BOUYGUES TRAVAUX PUBLICS

Contract No. HY/2018/08
Central Kowloon Route – Central Tunnel

PROJECT PLAN

CONSTRUCTION NOISE MITIGATION MEASURES PLAN

DOCUMENT REFERENCE NUMBER:

HKCKR	-	BTP	-	PLN	-	GEN	-	OMS	-	000012	-	G
Project Code		Issuer Code		Doc. Type		Location		Subject		Sequential No.		Rev

	Prepared by:	INTERNAL REVIEW AND APPROVAL			
		Review by:		Endorsed by:	Approved by:
COMPANY	BYTP	BYTP	BYTP	BYTP	BYTP
NAME	Alex CHAN	Simon WONG	Ludovic JEANNE	Victor AU-YEUNG	Alan KAM
POSITION	Environmental Officer	Environmental Manager	Method Manager	General Construction Manager	Project Manager
SIGNATURE					
DATE	27 Sep 2021	4 Oct 2021	4 Oct 2021	5 Oct 2021	7 Oct 2021

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Date 5 October 2021
Our Ref. MCL/ED/0394/2021/C

Bouygues Travaux Publics
3/F, 510 King's Road,
Island Place Tower, North Point,
Hong Kong

Attn: Mr. Simon Wong

Dear Sir,

Consultancy Agreement No. CA001
Environmental Team for Central Kowloon Route – Central Tunnel
(Environmental Permit (EP) No. EP-457/2013/D)
Contract No. HY/2018/08 – Certification of Construction Noise Mitigation Measure Plan

We refer to the submission of Construction Noise Mitigation Measure Plan (Rev. G) for Central Kowloon Route – Central Tunnel received on 5 October 2021.

We have no comment on the plan and hereby certify it in accordance with Clause 2.9 of the Environmental Permit (EP No.: EP-457/2013/D).

Should you have any queries, please contact our Mr. Cyrus Lai at 3565-4442 or the undersigned at 3565-4371.

Yours faithfully,
for and on behalf of
FUGRO TECHNICAL SERVICES LIMITED

David Hung
Environmental Team Leader

路政署
HIGHWAYS DEPARTMENT
主要工程管理處
MAJOR WORKS PROJECT MANAGEMENT OFFICE

ERM

Environmental Permit No. EP-457/2013/D

Central Kowloon Route

Independent Environmental Checker Verification

Works Contract:	**Central Tunnel (HY/2018/08)**

Reference Document/Plan

~~Document~~/Plan to be ~~Certified~~/ Verified:	Construction Noise Mitigation Measure Plan
Date of Report:	5 October 2021 (Rev. G)
Date received by IEC:	5 October 2021

Reference EP Condition

Environmental Permit Condition: 2.9

To further reduce the air-borne construction noise impacts on Yau Ma Tei Catholic Primary School (Hoi Wang Road), Tak Cheong Building, Prosperous Garden Block 1, The Coronation Tower 1, Ko Fai House of Kwun Fat Court, Grand Waterfront Tower 3 and Hang Chien Court Block J, the Permit Holder shall, no later than one month before the commencement of construction of the corresponding component(s) of the Project, submit to the Director for approval four hard copies and one electronic copy of an updated Construction Noise Mitigation Measure Plan (CNMMP). The plan shall include:-

(a) a schedule of construction works to be carried out at the works areas of the Project within 300m from the NSRs;
(b) an updated construction methodology of the construction works;
(c) an updated powered mechanical equipment (PME) list for the construction works;
(d) an updated proposal of air-borne construction noise mitigation measures for the Noise Sensitive Receivers as mentioned above, including the provision of noise barriers, enclosures;
(e) other initiatives proposed by the Permit Holder; and
(f) an updated prediction of noise levels in accordance with the above updated information and mitigation proposals in place.

Before submission to the Director, the CNMMP shall be certified by the ET and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report. The approved CNMMP shall be fully and properly implemented.

IEC Verification

I hereby verify that the above referenced ~~document~~/plan complies with the above referenced condition of EP-457/2013/D.

Ms Mandy To

Independent Environmental Checker

Date: 5 October 2021

Our ref: 0436942_IEC Verification Cert_CT_CNMMP_20211005.docx

DOCUMENT STATUS

Revision History

Revision	Rev. Date	Coverage	Sections	Summary of Revision
A	23 Sep 2019	Ho Man Tin Shaft Worksite	All	Updated issue for approval
B	26 Sep 2019		Sec 2.1, 2.4, 5.1.3, 5.1.8, Table 1, Table 4, Table 5, Table 7, Annex B, Annex E, Annex F,	Address ET comments given on 25 Sep 2019
			Sec 1.1.1, 2.4, 3.2.3, 5.1.8, Table 1, Table 4, Table 7, Annex E, Annex F	Address IEC comments given on 25 Sep 2019
C	26 Sep 2019		Sec 2.4	Address ET comments given on 26 Sep 2019
			Sec 2.4, Table 1, Table 4, Sec 5.1.8, Annex E	Address IEC comments given on 26 Sep 2019
D	24 Jun 2020		Sec 5.1.8, 6.2, Table 1, Table 5 Sec 5.1.6, Table 1, Table 4, Annex F	Address EPD comments given on 17 Apr 2020 Address ET and IEC comments given on 23 and 24 Jun 2020
E	19 Mar 2021		Sec 5.1.6	Address EPD comments given on 21 Oct 2020
	15 Apr 2021		Table 5, Table 6, Annex F Annex D, Annex G	Address IEC comments given on 30 Mar 2021 Noise enclosure is proposed to replace the noise cover
	16 Apr 2021		Table of Content, S5.1.6	Address IEC comments given on 16 Apr 2021
F	12 Jul 2021	Ho Man Tin Shaft Worksite, Yau Ma Tei Shaft Worksite & Ma Tau Kok Shaft Worksite	All	Cover all three works area and address comments from EPD, IEC and ET.
G	18 Aug 2021	Ho Man Tin Shaft Worksite, Yau Ma Tei Shaft Worksite & Ma Tau Kok Shaft Worksite	HMTS: Table 1, Table 4 YMTS: Table 5, Table 6	Address EPD comments given on 11 Aug 2021 Address IEC comments given on 8 Aug 2021 and 4 Oct 2021.

BOUYGUES
TRAVAUX PUBLICS

Contract No. HY/2018/08
Central Kowloon Route – Central Tunnel

PROJECT PLAN

CONSTRUCTION NOISE MITIGATION MEASURES PLAN

(Ho Man Tin Shaft Worksite)

TABLE OF CONTENT

1. INTRODUCTION

1.1 Project Description

1.1.1 Following the completion of Contract HY/2014/09, CKR-HMTS construction site was taken over by Bouygues Travaux Publics (BYTP). BYTP was commissioned by the Highway Department of the HKSAR as the Main Contractor for the Contract HY/2018/08. This Construction Noise Mitigation Measure Plan (CNMMP) is updated based on the approved CNMMP for CKR-HMTS under CKR-CT Contract.

1.1.2 Highways Department (HyD) commissioned the Design and Construction Assignment for the Central Kowloon Route in Jun 1998. CKR is a duel 3-lane trunk road across central Kowloon linking the West Kowloon in the west and the proposed Kai Tak Development (KTD) in the east. The CKR will be about 4.7km long with an underground tunnel section of about 3.9km long, in particular, there will be an underwater tunnel of about 370m long in Kowloon Bay to the north of the To Kwa Wan Typhoon Shelter. It will connect the West Kowloon Highway at Yau Ma Tei Interchange with the road network at Kowloon Bay and the future Trunk Road T2 at KTD which will connect to the future Tseung Kwan O – Lam Tin Tunnel (TKO-LTT) and Cross Bay Link (CBL). CKR, Trunk Road T2 and TKO-LTT will form a strategic highway link, namely Route 6, connecting West Kowloon and Tseung Kwan O. Consultancy studies for Trunk Road T2, TKO-LTT and CBL have been commissioned by CEDD. In addition, 3 ventilation buildings, which will be located in Yau Ma Tei, Ho Man Tin and ex-Kai Tak airport area, are proposed to ensure acceptable air quality within the tunnel.

1.1.3 The Central Kowloon Route – Design and Construction Environmental Impact Assessment Report (Register No.: AEIAR-171/2013) was approved with conditions by the Environmental Protection Department (EPD) on 11 July 2013. An Environmental Permit (EP) (No. EP-457/2013) was issued on 9 Aug 2013. Variations of EP (VEP) was subsequently applied for and the latest EP (EP-457/2013/C) was issued by EPD on 16 Jan 2017.

1.1.4 Contract HY/2014/09 was completed on 19 September 2019. The Environmental Team of Contract HY/2018/08 shall continue the EM&A impact monitoring at the noise monitoring station (M-N3) - SKH Tsoi Kung Po Secondary School from 20 September 2019.

1.1.5 The activities planned for the Ho Man Tin Access Shaft (HMTS) under the EP include:

- Construction of diaphragm wall,
- Foundation for the ventilation building,
- Construction of cavern and temporary adit under the shaft, and
- Construction of Eastbound and Westbound of the main tunnels towards Yau Ma Tei East Access Shaft (YMTE) and Ma Tau Kok West Access Shaft (MTKW).

The overall layout plan of Central Tunnel and HMTS are enclosed in Annex A.

1.1.6 It is anticipated that the Contractors of Yau Ma Tei East (YMTE) and Ma Tau Kok West (MTKW) will hand over their sites to BYTP in April 2020 and Jan 2021 respectively. BYTP will update this CNMMP accordingly in due course.

1.1.7 Condition 2.9 of the EP No. EP-457/2013/C stipulated that to further reduce the air-borne construction noise impacts on Ko Fai House of Kwun Fai Court (NSR), the Permit Holder shall,

no later than one month before commencement of the construction of the corresponding component(s) of the Project, submit four hard copies and one electronic copy of an updated CNMMP to the Director of EPD for approval. The plan shall include:

(a) A schedule of construction works to be carried out at the works areas of the Project within 300m from the NSRs;
(b) An updated construction methodology of the construction works;
(c) An updated Power Mechanical Equipment (PME) list for the construction works;
(d) An updated proposal of air-borne construction noise mitigation measures for the identified NSR (Ko Fai House), including the provision of noise barriers, enclosures;
(e) Other activities proposed by the Permit Holder; and
(f) An updated prediction of noise levels in accordance with the above updated information and mitigation proposals in place.

1.1.8 The CNMMP will be reviewed upon the proposed change of construction methods or materials. The updated PME listed in Table 1 represented the worst-case scenario which is practicable for completing the works required by the Contract within the scheduled timeframe.

2. CONSTRUCTION WORKS / ACTIVITIES OF THE PROJECT

2.1 Construction works will be commenced in late Oct 2019 and expected to be completed in early 2024. The programme for the construction works described in above Section 1.1.5 are presented in Annex B.

2.2 The proposed construction works will generally follow the methodologies recommended in Chapter 3 of the approved EIA report. Drill and Blast methodology will be adopted for the construction of adit, cavern and main tunnel.

2.3 Application of electronic detonator will be adopted for blasting in certain tunnel sections. Electronic detonator was widely used in other tunnel projects in Hong Kong (HATS, WIL, XRL and TKO-LTT). Comparing to the traditional shock tube detonator system, qualitative review revealed that the improved design of electronic detonator can (1) eliminate the likelihood of failure caused by human errors and (2) provide a reliable control of ground vibration thus less ground-borne noise disturbance to the public is anticipated.

2.4 A summary of PME proposed for the construction works is shown in Table 1. The respective Sound Power Level (SWL) of the PME can be obtained from:

(1) EPD's Technical Memorandum on Noise from Construction Work Other than Percussive Pilling.
(2) List of SWLs of other commonly used PME or
(3) British Standard 5228 – Part 1:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites.

As recommended in the EIA report, quiet equipment and adjustment in utilization rates should be adopted according to Appendix 5.4 of the EIA report to minimize the noise impact to the NSRs. Extra PME have been proposed to take account the latest construction programme and PME inventory in addition to the quiet PME proposed in the EIA report.

Table 1: Summary of PME proposed for construction works

PME (% Operation)	Reference	SWL, dB(A)*
Air blower (100%)	CNP 006	95
Air Compressor (50%)	CNP 002	99
Water Pump, submersible (electric) (100%)	CNP 283	85
Aerial work platform, working height ≤ 13m (50%)	BS5228 Table C.4	92
Grout mixer (50%)	CNP 105	87
Grout pump (50%)	CNP 106	102
Concrete Mixer (50%)	CNP 045	93
Concrete Lorry Mixer (30%)	CNP 044	104
Shotcreting machine (50%)	BS5228 Table D.6/13	105
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102
Light good vehicle < 5.5 tonne (50%)	CNP 143	98
Loader, wheeled (50%)	CNP 081	109
Piling, vibrating hammer (50%)	CNP 172	112
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102
Piling, diaphragm wall, hydraulic extractor (100%)	CNP 163	90

PME (% Operation)	Reference	SWL, dB(A)*
Ventilation fan (100%)	CNP 241	108
Excavator, tracked (50%)	EPD-07059	103
Breaker, excavator mounted (hydraulic) (50%)	BS5228 Table D.8/13	107
Rock drill, (hydraulic) (50%)	SIL EIA#	105
Mobile crane (50%)	EPD-09573	99

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** Noise data refers to the Quiet Plant in Appendix 5.4 and Appendix 5.6a of the CKR EIA report.*

Sound Power Level refers to EPD website (Sound Power Level of other commonly used PME)

BS5228 – Code of practice for noise and vibration control on construction and open sites, and the Technical Memorandum on Noise from Construction Work Other than Percussive Piling (GW-TM) under the Noise Control Ordinance.

*** Series of this kind of PME with same or lower SWL will be adopted.*

 # Reference to Approved South Island Line (East) EIA

3. ASSESSMENT CRITERIA AND METHODOLOGY

3.1 Assessment Criteria

3.1.1 Noise impacts arising from the construction works at HMTS are assessed in accordance with the criteria given in the Technical Memoranda under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment. The daytime construction noise criteria are listed in Table 2.

Table 2: Daytime construction noise criteria

Use	Acceptable Noise Level in Leq (30-min), dB(A)
Residential	75
Educational Institute (Examination Period)	70 (65)

3.2 Assessment Methodology

3.2.1 Construction noise assessment was carried out according to the methodology adopted in the EIA report. The utilization rate for each PME was estimated individually for the corresponding activity to ensure it is practical and consistent with the assumptions made in the EIA report.

3.2.2 BYTP confirmed that the programme and plant inventory are reasonable and practicable allowing the completion of works within the schedule timeframe.

3.2.3 All mitigation measures and their effectiveness evaluated in the EIA report including adoption of quiet PME, percentage on-time for each PME, movable noise barrier and noise enclosure for the PME were considered in this CNMMP. Details of acoustic materials to construct the noise enclosure are enclosed in Annex G.

3.2.4 To predict the noise level, PME are divided into groups required for each respective construction task. The purpose is to identify the worst-case scenario representing those PME that will be in use concurrently at any time. The total Sound Pressure Level (SPL) of each construction task at the identified NSR is calculated according to the Sound Power Level (SWL) of each PME and the distance attenuation to the NSR. If more than one construction task will be carried out concurrently, the total SPL is predicted by adding up all SPL of concurrent construction tasks in logarithmic scale.

3.2.5 Tunnel works will involve alternating cycles from drilling to mucking out. Therefore, tunnel excavation activities will be operated in sequence rather than concurrently.

3.2.6 A positive 3dB(A) façade correction is added to the predicted noise level to account for the façade effect at the NSR.

4. NOISE SENSITIVE RECEIVERS

4.1 According to Condition 2.9 of the EP, Ko Fai House of Kwun Fai Court was identified as a representative NSR for the assessment. In this CNMMP, other NSRs identified in the EIA report will also be assessed. The predicted noise levels at the identified NSRs are summarized in Table 3. The noise assessment in EIA report revealed that exceedance of 5dB(A) will be anticipated during the examination period of SKH Tosi Kung Po Secondary School.

Table 3: Summary of mitigated noise level predicted at the identified NSRs in EIA report

NSR ID	NSR Description	Uses	Criterion *[1]* dB(A)	Max. Mitigated Noise *Level [2]* dB(A)	Exceedance *[3]* dB(A)
M-N1	Kar Man House, Oi Man Estate	R	75	66	-
M-N2	Carmel on the Hill	R	75	63	-
M-N3	SKH Tsoi Kung Po Secondary School	E	70(65)	**70**	1 month (Jan/Feb 2018) (5dB(A)) 2 months (Jun 2018, Jan 2019) (1-4dB(A))
M-N4	Man Fuk House Block A	R	75	63	-
M-N5	Cascades Block A	R	75	63	-
M-N6	Ko Fai House, Kwun Fai Court	R	73	73	-
M-P3	Ultima	R	75	75	-

[1] Values in parentheses indicate the noise criterion during examination period of educational institution
[2] Bolded values mean exceedance of the relevant noise criteria.
[3] The normal examination period of M-N3 are schedule in January and June. In 2018, there are 2 days examinations will be held on 01 and 02 Feb 2018 (Refer to Appendix .5.6F of the EIA report).

4.2 The locations of identified NSRs are shown in Figure 1:

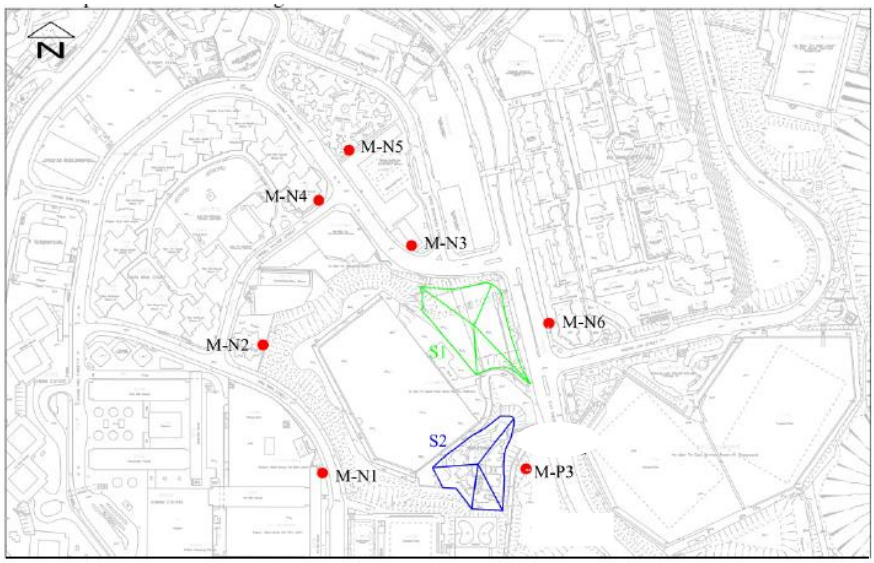


Figure 1: Location plan of identified NSRs

Photos of identified NSRs are presented in Annex C

5. ASSESSMENT OF CONSTRUCTION NOISE IMPACT

5.1 Mitigation Measures

5.1.1 The mitigation measures proposed in the EIA report will be adopted, i.e. Erection of movable barrier and noise enclosure. PME with adopted mitigation measures are summarized in Table 4.

5.1.2 Noise reduction of 5dB(A) is proposed for the movable barrier for the PME operating at surface.

5.1.3 All PME for tunnel excavation shall be operated at the shaft bottom (107m below the ground level) with a noise enclosure covering the shaft. In this case, the barrier effect proposed for the PME operating inside the shaft is 15dB(A).

5.1.4 A 62m x 32m and 24m (H) noise enclosure was constructed for the PME operating inside access shaft. The noise enclosure was basically constructed with (i) four side walls and a top cover, (ii) acoustic doors for the PME access, (iii) openings for ventilation purpose and (iv) lobby house for man access. Details of the noise enclosure are presented in Annex D. PME with proposed mitigation measures are summarized in Table 4.

Table 4: Summary of PME with proposed mitigation measures

PME (% Operation)	Proposed Mitigation Measures	Noise Reduction, dB(A)
Air blower (100%)	Noise enclosure	15 (Tunnel)
Air Compressor (50%)		
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Grout pump (50%)		
Grout mixer (50%)		
Shotcreting Machine (50%)		
Light good vehicle < 5.5 tonne (50%)		
Loader, wheeled (50%)		
Ventilation fan (100%)		
Excavator, tracked (50%)		
Breaker, excavator mounted (hydraulic) (50%)		
Rock drill, crawler mounted (hydraulic) (50%)		
Air Compressor (50%)	Movable barrier	5 (Surface)
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Concrete Mixer (100%)		
Concrete Lorry Mixer (30%)		
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)		
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)		
Mobile crane (50%)		
Piling, vibrating hammer (50%)		
Piling, diaphragm wall bentonite filtering plant (50%)		
Piling, diaphragm wall, hydraulic extractor (50%)		

5.1.5 According to the construction programme, noise assessments at the NSRs with implementation of proposed mitigation measures are presented in Annex E. The cumulative noise assessment to each NSR due to the concurrent construction activities are presented in Annex F. The cumulative noise levels are summarized in Table 5.

Table 5: Summary of cumulative noise levels at the NSRs (Mitigated)

NSR ID	NSR Description	Uses	Criterion *[1]* dB(A)	Mitigated Noise Level *[2]* dB(A)	Exceedance dB(A)	Exceedance Duration/Months
M-N1	Kar Man House, Oi Man Estate	R	75	53 - 59	-	-
M-N2	Carmel on the Hill	R	75	53 - 59	-	-
M-N3	SKH Tsoi Kung Po Secondary School	E	70 (65)	62-68 (62-63)	-	-
M-N4	Man Fuk House Block A	R	75	54 – 60	-	-
M-N5	Cascades Block A	R	75	53 – 59	-	-
M-N6	Ko Fai House, Kwun Fai Court	R	75	64 - 70	-	-
M-P3	Ultima	R	75	57 - 63	-	-

[1] Values in parentheses indicate the noise criterion during examination period of educational institution.
[2] Values in parentheses indicate the mitigated noise level during examination period.

5.1.6 The examination period of SKH Tsoi Kung Po Secondary School will be as follows:

- 18th -30th Oct 2019
- 6th Jan 2020 – 11th Feb 2020
- 20th -25th Mar 2020
- 3rd -18th Jun 2020
- 29th Jun 2020 – 6th Jul 2020
- Jan-Apr 2021, Jul 2021

To avoid the exceedance during the examination period, BYTP shall closely liaise with the school for re-arrangement of noisy construction activity or minimizing operation of PME during the examination period. Apart from the EM&A impact monitoring carried out by the ET, BYTP shall carry out additional noise monitoring during the examination period.

In case of non-compliance with the construction noise criteria, ET shall continue to carry out the impact monitoring until the exceedance is rectified or demonstrated to be unrelated to the construction activities.

BYTP will carry out the following noise abatement measures during the examination periods:

- Implement good site practices, such as re-schedule the noisy construction activities and to limit noise emission at the sources;
- Provide movable noise barrier as practicable as possible for the mobile PME, such as excavator, breaker, mobile crane, concrete lorry mixer, etc.;
- Relocate mobile PME as far as possible from the school;
- Turn off all idle equipment and deploy Quality Powered Mechanical Equipment (QPME).

5.1.7 The potential noise impacts at the identified NSRs due to the construction works at HMTS are updated in Table 6.

Table 6: Updated mitigated construction noise impact at the identified NSRs

NSR	Noise Criteria dB(A)	EIA Prediction			CNMMP Prediction		
		Max Noise Level dB(A)	Exceedance Duration (Month)		Max Noise Level dB(A)	Exceedance Duration (Month)	
			1-4 dB(A)	5 dB(A)		1-4 dB(A)	5 dB(A)
M-N1	75	66	-	-	59	-	-
M-N2	75	63	-	-	59	-	-
M-N3	70	70	-	-	68	-	-
M-N4	75	63	-	-	60	-	-
M-N5	75	63	-	-	59	-	-
M-N6	75	73	-	-	70	-	-
M-P3	75	75	-	-	63	-	-

The potential noise impact at the NSR M-N3 SKH Tsoi Kung Po Secondary School) is updated in Table 7.

Table 7: Updated mitigated construction noise impact at NSR M-N3 during the examination period

NSR	Noise Criteria dB(A)	EIA Prediction			CNMMP Prediction		
		Max Noise Level, dB(A)	Exceedance Duration (Month)		Max Noise Level dB(A)	Exceedance Duration (Month)	
			1-4 dB(A)	5 dB(A)		1-4 dB(A)	5 dB(A)
M-N3	65	70	2 Jun 2018 Jan 2019	1 Jan/Feb 2018	63	-	-

5.1.8 With the implementation of the above-mentioned measures, there is no residual impact predicted at all residential NSRs and school during normal school days. To ensure there is no exceedance, the proposed PME (Piling, vibrating hammer) will not be operated during the examination period. From the CNMMP prediction, no noise exceedance is predicted at M-N3. In other words, the construction noise impact predicted from the CNMMP is reduced in respect of the level of exceedance.

5.1.9 This CNMMP is updated to review the potential noise impact on the NSR M-N3 (School schedule is only available up to August 2021).

