ANNEX C

NOISE IMPACT ASSESSMENT

ANNEX C1

Details of Construction Noise Impact Assessment

Urgent By Fax Only

MEMO

From Project Manager (NTE)	To DEP
Ref. ( ) in NTE-ST 4/9/19 IX (TC)	(Attn.: Miss Jolitta Chan
Tel. No. 2301 1372	Your Ref. (24) in EP1/MOS/111-HR/7 IV
Fax No. 2721 8630	dated 8.1.2002 Fax. No. 2591 0558
Date 18 January 2002	Total Pages

'02 JAN 18 3:28

Agreement No. CE 16/99
Feasibility Study for Housing Development
at Whitehead & Lee On in Ma On Shan, Sha Tin
Environmental Impact Assessment (EIA)

I refer to your above reference letter addressed to BBV and copied to this office.

2. As regards para 5 (iii) (b) of your detailed comments on noise assessment, I consider that the proposed construction plant number/inventory as listed in Annex C1 of the EIA of the draft Final Report of the Study represent a realistic and practicable approach to meet the construction programme, though there may be variation in the actual construction stage.

(W H Kwan)
for Project Manager (NTE)

c.c. BBV (Attn: Mr C Y Hung) Fax No. 2601 3988
WHK/

CE 16/99 \ memo.DEP.18.1.02

ANNEX C1

General Site Formation Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Cut and Fill Operation						
Air compressor	001	3	100	105	120.0	120.0
Loader, tracked	081	2	112	115		
Lorry	141	2	112	115		
Excavator, tracked	081	2	112	115		
Generator, silenced, 75 dB(A) at 7m	102	2	100	103		
Water pump (electric)	281	5	88	95		
Removal of Materials						
Lorry	141	2	112	115	118.0	
Excavator, tracked	081	2	112	115		

Construction of Road (including upgrading / widening)

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Excavation						
Excavator, tracked	081	1	112	112	116.8	117.6
Lorry	141	2	112	115		
Provision of Drains and Sewers						
Crane, mobile	048	1	112	112	116.8	
Lorry	141	2	112	115		
Laying Base and Sub-base						
Lorry	141	2	112	115	117.6	
Excavator, tracked	081	1	112	112		
Road roller	185	1	108	108		
Compactor, vibratory	050	1	105	105		
Concreting Works						
Concrete lorry mixer	044	1	109	109	116.9	
Poker, vibratory, hand-held	170	2	113	116		
Generator, silenced, 75 dB(A) at 7m	102	1	100	100		
Resurfacing Works (for asphalt surface)						
Asphalt paver	004	1	109	109	117.2	
Lorry	141	2	112	115		
Road roller	185	2	108	111		

General Building Construction Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Formwork and Superstructure						
Bar bender and cutter	021	2	90	93	117.1	118.3
Crane, tower (electric)	049	4	95	101		
Generator, silenced	102	3	100	105		
Air compressor	001	3	100	105		
Lorry	141	2	112	115		
Saw, circular, wood	201	2	108	111		
Concreting Works						
Concrete lorry mixer	044	2	109	112	118.3	
Concrete pump	047	1	109	109		
Crane, tower (electric)	049	4	95	101		
Generator, silenced	102	3	100	105		
Poker, vibratory, hand-held	170	2	113	116		

Note:
SWL = Sound Power Level of a Powered Mechanical Equipment (PME).

General Site Formation Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Cut and Fill Operation						
Air compressor	BS5228 C.7-25	3	98	103	113.4	113.4
Loader, wheeled	BS5228 C.3-61	2	104	107		
Lorry	BS5228 C.9-27	2	105	108		
Excavator, tracked	BS5228 C.3-97	2	105	108		
Generator, silenced, 75 dB(A) at 7m	102	2	100	103		
Water pump (electric)	281	5	88	95		
Removal of Materials						
Lorry	BS5228 C.9-27	2	105	108	111.0	
Excavator, tracked	BS5228 C.3-97	2	105	108		

Construction of Road (including upgrading / widening)

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Excavation						
Excavator, tracked	BS5228 C.3-97	1	105	105	109.8	111.5
Lorry	BS5228 C.9-27	2	105	108		
Provision of Drains and Sewers						
Crane, mobile	BS5228 C.7-112	1	102	102	109.0	
Lorry	BS5228 C.9-27	2	105	108		
Laying Base and Sub-base						
Lorry	BS5228 C.9-27	2	105	108	111.5	
Excavator, tracked	BS5228 C.3-97	1	105	105		
Road roller	BS5228 C.8-29	1	105	105		
Compactor, vibratory (roller)	BS5228 C.3-115	1	102	102		
Concreting Works						
Concrete lorry mixer	044	1	109	109	110.4	
Poker, vibratory, hand-held	BS5228 C.6-32	2	100	103		
Generator, silenced, 75 dB(A) at 7m	102	1	100	100		
Resurfacing Works (for asphalt surface)						
Asphalt paver	BS5228 C.8-24	1	101	101	111.4	
Lorry	BS5228 C.9-27	2	105	108		
Road roller	BS5228 C.8-29	2	105	108		

General Building Construction Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Formwork and Superstructure						
Bar bender and cutter	021	2	90	93	113.1	114.2
Crane, tower (electric)	049	4	95	101		
Generator, silenced	102	3	100	105		
Air compressor	BS5228 C.7-25	3	98	103		
Lorry	BS5228 C.9-27	2	105	108		
Saw, circular, wood	BS5228 C.7-78	2	106	109		
Concreting Works						
Concrete lorry mixer	044	2	109	112	114.2	
Concrete pump	BS5228 C.6-36	1	106	106		
Crane, tower (electric)	049	4	95	101		
Generator, silenced	102	3	100	105		
Poker, vibratory, hand-held	BS5228 C.6-32	2	100	103		

Note:
SWL = Sound Power Level of a Powered Mechanical Equipment (PME).

General Site Formation Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Barrier correction, dB(A)	Corrected SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Cut and Fill Operation								
Air compressor	BS5228 C.7-25	3	98	-10	88	93	107.8	107.8
Loader, wheeled	BS5228 C.3-61	2	104	-5	99	102		
Lorry	BS5228 C.9-27	2	105	-5	100	103		
Excavator, tracked	BS5228 C.3-97	2	105	-5	100	103		
Generator, silenced, 75 dB(A) at 7m	102	2	100	-10	90	93		
Water pump (electric)	281	5	88	-10	78	85		
Removal of Materials								
Lorry	BS5228 C.9-27	2	105	-5	100	103	106.0	
Excavator, tracked	BS5228 C.3-97	2	105	-5	100	103		

Construction of Road (including upgrading / widening)

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Barrier correction, dB(A)	Corrected SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Excavation								
Excavator, tracked	BS5228 C.3-97	1	105	-5	100	100	104.8	106.5
Lorry	BS5228 C.9-27	2	105	-5	100	103		
Provision of Drains and Sewers								
Crane, mobile	BS5228 C.7-112	1	102	-5	97	97	104.0	
Lorry	BS5228 C.9-27	2	105	-5	100	103		
Laying Base and Sub-base								
Lorry	BS5228 C.9-27	2	105	-5	100	103	106.5	
Excavator, tracked	BS5228 C.3-97	1	105	-5	100	100		
Road roller	BS5228 C.8-29	1	105	-5	100	100		
Compactor, vibratory (roller)	BS5228 C.3-115	1	102	-5	97	97		
Concreting Works								
Concrete lorry mixer	044	1	109	-5	104	104	104.5	
Poker, vibratory, hand-held	BS5228 C.6-32	2	100	-10	90	93		
Generator, silenced, 75 dB(A) at 7m	102	1	100	-10	90	90		
Resurfacing Works (for asphalt surface)								
Asphalt paver	BS5228 C.8-24	1	101	-5	96	96	106.4	
Lorry	BS5228 C.9-27	2	105	-5	100	103		
Road roller	BS5228 C.8-29	2	105	-5	100	103		

General Building Construction Works

Equipment	Reference CNP Code	Number of Equipment	SWL, dB(A)	Barrier correction, dB(A)	Corrected SWL, dB(A)	Summation of SWL, dB(A)	Total SWL, dB(A)	Maximum Noise Level, dB(A)
Formwork and Superstructure								
Bar bender and cutter	021	2	90	-10	80	83	106.6	108.8
Crane, tower (electric)	049	4	95	0	95	101		
Generator, silenced	102	3	100	-10	90	95		
Air compressor	BS5228 C.7-25	3	98	-10	88	93		
Lorry	BS5228 C.9-27	2	105	-5	100	103		
Saw, circular, wood	BS5228 C.7-78	2	106	-10	96	99		
Concreting Works								
Concrete lorry mixer	044	2	109	-5	104	107	108.8	
Concrete pump, stationary	BS5228 C.6-36	1	106	-10	96	96		
Crane, tower (electric)	049	4	95	0	95	101		
Generator, silenced	102	3	100	-10	90	95		
Poker, vibratory, hand-held	BS5228 C.6-32	2	100	-5	95	98		

Note:
SWL = Sound Power Level of a Powered Mechanical Equipment (PME).

Calculation of Haul Road Traffic

trips/hr	NSR C1		NSR C2		NSR C3		NSR C4		NSR C5		NSR C6	
Q	*d*	*Leq*	*d*	*Leq*	*d*	*Leq*	*d*	*Leq*	*d*	*Leq*	*d*	*Leq*
24	80	*67.0*	90	*66.5*	110	*65.6*	260	*61.9*	270	*61.7*	240	*62.2*

Equation based on BS 5228

$L_{aeq} = L_{wa} - 33 + 10 \log Q - 10 \log V - 10 \log d$

where:

117	Lwa	sound power level of dump truck (117 dB(A))
30	V	average vehicle speed (30 km/hr)
	Q	number of vehicles per hour
	d	distance from receiver to centre of haul road (m)

Haul Road Traffic volume calculation

max 120 trucks per day

assuming 10 hrs per working day

24	truck trips per hour

Programme A (2002-2003)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	610	1.2	63.7	+ 3.0 dB(A)	57.6	73.7
Site Formation Works (LWS)	120.0	135	1.2	50.6	+ 3.0 dB(A)	72.4	
Site Formation Works (IRC)	120.0	790	1.2	66.0	+ 3.0 dB(A)	57.1	
Haul Road Traffic	-	80	-	-	+ 3.0 dB(A)	67.0	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	73.4
Site Formation Works (LWS)	120.0	150	1.2	51.5	+ 3.0 dB(A)	71.5	
Site Formation Works (IRC)	120.0	600	1.2	63.6	+ 3.0 dB(A)	59.5	
Haul Road Traffic	-	90	-	-	+ 3.0 dB(A)	66.5	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	330	1.2	58.4	+ 3.0 dB(A)	63.0	74.6
Site Formation Works (LWS)	120.0	210	1.2	54.4	+ 3.0 dB(A)	68.6	
Site Formation Works (IRC)	120.0	140	1.2	50.9	+ 3.0 dB(A)	72.1	
Haul Road Traffic	-	110	-	-	+ 3.0 dB(A)	65.6	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	440	1.2	60.9	+ 3.0 dB(A)	60.5	71.1
Site Formation Works (LWS)	120.0	370	1.2	59.4	+ 3.0 dB(A)	63.7	
Site Formation Works (IRC)	120.0	200	1.2	54.0	+ 3.0 dB(A)	69.0	
Haul Road Traffic	-	260	-	-	+ 3.0 dB(A)	61.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	400	1.2	60.0	+ 3.0 dB(A)	61.3	70.8
Site Formation Works (LWS)	120.0	395	1.2	59.9	+ 3.0 dB(A)	63.1	
Site Formation Works (IRC)	120.0	210	1.2	54.4	+ 3.0 dB(A)	68.6	
Haul Road Traffic	-	270	-	-	+ 3.0 dB(A)	61.7	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	80	1.2	46.1	+ 3.0 dB(A)	75.3	76.3
Site Formation Works (LWS)	120.0	300	1.2	57.5	+ 3.0 dB(A)	65.5	
Site Formation Works (IRC)	120.0	300	1.2	57.5	+ 3.0 dB(A)	65.5	
Haul Road Traffic	-	240	-	-	+ 3.0 dB(A)	62.2	

Programme B (2004)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	610	1.2	63.7	+ 3.0 dB(A)	57.6	79.6
Building Works (LWS)	118.3	135	1.2	50.6	+ 3.0 dB(A)	70.7	
Building Works (IRC)	118.3	790	1.2	66.0	+ 3.0 dB(A)	55.4	
Infrastructure Works (Road D1)	117.6	75	1.2	45.5	+ 3.0 dB(A)	75.1	
Infrastructure Works (local roads)	117.6	740	1.2	65.4	+ 3.0 dB(A)	55.2	
Building Works (pumping station)	118.3	145	1.2	51.2	+ 3.0 dB(A)	70.1	
Site Formation Works (whitehead)	120.0	100	1.2	48.0	+ 3.0 dB(A)	75.0	
Haul Road Traffic	-	80	-	-	+ 3.0 dB(A)	67.0	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)

Building Works (WKS)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	75.5
Building Works (LWS)	118.3	195	1.2	53.8	+ 3.0 dB(A)	67.5	
Building Works (IRC)	118.3	600	1.2	63.6	+ 3.0 dB(A)	57.8	
Infrastructure Works (Road D1)	117.6	95	1.2	47.6	+ 3.0 dB(A)	73.0	
Infrastructure Works (local roads)	117.6	545	1.2	62.7	+ 3.0 dB(A)	57.8	
Site Formation Works (whitehead)	120.0	400	1.2	60.0	+ 3.0 dB(A)	63.0	
Haul Road Traffic	-	90	-	-	+ 3.0 dB(A)	66.5	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	330	1.2	58.4	+ 3.0 dB(A)	63.0	76.6
Building Works (LWS)	118.3	210	1.2	54.4	+ 3.0 dB(A)	66.9	
Building Works (IRC)	118.3	140	1.2	50.9	+ 3.0 dB(A)	70.4	
Infrastructure Works (Road D1)	117.6	110	1.2	48.8	+ 3.0 dB(A)	71.7	
Infrastructure Works (local roads)	117.6	150	1.2	51.5	+ 3.0 dB(A)	69.0	
Site Formation Works (whitehead)	120.0	560	1.2	63.0	+ 3.0 dB(A)	60.1	
Haul Road Traffic	-	110	-	-	+ 3.0 dB(A)	65.6	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	440	1.2	60.9	+ 3.0 dB(A)	60.5	74.2
Building Works (LWS)	118.3	370	1.2	59.4	+ 3.0 dB(A)	62.0	
Building Works (IRC)	118.3	200	1.2	54.0	+ 3.0 dB(A)	67.3	
Infrastructure Works (Road D1)	117.6	115	1.2	49.2	+ 3.0 dB(A)	71.3	
Infrastructure Works (local roads)	117.6	255	1.2	56.1	+ 3.0 dB(A)	64.4	
Site Formation Works (whitehead)	120.0	740	1.2	65.4	+ 3.0 dB(A)	57.6	
Haul Road Traffic	-	260	-	-	+ 3.0 dB(A)	61.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	400	1.2	60.0	+ 3.0 dB(A)	61.3	72.8
Building Works (LWS)	118.3	395	1.2	59.9	+ 3.0 dB(A)	61.4	
Building Works (IRC)	118.3	210	1.2	54.4	+ 3.0 dB(A)	66.9	
Infrastructure Works (Road D1)	117.6	160	1.2	52.1	+ 3.0 dB(A)	68.5	
Infrastructure Works (local roads)	117.6	270	1.2	56.6	+ 3.0 dB(A)	63.9	
Site Formation Works (whitehead)	120.0	820	1.2	66.3	+ 3.0 dB(A)	56.7	
Haul Road Traffic	-	270	-	-	+ 3.0 dB(A)	61.7	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	80	1.2	46.1	+ 3.0 dB(A)	75.3	77.2
Building Works (LWS)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	
Building Works (IRC)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	
Infrastructure Works (Road D1)	117.6	320	1.2	58.1	+ 3.0 dB(A)	62.5	
Infrastructure Works (local roads)	117.6	130	1.2	50.3	+ 3.0 dB(A)	70.3	
Site Formation Works (whitehead)	120.0	740	1.2	65.4	+ 3.0 dB(A)	57.6	
Haul Road Traffic	-	240	-	-	+ 3.0 dB(A)	62.2	

Programme C (2005-2008)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	610	1.2	63.7	+ 3.0 dB(A)	57.6	81.7
Building Works (LWS)	118.3	135	1.2	50.6	+ 3.0 dB(A)	70.7	
Building Works (IRC)	118.3	790	1.2	66.0	+ 3.0 dB(A)	55.4	
Infrastructure Works (Road D1)	117.6	75	1.2	45.5	+ 3.0 dB(A)	75.1	
Infrastructure Works (local roads)	117.6	740	1.2	65.4	+ 3.0 dB(A)	55.2	
Building Works (pumping station)	118.3	145	1.2	51.2	+ 3.0 dB(A)	70.1	
Building Works (whitehead)	118.3	100	1.2	48.0	+ 3.0 dB(A)	73.3	
Infrastructure Works (whitehead local road)	117.6	50	1.2	42.0	+ 3.0 dB(A)	78.6	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	75.0
Building Works (LWS)	118.3	195	1.2	53.8	+ 3.0 dB(A)	67.5	
Building Works (IRC)	118.3	600	1.2	63.6	+ 3.0 dB(A)	57.8	
Infrastucture Works (Road D1)	117.6	95	1.2	47.6	+ 3.0 dB(A)	73.0	
Infrastucture Works (local roads)	117.6	545	1.2	62.7	+ 3.0 dB(A)	57.8	
Building Works (whitehead)	118.3	400	1.2	60.0	+ 3.0 dB(A)	61.3	
Infrastructure Works (whitehead local road)	117.6	380	1.2	59.6	+ 3.0 dB(A)	61.0	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	330	1.2	58.4	+ 3.0 dB(A)	63.0	76.3
Building Works (LWS)	118.3	210	1.2	54.4	+ 3.0 dB(A)	66.9	
Building Works (IRC)	118.3	140	1.2	50.9	+ 3.0 dB(A)	70.4	
Infrastucture Works (Road D1)	117.6	110	1.2	48.8	+ 3.0 dB(A)	71.7	
Infrastucture Works (local roads)	117.6	150	1.2	51.5	+ 3.0 dB(A)	69.0	
Building Works (whitehead)	118.3	560	1.2	63.0	+ 3.0 dB(A)	58.4	
Infrastructure Works (whitehead local road)	117.6	490	1.2	61.8	+ 3.0 dB(A)	58.8	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	440	1.2	60.9	+ 3.0 dB(A)	60.5	74.0
Building Works (LWS)	118.3	370	1.2	59.4	+ 3.0 dB(A)	62.0	
Building Works (IRC)	118.3	200	1.2	54.0	+ 3.0 dB(A)	67.3	
Infrastucture Works (Road D1)	117.6	115	1.2	49.2	+ 3.0 dB(A)	71.3	
Infrastucture Works (local roads)	117.6	255	1.2	56.1	+ 3.0 dB(A)	64.4	
Building Works (whitehead)	118.3	740	1.2	65.4	+ 3.0 dB(A)	55.9	
Infrastructure Works (whitehead local road)	117.6	680	1.2	64.7	+ 3.0 dB(A)	55.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	400	1.2	60.0	+ 3.0 dB(A)	61.3	72.5
Building Works (LWS)	118.3	395	1.2	59.9	+ 3.0 dB(A)	61.4	
Building Works (IRC)	118.3	210	1.2	54.4	+ 3.0 dB(A)	66.9	
Infrastucture Works (Road D1)	117.6	160	1.2	52.1	+ 3.0 dB(A)	68.5	
Infrastucture Works (local roads)	117.6	270	1.2	56.6	+ 3.0 dB(A)	63.9	
Building Works (whitehead)	118.3	820	1.2	66.3	+ 3.0 dB(A)	55.0	
Infrastructure Works (whitehead local road)	117.6	770	1.2	65.7	+ 3.0 dB(A)	54.8	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	118.3	80	1.2	46.1	+ 3.0 dB(A)	75.3	77.1
Building Works (LWS)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	
Building Works (IRC)	118.3	300	1.2	57.5	+ 3.0 dB(A)	63.8	
Infrastucture Works (Road D1)	117.6	320	1.2	58.1	+ 3.0 dB(A)	62.5	
Infrastucture Works (local roads)	117.6	130	1.2	50.3	+ 3.0 dB(A)	70.3	
Building Works (whitehead)	118.3	740	1.2	65.4	+ 3.0 dB(A)	55.9	
Infrastructure Works (whitehead local road)	117.6	700	1.2	64.9	+ 3.0 dB(A)	55.7	

