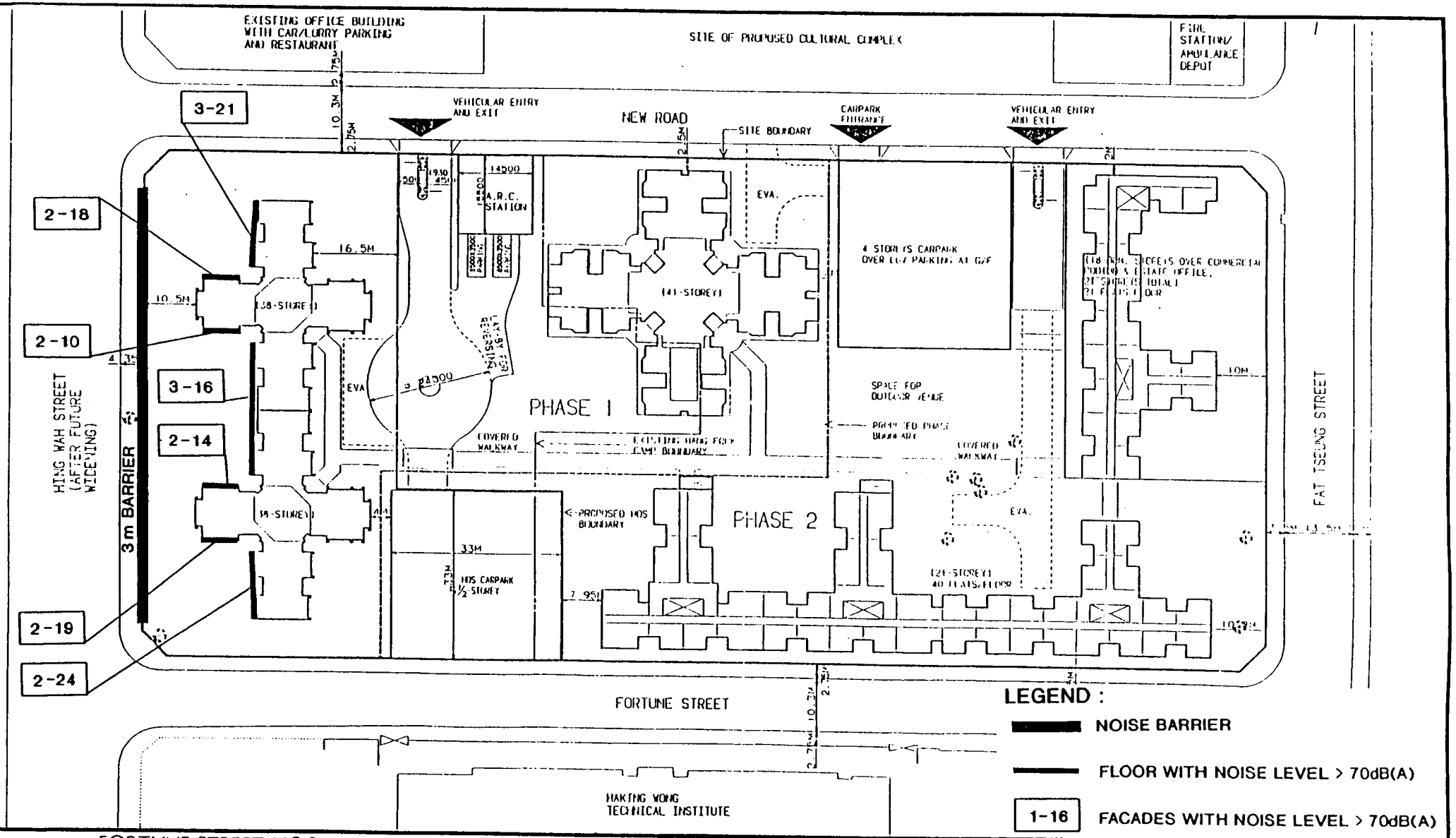
Figure No. 11

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F11 M/ECC/16-11-96



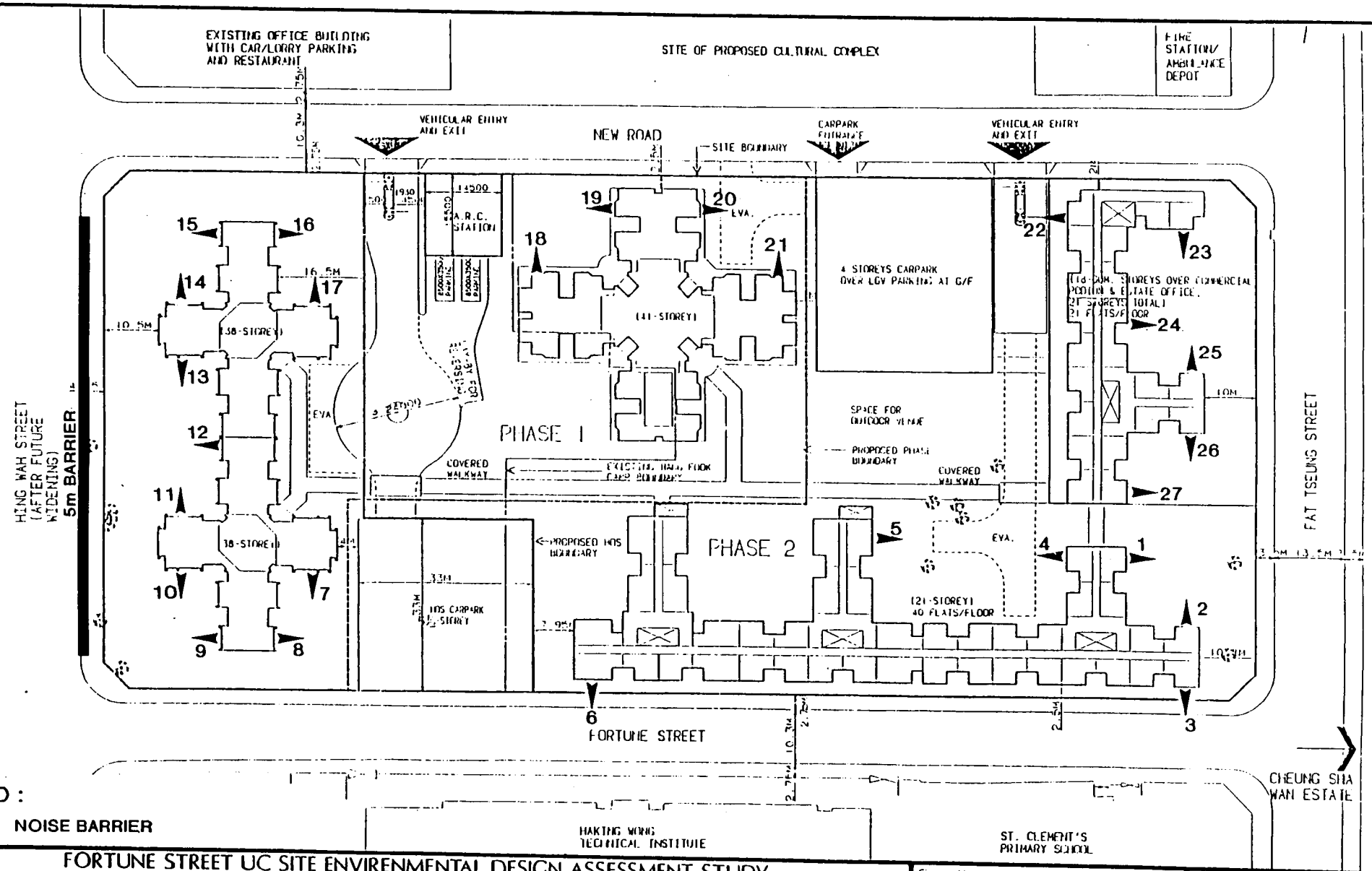
FORTUNE STREET UC SITE ENVICENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 5

Figure No.	Scale	Date
12		AUG. 1996

MVA ASIA Limited

10071-4/DFR/F12 M/ECC/15-11-96



LEGEND :