6. CONCLUSION

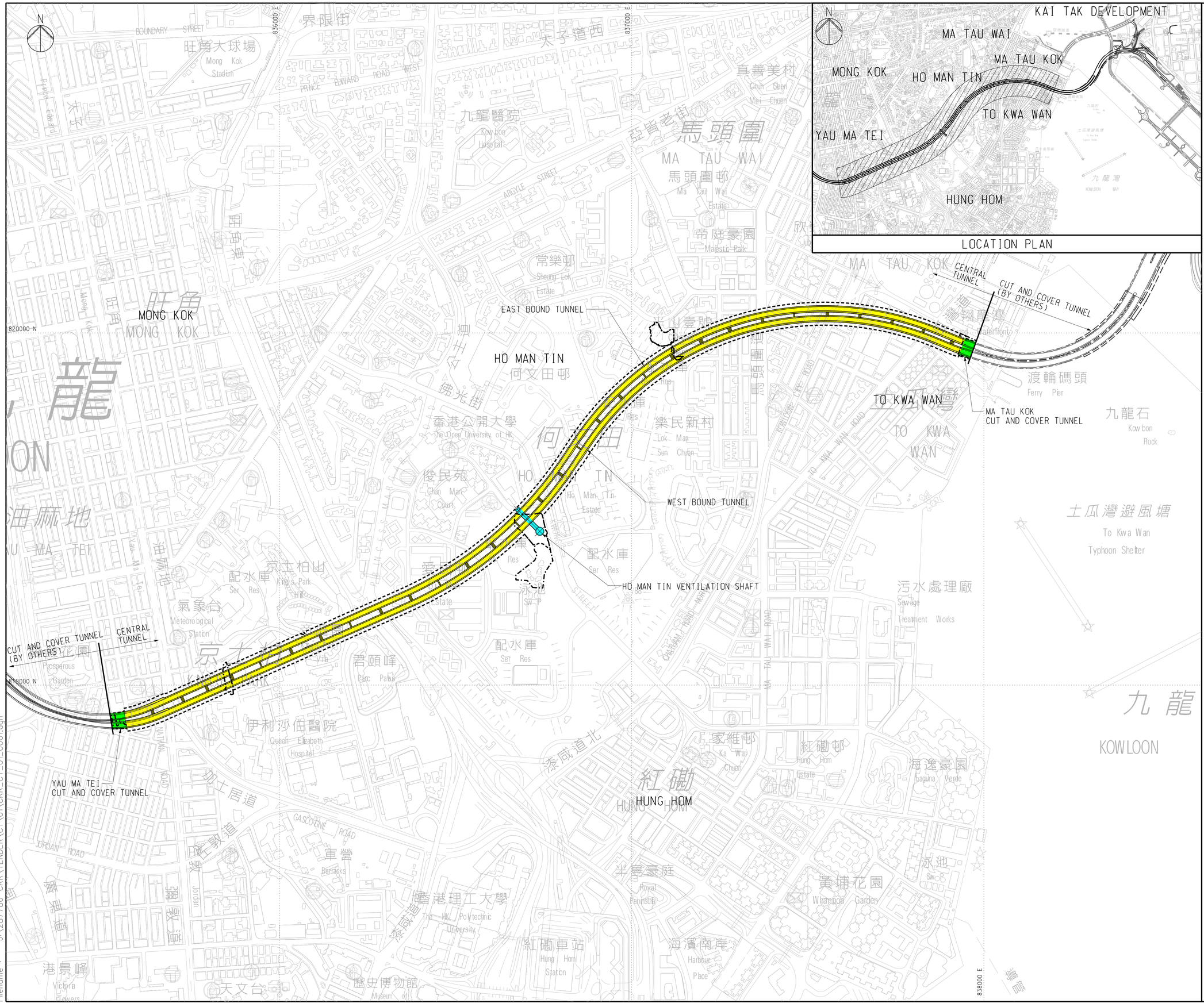
6.1 This CNMMP predicted the construction noise impact arising from the Ho Man Tin Access Shaft construction site to the identified NSRs. This plan has updated the information on PMEs and works programme which will be adopted by Bouygues Travaux Publics. The proposed mitigation measures including use of quiet QPME, movable barriers and noise enclosure will be implemented.

6.2 From the CNMMP prediction, no noise exceedance is predicted at the M-N3 during the examination period. The construction noise impact would be reduced in terms of duration when comparing the CNMMP prediction to the EIA prediction.

6.3 Subsequent review and update of this plan will be performed during the construction phase and liaison with the affected parties will be carried out to minimize the construction noise impact as far as practicable. Attention will be paid to the construction activities which are predicted to give noise exceedances. Appropriate mitigation measure such as re-arrangement of noisy activities during the examination period of the SKH Tsoi Kung Po Secondary School shall be implemented when necessary.

Annex A

Layout Plan of CKR-CT and Ho Man Tin Access Shaft Construction Site



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. CKR/CT/01/0002 TO 0014 AND 0021 TO 0034 FOR BOUNDARY OF THE SITE AND SETTING OUT PLAN RESPECTIVELY.

LEGEND:

- BOUNDARY OF THE SITE (ABOVE GROUND)
- BOUNDARY OF THE SITE (UNDERGROUND)
- PROPOSED CENTRAL TUNNEL
- PROPOSED CUT AND COVER TUNNEL
- PROPOSED HO MAN TIN VENTILATION ADIT

Rev. 修訂	Description 內容摘要	By 設計	Date 日期
00	ISSUE FOR TENDER	JC	12/18

ARUP MOTT MACDONALD
Arup-Mott MacDonald Joint Venture

Project title 工程名稱
Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Drawing title 圖紙名稱
PROJECT LAYOUT KEY PLAN

Drawing no. 圖紙編號	Rev. 修訂
CKR/CT/01/0001	00

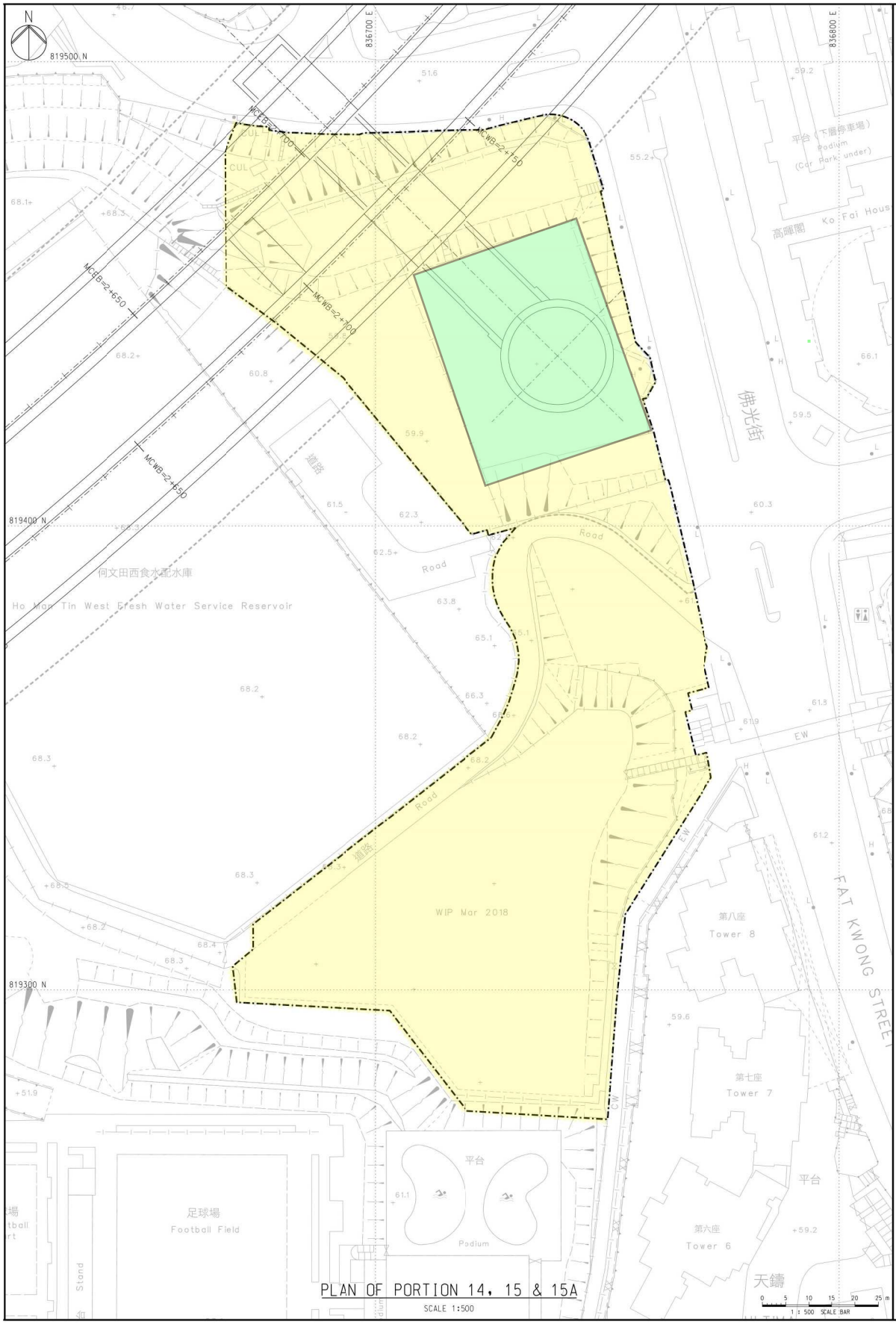
Drawn By 繪圖	Checked By 復核	Approved By 批准人
JL	AC	RC

Scale 比例: 1:5000 @ A1
Status 階段: TENDER

路政署 HIGHWAYS DEPARTMENT
主要工程管理處 MAJOR WORKS PROJECT MANAGEMENT OFFICE

Printed by : 12/13/2018
Filename : J:\287786-CKR\TENDER\CT\01\CKR_CT_01_0001.dgn

Site boundary of Ho Man Tin Access Shaft Construction Site



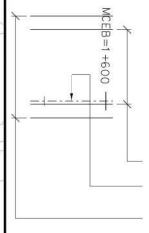
NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. CKR/CT/01/0021 TO CKR/CT/01/0033.
2. ALL CHAINAGES ARE IN METRES.
3. ALL LEVELS ARE IN m RELATIVE TO PRINCIPAL DATUM.
4. COORDINATES ARE RELATIVE TO HONG KONG METRIC GRID (1980).
5. FOR LONGITUDINAL PROFILE OF ALIGNMENTS REFER TO DRAWING NOS. CKR/CT/88/3011 TO CKR/CT/88/3020.
6. FOR SETTING OUT DATA REFER TO DRAWING NOS. CKR/CT/01/0021 AND CKR/CT/01/0031.
7. MCEB AND MCWB STAND FOR MASTER CONTROL EASTBOUND AND MASTER CONTROL WESTBOUND RESPECTIVELY.

LEGEND:

BOUNDARY OF THE SITE (GROUND LEVEL)

BOUNDARY OF THE SITE (UNDERGROUND)



Noise enclosure

Rev. 修訂	Description 內容摘要	By 設計	Date 日期
00	ISSUE FOR TENDER	AL	12/18

ARUP M MOTT MACDONALD
Arup-Mott MacDonald Joint Venture

Project title 工程名稱
Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Drawing title 圖紙名稱
BOUNDARY OF THE SITE AND SITE LAYOUT PLAN AT GROUND LEVEL
(SHEET 2 OF 3)

Drawing no. 圖紙編號	Rev. 修訂
CKR/CT/01/0013	00

Drawn By 繪圖	Checked By 復核	Approved By 批准人
-IK	AC	RC

Scale 比例	Status 階段
1:500 @ A1	TENDER

路政署 HIGHWAYS DEPARTMENT
主要工程管理處 MAJOR WORKS PROJECT MANAGEMENT OFFICE

Annex B

Construction Programme

Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

HMTS Major Works Programme

item	Description of Works	Duration	Calendar Year / Month
			2019: Sep Oct Nov Dec
			2020: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
			2021: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
			2022: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
			2023: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1	Ventilation Building Foundation	7 months	
2	Tunnel Excavation (Adit, Cavern & Main Tunnel)	39 months	
3	Construction of Diaphragm Wall	9 months	

Annex C

Photo of Identified NSRs

CKR – Central Portion

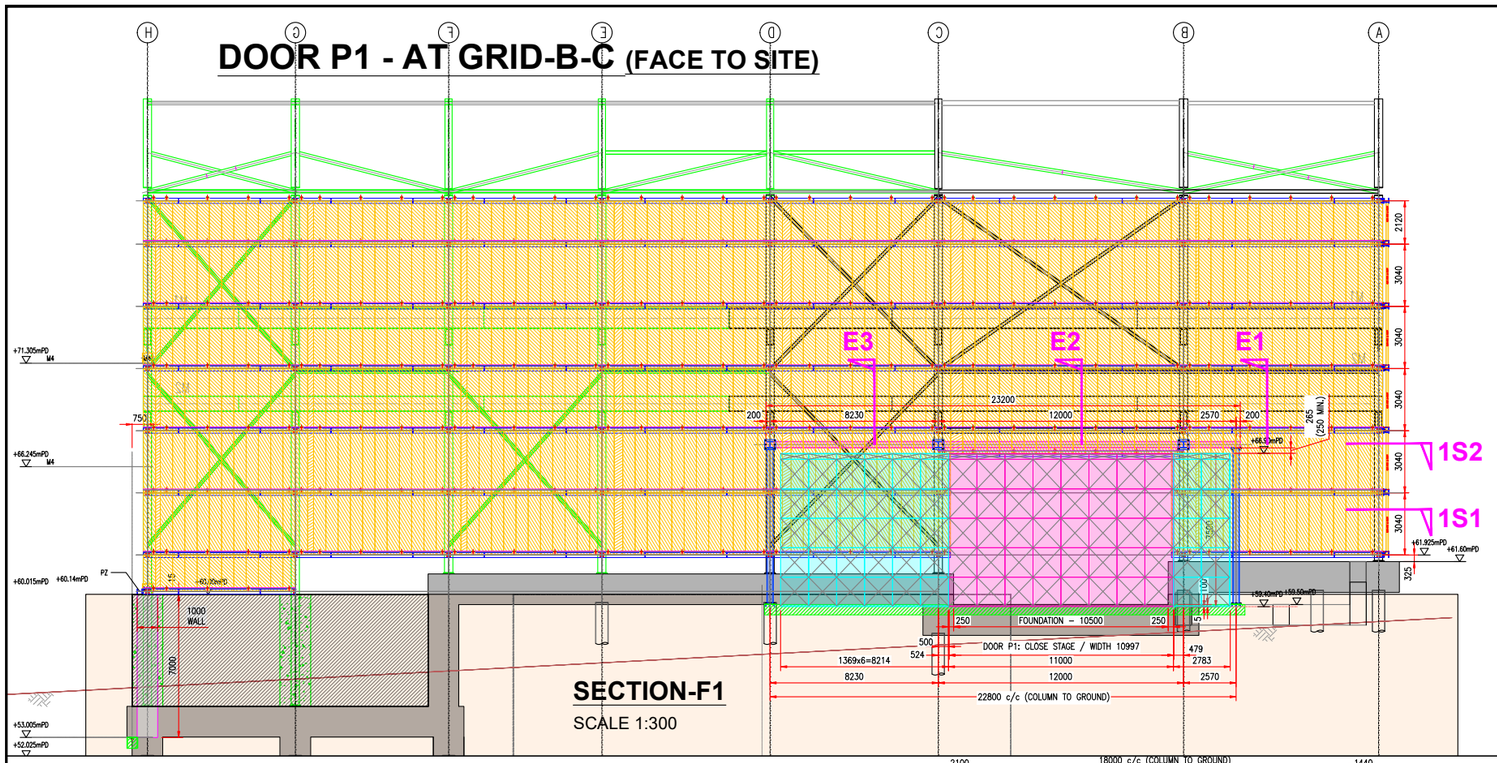
NSR No.	Location	Photo
CKR – Central Portion		
M-N1	Kar Man House, Oi Man Estate	
CKR – Central Portion		
M-N2	Carmel on the Hill	
CKR – Central Portion		
M-N3	SKH Tsoi Kung Po Secondary School	

NSR No.	Location	Photo
CKR – Central Portion		
M-N4	Man Fuk House Block A	
CKR – Central Portion		
M-N5	Cascades Block A	
CKR – Central Portion		
M-N6	Ko Fai House, Kwun Fai Court	
M-P3	Ultima	

Annex D

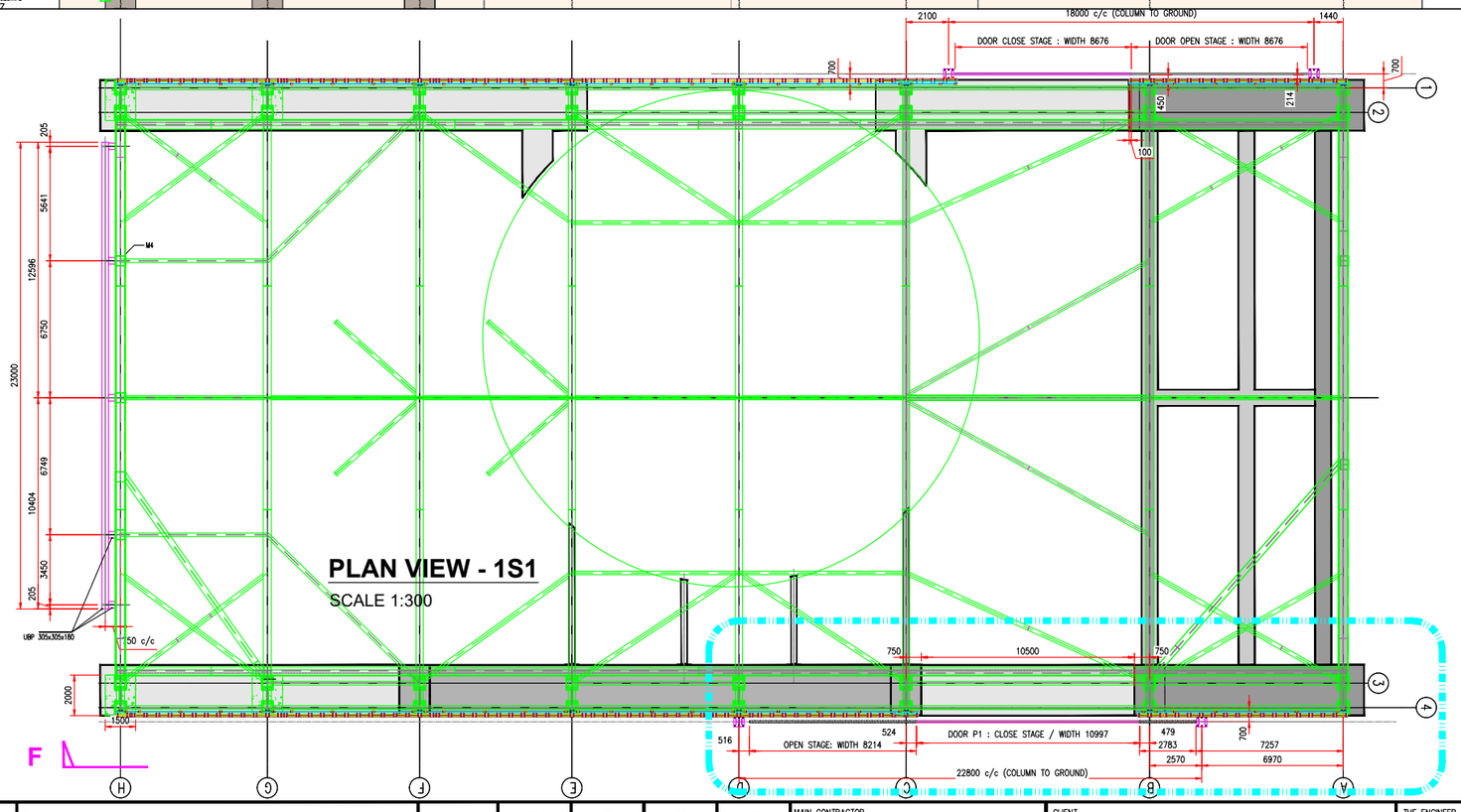
Details of Noise Enclosure

DOOR P1 - AT GRID-B-C (FACE TO SITE)



SECTION-F1

SCALE 1:300



PLAN VIEW - 1S1

SCALE 1:300

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A	FIRST ISSUE	19/05/2020	ML	ML	LJe	XMo

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE ENGINEER: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S DESIGNER: aurecon

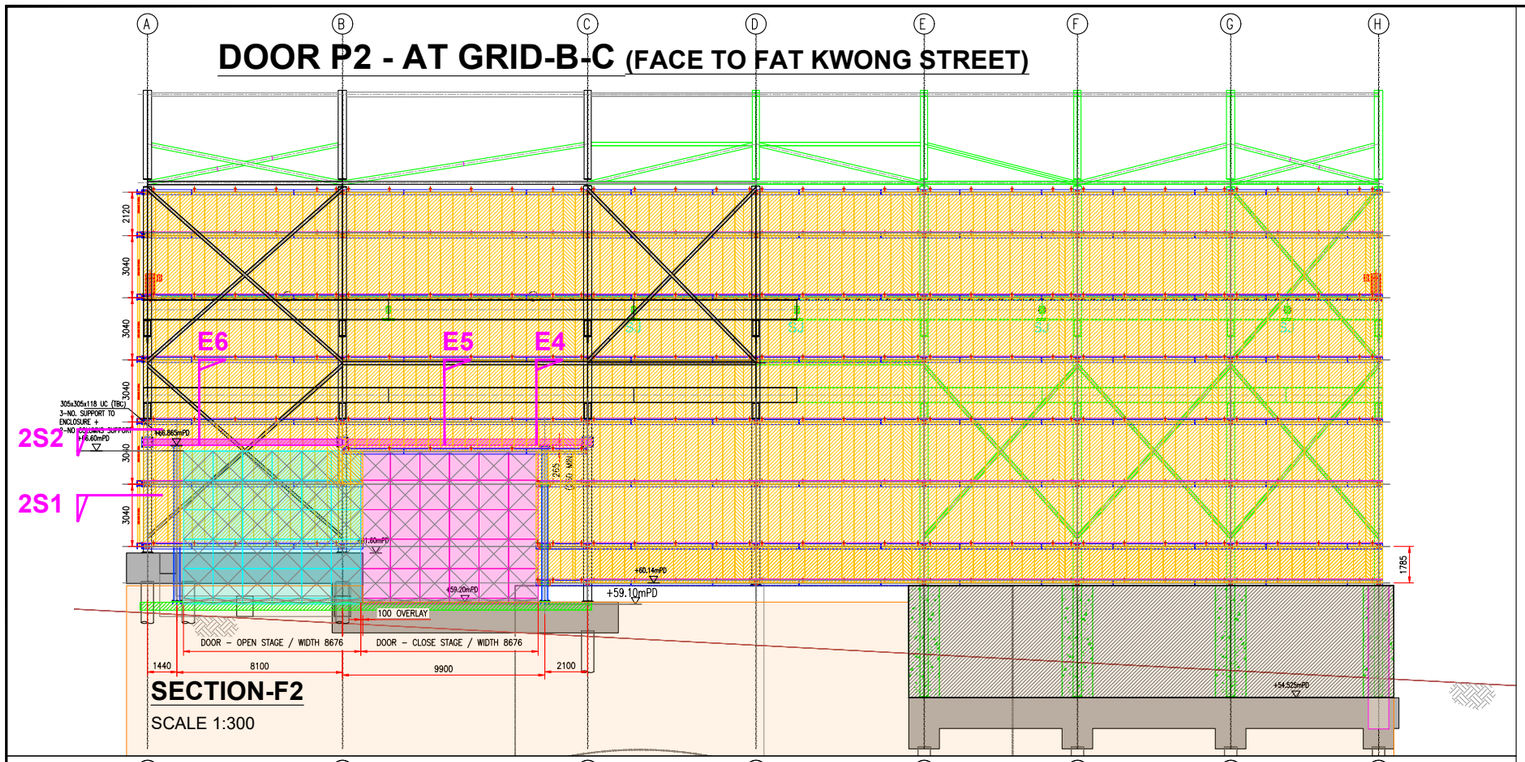
PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN
INSTALLATION OF NOISE ENCLOSURE
SLIDE DOOR – DETAIL

DRAWING NO.		
HKCKR/BTP/SKT/HMS/TSI/000267		
ISSUE STATUS: IFC	CREATION DATE: 19/05/2020	REVISION: A
PAPER SIZE: A3	SCALE: 1 : 400	PAGE: 1 /7

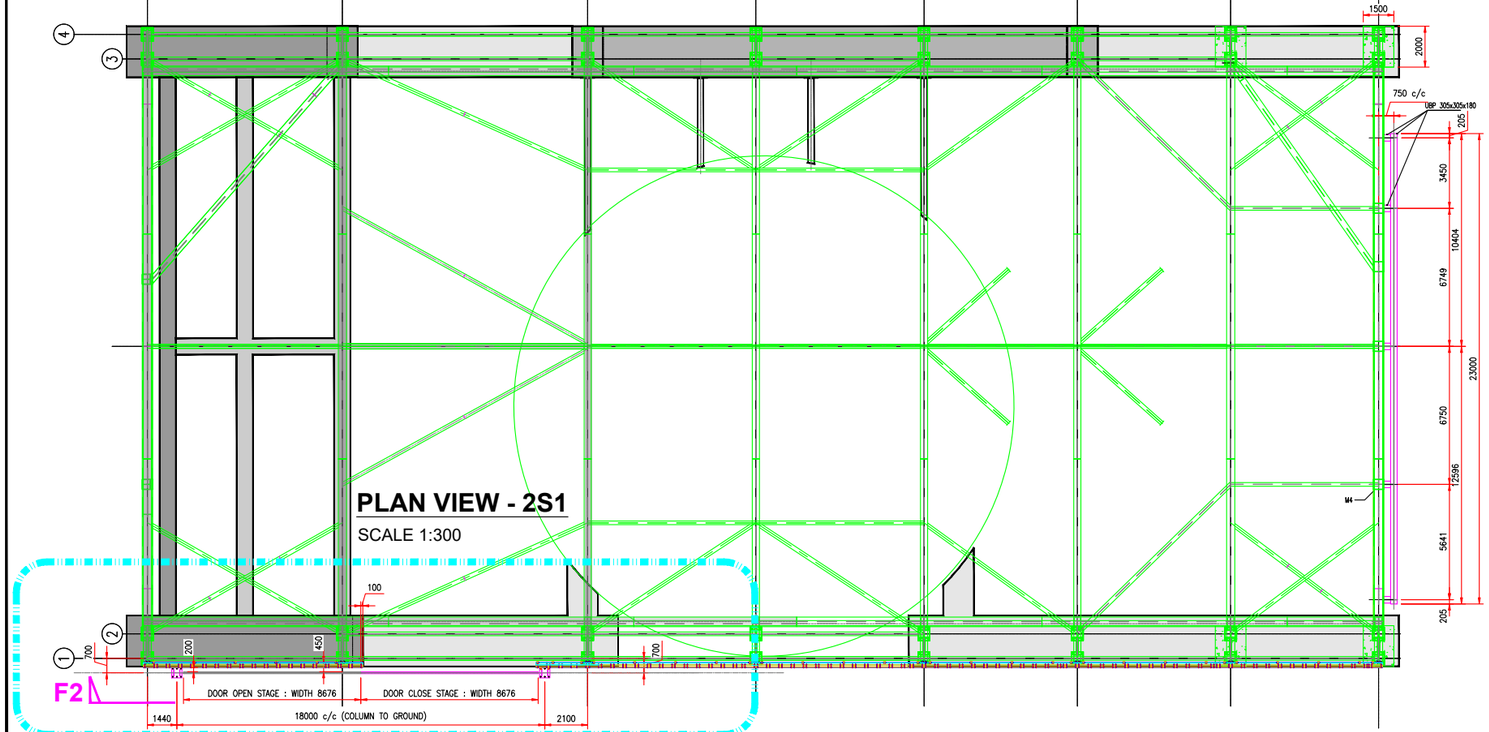
skt-hms-tsi-000267-a-20200519.dwg

DOOR P2 - AT GRID-B-C (FACE TO FAT KWONG STREET)