NSR C7

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (LWS)	118.3	180	1.2	53.1	+ 3.0 dB(A)	68.2	76.6
Building Works (IRC)	118.3	200	1.2	54.0	+ 3.0 dB(A)	67.3	
Infrastucture Works (Road D1)	117.6	200	1.2	54.0	+ 3.0 dB(A)	66.5	
Infrastucture Works (local roads)	117.6	80	1.2	46.1	+ 3.0 dB(A)	74.5	
Building Works (whitehead)	118.3	630	1.2	64.0	+ 3.0 dB(A)	57.3	
Infrastructure Works (whitehead local road)	117.6	590	1.2	63.4	+ 3.0 dB(A)	57.1	

TMEIA Daytime Construction Noise Standards : residential 75 dB(A), educational institution 70 dB(A) (65 dB(A) during examinations)

Programme A (2002-2003)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	610	1.2	63.7	+ 3.0 dB(A)	53.5	69.6
Site Formation Works (LWS)	113.4	135	1.2	50.6	+ 3.0 dB(A)	65.8	
Site Formation Works (IRC)	113.4	790	1.2	66.0	+ 3.0 dB(A)	50.4	
Haul Road Traffic	-	80	-	-	+ 3.0 dB(A)	67.0	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	69.4
Site Formation Works (LWS)	113.4	150	1.2	51.5	+ 3.0 dB(A)	64.9	
Site Formation Works (IRC)	113.4	600	1.2	63.6	+ 3.0 dB(A)	52.8	
Haul Road Traffic	-	90	-	-	+ 3.0 dB(A)	66.5	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	330	1.2	58.4	+ 3.0 dB(A)	58.8	69.8
Site Formation Works (LWS)	113.4	210	1.2	54.4	+ 3.0 dB(A)	62.0	
Site Formation Works (IRC)	113.4	140	1.2	50.9	+ 3.0 dB(A)	65.5	
Haul Road Traffic	-	110	-	-	+ 3.0 dB(A)	65.6	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	440	1.2	60.9	+ 3.0 dB(A)	56.3	66.2
Site Formation Works (LWS)	113.4	370	1.2	59.4	+ 3.0 dB(A)	57.0	
Site Formation Works (IRC)	113.4	200	1.2	54.0	+ 3.0 dB(A)	62.4	
Haul Road Traffic	-	260	-	-	+ 3.0 dB(A)	61.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	400	1.2	60.0	+ 3.0 dB(A)	57.1	66.0
Site Formation Works (LWS)	113.4	395	1.2	59.9	+ 3.0 dB(A)	56.5	
Site Formation Works (IRC)	113.4	210	1.2	54.4	+ 3.0 dB(A)	62.0	
Haul Road Traffic	-	270	-	-	+ 3.0 dB(A)	61.7	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	80	1.2	46.1	+ 3.0 dB(A)	71.1	72.1
Site Formation Works (LWS)	113.4	300	1.2	57.5	+ 3.0 dB(A)	58.9	
Site Formation Works (IRC)	113.4	300	1.2	57.5	+ 3.0 dB(A)	58.9	
Haul Road Traffic	-	240	-	-	+ 3.0 dB(A)	62.2	

Programme B (2004)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	610	1.2	63.7	+ 3.0 dB(A)	53.5	74.6
Building Works (LWS)	114.2	135	1.2	50.6	+ 3.0 dB(A)	66.6	
Building Works (IRC)	114.2	790	1.2	66.0	+ 3.0 dB(A)	51.2	
Infrasturcture Works (Road D1)	111.5	75	1.2	45.5	+ 3.0 dB(A)	69.0	
Infrasturcture Works (local roads)	111.5	740	1.2	65.4	+ 3.0 dB(A)	49.1	
Building Works (pumping station)	114.2	145	1.2	51.2	+ 3.0 dB(A)	65.9	
Site Formation Works (whitehead)	113.4	100	1.2	48.0	+ 3.0 dB(A)	68.4	
Haul Road Traffic	-	80	-	-	+ 3.0 dB(A)	67.0	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)

Building Works (WKS)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	71.3
Building Works (LWS)	114.2	195	1.2	53.8	+ 3.0 dB(A)	63.4	
Building Works (IRC)	114.2	600	1.2	63.6	+ 3.0 dB(A)	53.6	
Infrasturcture Works (Road D1)	111.5	95	1.2	47.6	+ 3.0 dB(A)	67.0	
Infrasturcture Works (local roads)	111.5	545	1.2	62.7	+ 3.0 dB(A)	51.8	
Site Formation Works (whitehead)	113.4	400	1.2	60.0	+ 3.0 dB(A)	56.4	
Haul Road Traffic	-	90	-	-	+ 3.0 dB(A)	66.5	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	330	1.2	58.4	+ 3.0 dB(A)	58.8	72.2
Building Works (LWS)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Building Works (IRC)	114.2	140	1.2	50.9	+ 3.0 dB(A)	66.2	
Infrasturcture Works (Road D1)	111.5	110	1.2	48.8	+ 3.0 dB(A)	65.7	
Infrasturcture Works (local roads)	111.5	150	1.2	51.5	+ 3.0 dB(A)	63.0	
Site Formation Works (whitehead)	113.4	560	1.2	63.0	+ 3.0 dB(A)	53.4	
Haul Road Traffic	-	110	-	-	+ 3.0 dB(A)	65.6	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	440	1.2	60.9	+ 3.0 dB(A)	56.3	69.5
Building Works (LWS)	114.2	370	1.2	59.4	+ 3.0 dB(A)	57.8	
Building Works (IRC)	114.2	200	1.2	54.0	+ 3.0 dB(A)	63.2	
Infrasturcture Works (Road D1)	111.5	115	1.2	49.2	+ 3.0 dB(A)	65.3	
Infrasturcture Works (local roads)	111.5	255	1.2	56.1	+ 3.0 dB(A)	58.4	
Site Formation Works (whitehead)	113.4	740	1.2	65.4	+ 3.0 dB(A)	51.0	
Haul Road Traffic	-	260	-	-	+ 3.0 dB(A)	61.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	400	1.2	60.0	+ 3.0 dB(A)	57.1	68.4
Building Works (LWS)	114.2	395	1.2	59.9	+ 3.0 dB(A)	57.2	
Building Works (IRC)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Infrasturcture Works (Road D1)	111.5	160	1.2	52.1	+ 3.0 dB(A)	62.5	
Infrasturcture Works (local roads)	111.5	270	1.2	56.6	+ 3.0 dB(A)	57.9	
Site Formation Works (whitehead)	113.4	820	1.2	66.3	+ 3.0 dB(A)	50.1	
Haul Road Traffic	-	270	-	-	+ 3.0 dB(A)	61.7	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	80	1.2	46.1	+ 3.0 dB(A)	71.1	72.9
Building Works (LWS)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	
Building Works (IRC)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	
Infrasturcture Works (Road D1)	111.5	320	1.2	58.1	+ 3.0 dB(A)	56.4	
Infrasturcture Works (local roads)	111.5	130	1.2	50.3	+ 3.0 dB(A)	64.3	
Site Formation Works (whitehead)	113.4	740	1.2	65.4	+ 3.0 dB(A)	51.0	
Haul Road Traffic	-	240	-	-	+ 3.0 dB(A)	62.2	

Programme C (2005-2008)

NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	610	1.2	63.7	+ 3.0 dB(A)	53.5	76.4
Building Works (LWS)	114.2	135	1.2	50.6	+ 3.0 dB(A)	66.6	
Building Works (IRC)	114.2	790	1.2	66.0	+ 3.0 dB(A)	51.2	
Infrasturcture Works (Road D1)	111.5	75	1.2	45.5	+ 3.0 dB(A)	69.0	
Infrasturcture Works (local roads)	111.5	740	1.2	65.4	+ 3.0 dB(A)	49.1	
Building Works (pumping station)	114.2	145	1.2	51.2	+ 3.0 dB(A)	65.9	
Building Works (whitehead)	114.2	100	1.2	48.0	+ 3.0 dB(A)	69.2	
Infrastructure Works (whitehead local road)	111.5	50	1.2	42.0	+ 3.0 dB(A)	72.6	

NSR C2

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	69.7
Building Works (LWS)	114.2	195	1.2	53.8	+ 3.0 dB(A)	63.4	
Building Works (IRC)	114.2	600	1.2	63.6	+ 3.0 dB(A)	53.6	
Infrasturcture Works (Road D1)	111.5	95	1.2	47.6	+ 3.0 dB(A)	67.0	
Infrasturcture Works (local roads)	111.5	545	1.2	62.7	+ 3.0 dB(A)	51.8	
Building Works (whitehead)	114.2	400	1.2	60.0	+ 3.0 dB(A)	57.1	
Infrastructure Works (whitehead local road)	111.5	380	1.2	59.6	+ 3.0 dB(A)	54.9	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	330	1.2	58.4	+ 3.0 dB(A)	58.8	71.1
Building Works (LWS)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Building Works (IRC)	114.2	140	1.2	50.9	+ 3.0 dB(A)	66.2	
Infrasturcture Works (Road D1)	111.5	110	1.2	48.8	+ 3.0 dB(A)	65.7	
Infrasturcture Works (local roads)	111.5	150	1.2	51.5	+ 3.0 dB(A)	63.0	
Building Works (whitehead)	114.2	560	1.2	63.0	+ 3.0 dB(A)	54.2	
Infrastructure Works (whitehead local road)	111.5	490	1.2	61.8	+ 3.0 dB(A)	52.7	

NSR C4

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	440	1.2	60.9	+ 3.0 dB(A)	56.3	68.7
Building Works (LWS)	114.2	370	1.2	59.4	+ 3.0 dB(A)	57.8	
Building Works (IRC)	114.2	200	1.2	54.0	+ 3.0 dB(A)	63.2	
Infrasturcture Works (Road D1)	111.5	115	1.2	49.2	+ 3.0 dB(A)	65.3	
Infrasturcture Works (local roads)	111.5	255	1.2	56.1	+ 3.0 dB(A)	58.4	
Building Works (whitehead)	114.2	740	1.2	65.4	+ 3.0 dB(A)	51.8	
Infrastructure Works (whitehead local road)	111.5	680	1.2	64.7	+ 3.0 dB(A)	49.9	

NSR C5

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	400	1.2	60.0	+ 3.0 dB(A)	57.1	67.4
Building Works (LWS)	114.2	395	1.2	59.9	+ 3.0 dB(A)	57.2	
Building Works (IRC)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Infrasturcture Works (Road D1)	111.5	160	1.2	52.1	+ 3.0 dB(A)	62.5	
Infrasturcture Works (local roads)	111.5	270	1.2	56.6	+ 3.0 dB(A)	57.9	
Building Works (whitehead)	114.2	820	1.2	66.3	+ 3.0 dB(A)	50.9	
Infrastructure Works (whitehead local road)	111.5	770	1.2	65.7	+ 3.0 dB(A)	48.8	

NSR C6

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	80	1.2	46.1	+ 3.0 dB(A)	71.1	72.6
Building Works (LWS)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	
Building Works (IRC)	114.2	300	1.2	57.5	+ 3.0 dB(A)	59.6	
Infrasturcture Works (Road D1)	111.5	320	1.2	58.1	+ 3.0 dB(A)	56.4	
Infrasturcture Works (local roads)	111.5	130	1.2	50.3	+ 3.0 dB(A)	64.3	
Building Works (whitehead)	114.2	740	1.2	65.4	+ 3.0 dB(A)	51.8	
Infrastructure Works (whitehead local road)	111.5	700	1.2	64.9	+ 3.0 dB(A)	49.6	

NSR C7

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (LWS)	114.2	180	1.2	53.1	+ 3.0 dB(A)	64.1	71.2
Building Works (IRC)	114.2	200	1.2	54.0	+ 3.0 dB(A)	63.2	
Infrasturcture Works (Road D1)	111.5	200	1.2	54.0	+ 3.0 dB(A)	60.5	
Infrasturcture Works (local roads)	111.5	80	1.2	46.1	+ 3.0 dB(A)	68.5	
Building Works (whitehead)	114.2	630	1.2	64.0	+ 3.0 dB(A)	53.2	
Infrastructure Works (whitehead local road)	111.5	590	1.2	63.4	+ 3.0 dB(A)	51.1	

TMEIA Daytime Construction Noise Standards : residential 75 dB(A), educational institution 70 dB(A) (65 dB(A) during examinations)

Programme B (2004)

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	330	1.2	58.4	+ 3.0 dB(A)	58.8	70.0
Building Works (LWS)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Building Works (IRC)	114.2	140	1.2	50.9	+ 3.0 dB(A)	66.2	
Infrasturcture Works (Road D1)	*106.5*	110	1.2	48.8	+ 3.0 dB(A)	*60.7*	
Infrasturcture Works (local roads)	*106.5*	150	1.2	51.5	+ 3.0 dB(A)	*58.0*	
Site Formation Works (whitehead)	113.4	560	1.2	63.0	+ 3.0 dB(A)	53.4	
Haul Road Traffic	-	110	-	-	+ 3.0 dB(A)	*60.6*	

Programme C (2005-2008)

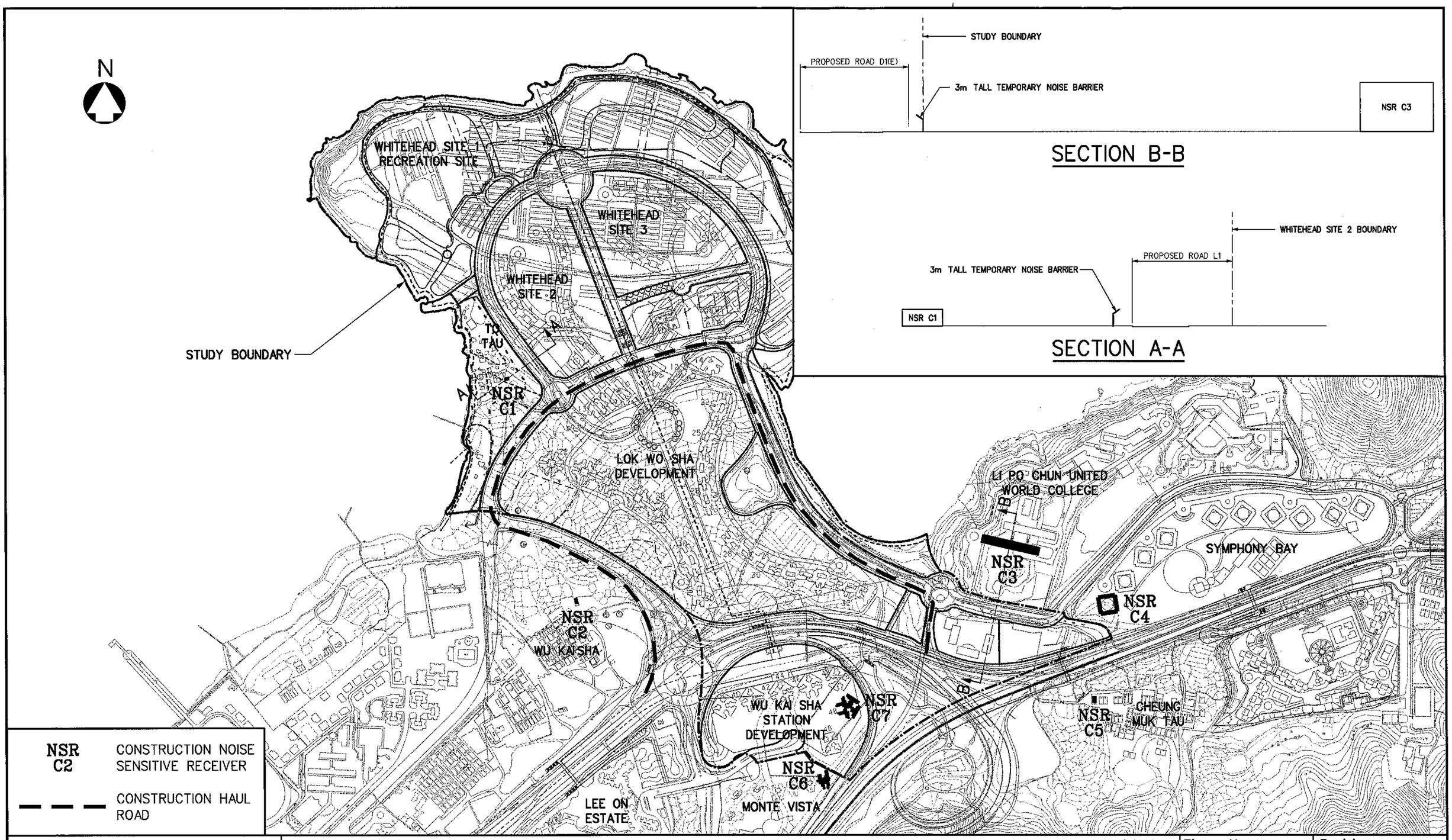
NSR C1

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	610	1.2	63.7	+ 3.0 dB(A)	53.5	74.0
Building Works (LWS)	114.2	135	1.2	50.6	+ 3.0 dB(A)	66.6	
Building Works (IRC)	114.2	790	1.2	66.0	+ 3.0 dB(A)	51.2	
Infrasturcture Works (Road D1)	*106.5*	75	1.2	45.5	+ 3.0 dB(A)	*64.0*	
Infrasturcture Works (local roads)	111.5	740	1.2	65.4	+ 3.0 dB(A)	49.1	
Building Works (pumping station)	114.2	145	1.2	51.2	+ 3.0 dB(A)	65.9	
Building Works (whitehead)	114.2	100	1.2	48.0	+ 3.0 dB(A)	69.2	
Infrastructure Works (whitehead local road)	*106.5*	50	1.2	42.0	+ 3.0 dB(A)	*67.6*	

NSR C3 (school)

Construction Activities	Total SWL dB(A)	Horizontal Distance (m)	Vertical Distance (m)	Distance Correction dB(A)	Facade Correction dB(A)	Predicted Noise Level dB(A)	Total Maximum Noise Level dB(A)
Building Works (WKS)	114.2	330	1.2	58.4	+ 3.0 dB(A)	58.8	70.2
Building Works (LWS)	114.2	210	1.2	54.4	+ 3.0 dB(A)	62.7	
Building Works (IRC)	114.2	140	1.2	50.9	+ 3.0 dB(A)	66.2	
Infrasturcture Works (Road D1)	*106.5*	110	1.2	48.8	+ 3.0 dB(A)	*60.7*	
Infrasturcture Works (local roads)	111.5	150	1.2	51.5	+ 3.0 dB(A)	63.0	
Building Works (whitehead)	114.2	560	1.2	63.0	+ 3.0 dB(A)	54.2	
Infrastructure Works (whitehead local road)	111.5	490	1.2	61.8	+ 3.0 dB(A)	52.7	

TMEIA Daytime Construction Noise Standards : residential 75 dB(A), educational institution 70 dB(A) (65 dB(A) during examinations)
italics denotes temporary noise barrier applied in addition to use of quiet plant, other works using quiet plant only



NSR C2 — CONSTRUCTION NOISE SENSITIVE RECEIVER

— — — CONSTRUCTION HAUL ROAD

AGREEMENT NO. CE 16/99
FEASIBILITY STUDY FOR HOUSING DEVELOPMENT AT WHITEHEAD AND LEE ON IN MA ON SHAN, SHATIN

Binnie Black & Veatch Hong Kong Limited
博威工程顧問有限公司
Engineers and Scientists

Title :

CROSS SECTION VIEW OF CONSTRUCTION SITE AND PROPOSED NOISE BARRIER FOR C1 AND C3

Figure No.	Revision
C1	0
Reference	File Name
-	3820950206-100.DGN
Prepared	Checked
MC	YWL
Date	Scale
SEP. 2002	N.T.S.