NOISE BARRIER

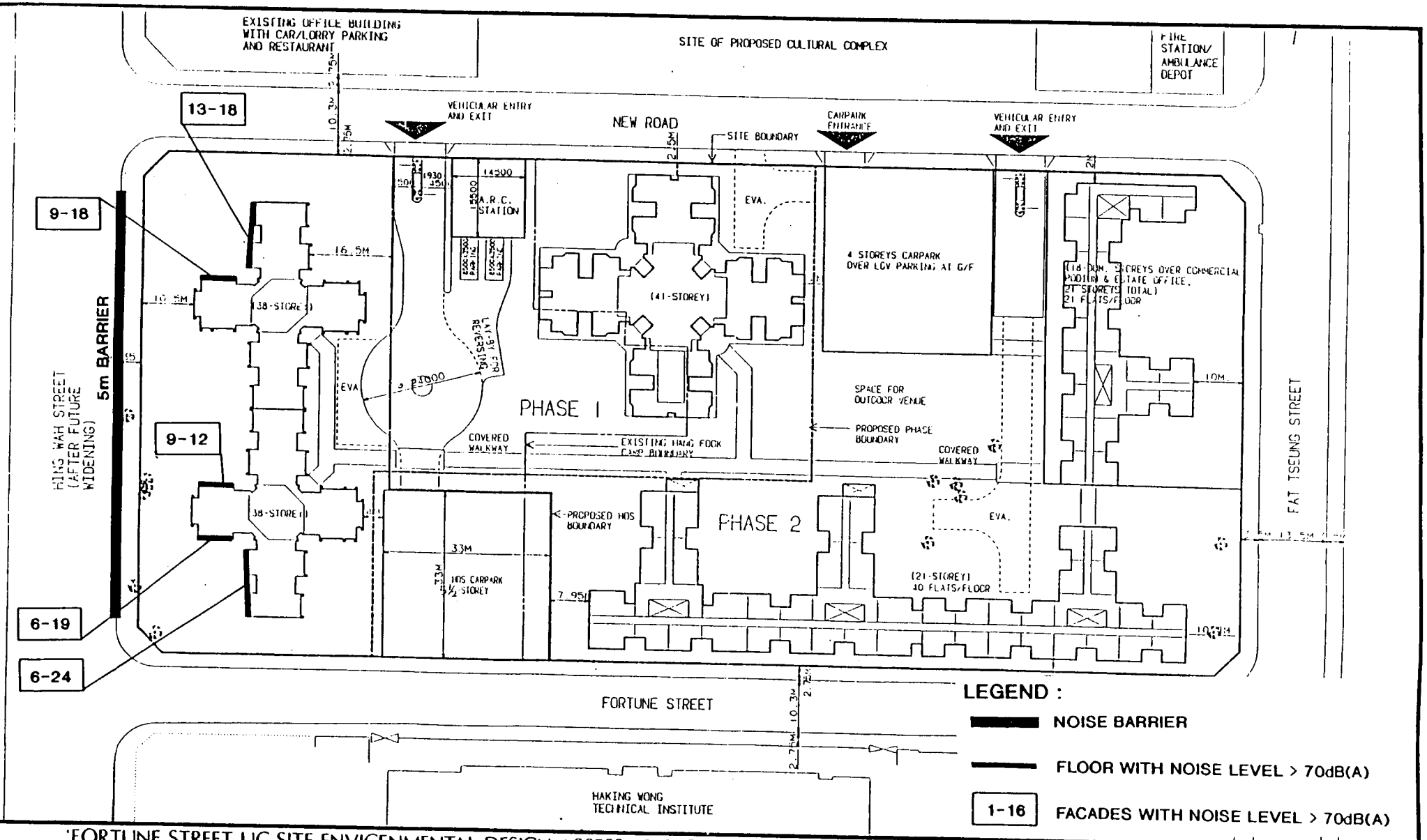
FORTUNE STREET UC SITE ENVIRENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 6

Figure No.	Scale	Date
13		AUG. 1996

MVA ASIA Limited

10071-4/DFR/F13 M/ECC/15-11-96



'FORTUNE STREET UC SITE ENVICENMENTAL DESIGN ASSESSMENT STUDY

MITIGATION 6

Figure No **14**

Scale

Date AUG. 1996

MVA ASIA Limited

10071-4/DFR/F14 M/ECC/15-11-96