SECTION-F2

SCALE 1:300



PLAN VIEW - 2S1

SCALE 1:300

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A	FIRST ISSUE	19/05/2020	ML	ML	LJe	XMo

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE ENGINEER: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN
INSTALLATION OF NOISE ENCLOSURE
SLIDE DOOR – DETAIL

DRAWING NO.: HKCKR/BTP/SKT/HMS/TSI/000267

ISSUE STATUS	CREATION DATE	REVISION
IFC	19/05/2020	A

PAPER SIZE	SCALE	PAGE
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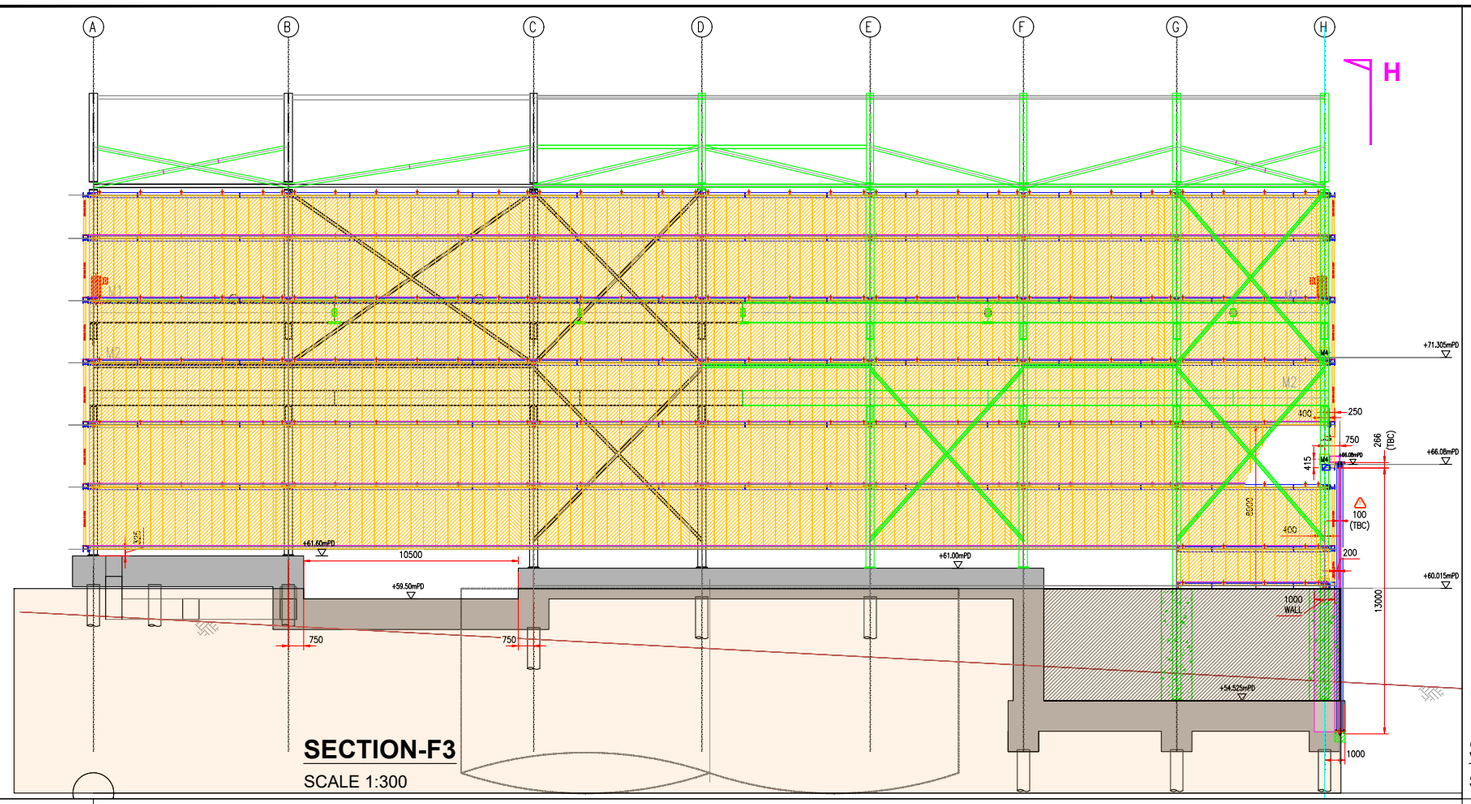
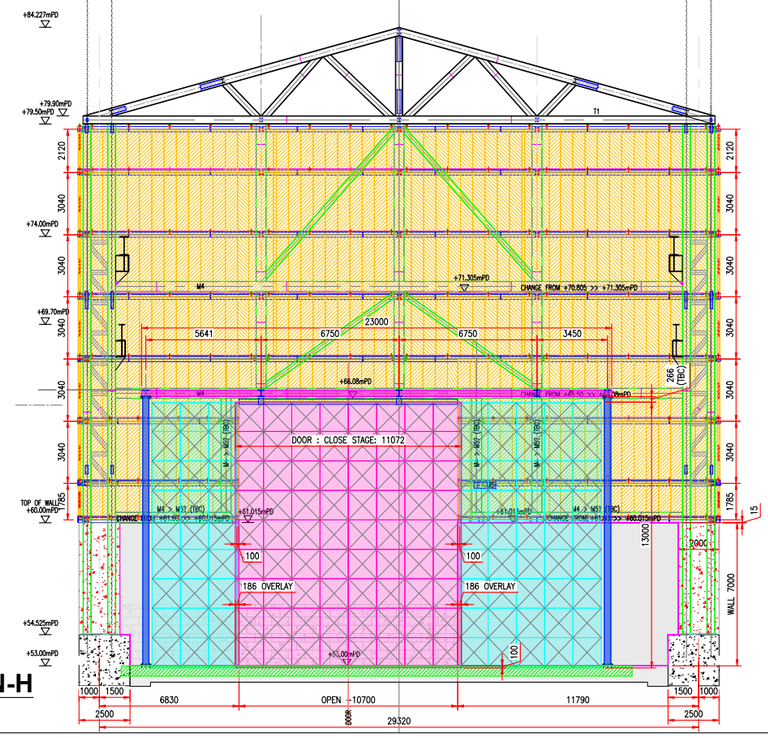
skt-hms-tsi-000267-a-20200519.dwg



SECTION-F3

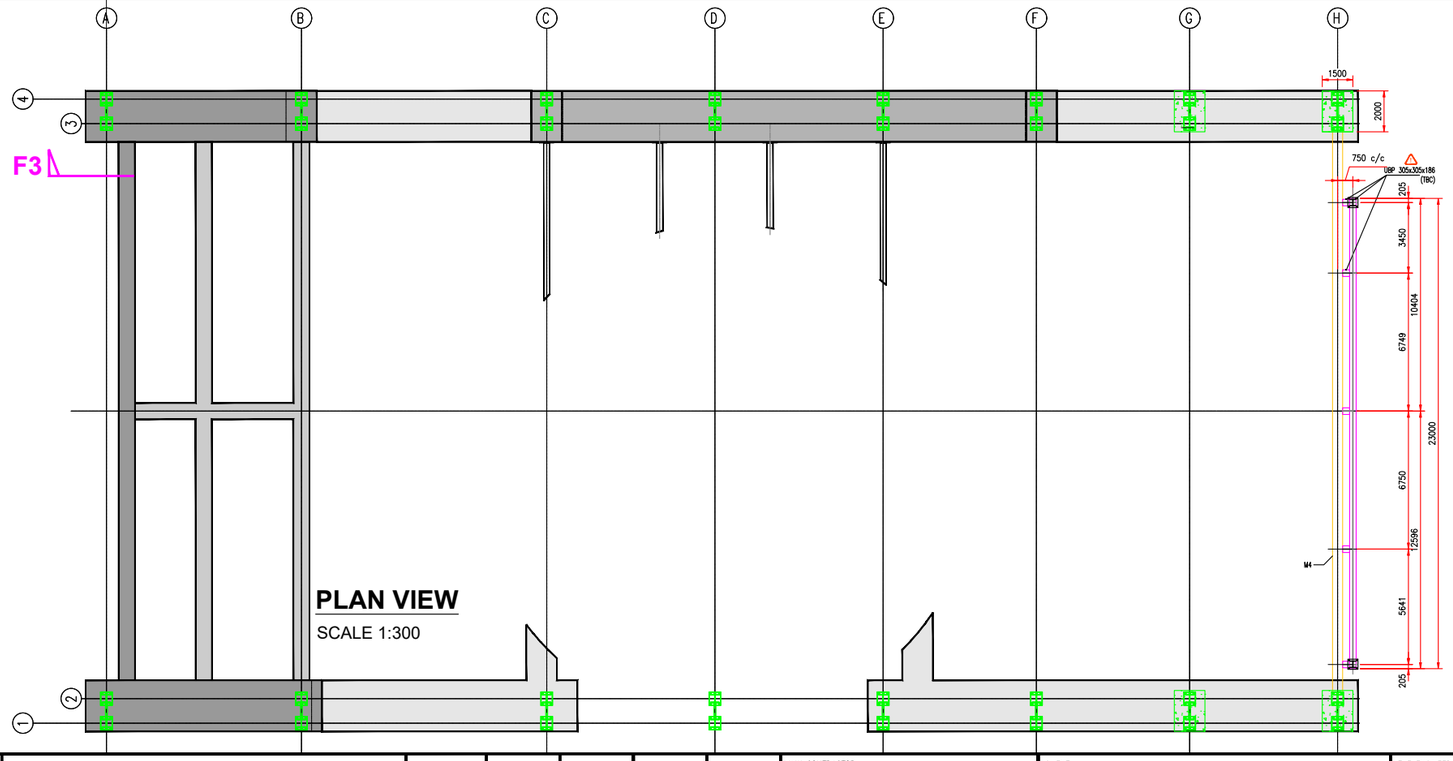
SCALE 1:300

DOOR P3 - AT GRID-H



SECTION-H

SCALE 1:300



PLAN VIEW

SCALE 1:300

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A	FIRST ISSUE	19/05/2020	ML	ML	LJe	XMo

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE ENGINEER: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN
INSTALLATION OF NOISE ENCLOSURE
SLIDE DOOR – DETAIL

DRAWING NO.: HKCKR/BTP/SKT/HMS/TSI/000267

ISSUE STATUS	CREATION DATE	REVISION
IFC	19/05/2020	A

PAPER SIZE	SCALE	PAGE
A3	1 : 400	5 /7

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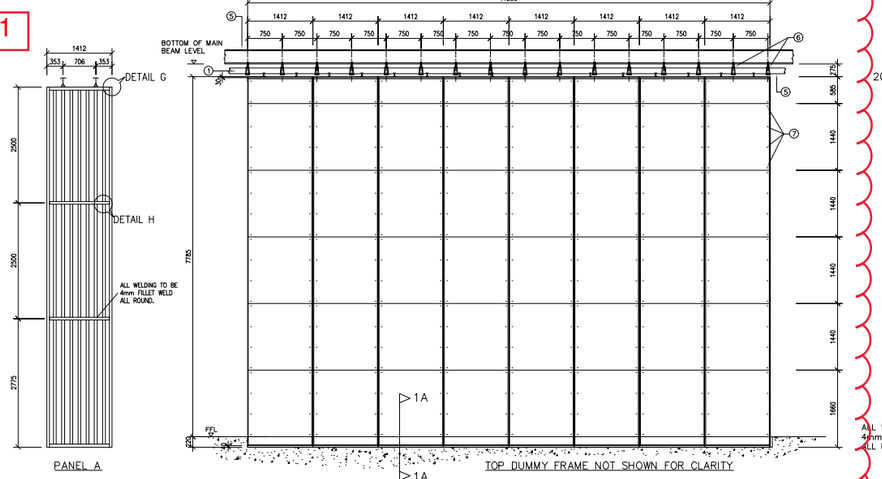
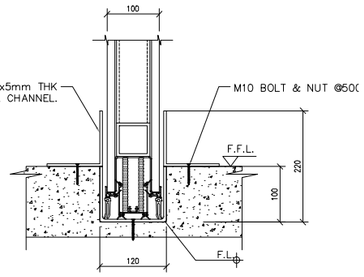
Design of "Kinetics" Acoustic Sliding Door

Door P1





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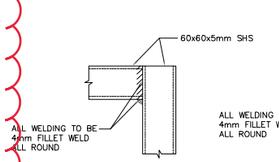
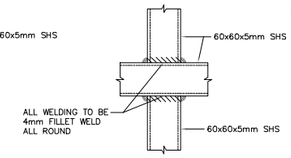


DETAIL G



DETAIL H

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 JO / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL A	1.412m WIDTH PANEL FRAME	60x60x5mm SHS, 9 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
PANEL B	1.083m WIDTH PANEL FRAME	60x60x5mm SHS, 7 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 220mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mmΦ WASHER GRADE 4.6	–

DESIGN DATA:

1. LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

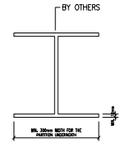
ELEVATION	WIND PRESSURE
0–5m	1.82kPa
5–10m	2.01kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

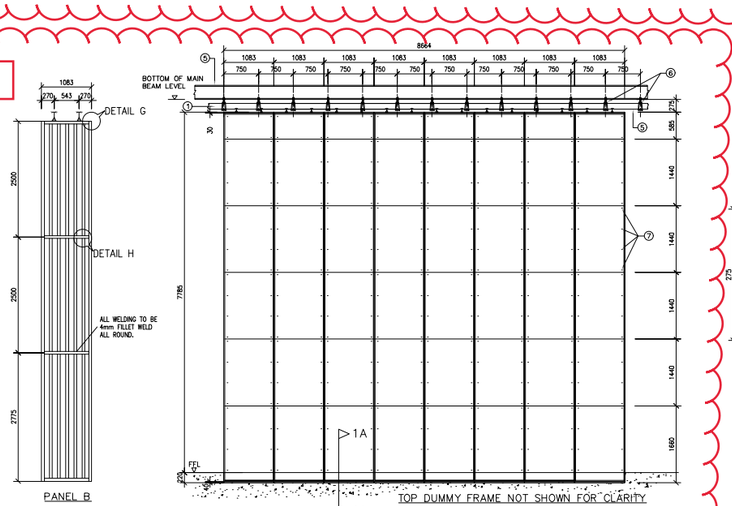
   DESIGN WIND PRESSURE = 0.7 X q:

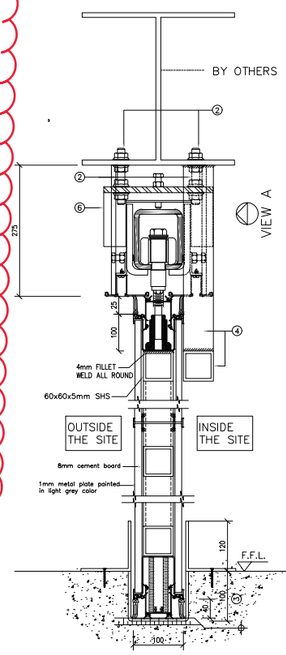
   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–7.5m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

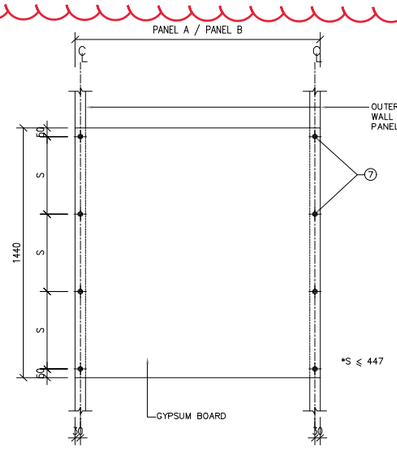
LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	7.854	0
LIVE LOAD	1.947	0.19635
WIND LOAD	0.1573	4.345



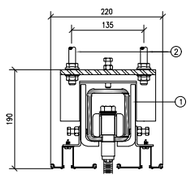
Door P2



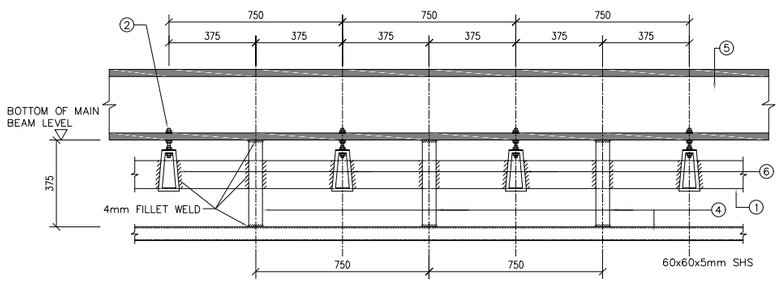




DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



ITEM 6



VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.: HKCKR/BTP/MDG/HMS/TSI/338223

ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A

PAPER SIZE	SCALE	PAGE
A3	N.T.S.	10/10

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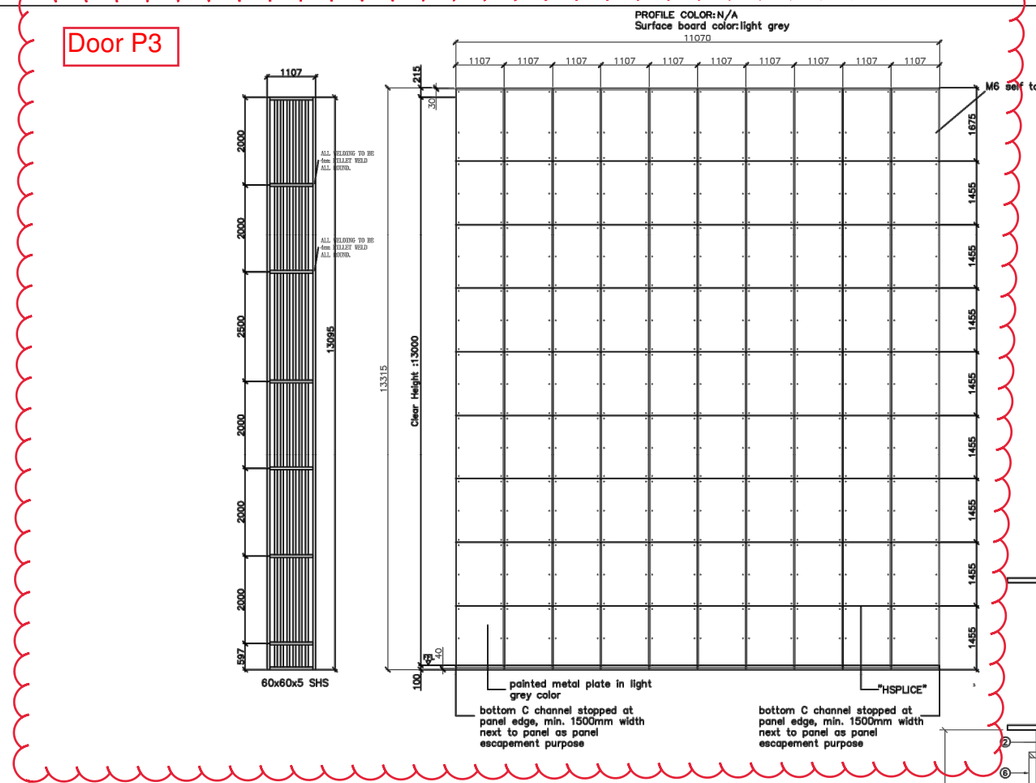
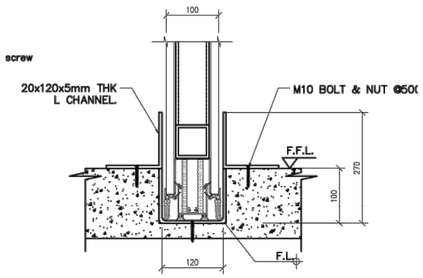
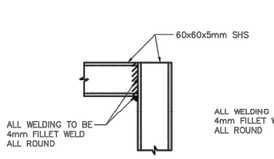
Door P3





SECTION 1A–1A (ITEM 3)



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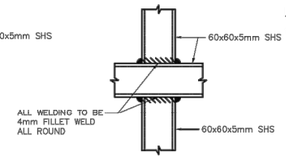
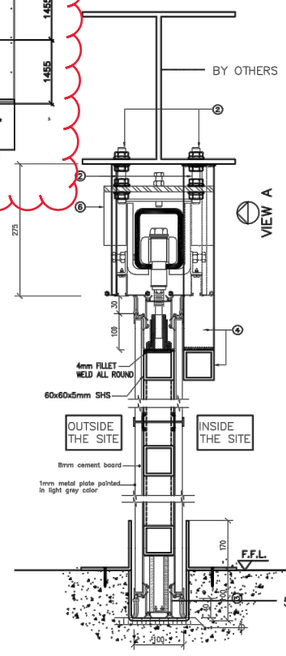
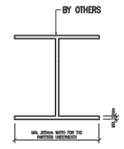
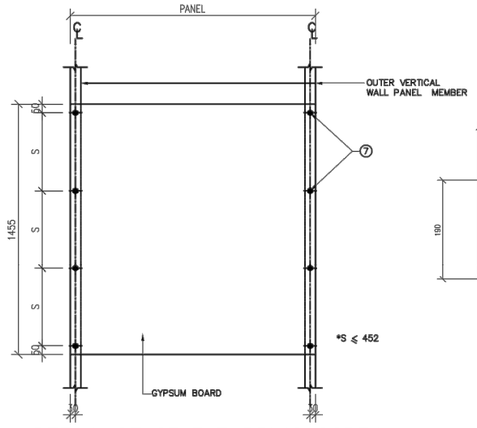


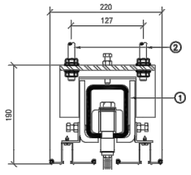
DETAIL H







DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



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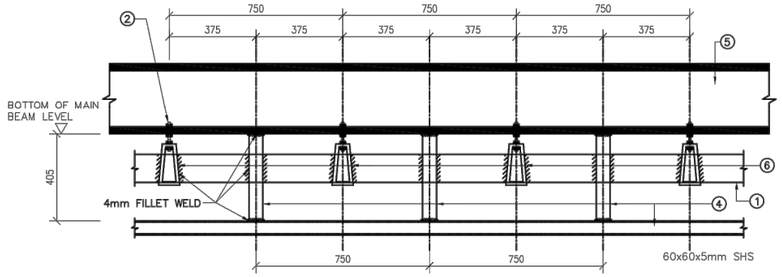

VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 J0 / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL	1.107m WIDTH PANEL FRAME	60x60x5mm SHS, 8 NOS. (VERT.) + 7 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 270mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mm# WASHER GRADE 4.6	–

DESIGN DATA:

1. Case1: q=0.75kpa
   Case2: LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

ELEVATION	WIND PRESSURE
0–5m	1.826kPa
5–10m	2.016kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

   DESIGN WIND PRESSURE = 0.7 X q:

   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–10m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (10–14m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

Case 1

LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	4.1932

Case 2

LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	8.0487

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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 13m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338224		
ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A
PAPER SIZE	SCALE	PAGE
A3	N.T.S.	5/5

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PRODUCT SPECIFICATIONS:

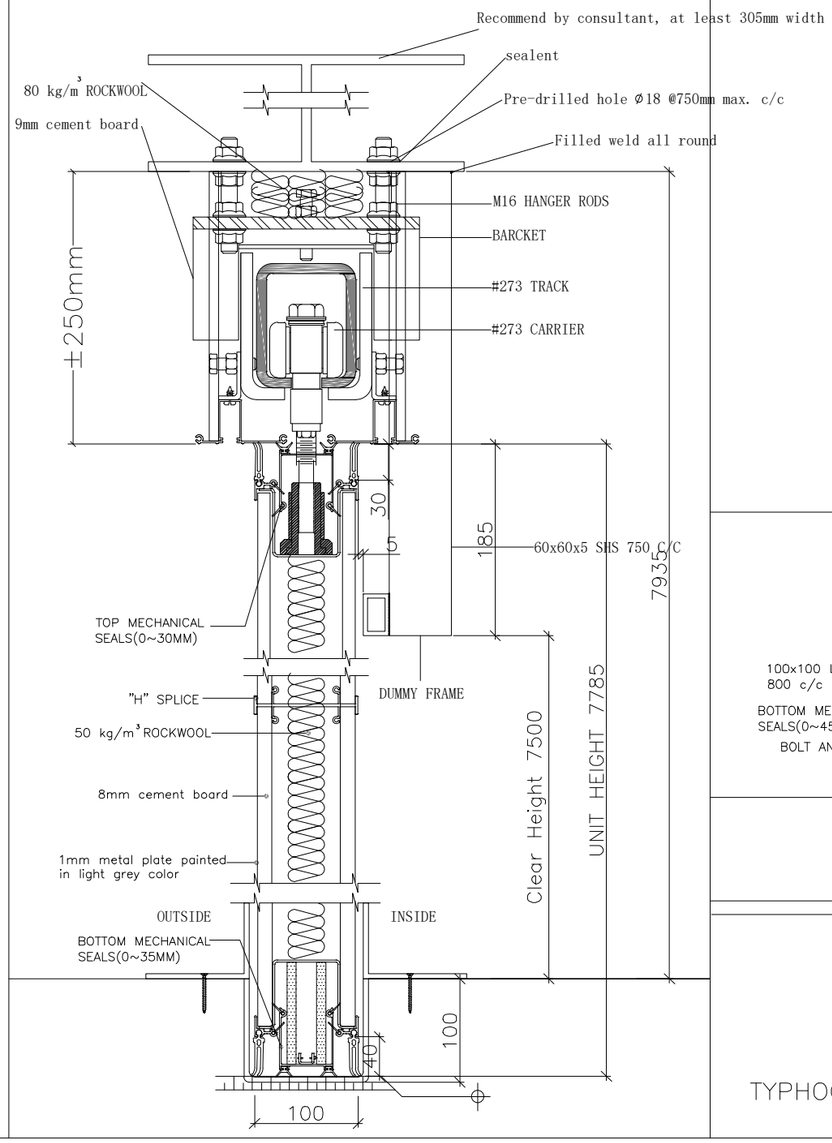
TYPE: 100 , STC: 53

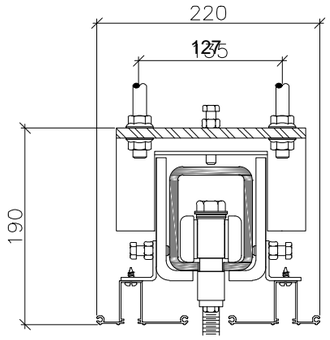
WEIGHT PER SQM: 97Kg/m². TOTAL WEIGHT OF OPERABLE WALL MUST BE CONSIDERED AND CHECKED IN STATICAL CALCULATION UNDER UNFAVOURABLE LOAD CONDITIONS. ALL FLANKING BUILDING ELEMENTS MUST ACHIEVE A MINIMUM, SOUND INSULATING VALUE OF STC 53

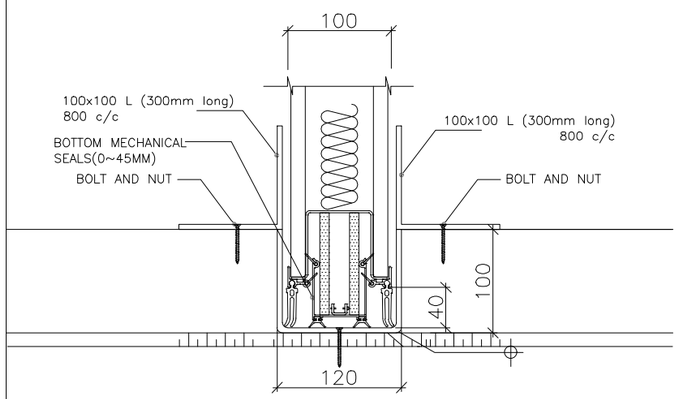
ATTENTION: IT IS NOT ALLOWED TO FIX OR CONNECT OTHER BUILDING PARTS TO OUR TRACKS. THE TRACK HAS TO REMAIN REMOVABLE FOR FIXING THE ELEMENTS.