ANNEX C2

Details of Traffic Noise Impact Assessment

Urgent by Fax (2721 8630)

684543

MEMO

BINNIE

From: Traffic Engineering (NTE) Division, Transport Department

To: Project Manager (NTE), TDD (Attn: Mr. W H Kwan)

Ref. ( ) *in* NR / 171/200/100

02 MAY 29 18 :07

Tel. No. 2399 2408 *Fax No.* 2381 3799

Your Ref.

Date: 28 May 2002

Dated:

CYH

SL

Agreement No. CE 16/99
Feasibility Study for Housing Development
at Whitehead and Lee On in Ma On Shan, Sha Tin
Draft Final Report – Forecast of Traffic Flows

I refer to the captioned submission from your Consultant (their ref. CYH/2095/604 dated 16.5.2002). I have no further comment on the traffic forecast.

(W. H. CHAN)
for Assistant Commissioner
for Transport/NT

c.c.

DEP	(Attn: Mr. Vincent Lau)	Fax. 2591 0558
Binnie	(Attn: Mr. C Y Hung)	Fax. 2601 3988

ANNEX C2

TOTAL P.01

Table C2.1 Traffic Flow of the Roads within the Study Area at Year 2023

Link Ref.	Total No. of Vehicles (veh./hr.)	Vehicle Mix							
		Car	Taxi	LGV	Bus	Private Bus	PLB	MGV	HGV
A	220	100	30	20	20	10	20	10	10
B	140	70	20	20	0	10	0	10	10
C	460	280	60	50	20	10	10	10	20
D	390	230	50	40	20	10	10	10	20
E	1010	700	110	80	0	30	0	50	40
F	160	110	20	10	0	10	0	0	10
G	190	120	20	10	20	10	0	0	10
H	450	250	60	40	30	10	30	10	20
I	60	40	10	10	0	0	0	0	0
J E/b	1020	560	140	90	80	40	40	20	50
J W/b	930	520	130	80	80	30	30	20	40
K	1290	730	140	100	150	30	50	30	60
L E/b	1520	970	220	140	40	40	20	30	60
L W/b	1250	790	170	120	40	30	20	30	50
M	710	460	100	60	20	20	10	10	30
N	520	340	60	50	20	10	10	10	20
P	360	230	30	20	0	20	0	40	20
Q	590	430	70	50	0	10	0	10	20
R E/b	1300	880	150	140	0	40	0	30	60
R W/b	2720	1810	310	290	20	80	10	70	130
S N/b	730	450	110	70	20	20	10	20	30
S S/b	810	510	120	80	20	20	10	20	30
T E/b	2180	1450	240	210	20	70	10	80	100
T W/b	3430	2340	390	350	20	90	10	80	150

Table C2.1 Traffic Flow of the Roads within the Study Area at Year 2003

Link Ref.	Total No. of Vehicles (veh./hr.)	Vehicle Mix							
		Car	Taxi	LGV	Bus	Private Bus	PLB	MGV	HGV
J	1610	890	220	140	130	60	60	40	70
K	450	250	50	40	50	10	20	10	20
L	1320	840	170	130	30	40	20	30	60

Road I.D. for Table C2.1

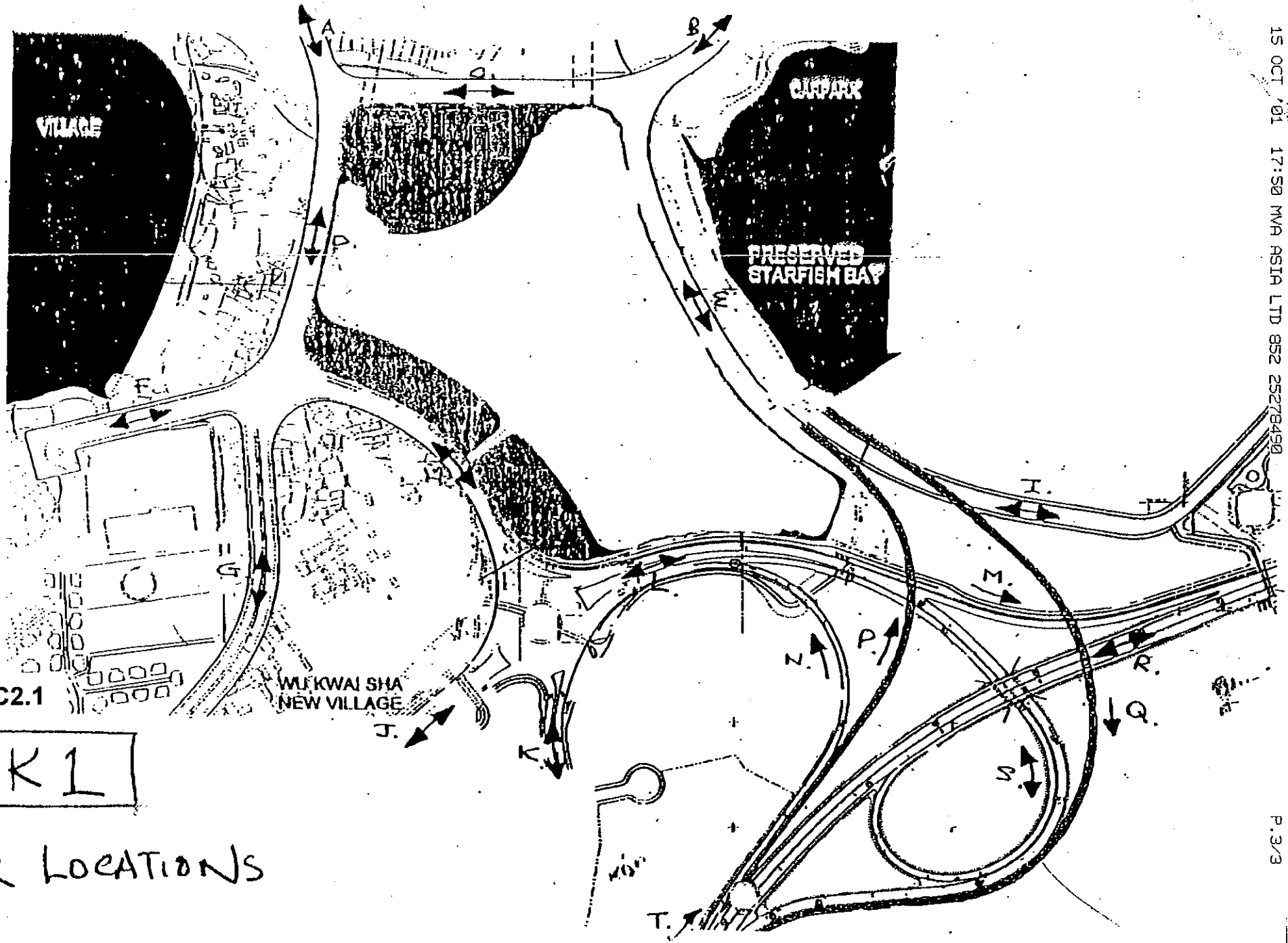
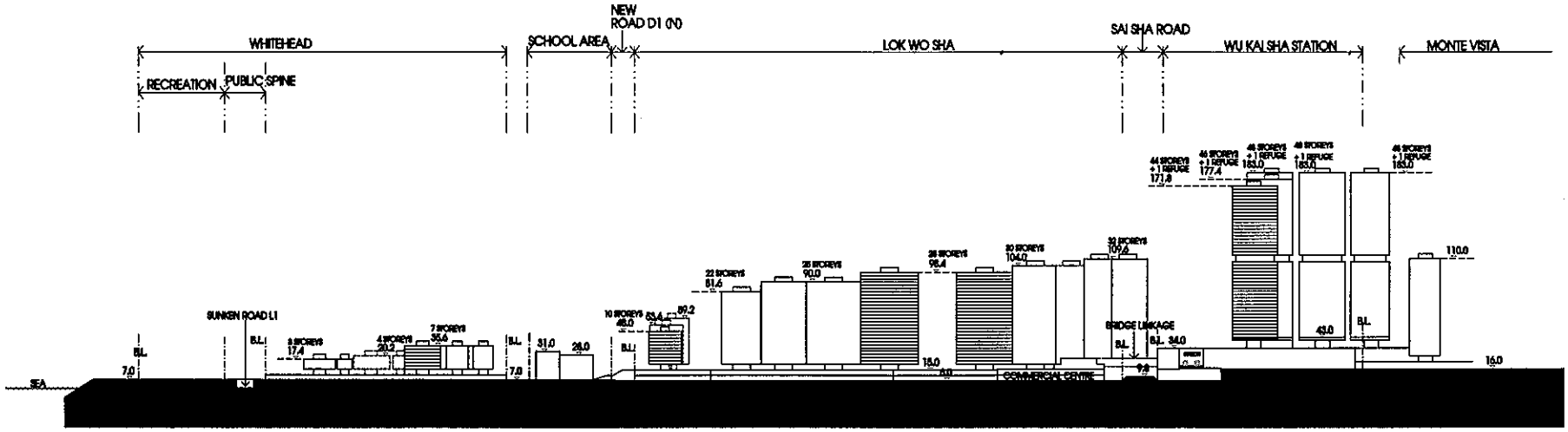


FIGURE C2.1

SK1

LINK LOCATIONS



SECTION A-A

SITE SECTION A-A

Ronald Lu & Partners (HK) Ltd.
Architects • Planners • Interior Designers
呂元祥建築師事務所(香港)有限公司

FEASIBILITY STUDY FOR HOUSING DEVELOPMENT
AT WHITEHEAD AND LEE ON IN MA ON SHAN, SHA TIN

Figure C2.2

JOB NO.: 9905SNT
CAD REF: PRESENTN\SECTION\09.261\SEC-A_A
DRG. NO.: A/302/102
DATE: 24 SEP 2002
APPR.: _____

Table C2.2
Predicted Traffic Noise Levels
of Representative NSRs at Year 2023

NSR ID	Status	Façade	Floor	Noise Criteria (NC) dB(A)	Unmitigated Predicted Noise Level dB(A)	Exceed NC?	Mitigated Predicted Noise Level dB(A)	Exceed NC?	Remarks
1	Existing	1	1	70	71	Exceed	71	Exceed	Eligibility Test
1	Existing	1	6	70	71	Exceed	71	Exceed	Eligibility Test
1	Existing	1	12	70	71	Exceed	71	Exceed	Eligibility Test
1	Existing	2	1	70	69	N/A	69	N/A	
1	Existing	2	6	70	70	N/A	70	N/A	
1	Existing	2	12	70	71	Exceed	71	Exceed	Eligibility Test
2	Existing	1	1	70	65	N/A	65	N/A	
2	Existing	1	3	70	67	N/A	67	N/A	
3	Existing	1	1	70	65	N/A	65	N/A	
3	Existing	1	3	70	68	N/A	68	N/A	
3	Existing	2	1	70	66	N/A	66	N/A	
3	Existing	2	3	70	68	N/A	68	N/A	
4	Existing	1	1	70	60	N/A	60	N/A	
4	Existing	1	4	70	65	N/A	65	N/A	
4	Existing	1	7	70	69	N/A	69	N/A	
4	Existing	2	1	70	58	N/A	58	N/A	
4	Existing	2	4	70	63	N/A	63	N/A	
4	Existing	2	7	70	66	N/A	66	N/A	
5 *	Existing	1	1	65	64	N/A	64	N/A	
5 *	Existing	1	3	65	65	N/A	65	N/A	
5 *	Existing	2	1	65	64	N/A	64	N/A	
5 *	Existing	2	3	65	65	N/A	65	N/A	
11	Existing	1	1	70	65	N/A	65	N/A	
11	Existing	1	5	70	66	N/A	66	N/A	
11	Existing	1	10	70	67	N/A	67	N/A	
11	Existing	1	20	70	68	N/A	68	N/A	
11	Existing	1	30	70	69	N/A	69	N/A	
11	Existing	1	37	70	69	N/A	69	N/A	
11	Existing	2	1	70	65	N/A	65	N/A	
11	Existing	2	5	70	66	N/A	66	N/A	
11	Existing	2	10	70	67	N/A	67	N/A	
11	Existing	2	20	70	69	N/A	69	N/A	
11	Existing	2	30	70	70	N/A	70	N/A	
11	Existing	2	37	70	69	N/A	69	N/A	
12	Existing	1	1	70	69	N/A	69	N/A	
12	Existing	1	5	70	68	N/A	68	N/A	
12	Existing	1	10	70	67	N/A	67	N/A	
12	Existing	1	20	70	66	N/A	66	N/A	
12	Existing	1	30	70	66	N/A	66	N/A	
12	Existing	1	37	70	66	N/A	66	N/A	
12	Existing	2	1	70	64	N/A	64	N/A	
12	Existing	2	5	70	64	N/A	64	N/A	
12	Existing	2	10	70	64	N/A	64	N/A	
12	Existing	2	20	70	64	N/A	64	N/A	
12	Existing	2	30	70	65	N/A	65	N/A	
12	Existing	2	37	70	65	N/A	65	N/A	
13	Existing	1	1	70	66	N/A	66	N/A	
13	Existing	1	3	70	68	N/A	68	N/A	
14	Existing	1	1	70	67	N/A	67	N/A	
14	Existing	1	3	70	66	N/A	66	N/A	
15	Existing	1	1	70	64	N/A	64	N/A	
15	Existing	1	3	70	65	N/A	65	N/A	
16	Existing	1	1	70	68	N/A	68	N/A	
16	Existing	1	3	70	67	N/A	67	N/A	
17	Existing	1	1	70	67	N/A	67	N/A	
17	Existing	1	3	70	67	N/A	67	N/A	
21	Existing	1	1	70	62	N/A	62	N/A	
22	Existing	1	1	70	64	N/A	64	N/A	
30	Existing	1	1	70	71	Exceed	71	Exceed	Eligibility Test
30	Existing	1	3	70	71	Exceed	71	Exceed	Eligibility Test
30	Existing	2	1	70	69	N/A	69	N/A	
30	Existing	2	3	70	69	N/A	69	N/A	
31	Existing	1	1	70	58	N/A	58	N/A	
31	Existing	1	5	70	62	N/A	62	N/A	
31	Existing	1	10	70	64	N/A	64	N/A	
31	Existing	1	20	70	67	N/A	67	N/A	
31	Existing	1	30	70	68	N/A	68	N/A	
31	Existing	2	1	70	58	N/A	58	N/A	
31	Existing	2	5	70	59	N/A	59	N/A	
31	Existing	2	10	70	63	N/A	63	N/A	

Table C2.2
Predicted Traffic Noise Levels
of Representative NSRs at Year 2023

NSR ID	Status	Façade	Floor	Noise Criteria (NC) dB(A)	Unmitigated Predicted Noise Level dB(A)	Exceed NC?	Mitigated Predicted Noise Level dB(A)	Exceed NC?	Remarks
31	Existing	2	20	70	65	N/A	65	N/A	
31	Existing	2	30	70	67	N/A	67	N/A	
32	Existing	1	1	70	57	N/A	57	N/A	
32	Existing	1	5	70	60	N/A	60	N/A	
32	Existing	1	10	70	64	N/A	64	N/A	
32	Existing	1	20	70	69	N/A	69	N/A	
32	Existing	1	30	70	69	N/A	69	N/A	
32	Existing	2	1	70	61	N/A	61	N/A	
32	Existing	2	5	70	64	N/A	64	N/A	
32	Existing	2	10	70	67	N/A	67	N/A	
32	Existing	2	20	70	70	N/A	70	N/A	
32	Existing	2	30	70	69	N/A	69	N/A	
34	Existing	1	1	70	66	N/A	66	N/A	
6	Future	1	1	70	70	N/A	70	N/A	
6	Future	1	5	70	70	N/A	70	N/A	
6	Future	1	10	70	70	N/A	70	N/A	
6	Future	1	20	70	68	N/A	68	N/A	
6	Future	1	30	70	68	N/A	68	N/A	
6	Future	1	32	70	67	N/A	67	N/A	
6	Future	2	1	70	63	N/A	63	N/A	
6	Future	2	5	70	67	N/A	67	N/A	
6	Future	2	10	70	69	N/A	69	N/A	
6	Future	2	20	70	70	N/A	70	N/A	
6	Future	2	30	70	69	N/A	69	N/A	
6	Future	2	32	70	69	N/A	69	N/A	
7	Future	1	1	70	68	N/A	68	N/A	
7	Future	1	5	70	69	N/A	69	N/A	
7	Future	1	10	70	70	N/A	70	N/A	
7	Future	1	20	70	70	N/A	70	N/A	
7	Future	1	30	70	70	N/A	70	N/A	
7	Future	1	40	70	70	N/A	70	N/A	
7	Future	1	50	70	69	N/A	69	N/A	
7	Future	2	1	70	68	N/A	68	N/A	
7	Future	2	5	70	68	N/A	68	N/A	
7	Future	2	10	70	69	N/A	69	N/A	
7	Future	2	20	70	69	N/A	69	N/A	
7	Future	2	30	70	69	N/A	69	N/A	
7	Future	2	40	70	68	N/A	68	N/A	
7	Future	2	50	70	68	N/A	68	N/A	
8	Future	1	1	70	67	N/A	67	N/A	
8	Future	1	5	70	68	N/A	68	N/A	
8	Future	1	10	70	69	N/A	69	N/A	
8	Future	1	20	70	69	N/A	69	N/A	
8	Future	1	30	70	69	N/A	69	N/A	
8	Future	1	40	70	68	N/A	68	N/A	
8	Future	1	50	70	68	N/A	68	N/A	
8	Future	2	1	70	66	N/A	66	N/A	
8	Future	2	5	70	68	N/A	68	N/A	
8	Future	2	10	70	69	N/A	69	N/A	
8	Future	2	20	70	69	N/A	69	N/A	
8	Future	2	30	70	69	N/A	69	N/A	
8	Future	2	40	70	68	N/A	68	N/A	
8	Future	2	50	70	68	N/A	68	N/A	
9	Future	1	1	70	63	N/A	63	N/A	
9	Future	1	5	70	65	N/A	65	N/A	
9	Future	1	10	70	66	N/A	66	N/A	
9	Future	1	20	70	67	N/A	67	N/A	
9	Future	1	30	70	67	N/A	67	N/A	
9	Future	1	40	70	67	N/A	67	N/A	
9	Future	1	50	70	67	N/A	67	N/A	
9	Future	2	1	70	58	N/A	58	N/A	
9	Future	2	5	70	59	N/A	59	N/A	
9	Future	2	10	70	61	N/A	61	N/A	
9	Future	2	20	70	64	N/A	64	N/A	
9	Future	2	30	70	65	N/A	65	N/A	
9	Future	2	40	70	66	N/A	66	N/A	
9	Future	2	50	70	67	N/A	67	N/A	
10	Future	1	1	70	72	Exceed	72	Exceed	SD
10	Future	1	5	70	71	Exceed	71	Exceed	SD
10	Future	1	10	70	71	Exceed	71	Exceed	SD