AFTER INSTALLATION OF TRACKS A 10mm DEFLECTION OF THE BUILDING STRUCTURE HAS BEEN CONSIDERED.

Section View

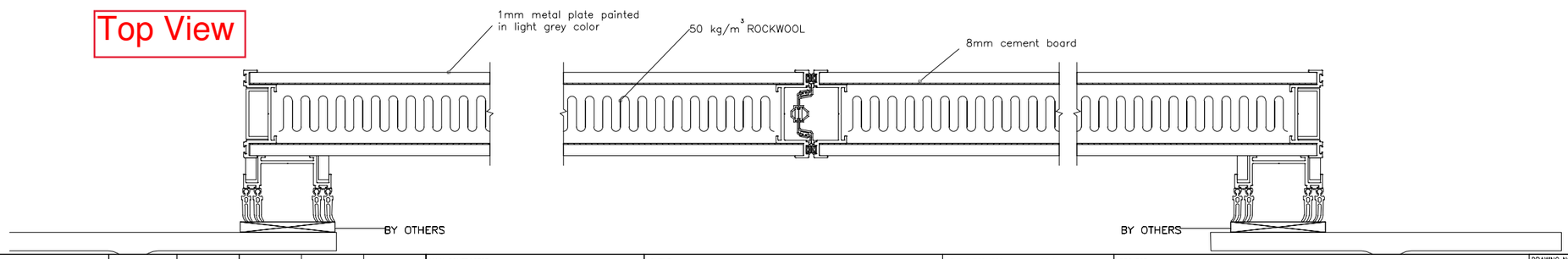






TYPHOON SITUATION

Top View



REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338223		
ISSUE STATUS: FOR INFORMATION	CREATION DATE: 21/07/2020	REVISION: A
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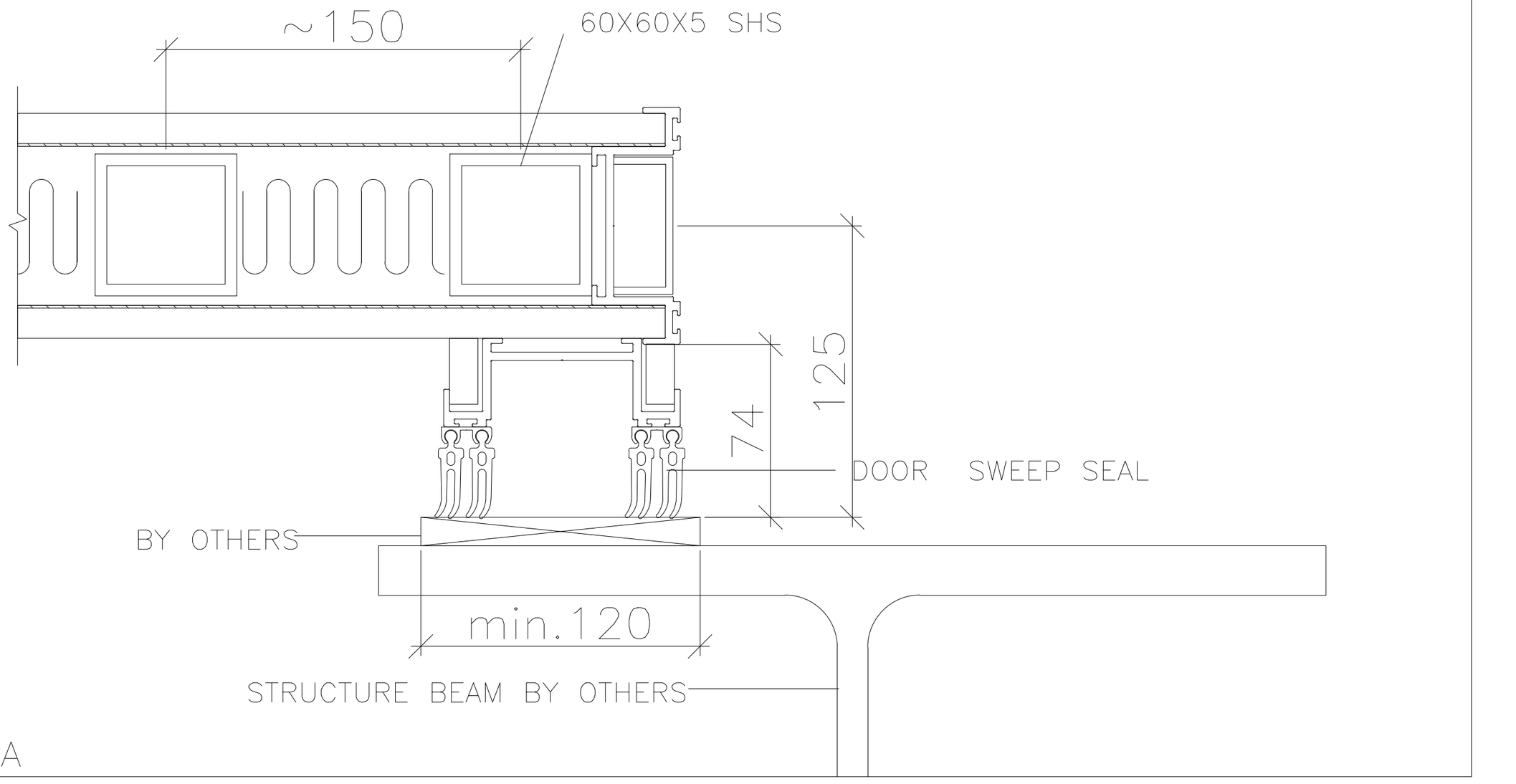

DETAIL A

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

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Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338223		
ISSUE STATUS	CREATION DATE	REVISION
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Annex E

Predicted Noise Level at the NSRs

Predicted Noise Level for NSR

Kar Man House, Oi Man Estate (M-N1)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Air Compressor (50%)	CNP 002	99	1	99	175	-53	-5	3	44.16
Piling , vibrating hammer (50%)	CNP 172	112	1	112	175	-53	-5	3	57.16
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	175	-53	-5	3	37.16
								Total CNL	**57.61**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	175	-53	-15	3	38.16
Air Compressor (50%)	CNP 002	99	1	99	175	-53	-15	3	34.16
Water Pump, submersible (electric)	CNP 283	85	10	95	175	-53	-15	3	30.16
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	175	-53	-15	3	30.16
Grout pump (50%)	CNP 106	102	1	102	175	-53	-15	3	37.16
Grout mixer (50%)	CNP 105	87	1	87	175	-53	-15	3	22.16
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	175	-53	-15	3	40.16
Loader, wheeled (50%)	CNP 081	109	1	109	175	-53	-15	3	44.16
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	175	-53	-5	3	47.16
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	175	-53	-15	3	33.16
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	175	-53	-5	3	38.16
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	175	-53	-15	3	38.16
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	175	-53	-15	3	42.16
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	175	-53	-15	3	40.16
Ventilation fan	CNP 241	108	1	108	175	-53	-15	3	43.16
								Total CNL	**52.87**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	175	-53	-5	3	49.16
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	175	-53	-5	3	45.16
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	175	-53	-5	3	36.16
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	175	-53	-5	3	47.16
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	175	-53	-5	3	35.16
								Total CNL	**53.02**

Predicted Noise Level for NSR

Carmel on the Hill (M-N2)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Air Compressor (50%)	CNP 002	99	1	99	175	-53	-5	3	44.16
Piling , vibrating hammer (50%)	CNP 172	112	1	112	175	-53	-5	3	57.16
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	175	-53	-5	3	37.16
								Total CNL	**57.61**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	175	-53	-15	3	38.16
Air Compressor (50%)	CNP 002	99	1	99	175	-53	-15	3	34.16
Water Pump, submersible (electric)	CNP 283	85	10	95	175	-53	-15	3	30.16
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	175	-53	-15	3	30.16
Grout pump (50%)	CNP 106	102	1	102	175	-53	-15	3	37.16
Grout mixer (50%)	CNP 105	87	1	87	175	-53	-15	3	22.16
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	175	-53	-15	3	40.16
Loader, wheeled (50%)	CNP 081	109	1	109	175	-53	-15	3	44.16
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	175	-53	-5	3	47.16
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	175	-53	-15	3	33.16
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	175	-53	-5	3	38.16
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	175	-53	-15	3	38.16
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	175	-53	-15	3	42.16
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	175	-53	-15	3	40.16
Ventilation fan	CNP 241	108	1	108	175	-53	-15	3	43.16
								Total CNL	**52.87**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	175	-53	-5	3	49.16
Mobile crane (50%)	EPD-09573	99	1	99	175	-53	-5	3	44.16
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	175	-53	-5	3	45.16
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	175	-53	-5	3	36.16
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	175	-53	-5	3	47.16
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	175	-53	-5	3	35.16
								Total CNL	**53.02**

Predicted Noise Level for NSR

SKH Tsoi Kung Po Secondary School (M-N3)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Air Compressor (50%)	CNP 002	99	1	99	65	-44	-5	3	52.76
Piling , vibrating hammer (50%)	CNP 172	112	1	112	65	-44	-5	3	65.76
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	65	-44	-5	3	45.76
								Total CNL	**66.21**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	65	-44	-15	3	46.76
Air Compressor (50%)	CNP 002	99	1	99	65	-44	-15	3	42.76
Water Pump, submersible (electric)	CNP 283	85	10	95	65	-44	-15	3	38.76
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	65	-44	-15	3	38.76
Grout pump (50%)	CNP 106	102	1	102	65	-44	-15	3	45.76
Grout mixer (50%)	CNP 105	87	1	87	65	-44	-15	3	30.76
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	65	-44	-15	3	48.76
Loader, wheeled (50%)	CNP 081	109	1	109	65	-44	-15	3	52.76
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	65	-44	-5	3	55.76
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	65	-44	-15	3	41.76
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	65	-44	-5	3	46.76
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	65	-44	-15	3	46.76
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	65	-44	-15	3	50.76
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	65	-44	-15	3	48.76
Ventilation fan	CNP 241	108	1	108	65	-44	-15	3	51.76
								Total CNL	**61.47**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	65	-44	-5	3	57.76
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	65	-44	-5	3	53.76
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	65	-44	-5	3	44.76
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	65	-44	-5	3	55.76
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	65	-44	-5	3	43.76
								Total CNL	**61.63**

Predicted Noise Level for NSR

SKH Tsoi Kung Po Secondary School (M-N3) - During Examination Period

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Air Compressor (50%)	CNP 002	99	1	99	65	-44	-5	3	52.76
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	65	-44	-5	3	45.76
								Total CNL	**56.18**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	65	-44	-15	3	46.76
Air Compressor (50%)	CNP 002	99	1	99	65	-44	-15	3	42.76
Water Pump, submersible (electric)	CNP 283	85	10	95	65	-44	-15	3	38.76
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	65	-44	-15	3	38.76
Grout pump (50%)	CNP 106	102	1	102	65	-44	-15	3	45.76
Grout mixer (50%)	CNP 105	87	1	87	65	-44	-15	3	30.76
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	65	-44	-15	3	48.76
Loader, wheeled (50%)	CNP 081	109	1	109	65	-44	-15	3	52.76
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	65	-44	-5	3	55.76
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	65	-44	-15	3	41.76
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	65	-44	-5	3	46.76
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	65	-44	-15	3	46.76
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	65	-44	-15	3	50.76
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	65	-44	-15	3	48.76
Ventilation fan	CNP 241	108	1	108	65	-44	-15	3	51.76
								Total CNL	**61.47**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	65	-44	-5	3	57.76
Mobile crane (50%)	EPD-09573	99	1	99	65	-44	-5	3	52.76
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	65	-44	-5	3	53.76
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	65	-44	-5	3	44.76
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	65	-44	-5	3	55.76
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	65	-44	-5	3	43.76
								Total CNL	**61.63**

Predicted Noise Level for NSR

Man Fuk House Block A (M-N4)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	155	-52	-5	3	45.21
Air Compressor (50%)	CNP 002	99	1	99	155	-52	-5	3	45.21
Piling , vibrating hammer (50%)	CNP 172	112	1	112	155	-52	-5	3	58.21
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	155	-52	-5	3	38.21
								Total CNL	**58.67**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	155	-52	-15	3	39.21
Air Compressor (50%)	CNP 002	99	1	99	155	-52	-15	3	35.21
Water Pump, submersible (electric)	CNP 283	85	10	95	155	-52	-15	3	31.21
Mobile crane (50%)	EPD-09573	99	1	99	155	-52	-5	3	45.21
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	155	-52	-15	3	31.21
Grout pump (50%)	CNP 106	102	1	102	155	-52	-15	3	38.21
Grout mixer (50%)	CNP 105	87	1	87	155	-52	-15	3	23.21
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	155	-52	-15	3	41.21
Loader, wheeled (50%)	CNP 081	109	1	109	155	-52	-15	3	45.21
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	155	-52	-5	3	48.21
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	155	-52	-15	3	34.21
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	155	-52	-5	3	39.21
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	155	-52	-15	3	39.21
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	155	-52	-15	3	43.21
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	155	-52	-15	3	41.21
Ventilation fan	CNP 241	108	1	108	155	-52	-15	3	44.21
								Total CNL	**53.92**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	155	-52	-5	3	50.21
Mobile crane (50%)	EPD-09573	99	1	99	155	-52	-5	3	45.21
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	155	-52	-5	3	46.21
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	155	-52	-5	3	37.21
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	155	-52	-5	3	48.21
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	155	-52	-5	3	36.21
								Total CNL	**54.08**

Predicted Noise Level for NSR

Cascades Block A (M-N5)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	170	-53	-5	3	44.41
Air Compressor (50%)	CNP 002	99	1	99	170	-53	-5	3	44.41
Piling , vibrating hammer (50%)	CNP 172	112	1	112	170	-53	-5	3	57.41
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	170	-53	-5	3	37.41
								Total CNL	**57.86**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	170	-53	-15	3	38.41
Air Compressor (50%)	CNP 002	99	1	99	170	-53	-15	3	34.41
Water Pump, submersible (electric)	CNP 283	85	10	95	170	-53	-15	3	30.41
Mobile crane (50%)	EPD-09573	99	1	99	170	-53	-5	3	44.41
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	170	-53	-15	3	30.41
Grout pump (50%)	CNP 106	102	1	102	170	-53	-15	3	37.41
Grout mixer (50%)	CNP 105	87	1	87	170	-53	-15	3	22.41
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	170	-53	-15	3	40.41
Loader, wheeled (50%)	CNP 081	109	1	109	170	-53	-15	3	44.41
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	170	-53	-5	3	47.41
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	170	-53	-15	3	33.41
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	170	-53	-5	3	38.41
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	170	-53	-15	3	38.41
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	170	-53	-15	3	42.41
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	170	-53	-15	3	40.41
Ventilation fan	CNP 241	108	1	108	170	-53	-15	3	43.41
								Total CNL	**53.12**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	170	-53	-5	3	49.41
Mobile crane (50%)	EPD-09573	99	1	99	170	-53	-5	3	44.41
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	170	-53	-5	3	45.41
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	170	-53	-5	3	36.41
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	170	-53	-5	3	47.41
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	170	-53	-5	3	35.41
								Total CNL	**53.27**

Predicted Noise Level for NSR

Ko Fai House, Kwun Fai Court (M-N6)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	50	-42	-5	3	55.04
Air Compressor (50%)	CNP 002	99	1	99	50	-42	-5	3	55.04
Piling , vibrating hammer (50%)	CNP 172	112	1	112	50	-42	-5	3	68.04
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	50	-42	-5	3	48.04
								Total CNL	**68.49**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	50	-42	-15	3	49.04
Air Compressor (50%)	CNP 002	99	1	99	50	-42	-15	3	45.04
Water Pump, submersible (electric)	CNP 283	85	10	95	50	-42	-15	3	41.04
Mobile crane (50%)	EPD-09573	99	1	99	50	-42	-5	3	55.04
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	50	-42	-15	3	41.04
Grout pump (50%)	CNP 106	102	1	102	50	-42	-15	3	48.04
Grout mixer (50%)	CNP 105	87	1	87	50	-42	-15	3	33.04
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	50	-42	-15	3	51.04
Loader, wheeled (50%)	CNP 081	109	1	109	50	-42	-15	3	55.04
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	50	-42	-5	3	58.04
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	50	-42	-15	3	44.04
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	50	-42	-5	3	49.04
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	50	-42	-15	3	49.04
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	50	-42	-15	3	53.04
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	50	-42	-15	3	51.04
Ventilation fan	CNP 241	108	1	108	50	-42	-15	3	54.04
								Total CNL	**63.75**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	50	-42	-5	3	60.04
Mobile crane (50%)	EPD-09573	99	1	99	50	-42	-5	3	55.04
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	50	-42	-5	3	56.04
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	50	-42	-5	3	47.04
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	50	-42	-5	3	58.04
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	50	-42	-5	3	46.04
								Total CNL	**63.90**

Predicted Noise Level for NSR

Ultima (M-P3)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Ventilation Building Foundation									
Mobile crane (50%)	EPD-09573	99	1	99	115	-49	-5	3	47.80
Air Compressor (50%)	CNP 002	99	1	99	115	-49	-5	3	47.80
Piling , vibrating hammer (50%)	CNP 172	112	1	112	115	-49	-5	3	60.80
Aerial work platform, working height ≤ 13m (Surface) (50%)	BS 5228 Table C.4	92	1	92	115	-49	-5	3	40.80
								Total CNL	**61.26**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation									
Air Blower	CNP 006	95	6	103	115	-49	-15	3	41.80
Air Compressor (50%)	CNP 002	99	1	99	115	-49	-15	3	37.80
Water Pump, submersible (electric)	CNP 283	85	10	95	115	-49	-15	3	33.80
Mobile crane (50%)	EPD-09573	99	1	99	115	-49	-5	3	47.80
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	115	-49	-15	3	33.80
Grout pump (50%)	CNP 106	102	1	102	115	-49	-15	3	40.80
Grout mixer (50%)	CNP 105	87	1	87	115	-49	-15	3	25.80
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	115	-49	-15	3	43.80
Loader, wheeled (50%)	CNP 081	109	1	109	115	-49	-15	3	47.80
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	115	-49	-5	3	50.80
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	115	-49	-15	3	36.80
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	115	-49	-5	3	41.80
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	115	-49	-15	3	41.80
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	115	-49	-15	3	45.80
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	115	-49	-15	3	43.80
Ventilation fan	CNP 241	108	1	108	115	-49	-15	3	46.80
								Total CNL	**56.52**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Construction of Diaphragm Wall									
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	115	-49	-5	3	52.80
Mobile crane (50%)	EPD-09573	99	1	99	115	-49	-5	3	47.80
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	115	-49	-5	3	48.80
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	115	-49	-5	3	39.80
Piling, diaphragm wall bentonite filtering plant (50%)	CNP 162	102	1	102	115	-49	-5	3	50.80
Piling, diaphragm wall, hydraulic extractor (50%)	CNP 163	87	2	90	115	-49	-5	3	38.80
								Total CNL	**56.67**

Annex F

Cumulative Noise Level at the NSRs

Contract No. HY/2018/08

Central Kowloon Route - Central Tunnel

Cumulative Noise Assessment

Calendar Year / Month

Cumulative Noise Level, dB(A)

NSR ID	NSRs	2019				2020											
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
M-N1	Kar Man House, Oi Man Estate			58	59	59	59	59	59	59	53	53	53	53	53	53	53
M-N2	Carmel on the Hill			58	59	59	59	59	59	59	53	53	53	53	53	53	53
M-N3	SKH Tsoi Kung Po Secondary School			66	68	63	63	63	68	68	62	62	62	62	62	62	62
M-N4	Man Fuk House Block			59	60	60	60	60	60	60	54	54	54	54	54	54	54
M-N5	Cascades Block A			58	59	59	59	59	59	59	53	53	53	53	53	53	53
M-N6	Ko Fai House, Kwun Fai			69	70	70	70	70	70	70	64	64	64	64	64	64	64
M-P3	Ultima			61	63	63	63	63	63	63	57	57	57	57	57	57	57

NSR ID	NSRs	2021												2022											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
M-N1	Kar Man House, Oi Man Estate	53	53	53	53	53	53	53	53	56	56	56	56	56	56	56	56	56	53	53	53	53	53	53	53
M-N2	Carmel on the Hill	53	53	53	53	53	53	53	53	56	56	56	56	56	56	56	56	56	53	53	53	53	53	53	53
M-N3	SKH Tsoi Kung Po Secondary School	62	62	62	62	62	62	62	62	65	65	65	65	65	65	65	65	65	62	62	62	62	62	62	62
M-N4	Man Fuk House Block	54	54	54	54	54	54	54	54	57	57	57	57	57	57	57	57	57	54	54	54	54	54	54	54
M-N5	Cascades Block A	53	53	53	53	53	53	53	53	56	56	56	56	56	56	56	56	56	53	53	53	53	53	53	53
M-N6	Ko Fai House, Kwun Fai	64	64	64	64	64	64	64	64	67	67	67	67	67	67	67	67	67	64	64	64	64	64	64	64
M-P3	Ultima	57	57	57	57	57	57	57	57	60	60	60	60	60	60	60	60	60	57	57	57	57	57	57	57

NSR ID	NSRs	2023											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
M-N1	Kar Man House, Oi Man Estate	53	53										
M-N2	Carmel on the Hill	53	53										
M-N3	SKH Tsoi Kung Po Secondary School	62	62										
M-N4	Man Fuk House Block	54	54										
M-N5	Cascades Block A	53	53										
M-N6	Ko Fai House, Kwun Fai	64	64										
M-P3	Ultima	57	57										

Dec 2019 - May 2020
Period with concurrent activities
(Ventilation building foundation
and Tunnel excavation)

Sep 2021 - May 2022
Period with concurrent activities
(Tunnel excavation and
construction of diaphragm wall)
**Should there be any exam within this period, the maximum cumulative noise level = 64.6dB(A)*

Examinatioin Period

Period with concurrent site activities

Annex G

Details of Acoustic Materials for Construction of Noise Enclosure

- “Eastland” AAC Noise panel
- “NAP” Noise panel (SD 150RW)
- “Kinetics” Acoustic Sliding Door
- “MYG” Silencer and Man-access Lobby House

What is AAC Panel & Block

AAC Panel is the shortened form of Autoclaved Aerated Concrete Panel. The main materials of AAC panel are silicon sand, cement, lime etc. Reinforced with anti-stain processed steel bar, the concrete panel with many air holes was formed after high-temperature, high-pressure protection with steam. It's a new type constructional material with excellent functions. There are patents of Germany and Sweden and Japan included in the production equipments. The complete production process, from mixing raw material, anti-stain processing of steel bar, organizing into frame, pouring paste on, cutting, steaming and pressing to surface processing, is calculated accurately with computer program and has a rigid QC control.

AAC Block is the shortened form of Autoclaved Aerated Concrete Block. The difference of the AAC block from the AAC panel are: 1) no reinforced steel inside 2) sizes are smaller than AAC panel

The Application Scope of AAC

- AAC panels have been used in many cities through China, such as Guangzhou, Shanghai, Ningbo, Suzhou, Wuxi, and Changzhou, Tianjin, Beijing, Qingdao, Dalian, etc. The products are also regularly exported to other countries, such as Australia, New Zealand, Japan, Middle-East, Europe, USA, South-East Asia etc.
- AAC panels have been used various kinds of buildings, such as public facilities, industrial constructions, civil housing, hospital, hotel, schools, stores, supermarkets etc. The construction structures it suits also expand from concrete frame structure, steel frame structure, to other structures.
- The existing products range from interior partition wall panels to exterior walls, ornamental wall panels, floor, roofing and cladding.

EASTLAND
Quality Building Materials

The Product Range of AAC

Standard AAC Panels

- AAC External Wall Panel
- AAC Partition Wall Panel
- AAC Flooring Slab
- AAC Roofing Slab
- AAC Wall Cladding
- AAC Fencing Panel

Standard AAC Blocks

- AAC External Wall Block
- AAC Internal Wall Block

The Test Result of AAC

Properties (Test Result) of Eastland AAC Panels & Blocks					
Characteristics		Unit	Test Value	Criterion	Value of Criterion
Dry Density		Kg/m3	Grade 04: 412	GB/T11970 -1997	≤425
			Grade 05: 503		≤525
			Grade 06: 608		≤625
Compressive Strength	Average	Mpa	Grade 04: 2.4	GB/T11971 -1997	≥2.0
			Grade 05: 4.0		≥3.5
			Grade 06: 5.3		≥5.0
	Minimum		Grade 04: 2.2		≥1.6
			Grade 05: 3.7		≥2.8
			Grade 06: 4.9		≥4.0
Dry Shrinkage		mm/m	Grade 04/05: 0.66	GB/T11972 -1997	≤0.8
			Grade 06: 0.65		
Frozen Resistanc	Quality Lost	%	Grade 04: 0.7	GB/T11973 -1997	≤5.0
			Grade 05/06: 1.0		
	Strength After Frozen	Mpa	Grade 04: 2.0		≥1.6
			Grade 05: 3.6		≥2.8
			Grade 06: 4.8		≥4.0
Thermal Conductivity		W/(m.k)	Grade 04: 0.11	GB/T10295 -88	≤0.12
			Grade 05: 0.13		≤0.14
			Grade 06: 0.15		≤0.16
Sound Insulation	120mm thick	dB	40.5 (render)	GBJ75-84 GB/T50121 -2005	
	150mm thick	dB	40.5 (no render)		
	150mm thick	dB	41.5 (render)		
	200mm thick	dB	44.5 (no render)		
	200mm thick	dB	45 (render)		
	240mm thick	dB	47.5 (no render)		
	240mm thick	dB	48.5 (render)		
	240mm thick	dB	51 (complex)		
Infiltration Resistance (6 days, falling in water)		mm	88.2	JISA 54160 -1997	≤100
Fire Resistance (100mm thick)		hour	≥4.0	GB/T9978 -1999	1. ≥4.0 2. ≥3.0
Modulus of Elasticity		N/mm2	1800		
Water Absorption		°/vol	Totally underwater: 36 Partly underwater: 30		
Expansion Coefficient		/□	7.0 x 10-6		
Note: Property values, as a result of different production batch, may change within a reasonable scope of the standard value.					

Acoustic Test Report for "Eastland" AAC Noise Panel

intertek
Total Quality. Assured.

Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2019-12-03 Intertek Report No. 191126017SHF-001

Applicant: Dragages Hong Kong Limited

Address: 3/F, Island Place Tower, 510 King's Road, North Point, Hong Kong

Attn: Elly SUN

Manufacturer: Eastland International Limited

Address: 2404, Building 4, No. 37 Pukou Avenue, Nanjing, China

Test Type : Performance test, samples provided by the applicant.

Product Information

Product Name	Noise Panel	Brand	/
Sample Description	Good Condition	Sample Amount	10 PCS
		Received Date	2019-11-26

Sample ID	Model	Specification
S191126017SHF.001	/	3m x 0.6m x 0.12m noise panel + 50mm Thick Rockwool

Test Methods And Standards

Test Standard	ISO 10140-2:2010
Specification Standard	ISO 717-1:2013
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:

1.This report relates specifically to the sample(s) that were drawn and provided by the applicant or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested.

Report Authorized

Name: Jodie Zhou Name: Mason Wang

Title: Reviewer Title: Project Engineer

intertek
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Test Report

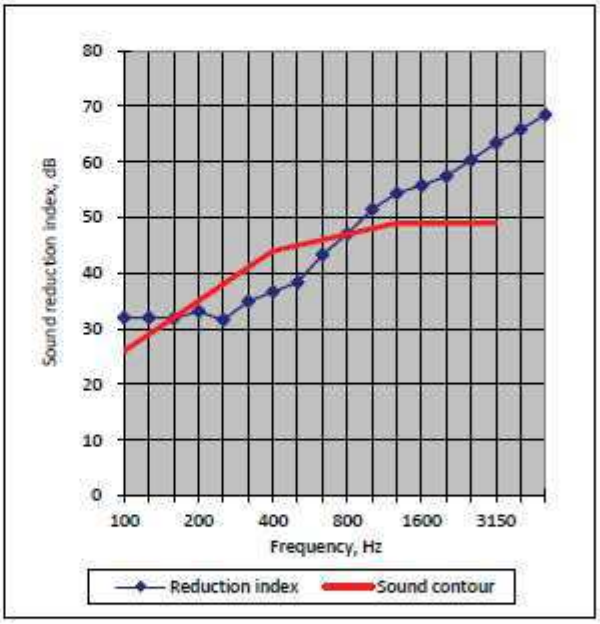
Issue Date: 2019-12-03 Intertek Report No. 191126017SHF-001

Test Items, Method and Results:

Test method: ISO 10140-2:2010

Temperature:	16.5	°C	Relative Humidity:	80	%
Volume of the source room:	112	m^3	Volume of the receiving room:	137	m^3
Specimen area:	12.6	m^2			

Frequency (Hz)	Sound Reduction Index, Ri (dB)
100	32.0
125	32.0
160	31.9
200	33.1
250	31.6
315	34.9
400	36.7
500	38.3
630	43.3
800	47.0
1000	51.4
1250	54.4
1600	55.8
2000	57.5
2500	60.3
3150	63.4
4000	65.8
5000	68.5



Rating according to ISO 717-1:2013

Weighted Sound reduction index	Rw(C;Ctr)=	45(-2;-5)	dB
Spectrum A-weighted pink noise	C=	-2	dB
Spectrum A-weighted urban traffic noise	Ctr=	-5	dB

Note:

1. Evaluation based on laboratory measurement results obtained by an engineer method.
2. The detailed sample installation drawing in Appendix A was provided by the applicant.

Report Ref. No.	:	STR 20027
Issue Date	:	15 July 2020
Project Ref. No.	:	J 20027
Sample No.	:	YP 20027
Customer	:	NAP Acoustics (Far East) Ltd.
Address Of Customer	:	Room 1811, 18/F Hong Kong Plaza, 188 Connaught Road West, Hong Kong

Laboratory Measurement Report for Airborne Sound Insulation to ISO 10140-2 for SNAPAcoustics Noise Barrier Panels model SD150RW

Prepared By : Ms. Vivian Ou (Test Engineer)
BEng., AMMOIA

Checked By : Ms. Vita Feng (Quality Control Manager)
BEng., MMOIA

Approved By : *Ir.* K. K. Iu (Laboratory Manager)
Registered Professional Engineer
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盈普声学(惠州)有限公司声学实验室
SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory
TESTING
CNAS L8117

NOTES

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CONTENTS

盈普声学(惠州)有限公司声学实验室
SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory
TESTING
CNAS L8117

1.0 Introduction

SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory was invited by NAP Acoustics (Far East) Ltd. to determine room-to-room airborne sound insulation of SNAPAcoustics Noise Barrier Panels model SD150RW in accordance with ISO 10140-2:2010.

The test specimen was installed at the test aperture between two Reverberation Rooms at No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China. The volume of the source room named Saturn and the receiving room named Uranus were 127 m^3 and 90.6 m^3 respectively. The structural opening dimensions of the test aperture between two rooms was 4,130 (W) x 3,280 (H) mm.

2.0 Date & Time

Sample was received on 30 June 2020.
Test was conducted from 16:00 to 17:30 on 10 July 2020.

3.0 Environmental Conditions

	Source room	Receiving room
温度 Temperature	31.7 deg. C	31.6 deg. C
湿度 Relative humidity	63 %	65 %

4.0 Test Conducted By

Ms. Fanni Lin	Test Engineer
Mr. Amber Lin	Test Engineer

地址：广东省惠州市惠阳区秋长镇桔园路56号
Add: No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China
电话：（Tel）:0752-3806880 传真：0752-3919311
电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

5.0 Reference Standards

- "ISO 10140-2:2010 Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation "
- "ISO 3382-2:2008 Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms"
- "ISO 717-1:2013 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation"

6.0 Description of the test specimen

6.1 The test specimen was said to be SNAPAcoustics Noise Barrier Panels model SD150RW in thickness of 150 mm. The solid outer shell of the panel was made of 0.8 mm galvanized steel sheet with calcium silicate board in density of 1550 kg/m^3 as damping materials. The sound absorption face was made of 0.5 mm thick galvanized steel sheet having perforation of 23 %. The panels were filled with 60 kg/m^3 rock wool and covered with black fiberglass tissue.

6.2 The test specimen consisted of 7 pieces of the said Noise Barrier Panels in size of 3,200 mm (L) x 565 mm (W). The panels were installed into the test aperture which joined together to form an overall size of 12.7 m^2.

6.3 Photograph of the test specimen installed for testing was given in Appendix 10.

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TESTING
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7.0 Instrumentation

The instrumentation used for the measurement was as follows:

7.1 Norsonic Type 150 Dual-Channel Investigator complying with IEC 61672-1 (Class 1) / ANSI S1.43-1997 (Type 1), with 1/3 octave bands filter complying with IEC 61260 / ANSI S1.11-2004 Class 0 / ANSI S1.11-1986, Order 3, Type 0-C, for sound pressure levels measurements. Microphone extension cables, and internal sound source were used during the measurements.

7.2 Omni Power Sound Source Type Nor 276 and power amplifier Nor 280.

7.3 Bruel & Kjaer Sound Level Calibrator Type 4231, complying with IEC 60942.

8.0 Measurement Procedure

8.1 Calibration checks were carried out on the Sound Measuring Instrument with the Sound Level Calibrator, before and after the measurements. The difference in the calibration value before and after measurements should be no more than 0.5 dB.

8.2 White Noise was generated in the source room so that the transmitted sound level in the receiving room was at least 6 dB above the background noise level at all frequencies. Source and microphone positions were chosen according to ISO 10140-2:2010. Measurements were taken for three source positions, with six microphone positions in the source and receiving room respectively. The Level Difference $D = L_{p1} - L_{p2}$ as per defined in ISO 10140-2:2010 was then calculated.

8.3 For the purpose of estimating the Sound Reduction Index R, the reverberation time in the receiving room was measured according to ISO 3382-2, choosing two loudspeaker positions and six microphone positions.

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Add: No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China
电话：（Tel）:0752-3806880 传真：0752-3919311
电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

8.4 The Sound Reduction Index R was calculated according to ISO 10140-2:2010 as:

$$R = L_{p1} - L_{p2} + 10\log(S / A)$$

where

L_{p1} is the average sound pressure level in the source room, in decibels;
L_{p2} is the average sound pressure level in the receiving room, in decibels;
S is the area of the test specimen, in square meters;
A is the equivalent sound absorption area in the receiving room, in square meters.

8.5 The Weighted Sound Reduction Index R_w was determined from the value of R in 1/3 octave bands with centre frequencies from 100 Hz to 3,150 Hz, following the procedure given in ISO 717-1:2013.

Note: Rw is a single-number values intended to give rating of airborne sound insulation in view to compare the performance of different systems.

9.0 Results

9.1 Calibration checks were carried out on the sound level meter before and after the measurements. The results were recorded below:

Sound level meter	Nor 150 (Channel 1)	Nor 150 (Channel 2)
Calibrator Reference	94.0 dB	94.0 dB
Before Measurement	94.0 dB	94.0 dB
After Measurement	94.0 dB	94.0 dB
Drift	0 dB	0 dB

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9.2 The Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW was determined in accordance with ISO 10140-2:2010 to achieve the following values:

1/3 Octave Band Centre Frequency（Hz）	Sound Reduction Index R（dB）	1/1 Octave Band Frequency Sound Reduction Index R（dB）
50	19.8	20.9
63	22.1	
80	21.2	
100	28.8	31.3
125	32.6	
160	34.3	
200	37.6	40.2
250	41.3	
315	44.0	
400	46.6	47.6
500	47.3	
630	49.3	
800	50.0	52.8
1000	53.8	
1250	58.2	
1600	60.2	61.8
2000	61.7	
2500	64.7	
3150	66.4	67.7
4000	68.3	
5000	68.7	
6300	67.8	57.8
8000	66.3	
10000	53.4	
Weighted Sound Reduction Index R_w (ISO 717-1:2013)	R_w (C;C_{tr}) = 51 (-2;-7)	
	Sum of unfavourable deviations: 31.4 dB	

9.3 The following graph shows the Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW plotted against frequency (dotted line) and the shifted reference curve (solid line), the bars show the values of the unfavourable deviations for each frequency band.

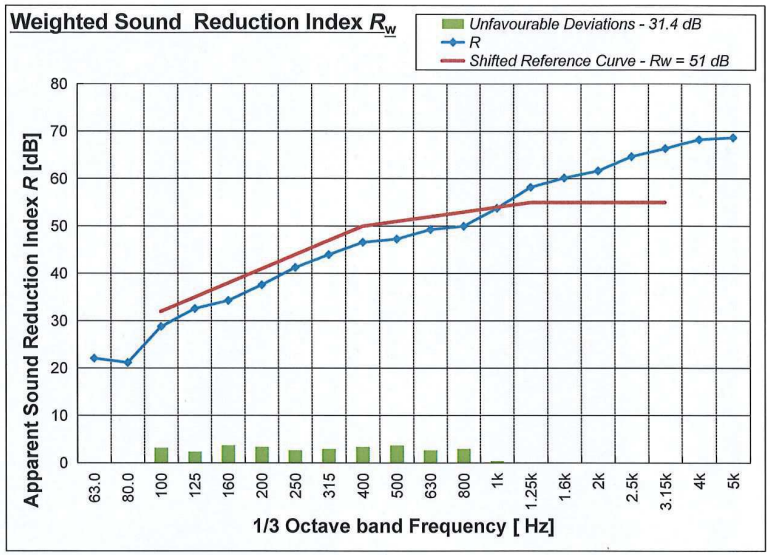

Figure 1: Sound Reduction Index R, reference curve for $R_w = 51$ dB
For SNAPAcoustics Noise Barrier Panels model SD150RW

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TESTING
CNAS L8117

10.0 Appendix

10.1 Photograph of the test specimen installed for testing.

地址：广东省惠州市惠阳区秋长镇桔园路56号
Add: No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China
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电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

Acoustic Test Report for "Kinetics" Sliding Door

Be it ELECTRIC or MANUAL operation, AEC offers a wide range of panel constructions and tracks designed to fit your specific need and budget. For life-of-the-building durability select one of the ALPHA® panel constructions.

advanced equipment CORPORATION

	Panel Type	Weight #/SQ. FT	Weight KG/M2	S.T.C	N.I.C.*	N.R.C.	Panel Thickness	Maximum Width	Maximum Height	Panel Face Sheet
Alpha	S	8.5	41.6	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	16-Ga. Steel or optional 14-Ga.
	T	9.1	44.5	54	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	Minimum 16-Ga. Steel
	U	9.7	47.5	53	42	-	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Steel
	P	12	58.7	49	42	0.65	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Perforated Steel
	X	10	48.9	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	14 or 16-Ga. Steel (1-Hr fire)
Sigma	A	5.9	28.9	49	40	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	B	6.4	31.3	50	41	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	C	6.9	33.8	51	41	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel
	D	7.4	36.2	52	42	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel

N.I.C.* when tested in accordance with ASTM E 336-97: Deduct 2 points when using ASTM E 336-05

With the exception of "X" (fire rated), all ALPHA and SIGMA panels are suitable for electric operation

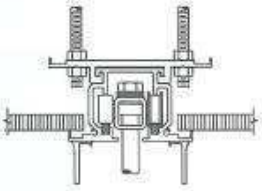
With the exception of "X" (fire rated), all ALPHA and SIGMA panel constructions are available as curved panels

ALPHA & SIGMA panels are one-piece steel weldments with face sheets welded to frame

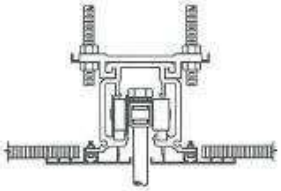
Maximum heights are for individual panel operation and may be less for hinged groups or electric operation

Advanced Equipment's family of extended warranty tracks produce easy, reliable, long term service with virtually no maintenance. These tracks are furnished with a 5 or 10-year warranty period that does not exclude normal wear and tear. Specify tracks #1a, #8 or #8b.

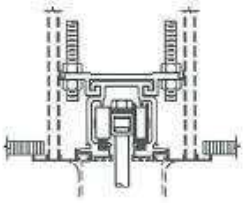
SUPERTRACK®



#1a 900-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
5-YEAR WARRANTY

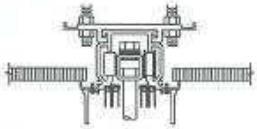


#8 1700-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

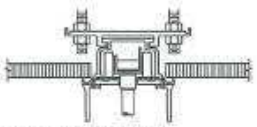


#8b 1500-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

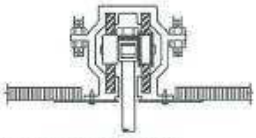
TRACK®



#1 800-pound trolley capacity
Composite track: Aluminum alloy track incorporating soffit trim. Manual or electric operation.
2-YEAR WARRANTY



#2 600-pound trolley capacity
Composite track: Aluminum case with steel running surface. Manual operation.
2-YEAR WARRANTY



#4 1,500-pound trolley capacity
Curve wall manual or electric.
5-YEAR WARRANTY

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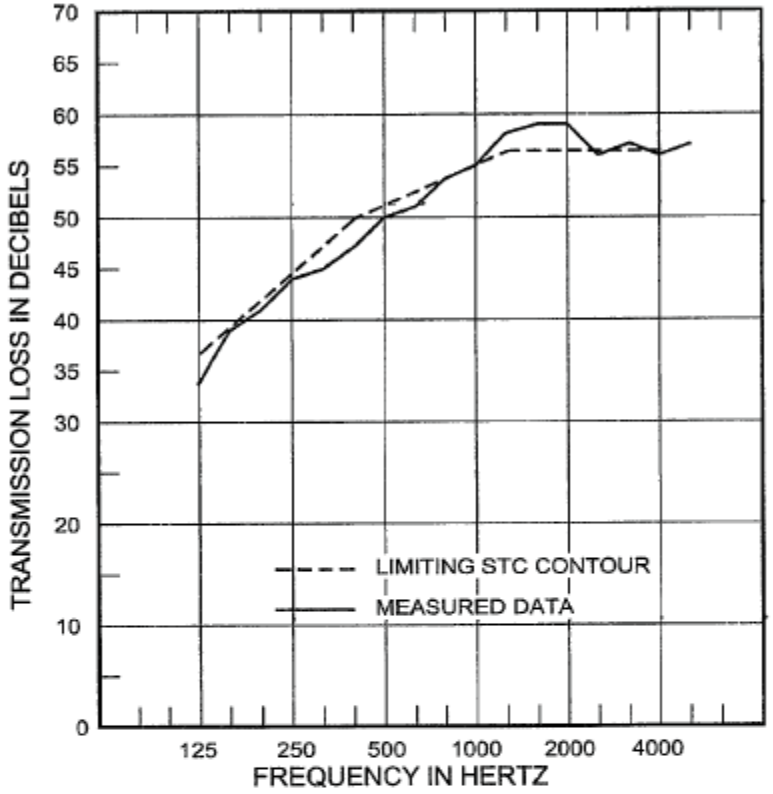
REFERENCE: WESTERN ELECTRO-ACOUSTIC LABORATORY, INC. REPORT #94-227



DESCRIPTION

THE TEST SPECIMEN WAS A FULLY OPERABLE ADVANCED EQUIPMENT CORPORATION **TYPE "U" PANEL** CONSTRUCTION IN A 14' X 9' TEST OPENING.

PROCEDURE

THE PROCEDURES FOR THIS TEST CONFORM TO THE PROVISION AND REQUIREMENTS OF A.S.T.M. E90-85, STANDARD METHOD FOR LABORATORY MEASUREMENT OF AIRBORNE SOUND TRANSMISSION LOSS OF BUILDING PARTITIONS.

RESULTS

THE SOUND TRANSMISSION CLASS RATING DETERMINED IN ACCORDANCE WITH A.S.T.M. E-413 WAS: **STC 53**

1/3 OCT BND CNTR FREQ	125	160	200	250	315	400	500	630	800
TL IN DB	34	37	41	44	45	47	50	52	54
95% CONFIDENCE IN dB DEFICIENCIES	1.80	2.64	1.48	0.69	1.55	1.03	0.90	0.91	0.89

1/3 OCT BND CNTR FREQ	1000	1250	1600	2000	2500	3150	4000	5000	STC
TL IN DB	55	57	59	59	56	57	56	57	53
95% CONFIDENCE IN dB DEFICIENCIES	.064	0.75	1.19	1.88	1.76	2.28	2.55	2.32	

SPECIMEN AREA: 114.75 SQ. FT.
TEMPERATURE: 70.6 DEG. F
RELATIVE HUMIDITY: 46 %
TEST DATE: JULY 16, 1995

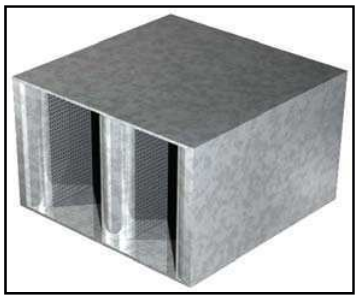
MYG
www.acoustic-hk.com

MANYA STEEL PRODUCTS MANUFACTORY

RECTANGULAR SILENCER

INTRODUCTION

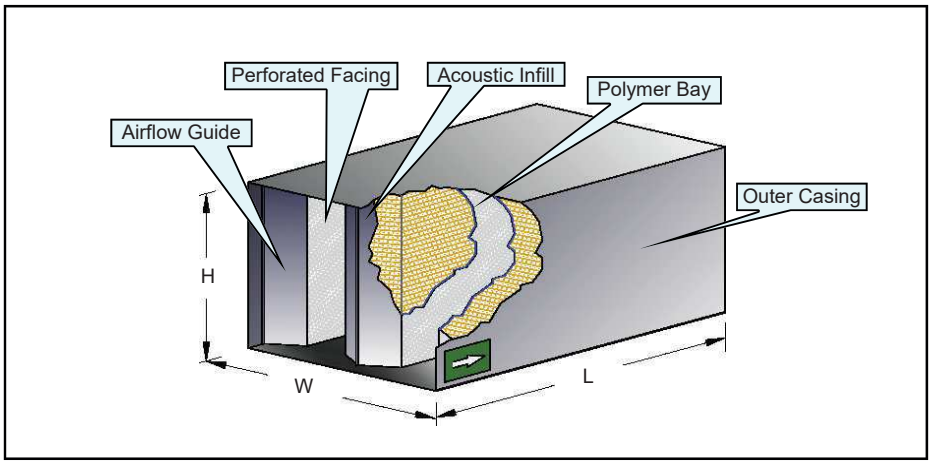
We often hear the noise from ventilation or heating systems that is hardly noticeable because it has no prominent features. The “MYG” rectangular silencer Model: MV series are mainly used in air flow intake, discharge and HVAC Ductwork systems. These silencers are offered in standard dimensions, which can be readily mounted onto the existing duct, combined with an easy calculation and selection method as well as be flexible to suit the client’s particular requirements.



Rectangle G.I. Silencer

MATERIALS AND CONSTRUCTION

Standard MYG MV series come with high quality materials, compact construction and assembled with “Pittsburg seam” with natural galvanized finish on the outer case. Both the outer and inter skins shall be made of pre-galvanized steel sheets and perforated steel sheets respectively. The weld affected areas and angle frames (optional) are to be protected with cold galvanizing paint finish or corrosion-resistant paint finish. Acoustic in fill using with inorganic glass fiber absorbent material with sufficient density functions to give the optimal intended performance.



MYG MV Series Rectangular Silencer

Specification of Standard Model

Materials	MYG Silencer MV Series
	Model: MV
Thickness of outer casing steel sheets	0.8 to 1.2mm
Thickness of inner perforated steel sheets	0.5mm
Acoustic infill density	32kg/m^3

**Others standard and materials are available base on customer request.*

OEM Factory Address : Langsha Industrial Zone, Qiao Tou Town, Dongguan City. Tel : 86-0769-345-3335 Fax : 86-0769-345-3337

APPLICATIONS

A wide variety of industrial applications can be considered when using "MYG" acoustic silencer for the control of airborne and duct-borne noise associated with common HVAC airflow systems. The use of silencers is to minimize the fan and blower noise at both the side inlets and outlets of the equipment. Commercial acoustic silencers are engineered to achieve a maximum insertion loss with a minimum pressure drop. Normally silencers are their type and applications as follows.