Table C2.2
Predicted Traffic Noise Levels
of Representative NSRs at Year 2023

NSR ID	Status	Façade	Floor	Noise Criteria (NC) dB(A)	Unmitigated Predicted Noise Level dB(A)	Exceed NC?	Mitigated Predicted Noise Level dB(A)	Exceed NC?	Remarks
10	Future	1	20	70	70	N/A	70	N/A	
10	Future	1	30	70	70	N/A	70	N/A	
10	Future	1	40	70	69	N/A	69	N/A	
10	Future	1	42	70	69	N/A	69	N/A	
10	Future	2	1	70	71	Exceed	71	Exceed	SD
10	Future	2	5	70	72	Exceed	72	Exceed	SD
10	Future	2	10	70	72	Exceed	72	Exceed	SD
10	Future	2	20	70	70	N/A	70	N/A	
10	Future	2	30	70	69	N/A	69	N/A	
10	Future	2	40	70	69	N/A	69	N/A	
10	Future	2	42	70	68	N/A	68	N/A	
18	Future	1	1	70	69	N/A	69	N/A	
18	Future	1	5	70	68	N/A	68	N/A	
18	Future	1	10	70	68	N/A	68	N/A	
18	Future	1	20	70	67	N/A	67	N/A	
18	Future	1	30	70	66	N/A	66	N/A	
19	Future	1	1	70	64	N/A	64	N/A	
19	Future	1	5	70	64	N/A	64	N/A	
19	Future	1	10	70	64	N/A	64	N/A	
19	Future	1	20	70	64	N/A	64	N/A	
19	Future	1	22	70	64	N/A	64	N/A	
19	Future	2	1	70	60	N/A	60	N/A	
19	Future	2	5	70	63	N/A	63	N/A	
19	Future	2	10	70	64	N/A	64	N/A	
19	Future	2	20	70	64	N/A	64	N/A	
19	Future	2	22	70	63	N/A	63	N/A	
19	Future	3	1	70	58	N/A	58	N/A	
19	Future	3	5	70	61	N/A	61	N/A	
19	Future	3	10	70	62	N/A	62	N/A	
19	Future	3	20	70	63	N/A	63	N/A	
19	Future	3	22	70	62	N/A	62	N/A	
20	Future	1	1	70	62	N/A	62	N/A	
20	Future	1	5	70	65	N/A	65	N/A	
20	Future	1	10	70	65	N/A	65	N/A	
20	Future	1	13	70	65	N/A	65	N/A	
20	Future	2	1	70	67	N/A	67	N/A	
20	Future	2	5	70	66	N/A	66	N/A	
20	Future	2	10	70	65	N/A	65	N/A	
20	Future	2	13	70	65	N/A	65	N/A	
23	Future	1	1	70	64	N/A	64	N/A	
23	Future	1	4	70	65	N/A	65	N/A	
23	Future	1	7	70	65	N/A	65	N/A	
24	Future	1	1	70	67	N/A	67	N/A	
24	Future	1	4	70	66	N/A	66	N/A	
25 *	Future	1	1	65	64	N/A	64	N/A	
25 *	Future	1	3	65	64	N/A	64	N/A	
25 *	Future	2	1	65	63	N/A	63	N/A	
25 *	Future	2	3	65	64	N/A	64	N/A	
26 *	Future	1	1	65	67	Exceed	64	N/A	
26 *	Future	1	3	65	66	Exceed	65	N/A	3m Boundary Wall
26 *	Future	1	6	65	65	N/A	65	N/A	
26 *	Future	2	1	65	62	N/A	62	N/A	
26 *	Future	2	3	65	62	N/A	62	N/A	
26 *	Future	2	6	65	62	N/A	62	N/A	
26 *	Future	3	1	65	55	N/A	55	N/A	
26 *	Future	3	3	65	55	N/A	55	N/A	
26 *	Future	3	6	65	64	N/A	64	N/A	
27	Future	1	1	70	66	N/A	66	N/A	
27	Future	1	3	70	65	N/A	65	N/A	
27	Future	1	5	70	65	N/A	65	N/A	
28	Future	1	1	70	70	N/A	70	N/A	
28	Future	1	5	70	69	N/A	69	N/A	
28	Future	1	10	70	68	N/A	68	N/A	
28	Future	1	14	70	67	N/A	67	N/A	
28	Future	2	1	70	70	N/A	70	N/A	
28	Future	2	5	70	69	N/A	69	N/A	
28	Future	2	10	70	68	N/A	68	N/A	
28	Future	2	14	70	67	N/A	67	N/A	
28	Future	3	1	70	68	N/A	68	N/A	
28	Future	3	5	70	67	N/A	67	N/A	

Table C2.2
Predicted Traffic Noise Levels
of Representative NSRs at Year 2023

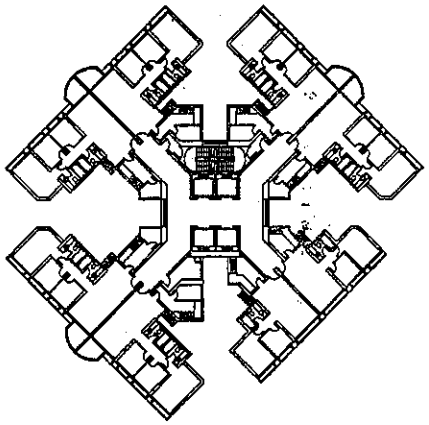
NSR ID	Status	Façade	Floor	Noise Criteria (NC) dB(A)	Unmitigated Predicted Noise Level dB(A)	Exceed NC?	Mitigated Predicted Noise Level dB(A)	Exceed NC?	Remarks
28	Future	3	10	70	66	N/A	66	N/A	
28	Future	3	14	70	65	N/A	65	N/A	
29	Future	1	1	70	70	N/A	70	N/A	
29	Future	1	5	70	70	N/A	70	N/A	
29	Future	1	10	70	69	N/A	69	N/A	
29	Future	1	20	70	67	N/A	67	N/A	
29	Future	1	22	70	67	N/A	67	N/A	
29	Future	2	1	70	69	N/A	69	N/A	
29	Future	2	5	70	68	N/A	68	N/A	
29	Future	2	10	70	67	N/A	67	N/A	
29	Future	2	20	70	65	N/A	65	N/A	
29	Future	2	22	70	65	N/A	65	N/A	

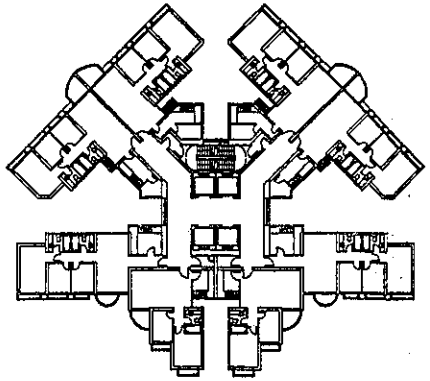
Note:
Noise Criteria (NC): 70 dB(A) for residential premises; and 65 dB(A) for educational institution.
N/A: Not Applicable.
SD: Specially design, for example window insulation and air-conditioning.
* : Educational institution

Table C2.3
Summary of Eligibility Test of Representative NSRs

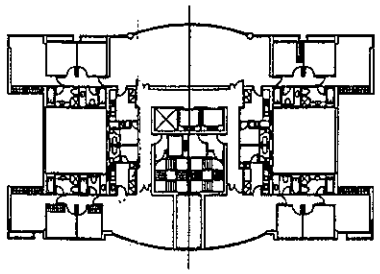
NSR ID	Façade	Floor	Noise Criteria dB(A) (NC)	Predicted Traffic Noise Level - dB(A)			Eligibility Test			
				at Year 2003 Existing Road (P)	at Year 2023 All Roads (T)	at Year 2023 Unaltered Road (UR)	T>NC	T-UR>1	T-P>1	Qualified for NIW
1	1	1	70	65.6	70.7	70.7	Yes	No	Yes	Not
1	1	6	70	66.0	71.0	71.0	Yes	No	Yes	Not
1	1	12	70	66.0	71.1	71.0	Yes	No	Yes	Not
1	2	12	70	66.3	71.1	71.1	Yes	No	Yes	Not
30	1	3	70	68.9	70.7	70.6	Yes	No	Yes	Not

Note:
Noise Criteria (NC): 70 dB(A) for residential premises; and 65 dB(A) for educational institution.
NIW: Noise Insulation Works: NIW can only be considered if all other possible direct mitigation have been considered.

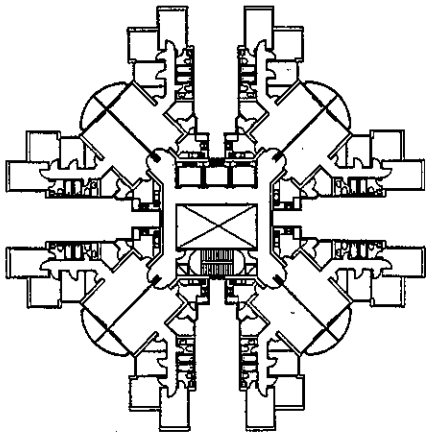


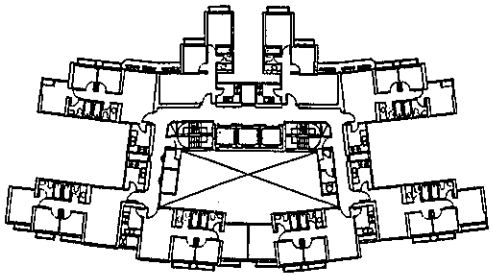


TYPICAL FLOOR PLAN FOR
WU KAI SHA STATION DEVELOPMENT

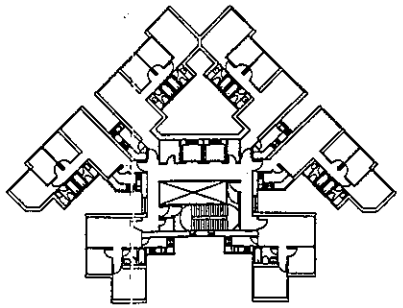


TYPICAL FLOOR PLAN FOR
WHITEHEAD SITE 2 & SITE 3





TYPICAL FLOOR PLAN FOR
LOK WO SHA DEVELOPMENT



TYPICAL FLOOR PLAN

Ronald Lu & Partners (HK) Ltd.
Architects • Planners • Interior Designers
呂元祥建築師事務所(香港)有限公司

FEASIBILITY STUDY FOR HOUSING DEVELOPMENT
AT WHITEHEAD AND LEE ON IN MA ON SHAN, SHA TIN

FIGURE C2.3

JOB NO.: 9905SNT
CAD REF: 02\12.12\TYPICAL\SEC-A_A
DRG. NO.: A/X02/102
DATE:13 DEC 2001
APPR.:

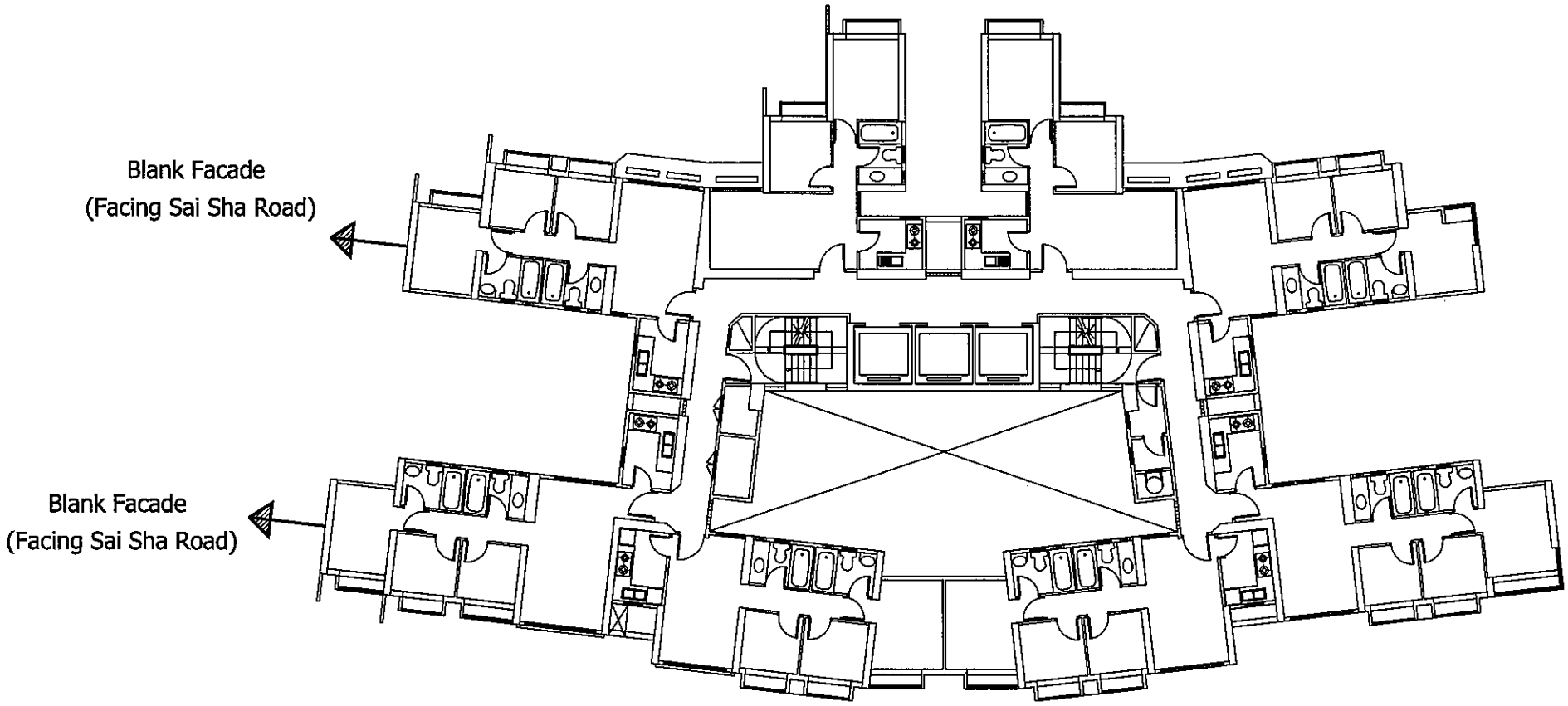


FIGURE C2.4

Typical Floor Plan for NSR 6 & 18
(Blank facade on Southern End)

Urgent By Fax Only

MEMO

From Project Manager (NTE)
Ref. (15) in NTE-ST 4/9/19 Pt. 11
Tel. No. 2301 1383
Fax No. 2721 8630
Date 14 May 2002

To DEP
(Attn.: Mr Vincent Lau
Your Ref. (24) in EP1/MOS/III-HR/7 (IV)
dated 8.2.2002 Fax. No. 2591 0558
Total Pages

Agreement No. CE 16/99
Feasibility Study for Housing Development
at Whitehead & Lee On in Ma On Shan, Sha Tin

681390

I refer to my Consultants Binnie Black & Veatch's letter dated 9 May 2002 to you enclosing their responses to your comments on the draft Final Report of the Study.

2. As regards your comment on the noise barriers/enclosures on Road T7 considered in the model of the Study, I wish to confirm that the noise barrier/enclosures on Road T7 as adopted in Binnie's noise model are the latest amended version of the noise mitigation measures for the Road T7 Project. Variation to the noise barriers/enclosures contained in the Environmental Permit issued in 2000 for the Road T7 Project to accord with the latest amendment will be submitted separately in due course.

(C W Kam)
for Project Manager (NTE)

MAY 14 14:29 20.

c.c. BBV (Attn: Mr C Y Hung) 2601 3988
SE/ST(3) – for Road T7 Project

WHK/0514_EPD

ANNEX C2

2095/604

TOTAL P.01

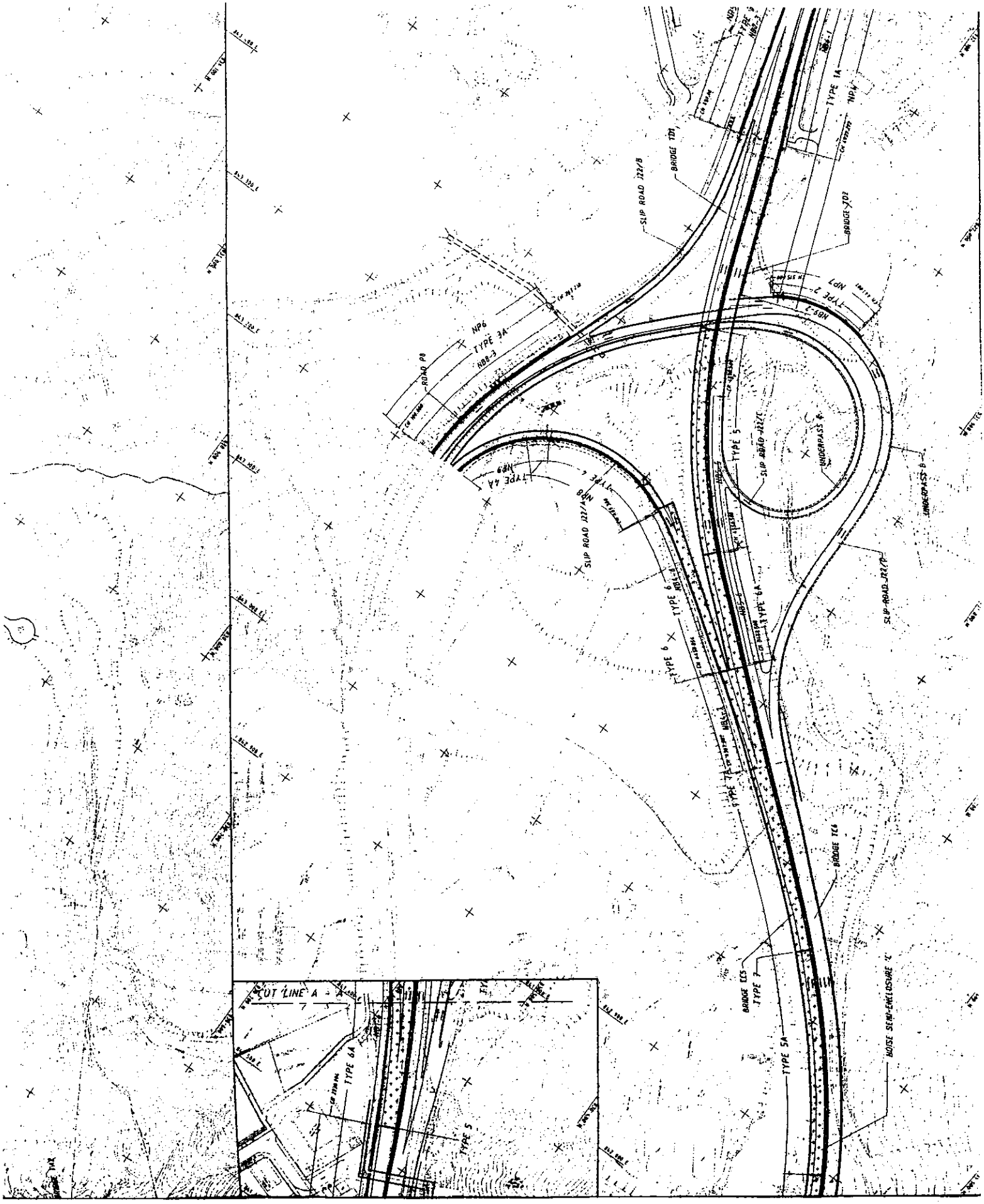

SLIP ROAD J22/B
BRIDGE TD1
BRIDGE TD2
TYPE 1A
NP4
NP6
TYPE 3A
ROAD P8
TYPE 2
NP7
TYPE 4A
NP8
SLIP ROAD J22/A
TYPE 5
SLIP ROAD J22/C
UNDERPASS A
UNDERPASS B
TYPE 6
SLIP ROAD J22/D
BRIDGE TC6
BRIDGE EC5
TYPE 5A
NOISE SEMI-ENCLOSURE 'C'
CUT LINE A - A
TYPE 6A
TYPE 5

FIGURE C2.5a

TYPICAL NOISE MITIGATION MEASURE TYPE 1,2 & 3

NOTE TYPE 1A, 3A ARE 2m, 5m HIGH ABSORPTIVE NOISE BARRIER RESPECTIVELY

ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 1A	2.0	168.3(10)	TYPE 1
TYPE 2	3.0	219.1(10)	TYPE 2
TYPE 3	5.0	2x193.7(12)	TYPE 3