- ☑ Air Discharge / Intake
- ☑ Duct Silencer
- ☑ Cross Talk Silencer
- ☑ Air Flow Splitter
- ☑ Standard Elbows
- ☑ Special Shaped Elbows
- ☑ Special Bend Elbows
- ☑ Packless Silencer

ENGINEERING DATA

Static Loss (Pressure Drop)

Determine pressure drop across silencer by the following formula:

Pressure drop, $\triangle P$ = PD x V^2 (Pa)

Where PD Value = Pressure loss coefficient

V = Face velocity in m/s (cross sectional size)

Insertion Loss of "MV" L-series, dB
Low Pressure (Airway 45%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVL2	600	0.48	2	4	9	12	19	19	11	4
MVL3	900	0.52	2	5	10	17	21	21	13	5
MVL4	1200	0.69	3	6	13	22	28	28	16	7
MVL5	1500	1.03	4	8	15	28	35	35	21	11
MVL6	1800	1.32	5	9	19	33	42	42	25	14
MVL7	2100	1.88	6	11	22	39	49	49	29	20
MVL8	2400	2.55	7	13	25	45	50	50	44	24
MVL9	2700	3.42	9	15	27	47	50	50	46	29

Insertion Loss of "MV" S-series, dB
Medium Pressure (Airway 33%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVS2	600	0.74	4	8	14	20	31	30	24	18
MVS3	900	0.92	5	10	18	27	34	36	30	21
MVS4	1200	1.72	6	14	24	37	46	46	40	26
MVS5	1500	2.3	8	18	27	42	50	50	46	31
MVS6	1800	3.1	9	19	34	50	50	50	50	39
MVS7	2100	4.4	11	23	40	50	50	50	50	49
MVS8	2400	6.4	13	25	45	50	50	50	50	50
MVS9	2700	8.7	14	27	48	50	50	50	50	50

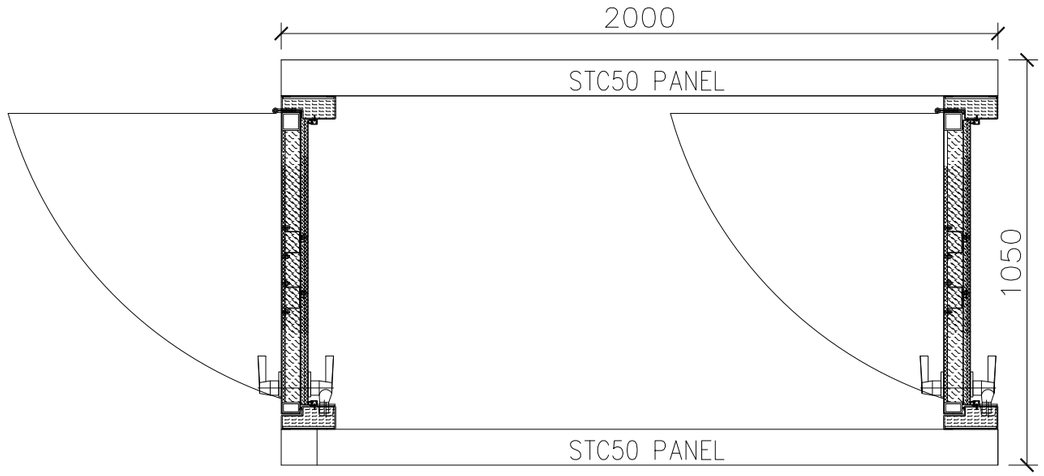
Length of each ventilation silencer = 2 x 1500mm

Insertion Loss of "MV" H-series, dB
High Pressure (Airway 22%)

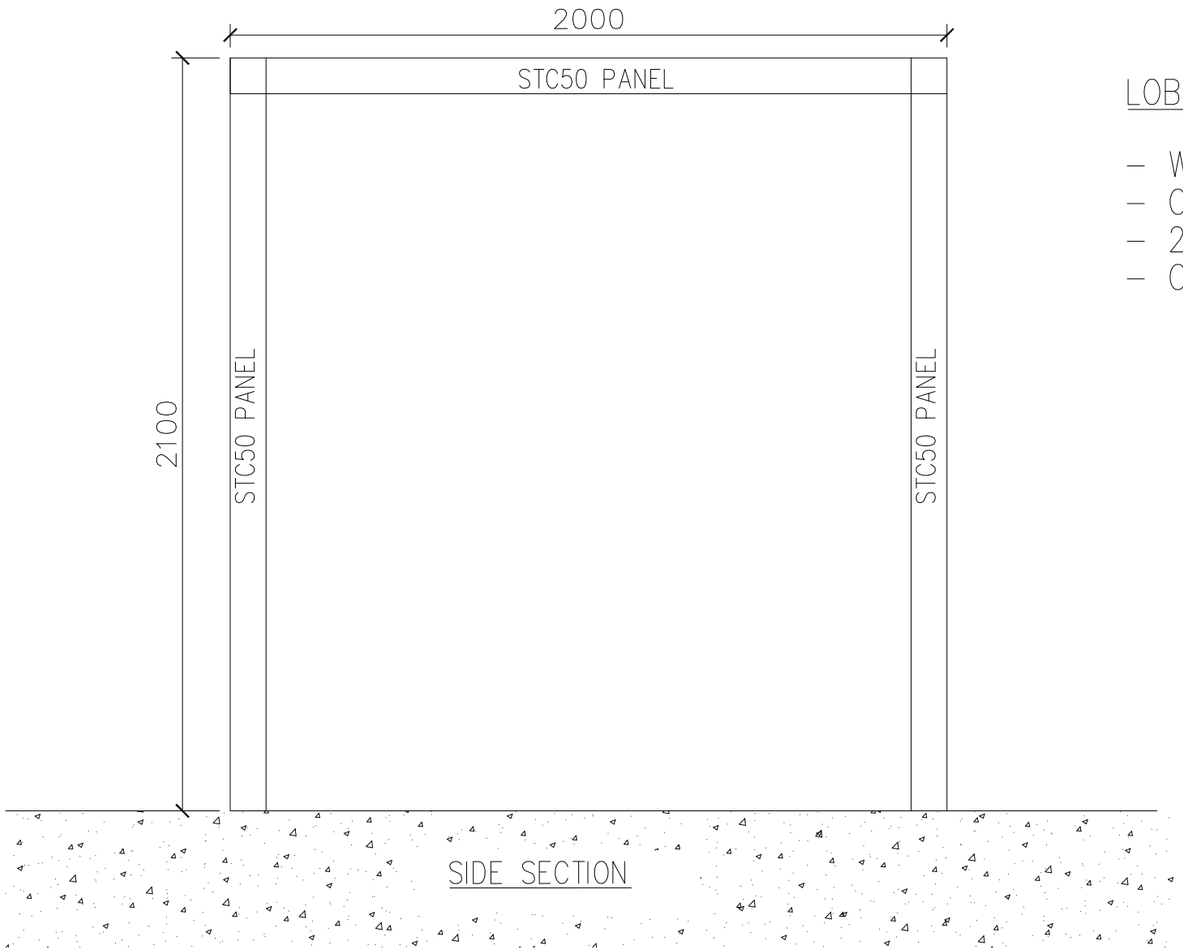
Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVH2	600	2.3	6	10	16	26	30	30	26	22
MVH3	900	3.4	9	16	24	37	48	50	50	39
MVH4	1200	5.1	11	21	31	49	50	50	50	46
MVH5	1500	8.1	14	25	39	50	50	50	50	50
MVH6	1800	12.1	16	29	46	50	50	50	50	50
MVH7	2100	16.5	18	33	50	50	50	50	50	50
MVH8	2400	21	20	37	50	50	50	50	50	50
MVH9	2700	23	22	39	50	50	50	50	50	50

DOUBLE DOOR LOBBY HOUSE

STC50 Acoustic Panel



LAYOUT



SIDE SECTION

LOBBY HOUSE DETAILS

- WALL PANEL BY STC50 (100mm THICKNESS)
- CEILING PANEL BY STC50 (100mm THICKNESS)
- 2 ACOUSTIC DOORS WITH AIR TIGHT HANDSET
- OVERALL SIZE: 2000L X 1050W X 2100H

PROJECT:			
TITLE: PRE-FABRICATED ACOUSTIC LOBBY HOUSE			
DRAWN:	CAD	DATE:	
CHECKED:	CAD	SCALE:	N.T.S.
DWG. NO.			

BOUYGUES
TRAVAUX PUBLICS

Contract No. HY/2018/08
Central Kowloon Route – Central Tunnel

PROJECT PLAN

CONSTRUCTION NOISE MITIGATION MEASURES PLAN

(Yau Ma Tei Shaft Worksite)

TABLE OF CONTENT

1. INTRODUCTION

1.1 Project Description

1.1.1 Following the completion of Yau Ma Tei Access Shaft (YMTS) by the Contractor of HY/2014/08, part of the CKR-YMTE construction site was taken over by Bouygues Travaux Publics (BYTP). BYTP was commissioned by the Highway Department of the HKSAR as the Main Contractor for the Contract HY/2018/08. This Construction Noise Mitigation Measure Plan (CNMMP) is prepared with reference to the approved CNMMP for CKR-YMTE under the CKR Contract.

1.1.2 Highways Department (HyD) commissioned the Design and Construction Assignment for the Central Kowloon Route in Jun 1998. CKR is a duel 3-lane trunk road across central Kowloon linking the West Kowloon in the west and the proposed Kai Tak Development (KTD) in the east. The CKR will be about 4.7km long with an underground tunnel section of about 3.9km long there will be an underwater tunnel of about 370m long in Kowloon Bay to the north of the To Kwa Wan Typhoon Shelter. It will connect the West Kowloon Highway at Yau Ma Tei Interchange with the road network at Kowloon Bay and the future Trunk Road T2 at KTD which will connect to the future Tseung Kwan O – Lam Tin Tunnel (TKO-LTT) and Cross Bay Link (CBL). CKR, Trunk Road T2 and TKO-LTT will form a strategic highway link, namely Route 6, connecting West Kowloon and Tseung Kwan O. Consultancy studies for Trunk Road T2, TKO-LTT and CBL have been commissioned by CEDD. In addition, 3 ventilation buildings, which will be in Yau Ma Tei, Ho Man Tin and ex-Kai Tak airport area, are proposed to ensure acceptable air quality within the tunnel.

1.1.3 The Central Kowloon Route – Design and Construction Environmental Impact Assessment Report (Register No.: AEIAR-171/2013) was approved with conditions by the Environmental Protection Department (EPD) on 11 July 2013. An Environmental Permit (EP) (No. EP-457/2013) was issued on 9 Aug 2013. Variations of EP (VEP) was subsequently applied for and the latest EP (EP-457/2013/C) was issued by EPD on 16 Jan 2017.

1.1.4 The activities planned for the YMTS construction site under the EP include:

- Tunnel excavation (Tunneling & enlargement);
- Cut and cover tunnel.

The overall layout plan of Central Tunnel and YMTS are enclosed in Annex A.

1.1.5 Condition 2.9 of the EP No. EP-457/2013/C stipulated that to further reduce the air-borne construction noise impacts on the NSRs: Tak Cheong Building, Prosperous Garden Block 1, and The Coronation Tower 1, the Permit Holder shall prepare the CNMMP to the Director of EPD for approval. The plan shall include:

(a) A schedule of construction works to be carried out at the works areas of the Project within 300m from the NSRs defined by EP;
(b) An updated construction methodology of the construction works;
(c) An updated Power Mechanical Equipment (PME) list for the construction works;
(d) An updated proposal of air-borne construction noise mitigation measures for the identified NSR as mentioned above, including the provision of noise barriers, enclosures;

(e) Other activities proposed by the Permit Holder; and
(f) An updated prediction of noise levels in accordance with the above updated information and mitigation proposals in place.

1.1.6 The CNMMP will be reviewed upon the proposed change of construction methods or materials. The updated PME listed in Table 1 represented the worst-case scenario which is practicable for completing the works required by the Contract within the scheduled timeframe.

2. CONSTRUCTION WORKS / ACTIVITIES OF THE PROJECT

2.1. The programme for the construction works described in above Section 1.1.5 are presented in Annex B.

2.2. The proposed construction works will generally follow the methodologies recommended in Chapter 3 of the approved EIA report. Drill and Blast methodology will be adopted for the construction of the central tunnel.

2.3. Application of electronic detonator will be adopted for blasting in certain tunnel sections. Electronic detonator was widely used in other tunnel projects in Hong Kong (HATS, WIL, XRL and TKO-LTT). Comparing to the traditional shock tube detonator system, qualitative review revealed that the improved design of electronic detonator can (1) eliminate the likelihood of failure caused by human errors and (2) provide a reliable control of ground vibration thus less ground-borne noise disturbance to the public is anticipated.

2.4. A summary of PME proposed for the construction works is shown in Table 1. The respective Sound Power Level (SWL) of the PME can be obtained from:

1) EPD's Technical Memorandum on Noise from Construction Work Other than Percussive Pilling.
2) List of SWLs of other commonly used PME or
3) British Standard 5228 – Part 1:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites.

As recommended in the EIA report, quiet equipment and adjustment in utilization rates should be adopted according to Appendix 5.4 of the EIA report to minimize the noise impact to the NSRs. Extra PME have been proposed to take account the latest construction programme and PME inventory in addition to the quiet PME proposed in the EIA report.

Table 1: Summary of PMEs proposed for construction works

PME (% Operation)	Reference	SWL, dB(A)*
Air blower (100%)	CNP 006	95
Air Compressor (50%)	CNP 002	99
Water Pump, submersible (electric) (100%)	CNP 283	85
Aerial work platform, working height ≤ 13m (50%)	BS5228 Table C.4/57	92
Grout mixer (50%)	CNP 105	87
Grout pump (50%)	CNP 106	102
Concrete Mixer (50%)	CNP 045	93
Concrete Lorry Mixer (30%)	CNP 044	104
Shotcreting machine (50%)	BS5228 Table D.6/13	105
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100
Light good vehicle < 5.5 tonne (50%)	CNP 143	98
Loader, wheeled (50%)	CNP 081	109
Ventilation fan (100%)	CNP 241	108
Excavator, tracked (50%)	EPD-07059	103
Breaker, excavator mounted (hydraulic) (50%)	BS5228 Table D.8/13	107
Rock drill, (hydraulic) (50%)	SIL EIA#	105

PME (% Operation)	Reference	SWL, dB(A)*
Mobile crane (50%)	EPD-09573	99

.

** Noise data refers to the Quiet Plant in Appendix 5.4 and Appendix 5.6a of the CKR EIA report.*

Sound Power Level refers to EPD website (Sound Power Level of other commonly used PME)

BS5228 – Code of practice for noise and vibration control on construction and open sites, and the Technical Memorandum on Noise from Construction Work Other than Percussive Piling (GW-TM) under the Noise Control Ordinance.

*** Series of this kind of PME with same or lower SWL will be adopted.*

 # Reference to Approved South Island Line (East) EIA

3. ASSESSMENT CRITERIA AND METHODOLOGY

3.1 Assessment Criteria

3.1.1 Noise impacts arising from the construction works at YMT are assessed in accordance with the criteria given in the Technical Memoranda under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment. The daytime construction noise criteria are listed in Table 2.

Table 2: Daytime construction noise criteria

Use	Acceptable Noise Level in Leq (30-min), dB(A)
Residential	75

3.2 Assessment Methodology

3.2.1 Construction noise assessment was carried out according to the methodology adopted in the EIA report. The utilization rate for each PME was estimated individually for the corresponding activity to ensure it is practical and consistent with the assumptions made in the EIA report.

3.2.2 BYTP confirmed that the programme and plant inventory are reasonable and practicable allowing the completion of works within the schedule timeframe.

3.2.3 All mitigation measures and their effectiveness evaluated in the EIA report including adoption of quiet PME, percentage on-time for each PME, movable noise barrier and noise enclosure for the PME were considered in this CNMMP. Details of acoustic materials to construct the noise enclosure are enclosed in Annex G.

3.2.4 To predict the noise level, PMEs are divided into groups required for each respective construction task. The purpose is to identify the worst-case scenario representing those PME that will be in use concurrently at any time. The total Sound Pressure Level (SPL) of each construction task at the identified NSR is calculated, according to the Sound Power Level (SWL) of each PME and the distance attenuation to the NSRs. If more than one construction task will be carried out concurrently, the total SPL is predicted by adding up all SPL of concurrent construction tasks in logarithmic scale.

3.2.5 Tunnelling works will involve alternating cycles from drilling to mucking out. Therefore, tunnel excavation activities will be operated in sequence rather than concurrently. The relevant noise calculation is conducted in groups accordingly.

3.2.6 A positive 3dB(A) façade correction is added to the predicted noise level to account for the façade effect at the NSR.

4. NOISE SENSITIVE RECEIVERS

4.1 According to Condition 2.9 of the EP, Yau Ma Tei Catholic Primary School (Hoi Wang Road), Tak Cheong Building, Prosperous Garden Block 1, and The Coronation Tower 1 (West Façade) were identified as a representative NSR for the assessment. The predicted noise levels at the identified NSRs are summarized in Table 3. Since Yau Ma Tei Catholic Primary School (Hoi Wang Road) is > 300m away from the YMTS construction site, the corresponding noise assessment will not be considered in this CNMMP.

Table 3: Summary of Mitigated Noise Level Predicted at the Identified NSRs in EIA Report

NSR ID	NSR Description	Uses *[1]*	Criterion dB(A)	Max. Mitigated Noise Level, dB(A)*[2]*	Exceedance, dB(A) *[2]*
W-N8A	Tak Cheong Building	R	75	**82**	7
W-N25A	Prosperous Garden Block 1	R	75	**81**	6
W-P11	The Coronation Tower 1 (West Façade)	R	75	**77**	2

[1] R- Residential
[2] Bolded values mean exceedance of the relevant noise criteria.

4.2 The locations of identified NSRs are shown in Figure 1:

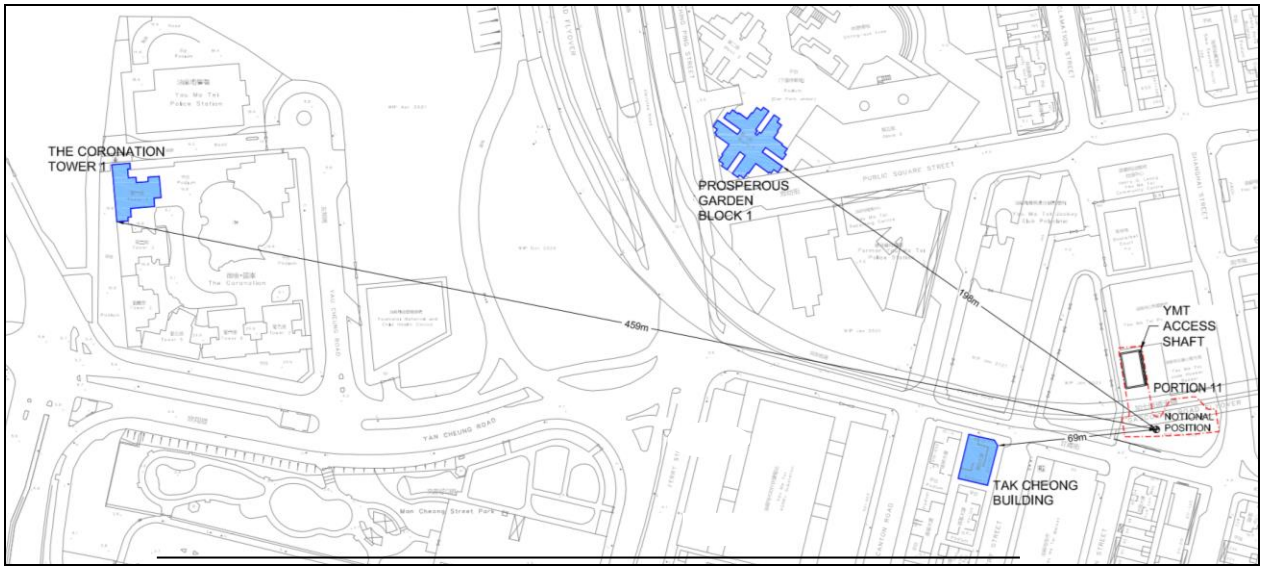


Figure 1: Location plan of identified NSRs

Photos of identified NSRs are presented in Annex C

5. ASSESSMENT OF CONSTRUCTION NOISE IMPACT

5.1. Mitigation Measures

5.1.1. The mitigation measures proposed in the EIA report will be adopted, i.e. Erection of movable barrier and noise enclosure. PME with adopted mitigation measures are summarized in Table 4.

5.1.2. Noise reduction of 5dB(A) is proposed for the movable barrier for the PME operating at surface.

5.1.3. All PME for tunnel excavation shall be operated at the shaft bottom (>35m below the ground level) with a noise enclosure covering the shaft. In this case, the barrier effect proposed for the PME operating inside the shaft is 20dB(A).

5.1.4. Shaft covers were constructed for the PME operating inside access shaft. The noise cover is made of 400mm thick concrete slab. A 14m x 8m opening is remained for daytime operation, which will be closed by a removable cover during restricted hours. The removable cover is made of 155mm thick proprietary noise panel (STC50), including 5mm thick steel sheet outer layer and 2mm thick steel sheet inner layer sandwiching 24mm thick stone board and ~124mm thick rockwool infill (100kg/m3). The removable cover will cover on a 14m x 8m x 2.2m (H) concrete pit. There is a man-access lobby house and a ventilation opening. The man-access lobby house is installed on the removable noise cover. The ventilation opening is located on the concrete slab, which is installed with two units of 1.5m long silencers (total 3m long, Model MVS5). Details of the noise cover are presented in Annex D. PME with proposed mitigation measures are summarized in Table 4.

Table 4: Summary of PME with Proposed Mitigation Measures

PME (% Operation)	Proposed Mitigation Measures	Noise Reduction, dB(A)
Air blower (100%)	Noise enclosure	20 (Tunnel)
Air Compressor (50%)		
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Grout pump (50%)		
Grout mixer (50%)		
Shotcreting Machine (50%)		
Light good vehicle < 5.5 tonne (50%)		
Loader, wheeled (50%)		
Ventilation fan (100%)		
Excavator, tracked (50%)		
Breaker, excavator mounted (hydraulic) (50%)		
Rock drill, crawler mounted (hydraulic) (50%)		
Air Compressor (50%)	Movable barrier	5 (Surface)
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Concrete Mixer (100%)		
Concrete Lorry Mixer (30%)		
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)		
Mobile crane (50%)		

5.1.5. According to the construction programme of YMTS, noise assessments at the NSRs with implementation of proposed mitigation measures are presented in Annex E. The cumulative noise

assessment for the NSRs due to the concurrent construction activities (YMTS and YMTE) are presented in Annex F. The cumulative noise levels are summarized in Table 5.

Table 5: Summary of Cumulative Noise Levels at the NSRs (Mitigated)

NSR ID	NSR Description	Uses	Criterion dB(A)	Mitigated Noise Level range dB(A)	Maximum Exceedance dB(A)	Exceedance Duration/Months
W-N8A	Tak Cheong Building	R	75	72 - 81	6	23
W-N25A	Prosperous Garden Block 1	R	75	64 - 80	5	4
W-P11	The Coronation Tower 1 (West Façade)	R	7Y5	69 - 73	-	-

5.1.6. With the implementation of the above-mentioned mitigation measures, residual impacts exceeding the construction noise criterion are still expected. The comparison of residual impacts between CKR EIA and this CNMMP is shown in Table 6.

Table 6: Mitigated Construction Noise Impact at the Identified NSRs

NSR	Noise Criteria dB(A)	EIA Prediction					CNMMP Prediction				
		Max Noise Level dB(A)	Exceedance Duration (Month)				Max Noise Level dB(A)	Exceedance Duration (Month)			
			1-4 dB(A)	5 dB(A)	6 dB(A)	7 dB(A)		1-4 dB(A)	5 dB(A)	6 dB(A)	7 dB(A)
W-N8A	75	82	26	5	4	2	81	16	4	3	-
W-N25A	75	81	6	-	3	-	80	1	3	-	-
W-P11	75	77	4	-	-	-	73	-	-	-	-

5.1.7. According to cumulative noise assessment presented in Annex F, the predicted noise impact contributed from this project is insignificant comparing with the predicted noise impact from the concurrent project (YMTE). Despite the maximum noise level predicted at the nearest NSR – Tak Cheong Building due to the construction works of YMTS is 60dB(A), the overall noise level is substantially dominated by the concurrent construction activity of YMTE, and therefore the exceedance will still exist.

6. CONCLUSION

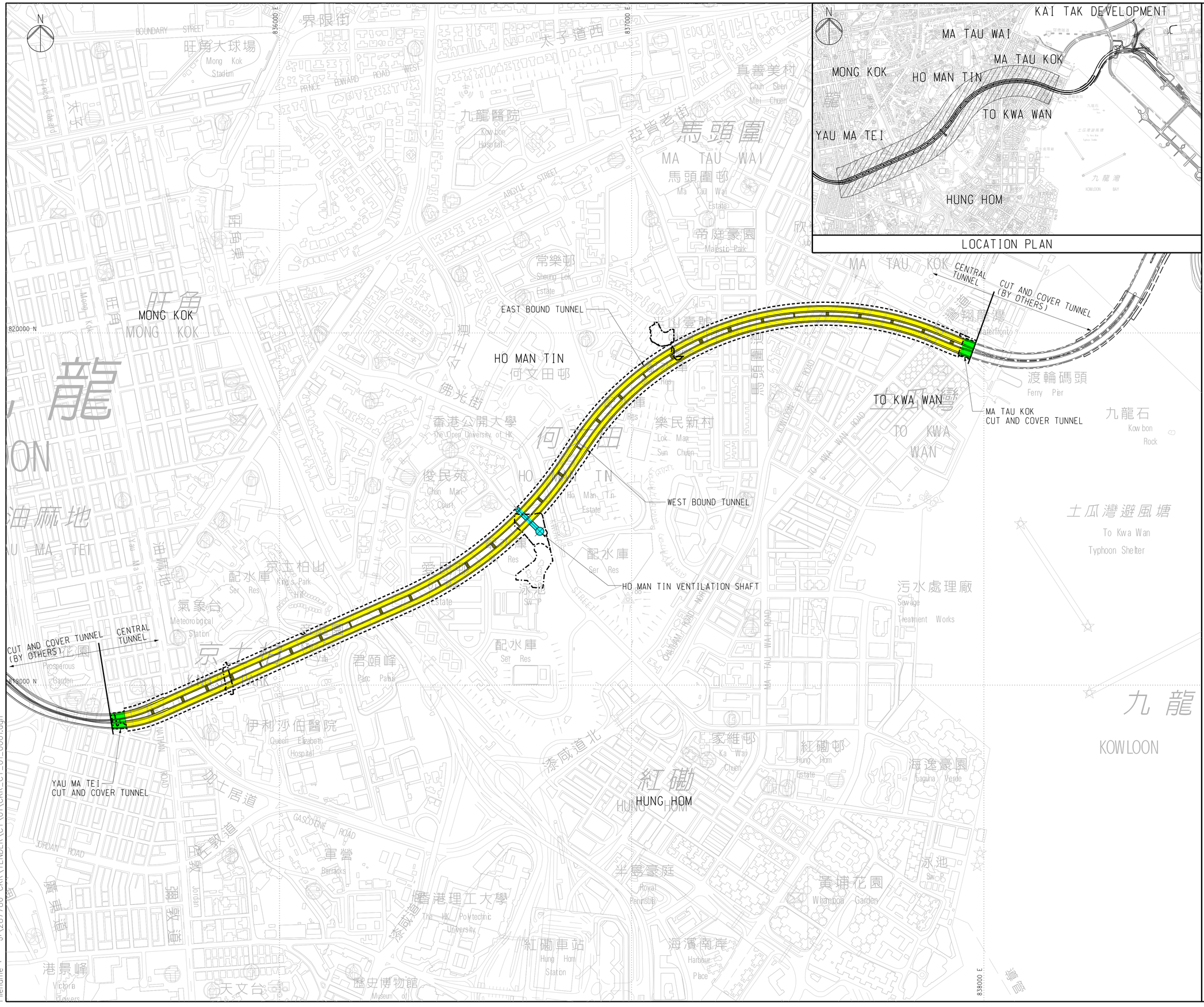
6.1. This CNMMP predicted the construction noise impact arising from the Yau Ma Tei Access Shaft construction site to the identified NSRs. This plan has updated the information on PMEs and works programme which will be adopted by Bouygues Travaux Publics. The proposed mitigation measures including use of quiet QPME, movable barriers and noise enclosure will be implemented.

6.2. According to the CNMMP prediction, no noise exceedance is predicted at the W-P11 which is better than EIA prediction comparatively. The overall construction noise impact would be reduced for all three NSRs in terms of duration and noise level, when comparing with the EIA prediction.

6.3. This CNMMP will be subsequently reviewed and updated along the construction phase. Liaison with the affected parties will be carried out to minimize the construction noise impact as far as practicable. Attention will be paid to the construction activities which are predicted to give noise exceedances. Appropriate mitigation measure such as re-arrangement of noisy activities shall be implemented when necessary.

Annex A

Layout Plan of CKR-CT and Yau Ma Tei Access Shaft Construction Site



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. CKR/CT/01/0002 TO 0014 AND 0021 TO 0034 FOR BOUNDARY OF THE SITE AND SETTING OUT PLAN RESPECTIVELY.

LEGEND:

- BOUNDARY OF THE SITE (ABOVE GROUND)
- BOUNDARY OF THE SITE (UNDERGROUND)
- PROPOSED CENTRAL TUNNEL
- PROPOSED CUT AND COVER TUNNEL
- PROPOSED HO MAN TIN VENTILATION ADIT

Rev. 修訂	Description 內容摘要	By 設計	Date 日期
00	ISSUE FOR TENDER	JC	12/18

ARUP MOTT MACDONALD
Arup-Mott MacDonald Joint Venture

Project title 工程名稱
Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Drawing title 圖紙名稱
PROJECT LAYOUT KEY PLAN

Drawing no. 圖紙編號	Rev. 修訂
CKR/CT/01/0001	00

Drawn By 繪圖	Checked By 復核	Approved By 批准人
JL	AC	RC

Scale 比例: 1:5000 @ A1
Status 階段: TENDER

路政署 HIGHWAYS DEPARTMENT
主要工程管理處 MAJOR WORKS PROJECT MANAGEMENT OFFICE

Printed by : 12/13/2018
Filename : J:\287786-CKR\TENDER\CT\01\CKR_CT_01_0001.dgn

LEGEND:

WORK AREA (SURFACE)

SETTING OUT POINT

P1

Noise enclosure A

Noise enclosure B

WIP Apr 2019

PORTION 11

Elevated Road

Yau Ma TeiJade HawkerBazaar

油麻地玉器小販市場

街市街垃圾收集站
Market StreetRefuse Collection Point

Yau Ma Tei Carpark

TEMPLE STREET

KANSU STREET

甘肅街

MCWB=1+391.388

MCWB=1+450

MCWB=1+397.422

MCWB=1+

POINTS	COORDINATES	
	EASTING	NORTHING
S001	835542.269	818916.054
S002	835532.693	818915.044
S003	835528.752	818914.629
S004	835523.942	818914.195
S005	835522.939	818914.120
S006	835519.329	818913.849
S007	835519.551	818912.570
S008	835520.946	818904.539
S009	835521.789	818897.938
S010	835523.077	818890.758
S011	835523.578	818887.203
S012	835522.749	818882.029
S013	835521.059	818874.668
S014	835541.166	818869.012
S015	835543.582	818868.424
S016	835549.327	818867.477
S017	835555.677	818866.494
S018	835560.343	818866.260
S019	835564.365	818865.986
S020	835565.736	818866.498
S021	835567.240	818869.426
S022	835568.293	818873.092
S023	835569.065	818878.059
S024	835569.961	818883.506
S025	835569.944	818884.876
S026	835569.825	818894.462
S027	835555.428	818892.963
S028	835546.398	818892.023

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	05/10/2020	MSS	GXE	LJE	XMO

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: YAU MA TEI (SURFACE)
LAYOUT PLAN
CNP APPLICATION
SURFACE COORDINATES

DRAWING NO.: HKCKR/BTP/SKT/YMS/TSI/000020

ISSUE STATUS: FOR INFORMATION

CREATION DATE: 05/10/2020

REVISION: A

PAPER SIZE: A3

SCALE: 1:400 @ A3

PAGE: 1/1

hkckr-btp-skt-yms-tsi-000020-a.dwg

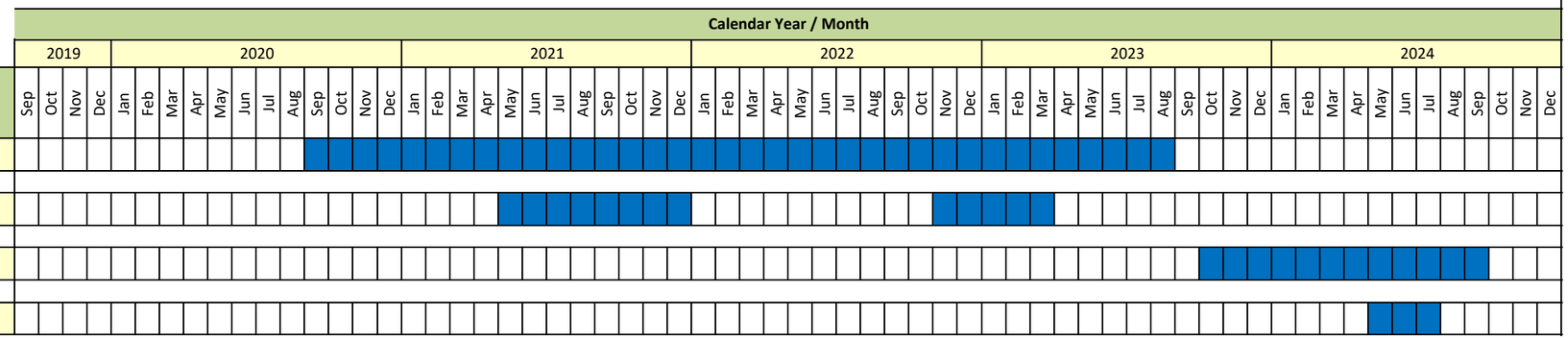
Annex B

Construction Programme

Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

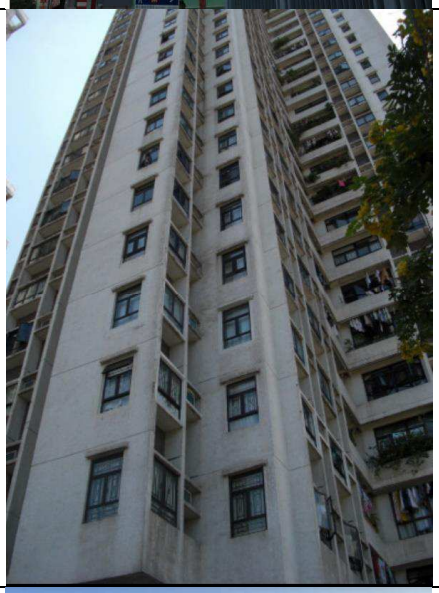
YMTS Major Works Programme

item	Description of Works	Duration	Calendar Year / Month
1	Tunnel Excavation (EB Tunnelling & Enlargement)	36 months	
2	Tunnel Excavation (WB Tunnelling & Enlargement)	13 months	
3	Cut & Cover Tunnel (EB)	12 months	
4	Cut & Cover Tunnel (WB)	3 months	



Annex C

Photo of Identified NSRs

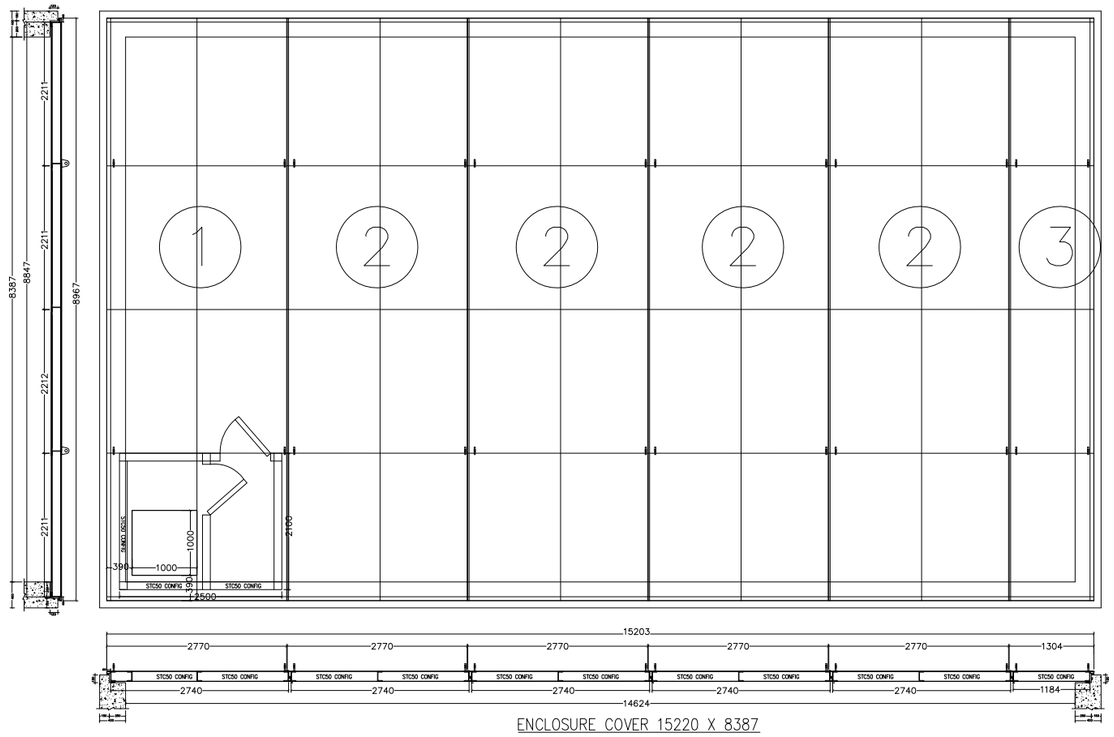
Noise Sensitive Reservoir Locations		
NSR	**Location**	**Photo**
W-N8A	Tak Cheong Building	
W-N25A	Prosperous Garden Block 1	
W-P11	The Coronation Tower 1 (West Facade)	

Annex D

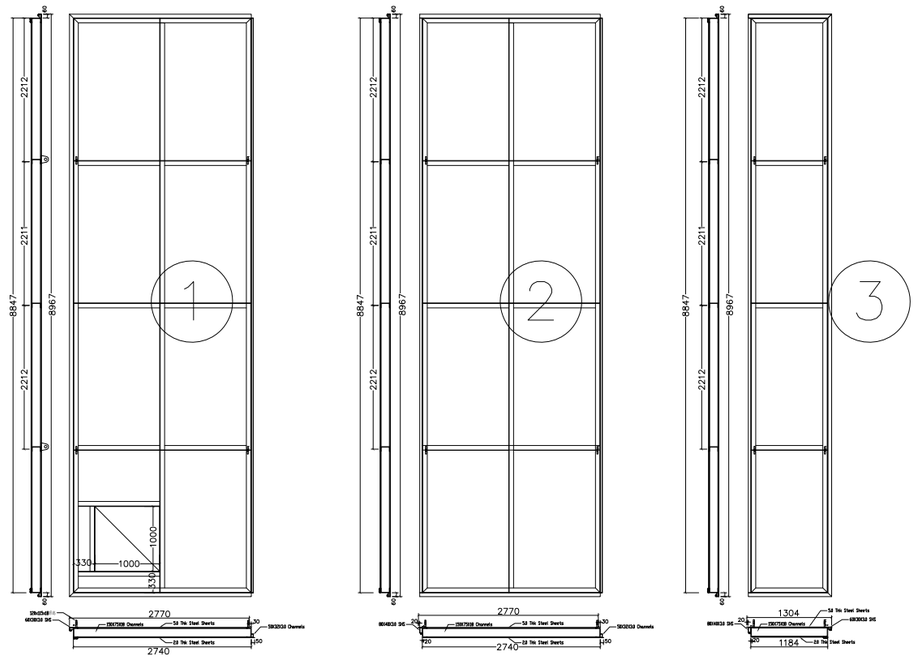
Details of Noise Enclosure

Noise Enclosure Cover

STC50 Acoustic Panel

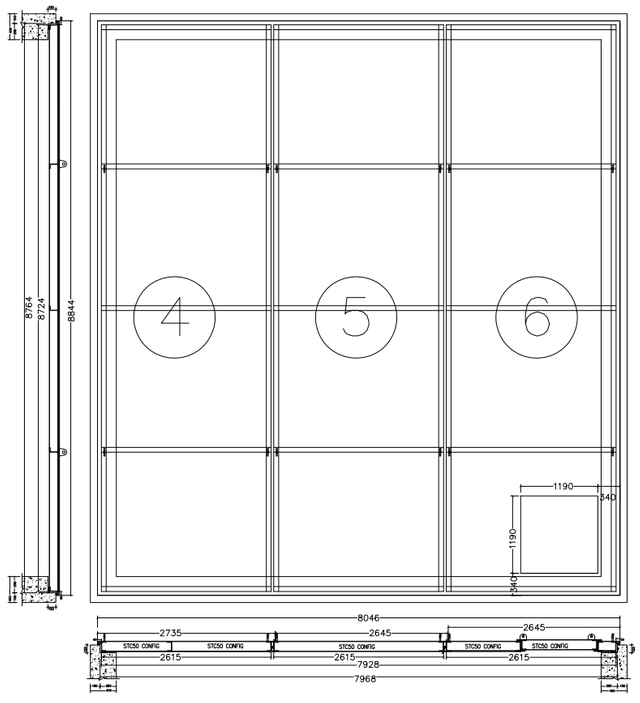


ENCLOSURE COVER 15220 X 8387

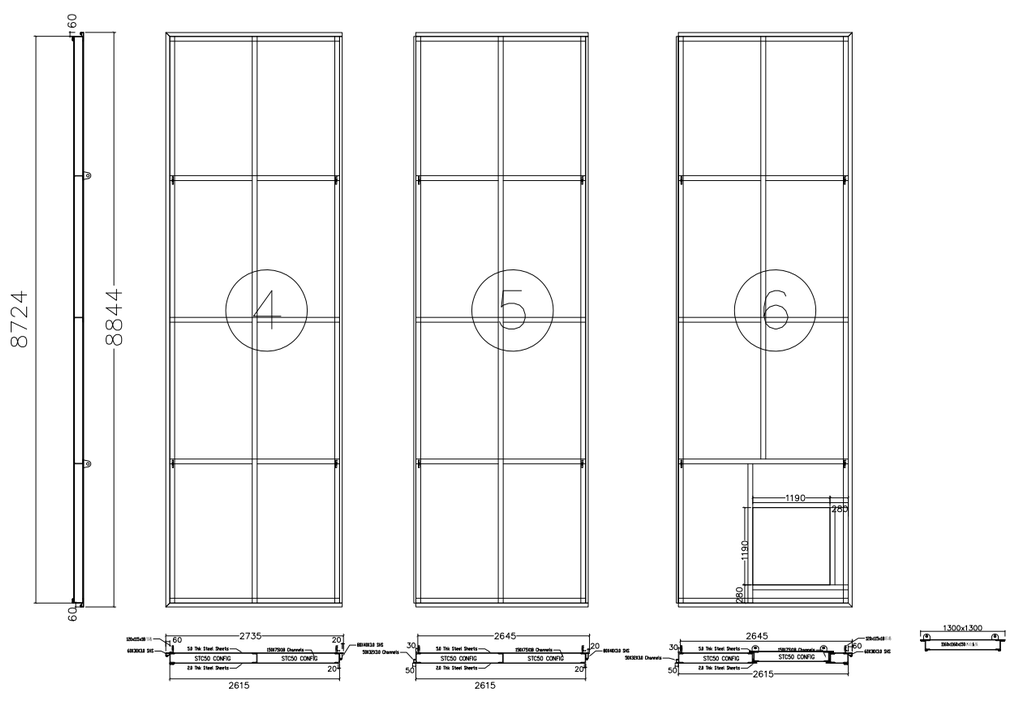


1 pc 4 pc 1 pc

Appendix A: Design Drawing of Removable Cover



ENCLOSURE COVER 8842 X 7968

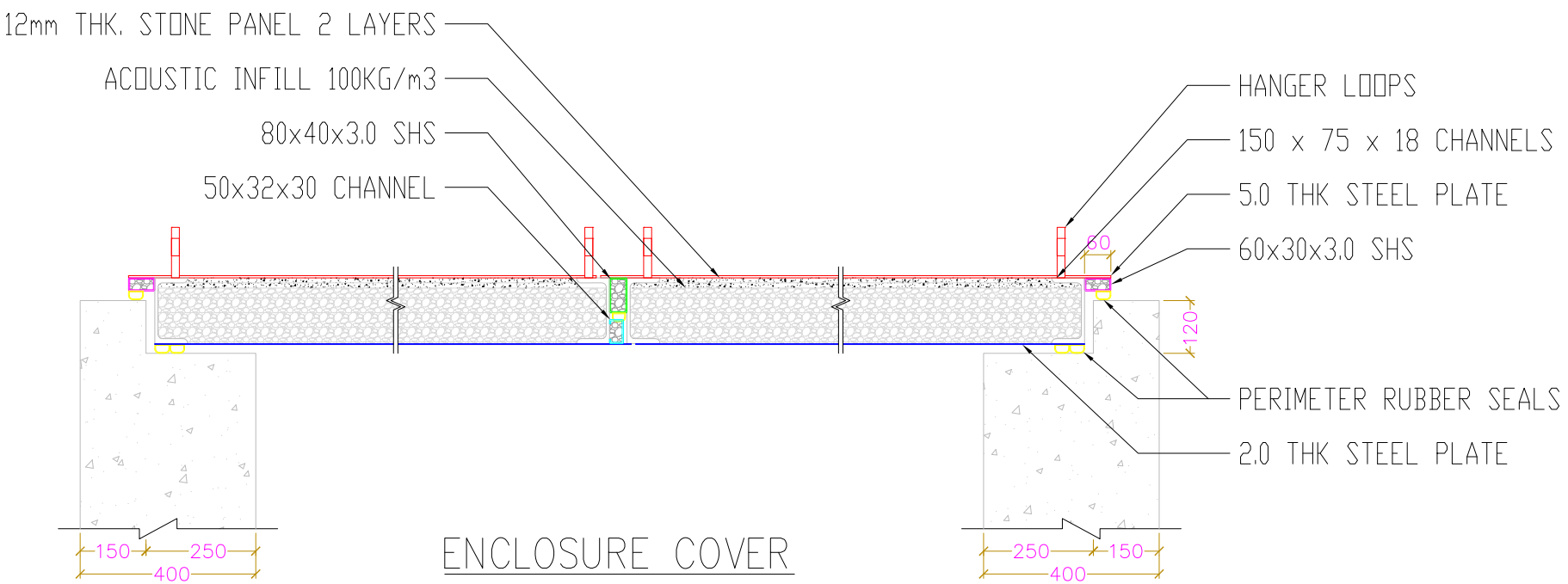


1 pc 1 pc 1 pc

PROJECT: Contract No. HY/2018/08 CENTRAL KOWLOON ROUT BUILD KING – SKJEC JV			
TITLE: Noise Enclosure Cover			
DRAWN:	CAD	DATE:	
CHECKED:	CAD	SCALE:	N.T.S.
DWG. NO.			

Noise Enclosure Cover

STC50 Acoustic Door Panel



ENCLOSURE COVER TYPICAL SECTION DETAILS

PROJECT: Contract No. HY/2018/08 CENTRAL KOWLOON ROUT BUILD KING – SKJEC JV			
TITLE: Noise Enclosure Cover			
DRAWN:	CAD	DATE:	
CHECKED:	CAD	SCALE:	N.T.S.
DWG. NO.			

Appendix B: Catalog of Noise Panel

MYG
www.acoustic-hk.com
MANYA STEEL PRODUCTS MANUFACTORY

Acoustic Panel

"MYG" Acoustic Panels — Easily assembled to form enclosures or vertical barriers, flexible to suit client's particular requirements.

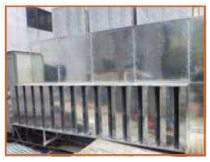
Material and Construction

Readily demountable design for both MYG acoustic panels like standard Model MLW-50,100 and 125, can be reassembled without loss of acoustic performance, using high quality materials and a comprehensive range of finishes. Standard acoustic panels are of double skin construction. Both the outer and inter skins shall be made of pre-galvanized steel sheets and perforated steel sheets. The acoustic infill shall be inorganic, non hygroscopic, flame, moisture and vermin proof mineral wool of glass fiber or to required density.

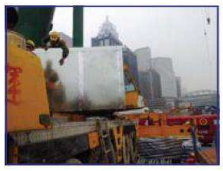
Construction Noise Enclosure

Acoustic Room Enclosure

Standard finish shall be galvanized mild steel with alternative finishes such as PVC finished in mild steel, stove enamel or syntha pulvine frame.



Chiller Plant Enclosure



Engine Noise Enclosure

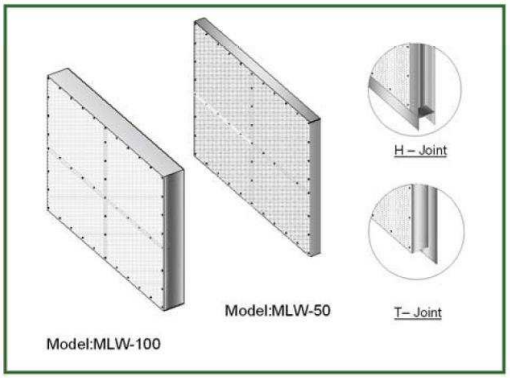
General Specification

Model (MLW)	10	25	50	50P	100	125
Infill (m^3)	150	32	40	80	80	100
Outer GI (mm)	1.0	1.0	0.8	1.5	2.0	2.0
Weight (kg/m^2) Approx.	15	19	28	45	65	75

*Others standard and materials are available base on customer request.
The actual weight of panel will be determinate to final design,
but not affected to the panel acoustic performance

MLW100 (STC42)

MLW125 (STC50)



Applications

A wide variety of applications can be considered when using "MYG" acoustic panels for the control of airborne noise in order to contain the noise close to its source, or to provide a controlled environment within a high noise area.

- ☑ Noise Barrier
- ☑ Plant Room Enclosures
- ☑ Engine Enclosures
- ☑ Fan Box Enclosures
- ☑ Air Plenum Enclosures
- ☑ Vertical Noise Barriers
- ☑ Generator Enclosures
- ☑ Compressor Enclosures

Sales & Service H.K. Agent : Marion Acoustics Tel: 3580 1612, Fax : 3695 7997, Website :www.acoustic-hk.com (V-14-SY)

Machinery Enclosure

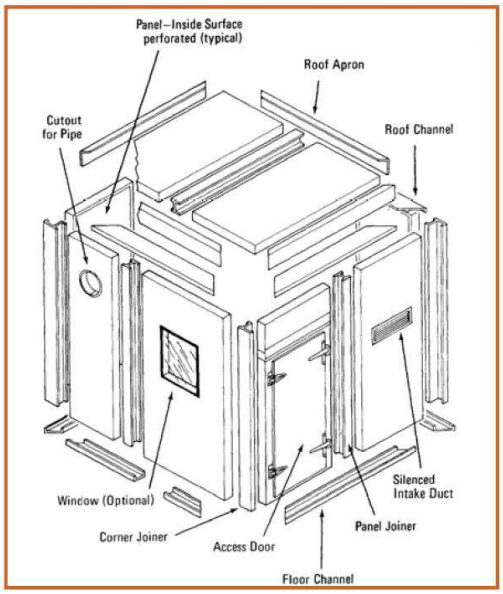
"MYG" Acoustic Panels can be use in enclosure to serve the dual function of reducing reverberation in spaces and acting as noise barriers. Applications in wall cladding or ceiling usually require a 50mm air space between the back panels and building structure surface, to obtain significant results.