TYPICAL NOISE MITIGATION MEASURE TYPE 4

NOTE TYPE 4A 5m HIGH ABSORPTIVE CANTILEVERED NOISE BARRIER

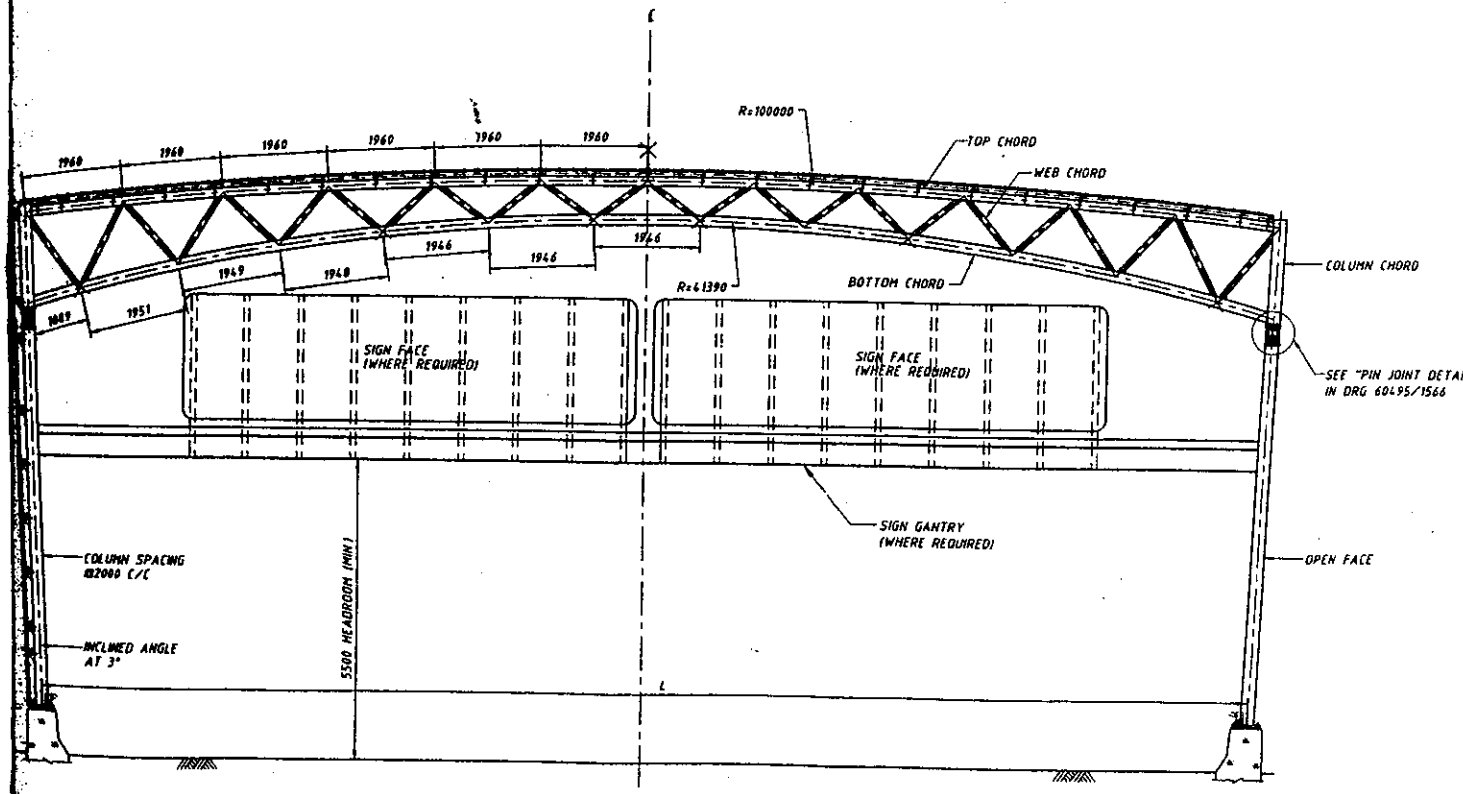
ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 4	5.20	2x273(14.2)	114.3(6.3)	114.3(6.3)	60.3(3.2)	273(14.2)	TYPE 4

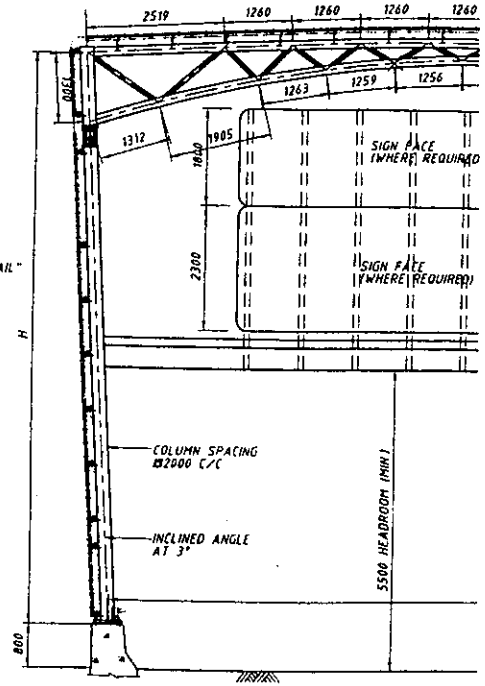
TYPICAL NOISE MITIGATION ME

NOTE TYPE 5A-TRANSITION BETWEEN T

ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) (MAX)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)
TYPE 5	5.50	14.0	2x219.1(16)	219.1(16)	219.1(16)
TYPE 5A	VARIES	14.0	2x244.5(16)	219.1(16)	219.1(16)

NOTE TYPE 5B SEE DRAWING 60495/153





TYPICAL NOISE MITIGATION MEASURE TYPE 6

NOTE TYPE 6A-TRANSITION BETWEEN TYPE 5 AND TYPE 6

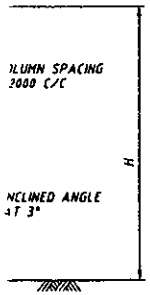
ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) MAX	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 6	9.20	22.5	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 6
TYPE 6A	VARIES	VARIES	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 6

TYPICAL NOISE MITIG

NOTE TYPE 7A-TRANSITIO

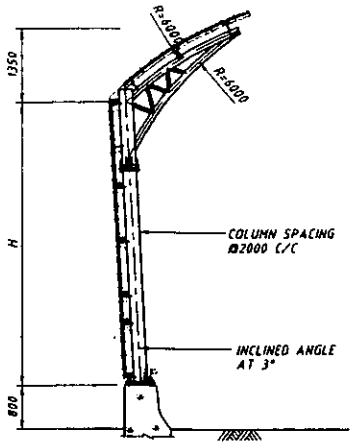
ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) MAX	COLUMN (CHS)	TOP CHO (CHS)
TYPE 7	10.50	14.0	2x273(16)	219.1(16
TYPE 7A	VARIES	VARIES	2x273(16)	219.1(16

FIGURE C2.5b



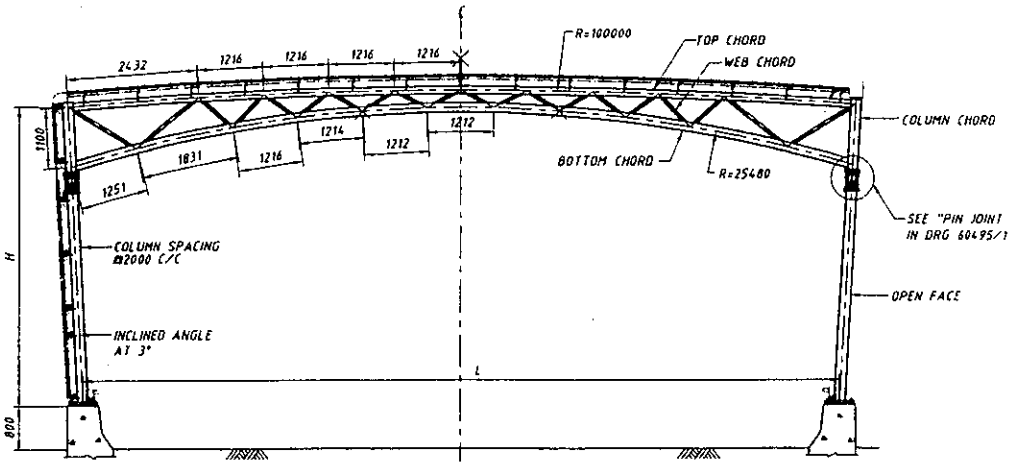
N MEASURE TYPE 1,2 & 3
m, 5m HIGH ABSORPTIVE
PECTIVELY

UMN (S)	BASE PLATE AND HOLDING DOWN DETAIL
3(10)	TYPE 1
1(10)	TYPE 2
7(12)	TYPE 3



TYPICAL NOISE MITIGATION MEASURE TYPE 4
NOTE TYPE 4A 5m HIGH ABSORPTIVE CANTILEVERED NOISE BARRIER

ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 4	5.20	2x273(14.2)	114.3(6.3)	114.3(6.3)	60.3(3.2)	273(14.2)	TYPE 4

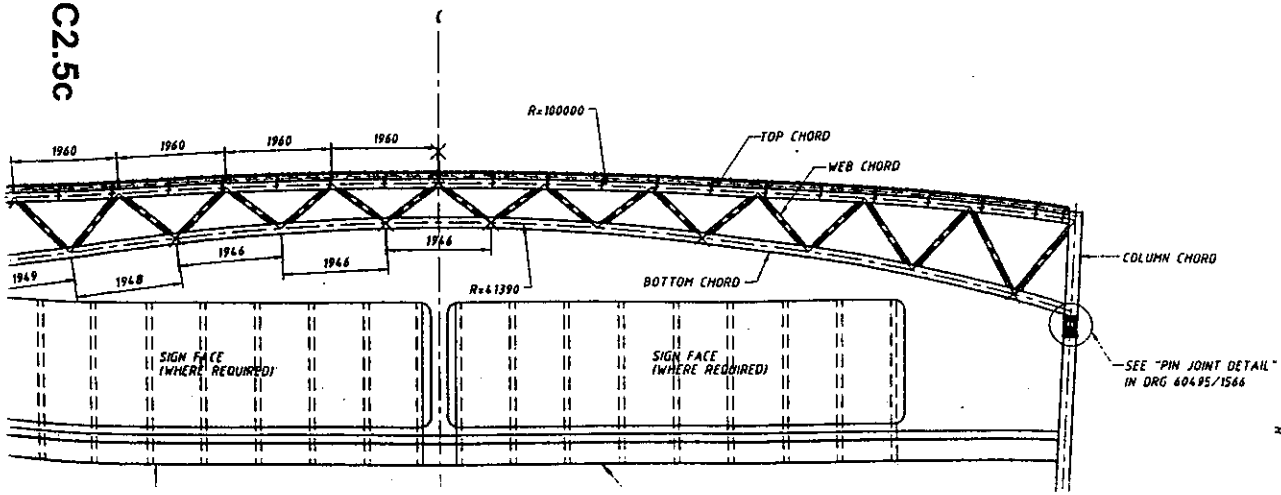


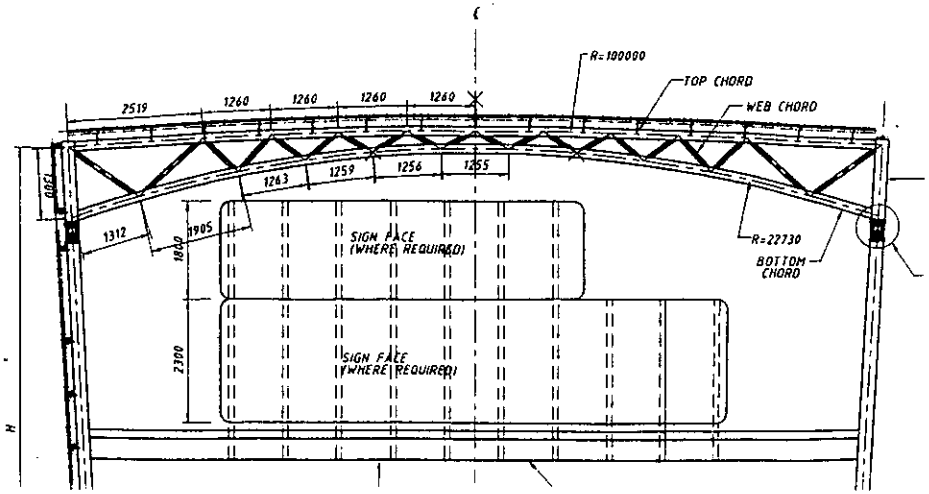
TYPICAL NOISE MITIGATION MEASURE TYPE 5
NOTE TYPE 5A-TRANSITION BETWEEN TYPE 5 AND TYPE 7

ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) (MAX)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 5	5.50	14.0	2x219.1(16)	219.1(16)	219.1(16)	168.3(12.5)	219.1(16)	TYPE 5
TYPE 5A	VARIES	14.0	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 7

NOTE TYPE 5B SEE DRAWING 60495/1539

FIGURE C2.5c





TYPICAL NOISE MITIGATION MEASURE TYPE 4

NOTE TYPE 4A 5m HIGH ABSORPTIVE CANTILEVERED NOISE BARRIER

ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 4	5.20	2x273(14.2)	114.3(6.3)	114.3(6.3)	60.3(3.2)	273(14.2)	TYPE 4

TYPICAL NOISE MITIGATION MEASURE TYPE 5

NOTE TYPE 5A-TRANSITION BETWEEN TYPE 5 AND TYPE 7

ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) (MAX.)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 5	5.50	14.0	2x219.1(16)	219.1(16)	219.1(16)	168.3(12.5)	219.1(16)	TYPE 5
TYPE 5A	VARIES	14.0	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 7

NOTE TYPE 5B SEE DRAWING 60495/1539

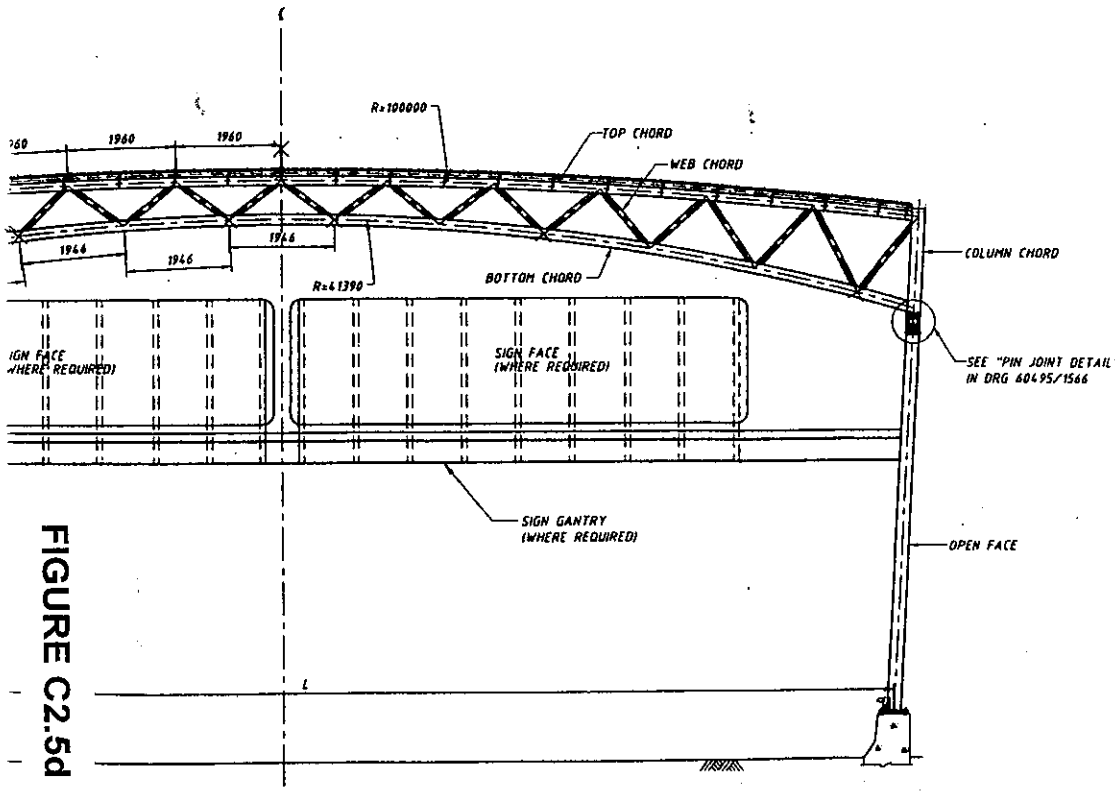
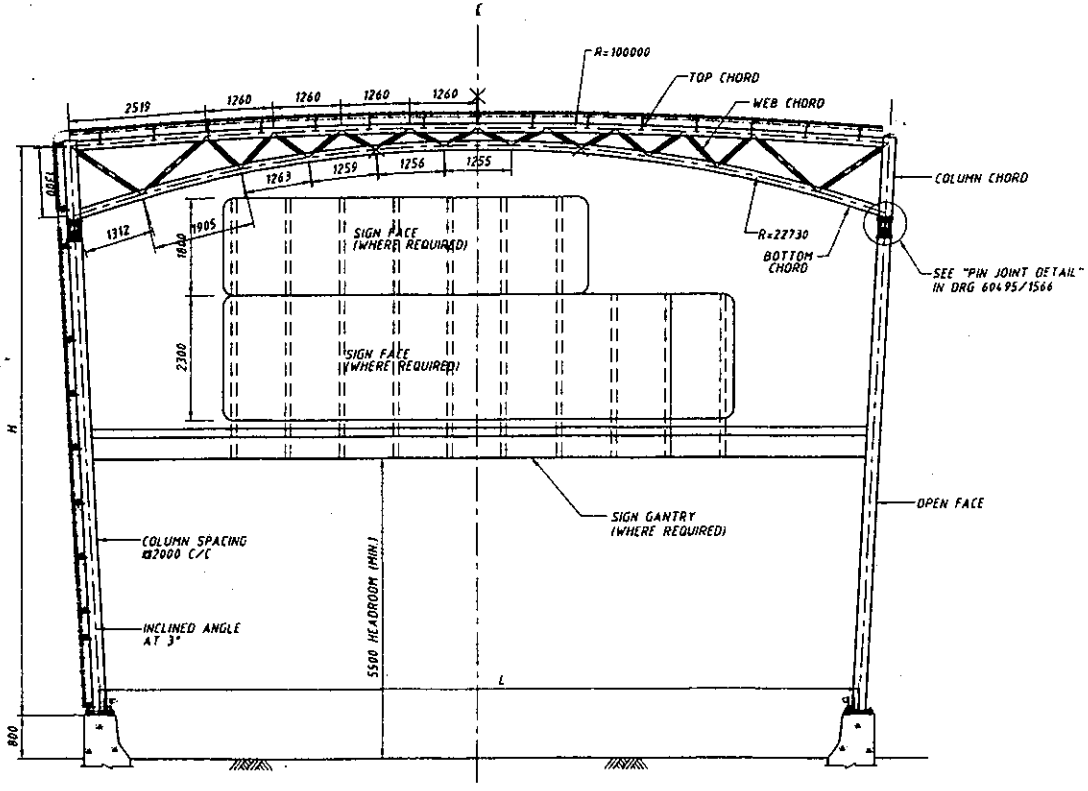


FIGURE C2.5d



TYPICAL NOISE MITIGATION MEASURE TYPE 6

NOTE TYPE 6A-TRANSITION BETWEEN TYPE 5 AND TYPE 6

(m)	SPAN L(m) MAX	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
	22.5	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 6
	VARIES	2x244.5(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 6

TYPICAL NOISE MITIGATION MEASURE TYPE 7

NOTE TYPE 7A-TRANSITION BETWEEN TYPE 6 AND TYPE 7

ENCLOSURE REF	HEIGHT H(m)	SPAN L(m) MAX	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 7	10.50	14.0	2x273(16)	219.1(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 7
TYPE 7A	VARIES	VARIES	2x273(16)	219.1(16)	219.1(16)	168.3(12.5)	244.5(16)	TYPE 7

附 註 NOTE:-
此 圖 紙 曾 原 比 例 一 半 之 縮 影
THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY HALF THE ORIGINAL SCALE

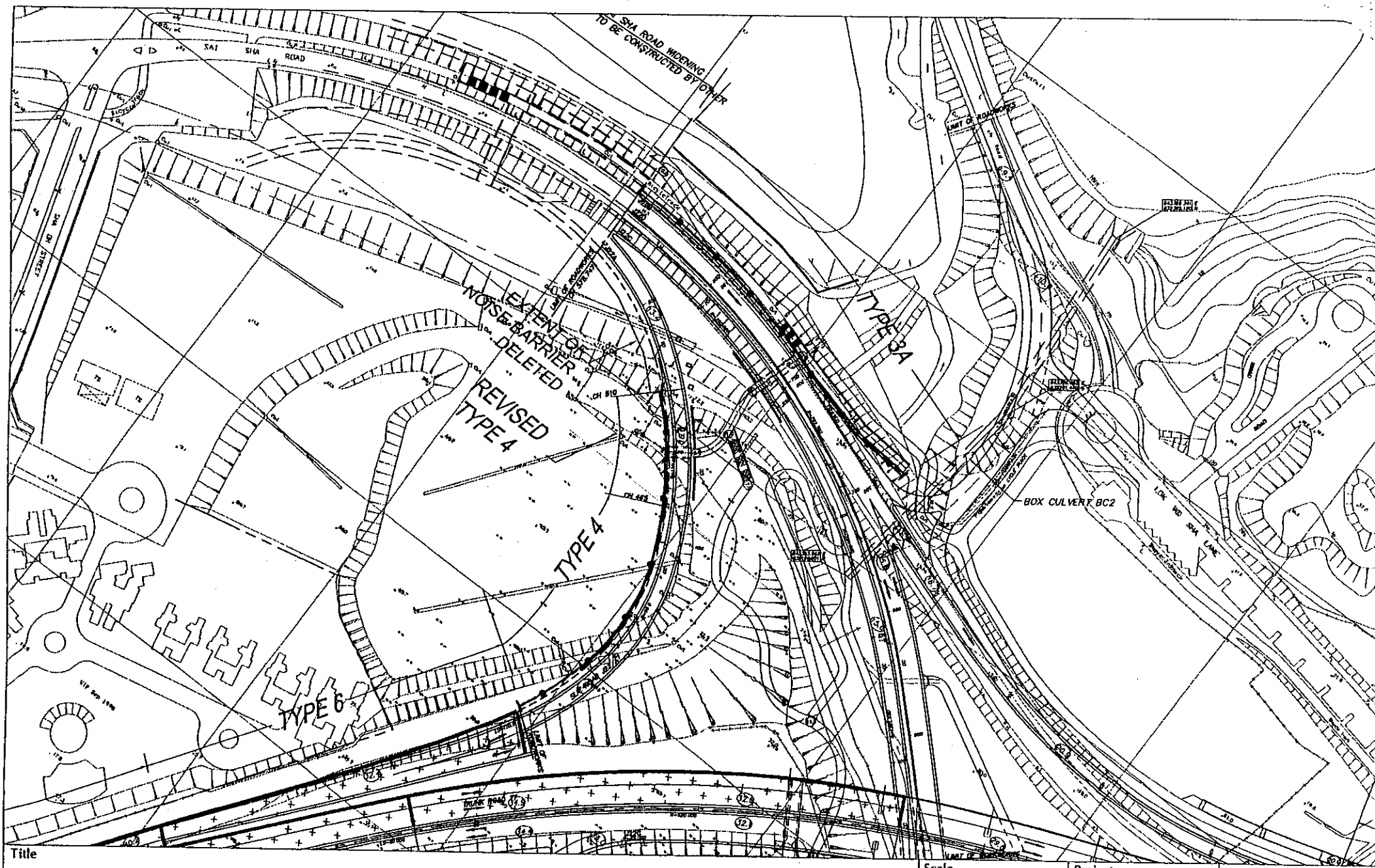


FIGURE C2.5e

Title

TRUNK ROAD T7 IN MA ON SHAN

REVISED NOISE MITIGATION MEASURE TYPE 4

Scale	1 : 2000	Project No.	A12401
Date	May 2002	Figure No.	2.5

Maunsell
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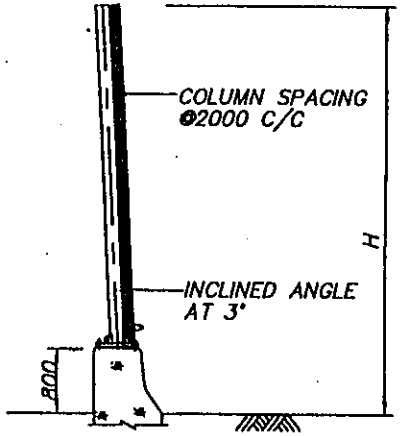
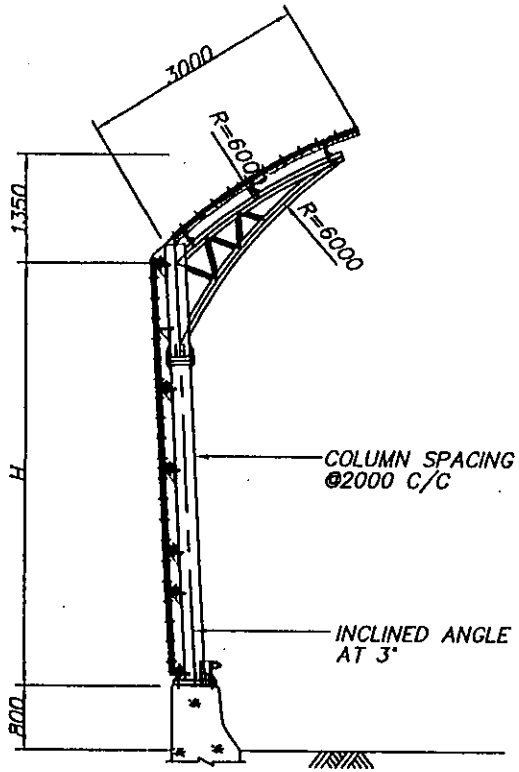


TYPICAL NOISE MITIGATION MEASURE TYPE 1,2 & 3

NOTE : TYPE 1A, 3A ARE 2m, 5m HIGH ABSORPTIVE NOISE BARRIER RESPECTIVELY

ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 1A	2.0	168.3(10)	TYPE 1
TYPE 2	3.0	219.1(10)	TYPE 2
TYPE 3	5.0	2x193.7(12)	TYPE 3



TYPICAL NOISE MITIGATION MEASURE TYPE 4

NOTE : TYPE 4A 5m HIGH ABSORPTIVE CANTILEVERED NOISE BARRIER

ENCLOSURE REF	HEIGHT H(m)	COLUMN (CHS)	TOP CHORD (CHS)	BOTTOM CHORD (CHS)	WEB CHORD (CHS)	COLUMN CHORD (CHS)	BASE PLATE AND HOLDING DOWN DETAIL
TYPE 4	5.20	2x273(14.2)	114.3(6.3)	114.3(6.3)	60.3(3.2)	273(14.2)	TYPE 4

FIGURE C2.5f

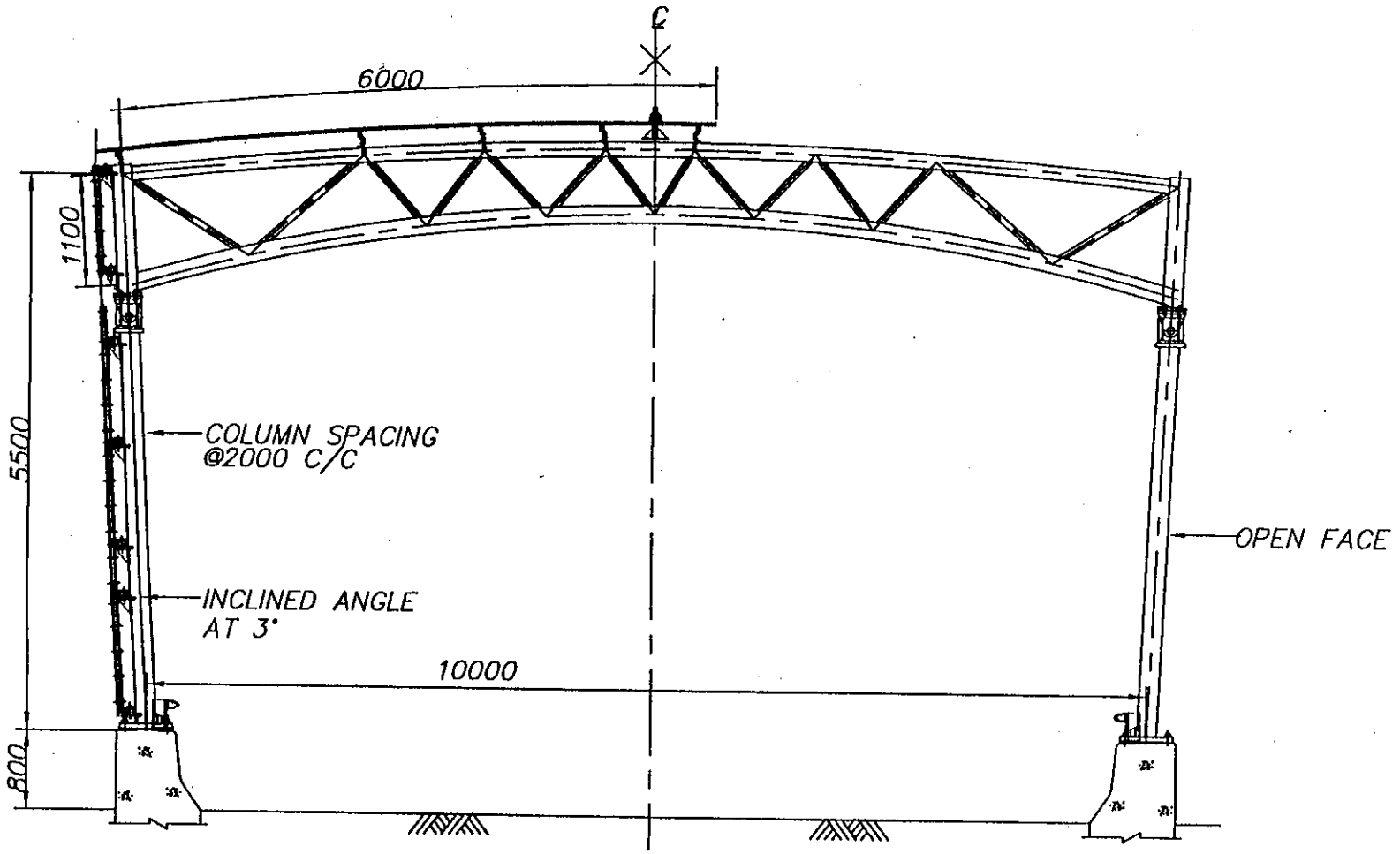
Title

TRUNK ROAD T7 IN MA ON SHAN

Noise Mitigation Measures Typical Section (Sheet 1 of 4)

Scale N.T.S.	Project No. A12401
Date May 2002	Figure No. 2.4

Maunsell
MAUNSELL ENVIRONMENTAL MANAGEMENT CONSULTANTS LTD



TYPICAL NOISE MITIGATION MEASURE REVISED TYPE 4

FIGURE C2.5g

Title: TRUNK ROAD T7 IN MA ON SHAN Revised Noise Mitigation Measure Type 4 Conceptual Design		Scale: N.T.S.	Project No. A12401
		Date: May 2002	Figure No. 2.6

aunsell
ELL ENVIRONMENTAL
MENT CONSULTANTS LTD

HIGHWAYS DEPARTMENT
2nd floor Ho Man Tin Government Offices,
88, Chung Hau Street, Ho Man Tin, Kowloon.

708457 路政署
九龍何文田忠孝街88號
何文田政府合署二樓

本署檔號 Our Ref.: ( ) in HNT 54/180 INT(PRD)

By Fax (2601 3988) & by Post

來函檔號 Your Ref.: CYH/LY/382095/604

'02 AUG -7 11 :31

電 話 Tel. No.: 2716 1043

圖文傳真 Fax.: 2715 3573

7 August 2002

Binnie Black & Veatch (HK) Ltd.,
11 th. Fl., New Town Tower,
Pak Hok Ting St.,
Sha Tin, N.T..

(Attn: Mr. C Y Hung)

CYH
2695/604
SL CK
cc LY

Dear Sirs,

Contract No. HY/2001/18
Sai Sha Road Widening
between Kam Ying Road and Future Trunk Road T7 Junction

Proposed Additional Noise Barrier at Sha On Street

I refer to your above facsimile transmittal in connection with the above and would like to advise as follows:

1. A preliminary checking of the above proposal indicates that due to narrowness of the footpath, the sightline problem and the congested existing/future underground utilities installations, we consider that it is not feasible to accommodate the 5.5m high cantilever noise barrier system at the proposed location.
2. Please be informed that the above contract has just been awarded to the contractor. The noise mitigation measures will be implementation in accordance with the approved EIA study report and the EP conditions. We opine that further proposal to add more noise barrier at the subject location should be outside the scope of our above project.
3. Beside, I understand that the building blocks are on top of a podium, which should function as a noise barrier. I doubt whether it is effective to install barriers along road to protect the dwellings.

Yours faithfully,

(Greg Leung)
for Regional Highway Engineer/N.T.
Highways Department

C.C. PM/NTE, TDD (Attn: Mr. C W Kam) by fax: 2721 8630
CE/R (1) RDO, HyD (Attn: Mr. Eric Chiang) by fax: 2714 5297
EPD (Attn: Mr. Vincent Lau) by fax 2771 9640

Sai Sha\ Project\ 54-180-INT(PRD) \ Noise barrier-Binnie-01

HYD 7B

ANNEX C2

TOTAL P.01

Table C2.5 : Predicted Unmitigated and Mitigated Traffic Noise Levels at representative NSRs at Western Side of Wu Kai Sha Station Development (Extended Podium as Mitigation)

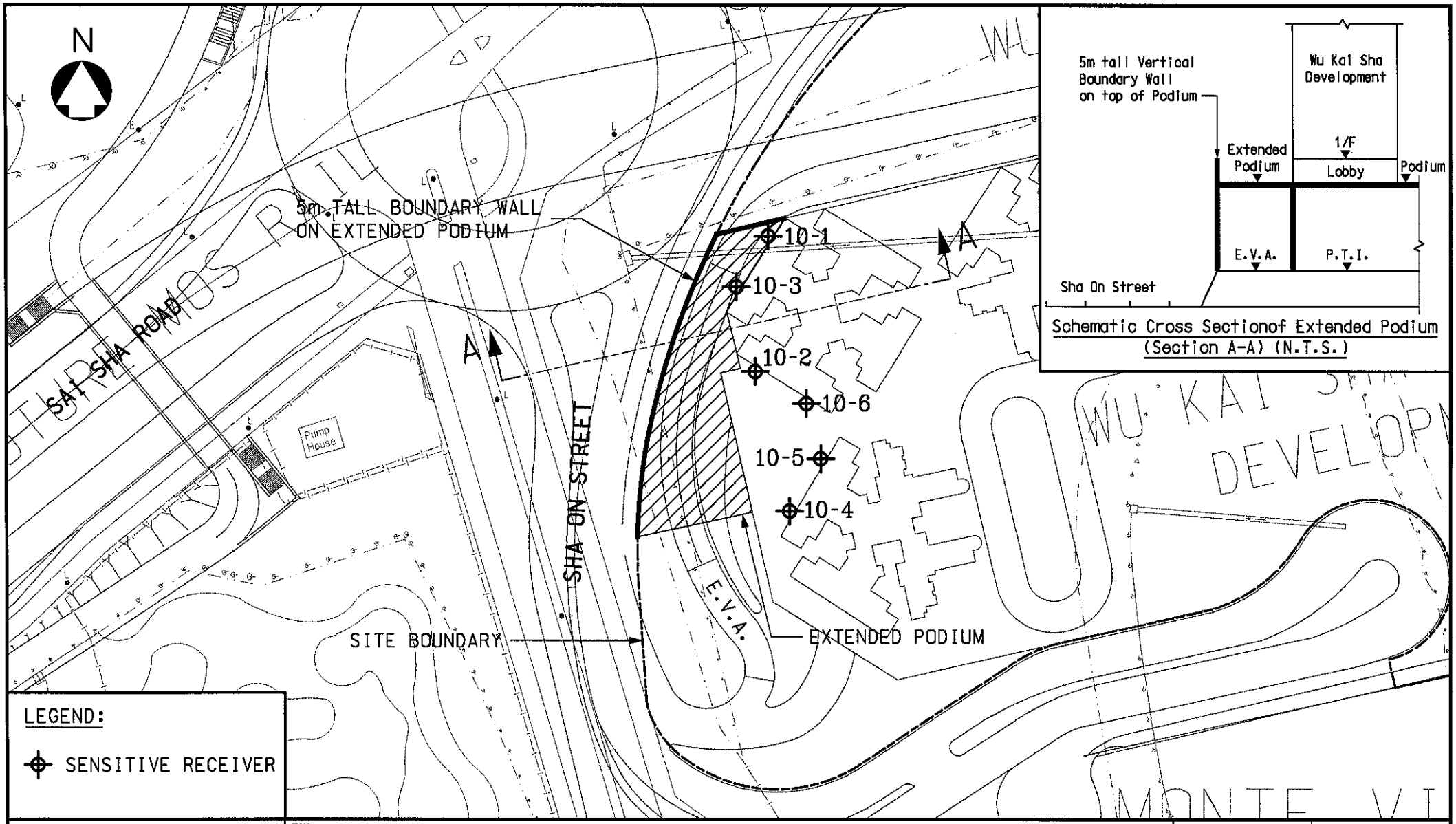
NSR	Façade	Floor	Unmitigated Predicted Noise Level	Mitigated Predicted Noise Level
10	1	1	**72**	60
10	1	5	**71**	67
10	1	10	**71**	69
10	1	15	**71**	70
10	1	20	70	70
10	1	30	70	70
10	1	40	69	69
10	1	42	69	69
10	2	1	**71**	59
10	2	5	**72**	64
10	2	10	**72**	65
10	2	15	**71**	66
10	2	20	70	66
10	2	30	69	68
10	2	40	69	68
10	2	42	68	68
10	3	1	**73**	60
10	3	5	**72**	68
10	3	10	**72**	70
10	**3**	**15**	**71**	**71**
10	**3**	**20**	**71**	**71**
10	3	30	70	70
10	3	40	69	69
10	3	42	69	69
10	4	1	70	67
10	4	5	**72**	68
10	4	10	**72**	68
10	4	15	**71**	68
10	4	20	**71**	68
10	4	30	70	68
10	4	40	69	68
10	4	42	69	68
10	5	1	64	60
10	5	5	**71**	67
10	5	10	**71**	67
10	5	15	70	67
10	5	20	70	67
10	5	30	69	66
10	5	40	68	66
10	5	42	68	67
10	6	1	64	60
10	6	5	**71**	67
10	6	10	**71**	67
10	6	15	70	67
10	6	20	70	67
10	6	30	69	67
10	6	40	68	67
10	6	42	68	67

Note :

Mitigation : 5m tall boundary wall on top of Extended Podium at Western Side of the Development

Location of the NSRs and Mitigation Measure, please refer to Figure C2.6.

Bold : Exceed traffic noise criteria



AGREEMENT NO. CE 16/99
FEASIBILITY STUDY FOR HOUSING DEVELOPMENT AT WHITEHEAD AND LEE ON IN MA ON SHAN, SHATIN

Binnie Black & Veatch Hong Kong Limited
博威工程顧問有限公司
Engineers and Scientists

Title :

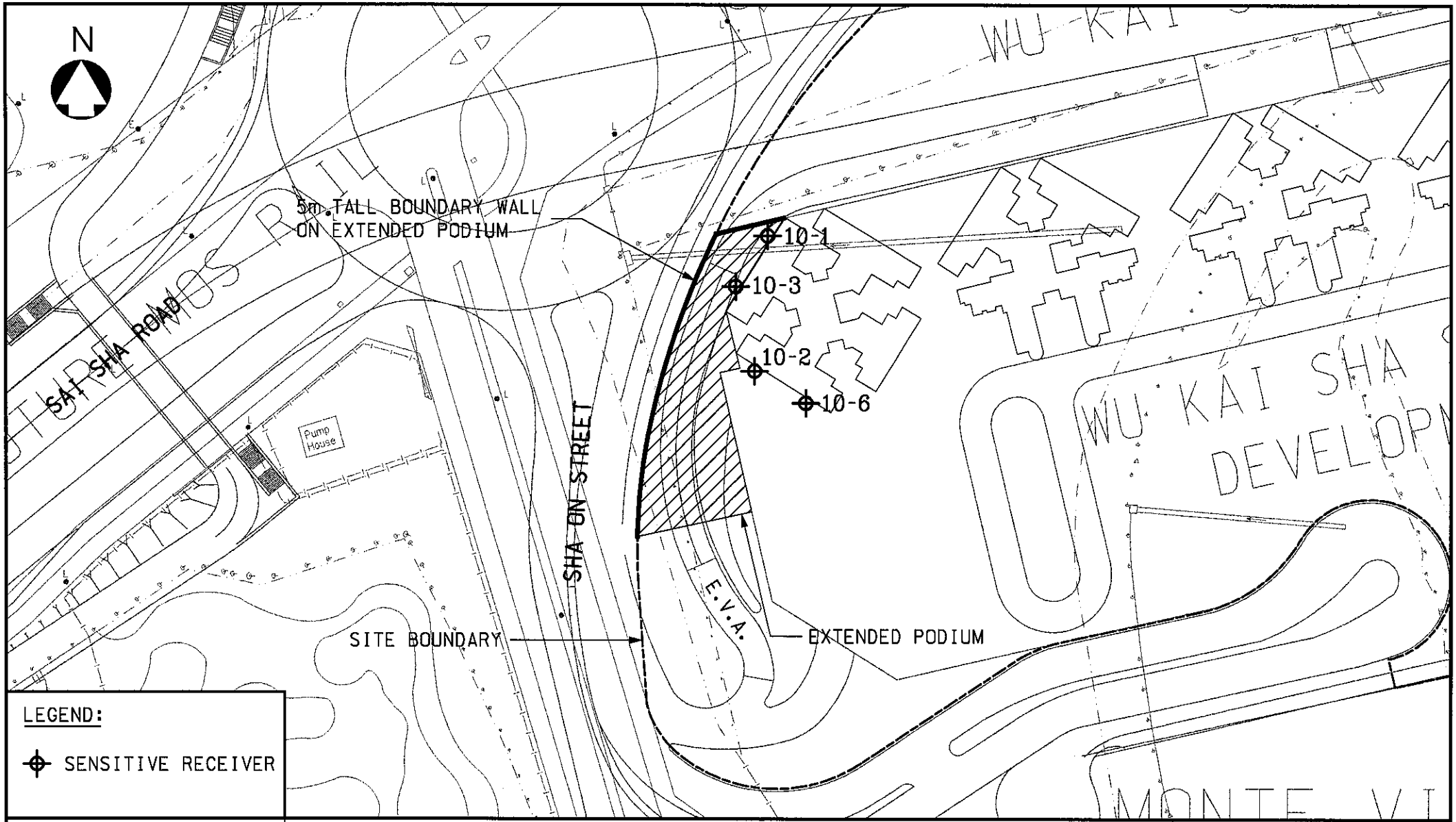
LOCATION OF PROPOSED EXTENDED PODIUM AT WESTERN SIDE OF WU KAI SHAI DEVELOPMENT

Figure No. C2.6	Revision -
Reference -	File Name 3820950206-98.DGN
Prepared TC	Checked YWL
Date JUL. 2002	Scale N.T.S.

Table C2.6 : Predicted Unmitigated and Mitigated Traffic Noise Levels at representative NSRs at Western Side of Wu Kai Sha Station Development (Extended Podium as Mitigation - Plot Ratio 5.0 -Option 1)

NSR	Façade	Floor	Unmitigated Predicted Noise Level	Mitigated Predicted Noise Level
10	1	1	**72**	60
10	1	5	**71**	67
10	1	10	**71**	69
10	1	15	**71**	70
10	1	20	70	70
10	1	30	70	70
10	1	40	69	69
10	1	42	69	69
10	2	1	**71**	59
10	2	5	**72**	64
10	2	10	**72**	65
10	2	15	**71**	66
10	2	20	70	66
10	2	30	69	68
10	2	40	69	68
10	2	42	68	68
10	3	1	**73**	60
10	3	5	**72**	68
10	3	10	**72**	70
10	**3**	**15**	**71**	**71**
10	**3**	**20**	**71**	**71**
10	3	30	70	70
10	3	40	69	69
10	3	42	69	69
10	6	1	64	60
10	6	5	**71**	67
10	6	10	**71**	67
10	6	15	70	67
10	6	20	70	67
10	6	30	69	67
10	6	40	68	67
10	6	42	68	67

Note :
Mitigation : 5m tall boundary wall on top of Extended Podium at Western Side of the Development
Location of the NSRs and Mitigation Measure, please refer to Figure C2.7.
Bold : Exceed traffic noise criteria



AGREEMENT NO. CE 16/99
FEASIBILITY STUDY FOR HOUSING DEVELOPMENT AT WHITEHEAD AND LEE ON IN MA ON SHAN, SHATIN

Binnie Black & Veatch Hong Kong Limited
博威工程顧問有限公司
Engineers and Scientists

Title :

LOCATION OF PROPOSED EXTENDED PODIUM AT WESTERN SIDE OF WU KAI SHAI DEVELOPMENT (PLOT RATIO 5 – OPTION 1)

Figure No.	Revision
C2.7	–
Reference	**File Name**
–	3820950206-91.DGN
Prepared	**Checked**
TC	YWL
Date	**Scale**
JUL. 2002	N.T.S.

Table C2.7 : Predicted Unmitigated and Mitigated Traffic Noise level at representative NSR at Western Side of Wu Kai Sha Station Development(Extended Podium as Mitigation for Plot Ratio 5 Option 2)

NSR	Façade	Floor	Predicted Traffic Noise Level	
			Unmitigated	Mitigated
10	4	1	**71**	69
10	4	5	**72**	69
10	4	10	**72**	69
10	4	15	**72**	70
10	4	20	**71**	70
10	4	30	**71**	70
10	4	40	70	70
10	4	42	70	70
10	5	1	65	64
10	5	5	**71**	69
10	5	10	**71**	69
10	5	15	**71**	69
10	5	20	**71**	70
10	5	30	70	70
10	5	40	70	70
10	5	42	70	69

Note :
Bold : exceedance of 70 dB(A) traffic noise criteria
Mitigation : 5m tall boundary wall on top of Extended Podium at Western Side of the Development
Location of the NSRs and Mitigation Measure, please refer to Figure C2.8.

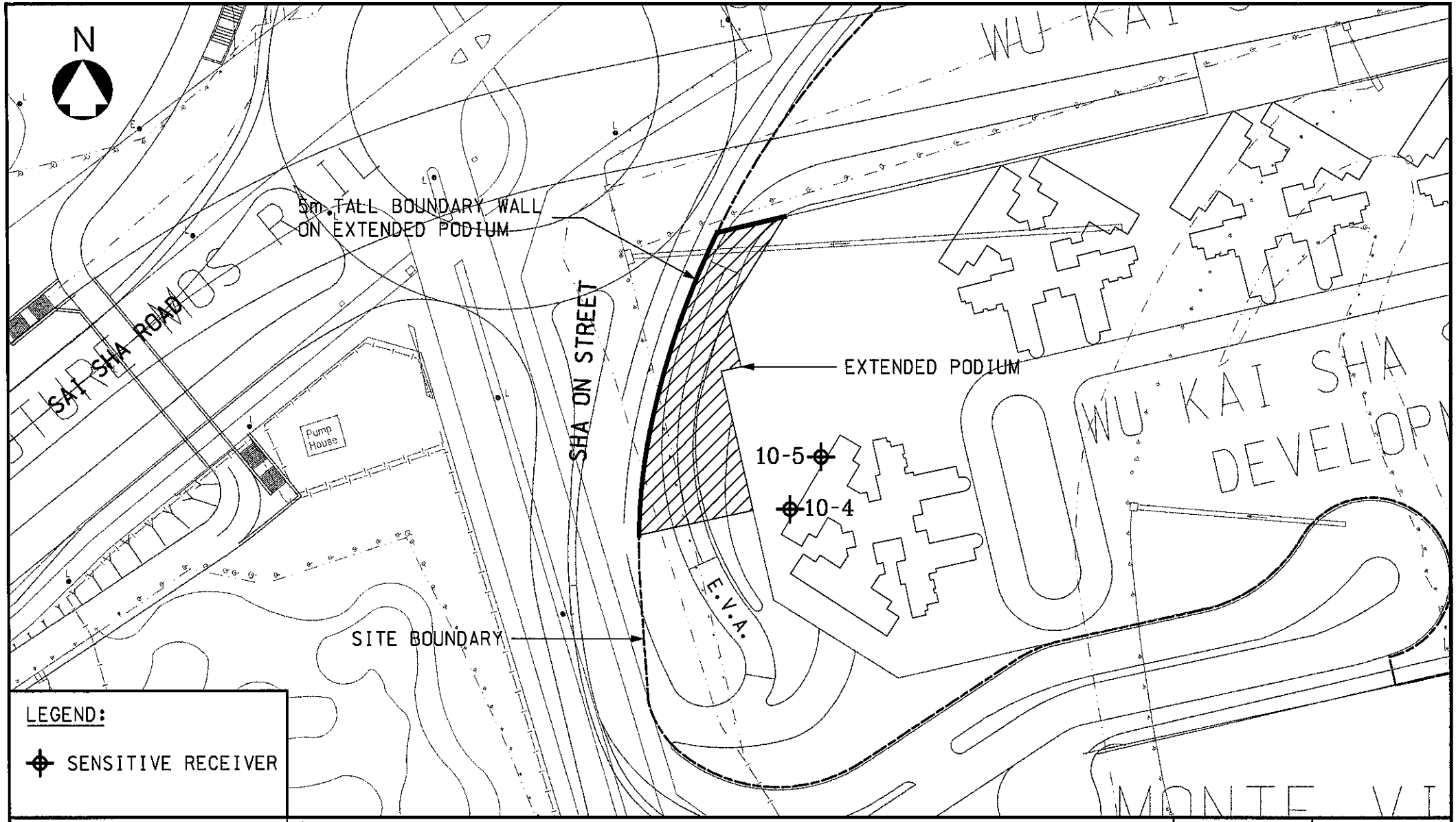


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Figure No. C2.8	Revision -
Reference -	File Name 3820950206-92.DGN
Prepared TC	Checked YWL
Date JUL. 2002	Scale N.T.S.

ANNEX C3

Train Noise Impact Assessment

KCR 九鐵鐵路

九廣鐵路公司
Kowloon-Canton Railway Corporation
東鐵支線部
East Rail Extensions Division

Comm Ref.: ERE/IF/EN102/tw-mos/000352

314448

23 November, 1999

Binnie Black & Veatch Hong Kong Limited (via fax: 2601-3988)
11th Floor, New Town Tower
Pak Hok Ting Street, Shatin
New Territories
Hong Kong

Attn: Mr Lok Yan

CYH LYY 382095 303

Subject: KCRC East Rail Extensions
Feasibility Study for Housing Development at Whitehead and Lee On in Ma On Shan, Shatin
Request for KCRC Data

Dear Yan,

I refer to the letter ref: CYH/YWL/LYY/382095/303 dated 17 November 1999. As requested, we provide the following information for your studies.

1. Information on the rail alignment and locations of joints and crossings extracted from the EIA are attached.

2. In the year 2004, the maximum trains in operation per hour per direction during the daytime (0700 – 2300) and night-time (2300 – 0700) is 24 and 10 respectively.

3. The Lmax for airborne noise on viaduct is 81.2 dB(A).

4. The Lmax for structure-borne noise is 56 dB(A).

5. The maximum speed is 80 kph.

6. There will ultimately be 8-car trains running on MOS rail and this has been assessed in the EIA.

9/F Citylink Plaza, Shatin, N.T., Hong Kong Telephone: (852) 2684-8300 Facsimile: (852)2601-5287

7. Increase of the noise source level due to the presence of crossovers can be assumed to be 7 dB(A) (ie. without mitigation).

Yours sincerely,

Vic McNally
Environmental Manager

dl/lp/VM

Response Required: No
Due Date: N/A

Attachments: Yes

九廣鐵路公司
Kowloon-Canton Railway Corporation
東鐵支線部
East Rail Extensions Division

Our Ref. : ERE/MOS/TCC300/IP611 (E1-211256)
Your Ref.: CYII/2095/603.1

Tel : 2163-6291
Fax : 2356-7712

25 September 2001 . 639575

Binnie Black & Veatch Hong Kong Limited
11/F New Town Tower
Pak Hok Ting Street
Shatin
New Territories

BY FAX & POST
(Fax No. 2601-3988)

CONFIRMATION COPY ONLY

ACTION CYH
REPLY BY DATE
TO SEE
2095/603.1
CK

(Attn.: Mr. C Y Hung)

Dear Sirs,

cc IH LY MCA

East Rail Extensions - Tai Wai to Ma On Shan
Contract No. TCC300 - Shek Mun to Lee On
Study for Housing Development at Whitehead and Lee On
Information on WKS Station

As per your request, attached please find the following information for your reference in connection with the captioned study:

(1) Alignment drawings at WKS Station;
(2) Viaducts drawings (including overrun for 8-car scheme) adjacent to WKS Station; and
(3) Layout and sections of WKS Station.

IH, please check if the environ. of viaducts will clash with the step road to Whitehead

Please contact our Mr. Andy Leung at 2645-6811 (email: afvleung@kcrc.com) should you require further information on MOS Rail.

Yours faithfully,
KOWLOON-CANTON RAILWAY CORPORATION

pp (Thomas Tam)
Project Manager (Ma On Shan)

Encl.

cc PM/NTE, TDD (Attn.: Mr. W H Kwan) - with encl. (Fax : 2721-8630)

TT/PY/ALE/el

香港九龍紅磡鶴園道八號 九廣鐵路紅磡大樓
KCRC Hung Hom Building, 8 Cheong Wan Road, Hung Hom, Kowloon, Hong Kong.
Telephone: (852) 2163 6000 Facimile: (852) 2363 3541

Annex C3 : Procedures for noise calculation of EMU Train Noise

The rail noise level at the NSR is predicted by modelling the train as a line source. The procedures for railway noise calculations are as follows:

Obtain the reference Lmax of a train at 25m from a continuously welded rail at speed Vo. According to the KCRC information (Annex C3, Ref ERE/IF/EN102/tw-mos/000352, dated 23 Nov., 1999) the airborne Lmax of the MOS Rail train is assumed to be 81.2 dB(A) at 80kph measured at 25m away from the ballast track. The structure borne noise of MOS Rail train Lmax using Floating Slab Track at 25m at 80 kph is 56 dB(A). The air-conditioning (AC) noise of MOS train Lmax at 15m is 57 dB(A).

Determine the locations of the NSRs

Divide the railway alignment into different segments in accordance with the different speeds, orientation of railway

Determination of Lmax

Airborne speed correction = 30 log (V/130), where V is the train speed (km/hr)

Structure borne speed correction = 25 log (V/130)

Correction for angle of view = 10 log (θ/180) where θ = angle of view at NSR

Barrier correction = Maekawa equation (details see p.4-5 of Annex E of WREIA)
$= 7 + 20 \log (\sqrt{2\pi}N/\tanh (\sqrt{2\pi}N)) - PL(N)$
where N, Fresel Number, = 2(p.l.d.)/λ,
p.l.d. = (path length difference between the direct and diffracted sound paths)
λ = sound wavelength
PL(N) is a factor for the integration of point source to line source
and is a function of the Fresel Number (N)

Correction of track wear is 3.0 dB(A)

Correction for viaduct slab track reflection is 2.0 dB(A)

Increase of rolling stock levels due to points and crossings = 7 dB(A)

Determination of SEL

For both standard twin viaduct, single viaduct and at grade ballasted track,
Sound Exposure Level = Lmax +10log (L/V) – 10log ($4D/4D^2+1$) + $2\tan^{-1}$ (1/2D) + 10.5 + correction for distance
where D = d/L with L being train length (m)
Correction for distance of Air Borne and Structure Borne noise = 10 log (25/d); while
Correction for distance of Air Condition Air Borne noise = 10 log (15/d)
where d is the slant distance (m) from centre of track segment to the NSR

Determination of Leq

The continuous sound pressure level Leq is determined from the measured single event exposure level, SEL, for a particular train type over the period T by the following equation:

Leq,i = SEL + Correction for train frequency + Correction of facade

Where Correction for train frequency = 10 log (N/T)
where N = number of trains on each track in 30 minutes
T = number of seconds in 30 minutes (1800 seconds)
Correction of facade is 2.5 dB(A)

Total Leq

The overall Leq contributing from all segment i is given by:

$$\text{Leq, total} = 10\log[\Sigma 10^{(\text{Leq,i}/10)}]$$

Table C3.1
Predicted Unmitigated and Mitigated Railway Noise Levels at representative NSRs

NSR	NSR 10-1				NSR 18-2	
Floor	Unmitigated		Mitigated [1]		Unmitigated	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
1	**56**	72	51	67	40	55
5	**58**	74	53	69	42	58
10	**58**	73	53	69	47	62
15	**57**	73	53	69	53	68
20	**57**	72	52	68	53	69
25	**57**	72	52	67	53	68
30	**56**	71	51	67	53	68
31	**56**	71	51	66		

Note :
BOLD = Predicted Noise Level exceeds the night-time Noise Criteria (55dB(A))
1 Mitigation = Provision of central plenum along twin viaduct secton (~ 60m)

Table C3.2 - Sample Calculation of Railway Noise at NSR 10-1 (4th Floor) with operation of MOS Rail (Without Mitigation)

Track		Air		Perpendicular	Vertical	Slant				Deck		Plenum			Air	Air	Train	Train		Air	Air
		Train Lmax	Speed	Distance	Distance	Distance	Angle	Angle Cor	Speed Corr.	Reflection	Poor Track	Correction	Barrier	Lmax	Distance Cor	SEL	Freq. / 30 mins	Freq. Corr	Façade	Leq 30 mins	Lmax
MOS Rail South Bound Segment 1	Air Borne	81.2	80	15	25	29.2	113	-2.0	0	+2	+3	-18	-0.1	66	0.7	74.9	5	-25.6	+2.5	51.9	68
	Structure	56.0	80	15	25	29.2	113	-2.0	0	0	0	0	0	54	0.7	62.9	5	-25.6	+2.5	39.8	56
	AC	57.0	80	15	25	29.2	113	-2.0			0	0	0	55	2.9	61.6	5	-25.6	+2.5	38.6	55
	Subtotal Leq																			52.3	68
MOS Rail South Bound Segment 2	Air Borne	81.2	80	18	25	30.8	12.5	-11.6	0	+2	+3	-18	-1.1	56	0.9	64.2	5	-25.6	+2.5	41.1	57
	Structure	56.0	80	18	25	30.8	12.5	-11.6	0	0	0	0	0	44	0.9	53.1	5	-25.6	+2.5	30.0	46
	AC	57.0	80	18	25	30.8	12.5	-11.6			0	0	0	45	3.1	51.8	5	-25.6	+2.5	28.8	45
	Subtotal Leq																			41.7	58
MOS Rail South Bound Segment 3	Air Borne	81.2	80	29	25	38.3	8.1	-13.5	0	+2	+3	-18	-6.9	48	1.9	55.6	5	-25.6	+2.5	32.5	48
	Structure	56.0	80	29	25	38.3	8.1	-13.5	0	0	0	0	0	43	1.9	50.3	5	-25.6	+2.5	27.2	43
	AC	57.0	80	29	25	38.3	8.1	-13.5			0	0	0	44	4.1	49.1	5	-25.6	+2.5	26.0	42
	Subtotal Leq																			34.3	50
MOS Rail South Bound Segment 4	Air Borne	81.2	80	46	26.2	52.9	8.2	-13.4	0	+2	+3	-18	-10.3	45	3.3	51.0	5	-25.6	+2.5	27.9	44
	Structure	56.0	80	46	26.2	52.9	8.2	-13.4	0	0	0	0	0	43	3.3	49.0	5	-25.6	+2.5	26.0	42
	AC	57.0	80	46	26.2	52.9	8.2	-13.4			0	0	0	44	5.5	47.8	5	-25.6	+2.5	24.8	41
	Subtotal Leq																			31.2	47
MOS Rail South Bound Sub-total Noise Level																				52.8	69
MOS Rail North Bound Segment 1	Air Borne	81.2	80	31	25	39.8	82.6	-3.4	0	+2	+3	-18	-7.1	58	2.0	65.3	5	-25.6	+2.5	42.2	58
	Structure	56.0	80	31	25	39.8	82.6	-3.4	0	0	0	0	0	53	2.0	60.2	5	-25.6	+2.5	37.1	53
	AC	57.0	80	31	25	39.8	82.6	-3.4			0	0	0	54	4.2	59.0	5	-25.6	+2.5	35.9	52
	Subtotal Leq																			44.1	60
MOS Rail North Bound Segment 2	Air Borne	81.2	80	37	25	44.7	17.3	-10.2	0	+2	+3	-18	-8.2	50	2.5	56.9	5	-25.6	+2.5	33.9	50
	Structure	56.0	80	37	25	44.7	17.3	-10.2	0	0	0	0	0	46	2.5	53.0	5	-25.6	+2.5	29.9	46
	AC	57.0	80	37	25	44.7	17.3	-10.2			0	0	0	47	4.7	51.7	5	-25.6	+2.5	28.7	45
	Subtotal Leq																			36.2	52
MOS Rail North Bound Segment 3	Air Borne	81.2	80	46	25	52.4	13.1	-11.4	0	+2	+3	-18	-10.0	47	3.2	53.3	5	-25.6	+2.5	30.3	46
	Structure	56.0	80	46	25	52.4	13.1	-11.4	0	0	0	0	0	45	3.2	51.1	5	-25.6	+2.5	28.1	44
	AC	57.0	80	46	25	52.4	13.1	-11.4			0	0	0	46	5.4	49.9	5	-25.6	+2.5	26.8	43
	Subtotal Leq																			33.4	49
MOS Rail North Bound Segment 4	Air Borne	81.2	80	56	26.2	61.8	10.1	-12.5	0	+2	+3	-0.0	-0.0	74	3.9	79.6	5	-25.6	+2.5	56.5	72
	Structure	56.0	80	56	26.2	61.8	10.1	-12.5	0	0	0	0	0	43	3.9	49.4	5	-25.6	+2.5	26.3	42
	AC	57.0	80	56	26.2	61.8	10.1	-12.5			0	0	0	44	6.2	48.2	5	-25.6	+2.5	25.1	41
	Subtotal Leq																			56.5	72
MOS Rail North Bound Sub-total Noise Level																				56.8	73
MOS Rail total Noise Level																				58.3	74

Note :

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr. + Barrier Corr. + Poor Track + Deck Reflection

Lmax (AC) = Train Lmax (AC) + Angle Corr. + Barrier Corr.

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr.

SEL (Air) = Lmax (Air) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (AC) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (Str) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

Leq = SEL + Train Freq. Corr. + Façade Corr.

Segments 1 to 3 of MOS South Bound and North Bound are single viaduct with multi-plenum system

Segments 4 of MOS South Bound and North Bound are twin viaduct with multi-plenum system at both sides. But, there is no centre plenum at this segment

Therefore, there is no multi-plenum system for the North Bound Segment 4. The edge barrier is far away from the track segment.

Deck Reflection correction (+2 dB(A)) based on assessment methodology of West Rail EIA included.

Source of AC and the reference distance used is based on assessment methodology of MOS Rail EIA.

Table C3.3a - Sample Calculation of Railway Noise at NSR 10-1 (7th Floor) with operation of MOS Rail (With Mitigation)

Track			Air		Perpendicular	Vertical	Slant				Deck		Plenum			Air	Air	Train	Train		Air
		Mitigation	Train Lmax	Speed	Distance	Distance	Distance	Angle	Angle Cor	Speed Corr.	Reflection	Poor Track	Correction	Barrier	Lmax	Distance Cor	SEL	Freq. / 30 mins	Freq. Corr	Façade	Leq 30 mins
MOS Rail South Bound Segment 1	Air Borne		81.2	80	15	25	29.2	113	-2.0	0	+2	+3	-18	-0.1	66	0.7	74.9	5	-25.6	+2.5	51.9
	Structure		56.0	80	15	25	29.2	113	-2.0	0	0	0	0	0	54	0.7	62.9	5	-25.6	+2.5	39.8
	AC		57.0	80	15	25	29.2	113	-2.0			0	0	0	55	2.9	61.6	5	-25.6	+2.5	38.6
	Subtotal Leq																				52.3
MOS Rail South Bound Segment 2	Air Borne		81.2	80	18	25	30.8	12.5	-11.6	0	+2	+3	-18	-1.1	56	0.9	64.2	5	-25.6	+2.5	41.1
	Structure		56.0	80	18	25	30.8	12.5	-11.6	0	0	0	0	0	44	0.9	53.1	5	-25.6	+2.5	30.0
	AC		57.0	80	18	25	30.8	12.5	-11.6			0	0	0	45	3.1	51.8	5	-25.6	+2.5	28.8
	Subtotal Leq																				41.7
MOS Rail South Bound Segment 3	Air Borne		81.2	80	29	25	38.3	8.1	-13.5	0	+2	+3	-18	-6.9	48	1.9	55.6	5	-25.6	+2.5	32.5
	Structure		56.0	80	29	25	38.3	8.1	-13.5	0	0	0	0	0	43	1.9	50.3	5	-25.6	+2.5	27.2
	AC		57.0	80	29	25	38.3	8.1	-13.5			0	0	0	44	4.1	49.1	5	-25.6	+2.5	26.0
	Subtotal Leq																				34.3
MOS Rail South Bound Segment 4	Air Borne		81.2	80	46	26.2	52.9	8.2	-13.4	0	+2	+3	-18	-20.0	35	3.3	41.2	5	-25.6	+2.5	18.2
	Structure	semi-	56.0	80	46	26.2	52.9	8.2	-13.4	0	0	0	0	0	43	3.3	49.0	5	-25.6	+2.5	26.0
	AC	Enclosure	57.0	80	46	26.2	52.9	8.2	-13.4			0	0	-20.0	24	5.5	27.8	5	-25.6	+2.5	4.8
	Subtotal Leq																				26.7
MOS Rail South Bound Sub-total Noise Level																					52.7
MOS Rail North Bound Segment 1	Air Borne		81.2	80	31	25	39.8	82.6	-3.4	0	+2	+3	-18	-7.1	58	2.0	65.3	5	-25.6	+2.5	42.2
	Structure		56.0	80	31	25	39.8	82.6	-3.4	0	0	0	0	0	53	2.0	60.2	5	-25.6	+2.5	37.1
	AC		57.0	80	31	25	39.8	82.6	-3.4			0	0	0	54	4.2	59.0	5	-25.6	+2.5	35.9
	Subtotal Leq																				44.1
MOS Rail North Bound Segment 2	Air Borne		81.2	80	37	25	44.7	17.3	-10.2	0	+2	+3	-18	-8.2	50	2.5	56.9	5	-25.6	+2.5	33.9
	Structure		56.0	80	37	25	44.7	17.3	-10.2	0	0	0	0	0	46	2.5	53.0	5	-25.6	+2.5	29.9
	AC		57.0	80	37	25	44.7	17.3	-10.2			0	0	0	47	4.7	51.7	5	-25.6	+2.5	28.7
	Subtotal Leq																				36.2
MOS Rail North Bound Segment 3	Air Borne		81.2	80	46	25	52.4	13.1	-11.4	0	+2	+3	-18	-10.0	47	3.2	53.3	5	-25.6	+2.5	30.3
	Structure		56.0	80	46	25	52.4	13.1	-11.4	0	0	0	0	0	45	3.2	51.1	5	-25.6	+2.5	28.1
	AC		57.0	80	46	25	52.4	13.1	-11.4			0	0	0	46	5.4	49.9	5	-25.6	+2.5	26.8
	Subtotal Leq																				33.4
MOS Rail North Bound Segment 4	Air Borne		81.2	80	56	26.2	61.8	10.1	-12.5	0	+2	+3	-0	-20.0	54	3.9	59.6	5	-25.6	+2.5	36.5
	Structure	semi-	56.0	80	56	26.2	61.8	10.1	-12.5	0	0	0	0	0	43	3.9	49.4	5	-25.6	+2.5	26.3
	AC	Enclosure	57.0	80	56	26.2	61.8	10.1	-12.5			0	0	-20.0	24	6.2	28.2	5	-25.6	+2.5	5.1
	Subtotal Leq																				36.9
MOS Rail North Bound Sub-total Noise Level																					45.7
MOS Rail total Noise Level																					53.5

Note :

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr. + Barrier Corr. + Poor Track + Deck Reflection

Lmax (AC) = Train Lmax (AC) + Angle Corr. + Barrier Corr.

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr.

SEL (Air) = Lmax (Air) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (AC) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (Str) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

Leq = SEL + Train Freq. Corr. + Façade Corr.

Segments 1 to 3 of MOS South Bound and North Bound are single viaduct with multi-plenum system

Segments 4 of MOS South Bound and North Bound are twin viaduct with multi-plenum system at both sides. But, there is no centre plenum at this segment

Therefore, there is no multi-plenum system for the North Bound Segment 4. The edge barrier is far away from the track segment.

Enclosure is proposed for North Bound Segment 4 and South Bound Segment 4.

Table C3.3b - Sample Calculation of Railway Noise at NSR 10-1 (4th Floor) with operation of MOS Rail (With Mitigation)

Track			Air		Perpendicular	Vertical	Slant				Deck		Plenum			Air	Air	Train	Train		Air
		Mitigation	Train Lmax	Speed	Distance	Distance	Distance	Angle	Angle Cor	Speed Corr.	Reflection	Poor Track	Correction	Barrier	Lmax	Distance Cor	SEL	Freq. / 30 mins	Freq. Corr	Façade	Leq 30 mins
MOS Rail South Bound Segment 1	Air Borne		81.2	80	15	25	29.2	113	-2.0	0	+2	+3	-18	-0.1	66	0.7	74.9	5	-25.6	+2.5	51.9
	Structure		56.0	80	15	25	29.2	113	-2.0	0	0	0	0	0	54	0.7	62.9	5	-25.6	+2.5	39.8
	AC		57.0	80	15	25	29.2	113	-2.0			0	0	0	55	2.9	61.6	5	-25.6	+2.5	38.6
	Subtotal Leq																				52.3
MOS Rail South Bound Segment 2	Air Borne		81.2	80	18	25	30.8	12.5	-11.6	0	+2	+3	-18	-1.1	56	0.9	64.2	5	-25.6	+2.5	41.1
	Structure		56.0	80	18	25	30.8	12.5	-11.6	0	0	0	0	0	44	0.9	53.1	5	-25.6	+2.5	30.0
	AC		57.0	80	18	25	30.8	12.5	-11.6			0	0	0	45	3.1	51.8	5	-25.6	+2.5	28.8
	Subtotal Leq																				41.7
MOS Rail South Bound Segment 3	Air Borne		81.2	80	29	25	38.3	8.1	-13.5	0	+2	+3	-18	-6.9	48	1.9	55.6	5	-25.6	+2.5	32.5
	Structure		56.0	80	29	25	38.3	8.1	-13.5	0	0	0	0	0	43	1.9	50.3	5	-25.6	+2.5	27.2
	AC		57.0	80	29	25	38.3	8.1	-13.5			0	0	0	44	4.1	49.1	5	-25.6	+2.5	26.0
	Subtotal Leq																				34.3
MOS Rail South Bound Segment 4	Air Borne		81.2	80	46	26.2	52.9	8.2	-13.4	0	+2	+3	-18	-10.3	45	3.3	51.0	5	-25.6	+2.5	27.9
	Structure		56.0	80	46	26.2	52.9	8.2	-13.4	0	0	0	0	0	43	3.3	49.0	5	-25.6	+2.5	26.0
	AC		57.0	80	46	26.2	52.9	8.2	-13.4			0	0	-0.0	44	5.5	47.8	5	-25.6	+2.5	24.8
	Subtotal Leq																				31.2
MOS Rail South Bound Sub-total Noise Level																					52.8
MOS Rail North Bound Segment 1	Air Borne		81.2	80	31	25	39.8	82.6	-3.4	0	+2	+3	-18	-7.1	58	2.0	65.3	5	-25.6	+2.5	42.2
	Structure		56.0	80	31	25	39.8	82.6	-3.4	0	0	0	0	0	53	2.0	60.2	5	-25.6	+2.5	37.1
	AC		57.0	80	31	25	39.8	82.6	-3.4			0	0	0	54	4.2	59.0	5	-25.6	+2.5	35.9
	Subtotal Leq																				44.1
MOS Rail North Bound Segment 2	Air Borne		81.2	80	37	25	44.7	17.3	-10.2	0	+2	+3	-18	-8.2	50	2.5	56.9	5	-25.6	+2.5	33.9
	Structure		56.0	80	37	25	44.7	17.3	-10.2	0	0	0	0	0	46	2.5	53.0	5	-25.6	+2.5	29.9
	AC		57.0	80	37	25	44.7	17.3	-10.2			0	0	0	47	4.7	51.7	5	-25.6	+2.5	28.7
	Subtotal Leq																				36.2
MOS Rail North Bound Segment 3	Air Borne		81.2	80	46	25	52.4	13.1	-11.4	0	+2	+3	-18	-10.0	47	3.2	53.3	5	-25.6	+2.5	30.3
	Structure		56.0	80	46	25	52.4	13.1	-11.4	0	0	0	-0	0	45	3.2	51.1	5	-25.6	+2.5	28.1
	AC		57.0	80	46	25	52.4	13.1	-11.4			0	0	0	46	5.4	49.9	5	-25.6	+2.5	26.8
	Subtotal Leq																				33.4
MOS Rail North Bound Segment 4	Air Borne		81.2	80	56	26.2	61.8	10.1	-12.5	0	+2	+3	-13	-0.0	61	3.9	66.6	5	-25.6	+2.5	43.5
	Structure	Central	56.0	80	56	26.2	61.8	10.1	-12.5	0	0	0	0	0	43	3.9	49.4	5	-25.6	+2.5	26.3
	AC	Plenum	57.0	80	56	26.2	61.8	10.1	-12.5			0	0	-0.0	44	6.2	48.2	5	-25.6	+2.5	25.1
	Subtotal Leq																				43.7
MOS Rail North Bound Sub-total Noise Level																					47.4
MOS Rail total Noise Level																					53.9

Note :

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr. + Barrier Corr. + Poor Track + Deck Reflection

Lmax (AC) = Train Lmax (AC) + Angle Corr. + Barrier Corr.

Lmax (Air) = Train Lmax (Air) + Speed Corr. + Angle Corr.

SEL (Air) = Lmax (Air) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (AC) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

SEL (Str) = Lmax (AC) + 10Log(L/V)-10Log((4D/(4D²+1))+2tan-1(1/2D))+10.5+Dist. Corr.

Leq = SEL + Train Freq. Corr. + Façade Corr.

Segments 1 to 3 of MOS South Bound and North Bound are single viaduct with multi-plenum system

Segments 4 of MOS South Bound and North Bound are twin viaduct with multi-plenum system at both sides. But, there is no centre plenum at this segment

Therefore, there is no multi-plenum system for the North Bound Segment 4. The edge barrier is far away from the track segment.

Enclosure is proposed for North Bound Segment 4 and South Bound Segment 4.

ANNEX C4

Details of Fixed Noise Impact Assessment

Appendix C4-1 – Assessment Methodology of Prediction of the Noise Impact from the Existing Pumping Station to Nearby Noise Sensitive Receivers

The theoretical Sound Power Level (SWL) at the source was calculated by the following equation:

$$\mathbf{SWL, dB(A) = SPL + 20 * \log D + 8}$$

where SPL = Sound Pressure Level, the averaged noise level measured at distance D
D = the distance from noise measurement point to the Source.

The SWL values have been taken to represent the source characteristics of the site. The noise from the pumping station was measured at 3m from the air vents.

A distance correction of - (20 log D_1 + 8) dB has been added to the SWL, in order to predict the noise level just outside the facade of the NSR. D_1 is the interventing distance between the point source and the NSR.

A facade correction of +3 dB has been added to the SWL to account for the facade reflection effect just outside the NSR.

In summary, the predicted noise level (PNL) was calculated using the formula :

$$\mathbf{PNL = CNL - (20 \log D + 8) + 3}$$

where CNL = Corrected Noise Level
D = the distance from the Source to the proposed noise sensitive receivers.

Appendix C4-2 – Assessment Methodology for Prediction of Noise Impact from the Proposed Fixed Noise Sources to Nearby Noise Sensitive Receivers

The theoretical Sound Power Level (SWL) at the source was calculated by the following equation:

SWL, dB(A) = SPL + 20 log D + 8

Where
SPL = Sound Pressure Level, the averaged noise level measured at distance D
D = the distance from the Source to the proposed noise sensitive receivers.

A distance correction of - (20 log D_1 + 8) dB(A) has been added to the SWL, in order to predict the noise level just outside the façade of the NSR. D_1 is the intervening distance between the point source and the NSR. In this case, D_1 is the shortest possible horizontal distance from identified NSRs to the noise sources.

A façade correction of +3 dB(A) has been added to the SWL to account for the façade reflection effect just outside the NSR.

In summary, the Maximum Allowable Total Sound Power Level was calculated using the following formula:

PNL = CNL (or SWL in this case) – (20 log D + 8) + 3

Where
CNL = Maximum Allowable Total Sound Power Level at the Fixed Noise Source in this case
PNL = Noise Limit – 5 dB(A), i.e. Night time noise level based on ASR 'B' (55 dB(A) – 5 dB(A) = 50 dB(A)).

i.e.
CNL = PNL + (20 log D + 8) - 3

Appendix C4 - Fixed Noise Source Calculation

Table C4.1 : Predicted Fix Noise Impact of the Existing Sewerage Pumping Station at Lee On Estate on the Proposed Wu Kai Sha Development

Existing Sewage Pumping Station

Distance for Noise Measurement		Dist. Corr.	Averaged Measured Noise Level	Predicted Noise Level generated by the Pumping Station		
3		17.5	65.2 dB(A)	82.7 dB(A)		
NSR	Dist. #	Dist. Corr.	Pumping Staion Noise Level	Predicted Noise Level at the NSR ^	Acceptable Noise Level *	Exceed or Not?
10	70	44.9	82.7 dB(A)	40.8 dB(A)	50.0 dB(A)	Not

Table C4.2 : Predicted Maximum Allowable Noise Levels for the Proposed Fixed Noise Sources

NSR	Dist. #	Dist. Corr.	Acceptable Noise Level *	Max. Allowable Noise Level ^
MOS Wu Kai Sha Station - Public Announcement System				
6	75	45.5	50 dB(A)	92.5 dB(A)
10	14	30.9	50 dB(A)	77.9 dB(A)
18	90	47.1	50 dB(A)	94.1 dB(A)
Proposed Salt Water Pumping Station west to the Whitehead Site 2				
24	6	23.6	45 dB(A)	65.6 dB(A)
Indoor Recreation Centre - Ventilation System				
5	120	49.6	60 dB(A)	106.6 dB(A)
Commercial Centre - Ventilation System				
18	6	23.6	60 dB(A)	80.6 dB(A)

Note :

* : Area Sensitivity Rating "B" is applied for area adjacent to Sai Sha Road, such as Wu Kai Sha Station Development, southern part of Lok Wo Sha Development
As the IRC and Commercial Centre will only operate from 0700 to 2300, daytime and evening noise criterion is applied for these two facilities
Area Sensitivity Rating "A" is applied for the area in Whitehead area, such as Northern part of Lok Wo Sha Development and Whitehead Development Site 1 to 3

: Shortest Distance between the proposed noise source and the affected representative NSR

^ : 3 dB(A) façade correction has been considered in the Calculation