Water-Cooled Chiller Enclosure—MTR (HK)

Before

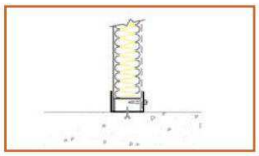
After

Readily demountable design and easily assembled

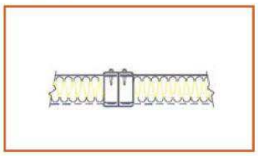


Machinery Room Noise Enclosure

Assembled Joiner

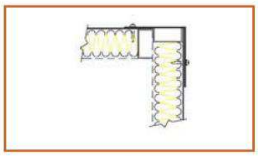


Floor / Wall Joiner



"H" - Joiner

"T" - Joiner



Corner "L" - Joiner

Sound Absorption Coefficient

Model (MLW)	OCTAVE BAND CENTRE FREQUENCY (Hz)					
	125	250	500	1K	2K	4K
10 (10mm)	0.21	0.37	0.42	0.51	0.64	0.66
25 (25mm)	0.21	0.38	0.42	0.56	0.65	0.69
50 (50mm)	0.42	0.57	0.69	0.72	0.70	0.72
50P(50mm)	0.42	0.93	1.10	1.10	1.16	1.02
100(100mm)	0.48	0.93	1.11	1.13	1.16	1.05
125 (125mm)	0.50	0.95	1.13	1.13	1.17	1.07

Sound Transmission Loss, dB

Model (MLW)	OCTAVE BAND CENTRE FREQUENCY (Hz)							
	125	250	500	1K	2K	4K	8K	STC
10 (10mm)	6	8	12	22	22	25	28	15
20 (25mm)	7	8	16	25	26	28	28	18
50 (50mm)	10	12	18	27	34	34	36	24
50P (50mm)	21	27	35	47	54	61	59	40
100 (100mm)	23	33	39	48	54	62	59	42
125 (125mm)	24	42	53	53	54	63	59	50

BS EN ISO 354:2003 / GB/T 20247-2006

Annex E

Predicted Noise Level at the NSRs

Predicted Noise Level for NSR

Tak Cheong Building (W-N8A)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (EB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	69	-45	-20	3	41.24
Air Compressor (50%)	CNP 002	99	1	99	69	-45	-20	3	37.24
Water Pump, submersible (electric)	CNP 283	85	10	95	69	-45	-20	3	33.24
Mobile crane (50%)	EPD-09573	99	1	99	69	-45	-5	3	52.24
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	69	-45	-20	3	33.24
Grout pump (50%)	CNP 106	102	1	102	69	-45	-20	3	40.24
Grout mixer (50%)	CNP 105	87	1	87	69	-45	-20	3	25.24
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	69	-45	-20	3	43.24
Loader, wheeled (50%)	CNP 081	109	1	109	69	-45	-20	3	47.24
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	69	-45	-5	3	55.24
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	69	-45	-20	3	36.24
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	69	-45	-5	3	46.24
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	69	-45	-20	3	41.24
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	69	-45	-20	3	45.24
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	69	-45	-20	3	43.24
Ventilation fan	CNP 241	108	1	108	69	-45	-20	3	46.24
								Total CNL	**58.84**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (WB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	69	-45	-20	3	41.24
Air Compressor (50%)	CNP 002	99	1	99	69	-45	-20	3	37.24
Water Pump, submersible (electric)	CNP 283	85	10	95	69	-45	-20	3	33.24
Mobile crane (50%)	EPD-09573	99	1	99	69	-45	-5	3	52.24
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	69	-45	-20	3	33.24
Grout pump (50%)	CNP 106	102	1	102	69	-45	-20	3	40.24
Grout mixer (50%)	CNP 105	87	1	87	69	-45	-20	3	25.24
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	69	-45	-20	3	43.24
Loader, wheeled (50%)	CNP 081	109	1	109	69	-45	-20	3	47.24
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	69	-45	-5	3	55.24
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	69	-45	-20	3	36.24
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	69	-45	-5	3	46.24
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	69	-45	-20	3	41.24
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	69	-45	-20	3	45.24
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	69	-45	-20	3	43.24
Ventilation fan	CNP 241	108	1	108	69	-45	-20	3	46.24
								Total CNL	**58.84**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**61.85**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (EB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	69	-45	-20	3	41.24
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	69	-45	-5	3	57.24
Grout pump (50%)	CNP 106	102	1	102	69	-45	-20	3	40.24
Grout mixer (50%)	CNP 105	87	1	87	69	-45	-20	3	25.24
Mobile crane (50%)	EPD-09573	99	1	99	69	-45	-5	3	52.24
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	69	-45	-5	3	53.24
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	69	-45	-5	3	44.24
								Total CNL	**59.82**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (WB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	69	-45	-20	3	41.24
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	69	-45	-5	3	57.24
Grout pump (50%)	CNP 106	102	1	102	69	-45	-20	3	40.24
Grout mixer (50%)	CNP 105	87	1	87	69	-45	-20	3	25.24
Mobile crane (50%)	EPD-09573	99	1	99	69	-45	-5	3	52.24
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	69	-45	-5	3	53.24
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	69	-45	-5	3	44.24
								Total CNL	**59.82**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**62.83**

Predicted Noise Level for NSR

Prosperous Garden Block 1 (W-N25A)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (EB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	198	-54	-20	3	32.08
Air Compressor (50%)	CNP 002	99	1	99	198	-54	-20	3	28.08
Water Pump, submersible (electric)	CNP 283	85	10	95	198	-54	-20	3	24.08
Mobile crane (50%)	EPD-09573	99	1	99	198	-54	-5	3	43.08
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	198	-54	-20	3	24.08
Grout pump (50%)	CNP 106	102	1	102	198	-54	-20	3	31.08
Grout mixer (50%)	CNP 105	87	1	87	198	-54	-20	3	16.08
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	198	-54	-20	3	34.08
Loader, wheeled (50%)	CNP 081	109	1	109	198	-54	-20	3	38.08
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	198	-54	-5	3	46.08
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	198	-54	-20	3	27.08
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	198	-54	-5	3	37.08
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	198	-54	-20	3	32.08
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	198	-54	-20	3	36.08
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	198	-54	-20	3	34.08
Ventilation fan	CNP 241	108	1	108	198	-54	-20	3	37.08
								Total CNL	**49.69**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (WB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	198	-54	-20	3	32.08
Air Compressor (50%)	CNP 002	99	1	99	198	-54	-20	3	28.08
Water Pump, submersible (electric)	CNP 283	85	10	95	198	-54	-20	3	24.08
Mobile crane (50%)	EPD-09573	99	1	99	198	-54	-5	3	43.08
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	198	-54	-20	3	24.08
Grout pump (50%)	CNP 106	102	1	102	198	-54	-20	3	31.08
Grout mixer (50%)	CNP 105	87	1	87	198	-54	-20	3	16.08
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	198	-54	-20	3	34.08
Loader, wheeled (50%)	CNP 081	109	1	109	198	-54	-20	3	38.08
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	198	-54	-5	3	46.08
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	198	-54	-20	3	27.08
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	198	-54	-5	3	37.08
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	198	-54	-20	3	32.08
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	198	-54	-20	3	36.08
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	198	-54	-20	3	34.08
Ventilation fan	CNP 241	108	1	108	198	-54	-20	3	37.08
								Total CNL	**49.69**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**52.70**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (EB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	198	-54	-20	3	32.08
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	198	-54	-5	3	48.08
Grout pump (50%)	CNP 106	102	1	102	198	-54	-20	3	31.08
Grout mixer (50%)	CNP 105	87	1	87	198	-54	-20	3	16.08
Mobile crane (50%)	EPD-09573	99	1	99	198	-54	-5	3	43.08
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	198	-54	-5	3	44.08
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	198	-54	-5	3	35.08
								Total CNL	**50.66**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (WB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	198	-54	-20	3	32.08
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	198	-54	-5	3	48.08
Grout pump (50%)	CNP 106	102	1	102	198	-54	-20	3	31.08
Grout mixer (50%)	CNP 105	87	1	87	198	-54	-20	3	16.08
Mobile crane (50%)	EPD-09573	99	1	99	198	-54	-5	3	43.08
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	198	-54	-5	3	44.08
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	198	-54	-5	3	35.08
								Total CNL	**50.66**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**53.67**

Predicted Noise Level for NSR

The Coronation Tower 1 (W-P11)

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (EB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	459	-61	-20	3	24.78
Air Compressor (50%)	CNP 002	99	1	99	459	-61	-20	3	20.78
Water Pump, submersible (electric)	CNP 283	85	10	95	459	-61	-20	3	16.78
Mobile crane (50%)	EPD-09573	99	1	99	459	-61	-5	3	35.78
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	459	-61	-20	3	16.78
Grout pump (50%)	CNP 106	102	1	102	459	-61	-20	3	23.78
Grout mixer (50%)	CNP 105	87	1	87	459	-61	-20	3	8.78
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	459	-61	-20	3	26.78
Loader, wheeled (50%)	CNP 081	109	1	109	459	-61	-20	3	30.78
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	459	-61	-5	3	38.78
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	459	-61	-20	3	19.78
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	459	-61	-5	3	29.78
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	459	-61	-20	3	24.78
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	459	-61	-20	3	28.78
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	459	-61	-20	3	26.78
Ventilation fan	CNP 241	108	1	108	459	-61	-20	3	29.78
								Total CNL	**42.38**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (WB Tunnelling & Enlargement)									
Air Blower	CNP 006	95	6	103	459	-61	-20	3	24.78
Air Compressor (50%)	CNP 002	99	1	99	459	-61	-20	3	20.78
Water Pump, submersible (electric)	CNP 283	85	10	95	459	-61	-20	3	16.78
Mobile crane (50%)	EPD-09573	99	1	99	459	-61	-5	3	35.78
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	459	-61	-20	3	16.78
Grout pump (50%)	CNP 106	102	1	102	459	-61	-20	3	23.78
Grout mixer (50%)	CNP 105	87	1	87	459	-61	-20	3	8.78
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	459	-61	-20	3	26.78
Loader, wheeled (50%)	CNP 081	109	1	109	459	-61	-20	3	30.78
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (50%)	CNP 068	102	1	102	459	-61	-5	3	38.78
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	459	-61	-20	3	19.78
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	459	-61	-5	3	29.78
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	459	-61	-20	3	24.78
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	459	-61	-20	3	28.78
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	459	-61	-20	3	26.78
Ventilation fan	CNP 241	108	1	108	459	-61	-20	3	29.78
								Total CNL	**42.38**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**45.39**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (EB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	459	-61	-20	3	24.78
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	459	-61	-5	3	40.78
Grout pump (50%)	CNP 106	102	1	102	459	-61	-20	3	23.78
Grout mixer (50%)	CNP 105	87	1	87	459	-61	-20	3	8.78
Mobile crane (50%)	EPD-09573	99	1	99	459	-61	-5	3	35.78
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	459	-61	-5	3	36.78
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	459	-61	-5	3	27.78
								Total CNL	**43.36**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel (WB)									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	459	-61	-20	3	24.78
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	459	-61	-5	3	40.78
Grout pump (50%)	CNP 106	102	1	102	459	-61	-20	3	23.78
Grout mixer (50%)	CNP 105	87	1	87	459	-61	-20	3	8.78
Mobile crane (50%)	EPD-09573	99	1	99	459	-61	-5	3	35.78
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	459	-61	-5	3	36.78
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	459	-61	-5	3	27.78
								Total CNL	**43.36**
								Cumulative Noise Level - Cut & Cover Tunnel (EB & WB)	**46.37**

Annex F

Cumulative Noise Level at the NSRs

Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Cumulative Noise Assessment - YMT

Period with concurrent activities - Sep 2020 - Sep 2024

NSR ID	NSRs	2020				2021												2022												2023												2024											
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CKR-CT Construction Noise Level, dB(A)																																																					
W-N8A	Tak Cheong Building	59	59	59	59	59	59	59	59	62	62	62	62	62	62	62	62	59	59	59	59	59	59	59	59	59	59	62	62	62	62	62	59	59	59	59	59		60	60	60	60	60	60	60	63	63	63	60	60			
W-N25A	Prosperous Garden Block 1	50	50	50	50	50	50	50	50	53	53	53	53	53	53	53	53	50	50	50	50	50	50	50	50	50	50	53	53	53	53	53	50	50	50	50	50		51	51	51	51	51	51	51	54	54	54	51	51			
W-P11	The Coronation Tower 1 (West Façade)	42	42	42	42	42	42	42	42	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42	42	45	45	45	45	45	42	42	42	42	42		43	43	43	43	43	43	43	46	46	46	43	43			
CKR-YMTE Construction Noise Level, dB(A)																																																					
W-N8A	Tak Cheong Building	77	76	76	79	75	75	81	81	81	80	80	80	78	79	80	79	79	79	77	73	73	77	77	77	76	76	76	75	75	75	75	75	75	75	75	73	73	73	75	75	73	73	74	74	73	73	73	72	72			
W-N25A	Prosperous Garden Block 1	68	69	69	72	68	65	68	68	69	68	72	72	74	75	75	79	75	74	74	74	73	73	73	73	80	80	80	68	65	65	65	65	72	72	72	72	72	75	75	75	64	64	66	66	66	66	66	65	65			
W-P11	The Coronation Tower 1 (West Façade)	72	72	72	73	73	73	73	73	73	73	71	71	71	70	71	71	71	71	71	71	71	71	71	71	71	71	71	73	73	73	73	73	73	73	73	73	73	73	69	69	69	69	69	69	69	69	69	69	69			
Cumulative Construction Noise Level, dB(A) (Including CKR-CT & CKR-YMTE)																																																					
W-N8A	Tak Cheong Building	77	76	76	79	75	75	81	81	81	80	80	80	78	79	80	79	79	79	77	73	73	77	77	77	76	76	76	75	75	75	75	75	75	75	75	73	73	73	75	75	73	73	74	74	73	73	73	72	72			
W-N25A	Prosperous Garden Block 1	68	69	69	72	68	65	68	68	69	68	72	72	74	75	75	79	75	74	74	74	73	73	73	73	80	80	80	68	65	65	65	65	72	72	72	72	72	75	75	75	64	64	66	66	66	66	66	65	65			
W-P11	The Coronation Tower 1 (West Façade)	72	72	72	73	73	73	73	73	73	73	71	71	71	70	71	71	71	71	71	71	71	71	71	71	71	71	71	73	73	73	73	73	73	73	73	73	73	73	69	69	69	69	69	69	69	69	69	69	69			

As shown in the above table, the cumulative construction noise level is dominated by construction noise from CKR-YMTE. The contribution from CKR-CT is negligable in the overall noise level.

Remarks

Exceedance:

(pink)	1-4 dB(A)
(yellow)	5 dB(A)
(green)	6 dB(A)

Annex G

Details of Acoustic Materials for Construction of Noise Enclosure

What is AAC Panel & Block

AAC Panel is the shortened form of Autoclaved Aerated Concrete Panel. The main materials of AAC panel are silicon sand, cement, lime etc. Reinforced with anti-stain processed steel bar, the concrete panel with many air holes was formed after high-temperature, high-pressure protection with steam. It's a new type constructional material with excellent functions. There are patents of Germany and Sweden and Japan included in the production equipments. The complete production process, from mixing raw material, anti-stain processing of steel bar, organizing into frame, pouring paste on, cutting, steaming and pressing to surface processing, is calculated accurately with computer program and has a rigid QC control.

AAC Block is the shortened form of Autoclaved Aerated Concrete Block. The difference of the AAC block from the AAC panel are: 1) no reinforced steel inside 2) sizes are smaller than AAC panel

The Application Scope of AAC

- AAC panels have been used in many cities through China, such as Guangzhou, Shanghai, Ningbo, Suzhou, Wuxi, and Changzhou, Tianjin, Beijing, Qingdao, Dalian, etc. The products are also regularly exported to other countries, such as Australia, New Zealand, Japan, Middle-East, Europe, USA, South-East Asia etc.
- AAC panels have been used various kinds of buildings, such as public facilities, industrial constructions, civil housing, hospital, hotel, schools, stores, supermarkets etc. The construction structures it suits also expand from concrete frame structure, steel frame structure, to other structures.
- The existing products range from interior partition wall panels to exterior walls, ornamental wall panels, floor, roofing and cladding.

EASTLAND
Quality Building Materials

The Product Range of AAC

Standard AAC Panels

- AAC External Wall Panel
- AAC Partition Wall Panel
- AAC Flooring Slab
- AAC Roofing Slab
- AAC Wall Cladding
- AAC Fencing Panel

Standard AAC Blocks

- AAC External Wall Block
- AAC Internal Wall Block

The Test Result of AAC

Properties (Test Result) of Eastland AAC Panels & Blocks					
Characteristics		Unit	Test Value	Criterion	Value of Criterion
Dry Density		Kg/m3	Grade 04: 412	GB/T11970 -1997	≤425
			Grade 05: 503		≤525
			Grade 06: 608		≤625
Compressive Strength	Average	Mpa	Grade 04: 2.4	GB/T11971 -1997	≥2.0
			Grade 05: 4.0		≥3.5
			Grade 06: 5.3		≥5.0
	Minimum		Grade 04: 2.2		≥1.6
			Grade 05: 3.7		≥2.8
			Grade 06: 4.9		≥4.0
Dry Shrinkage		mm/m	Grade 04/05: 0.66	GB/T11972 -1997	≤0.8
			Grade 06: 0.65		
Frozen Resistanc	Quality Lost	%	Grade 04: 0.7	GB/T11973 -1997	≤5.0
			Grade 05/06: 1.0		
	Strength After Frozen	Mpa	Grade 04: 2.0		≥1.6
			Grade 05: 3.6		≥2.8
			Grade 06: 4.8		≥4.0
Thermal Conductivity		W/(m.k)	Grade 04: 0.11	GB/T10295 -88	≤0.12
			Grade 05: 0.13		≤0.14
			Grade 06: 0.15		≤0.16
Sound Insulation	120mm thick	dB	40.5 (render)	GBJ75-84 GB/T50121 -2005	
	150mm thick	dB	40.5 (no render)		
	150mm thick	dB	41.5 (render)		
	200mm thick	dB	44.5 (no render)		
	200mm thick	dB	45 (render)		
	240mm thick	dB	47.5 (no render)		
	240mm thick	dB	48.5 (render)		
	240mm thick	dB	51 (complex)		
Infiltration Resistance (6 days, falling in water)		mm	88.2	JISA 54160 -1997	≤100
Fire Resistance (100mm thick)		hour	≥4.0	GB/T9978 -1999	1. ≥4.0 2. ≥3.0
Modulus of Elasticity		N/mm2	1800		
Water Absorption		°/vol	Totally underwater: 36 Partly underwater: 30		
Expansion Coefficient		/□	7.0 x 10-6		
Note: Property values, as a result of different production batch, may change within a reasonable scope of the standard value.					

Acoustic Test Report for "Eastland" AAC Noise Panel

intertek
Total Quality. Assured.

Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2019-12-03 Intertek Report No. 191126017SHF-001

Applicant: Dragages Hong Kong Limited

Address: 3/F, Island Place Tower, 510 King's Road, North Point, Hong Kong

Attn: Elly SUN

Manufacturer: Eastland International Limited

Address: 2404, Building 4, No. 37 Pukou Avenue, Nanjing, China

Test Type : Performance test, samples provided by the applicant.

Product Information

Product Name	Noise Panel	Brand	/
Sample Description	Good Condition	Sample Amount	10 PCS
		Received Date	2019-11-26

Sample ID	Model	Specification
S191126017SHF.001	/	3m x 0.6m x 0.12m noise panel + 50mm Thick Rockwool

Test Methods And Standards

Test Standard	ISO 10140-2:2010
Specification Standard	ISO 717-1:2013
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:

1.This report relates specifically to the sample(s) that were drawn and provided by the applicant or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested.

Report Authorized

Name: Jodie Zhou Name: Mason Wang

Title: Reviewer Title: Project Engineer

intertek
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Test Report

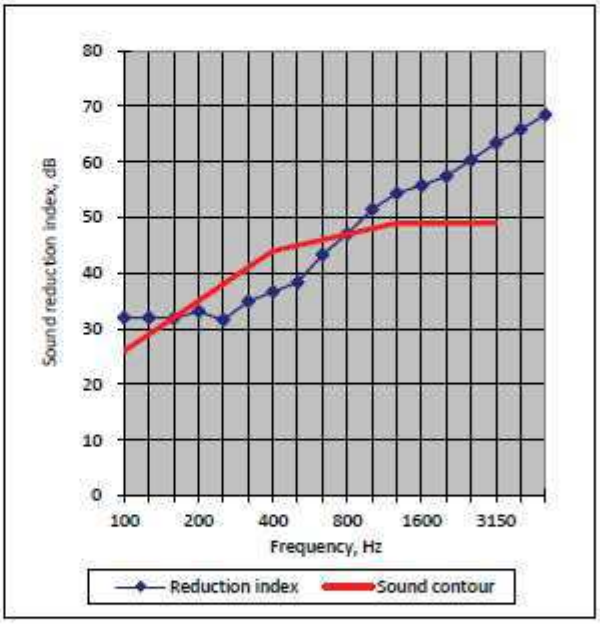
Issue Date: 2019-12-03 Intertek Report No. 191126017SHF-001

Test Items, Method and Results:

Test method: ISO 10140-2:2010

Temperature:	16.5	°C	Relative Humidity:	80	%
Volume of the source room:	112	m^3	Volume of the receiving room:	137	m^3
Specimen area:	12.6	m^2			

Frequency (Hz)	Sound Reduction Index, Ri (dB)
100	32.0
125	32.0
160	31.9
200	33.1
250	31.6
315	34.9
400	36.7
500	38.3
630	43.3
800	47.0
1000	51.4
1250	54.4
1600	55.8
2000	57.5
2500	60.3
3150	63.4
4000	65.8
5000	68.5



Rating according to ISO 717-1:2013

Weighted Sound reduction index	Rw(C;Ctr)=	45(-2;-5)	dB
Spectrum A-weighted pink noise	C=	-2	dB
Spectrum A-weighted urban traffic noise	Ctr=	-5	dB

Note:

1. Evaluation based on laboratory measurement results obtained by an engineer method.
2. The detailed sample installation drawing in Appendix A was provided by the applicant.

Report Ref. No.	:	STR 20027
Issue Date	:	15 July 2020
Project Ref. No.	:	J 20027
Sample No.	:	YP 20027
Customer	:	NAP Acoustics (Far East) Ltd.
Address Of Customer	:	Room 1811, 18/F Hong Kong Plaza, 188 Connaught Road West, Hong Kong

Laboratory Measurement Report for Airborne Sound Insulation to ISO 10140-2 for SNAPAcoustics Noise Barrier Panels model SD150RW

Prepared By : Ms. Vivian Ou (Test Engineer)
BEng., AMMOIA

Checked By : Ms. Vita Feng (Quality Control Manager)
BEng., MMOIA

Approved By : *Ir.* K. K. Iu (Laboratory Manager)
Registered Professional Engineer
B. Sc.(Eng.), MPhil, C.Eng., MCIBSE, MIE Aust., MHKIE, FHKIOA, MIOA, FMOIA, MHKIQEP, MASA

盈普声学(惠州)有限公司声学实验室
SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory
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NOTES

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   2) Without signatures of analysts, verified and approved by SNAP Laboratory.
   3) Partially reproduced without the written approval of SNAP Laboratory.
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3. Contact SNAP Laboratory should you have any questions and inquiries about this report within two weeks after received it.

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电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

CONTENTS

盈普声学(惠州)有限公司声学实验室
SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory
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1.0 Introduction

SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory was invited by NAP Acoustics (Far East) Ltd. to determine room-to-room airborne sound insulation of SNAPAcoustics Noise Barrier Panels model SD150RW in accordance with ISO 10140-2:2010.

The test specimen was installed at the test aperture between two Reverberation Rooms at No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China. The volume of the source room named Saturn and the receiving room named Uranus were 127 m^3 and 90.6 m^3 respectively. The structural opening dimensions of the test aperture between two rooms was 4,130 (W) x 3,280 (H) mm.

2.0 Date & Time

Sample was received on 30 June 2020.
Test was conducted from 16:00 to 17:30 on 10 July 2020.

3.0 Environmental Conditions

	Source room	Receiving room
温度 Temperature	31.7 deg. C	31.6 deg. C
湿度 Relative humidity	63 %	65 %

4.0 Test Conducted By

Ms. Fanni Lin	Test Engineer
Mr. Amber Lin	Test Engineer

地址：广东省惠州市惠阳区秋长镇桔园路56号
Add: No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China
电话：（Tel）:0752-3806880 传真：0752-3919311
电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

5.0 Reference Standards

- "ISO 10140-2:2010 Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation "
- "ISO 3382-2:2008 Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms"
- "ISO 717-1:2013 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation"

6.0 Description of the test specimen

6.1 The test specimen was said to be SNAPAcoustics Noise Barrier Panels model SD150RW in thickness of 150 mm. The solid outer shell of the panel was made of 0.8 mm galvanized steel sheet with calcium silicate board in density of 1550 kg/m^3 as damping materials. The sound absorption face was made of 0.5 mm thick galvanized steel sheet having perforation of 23 %. The panels were filled with 60 kg/m^3 rock wool and covered with black fiberglass tissue.

6.2 The test specimen consisted of 7 pieces of the said Noise Barrier Panels in size of 3,200 mm (L) x 565 mm (W). The panels were installed into the test aperture which joined together to form an overall size of 12.7 m^2.

6.3 Photograph of the test specimen installed for testing was given in Appendix 10.

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7.0 Instrumentation

The instrumentation used for the measurement was as follows:

7.1 Norsonic Type 150 Dual-Channel Investigator complying with IEC 61672-1 (Class 1) / ANSI S1.43-1997 (Type 1), with 1/3 octave bands filter complying with IEC 61260 / ANSI S1.11-2004 Class 0 / ANSI S1.11-1986, Order 3, Type 0-C, for sound pressure levels measurements. Microphone extension cables, and internal sound source were used during the measurements.

7.2 Omni Power Sound Source Type Nor 276 and power amplifier Nor 280.

7.3 Bruel & Kjaer Sound Level Calibrator Type 4231, complying with IEC 60942.

8.0 Measurement Procedure

8.1 Calibration checks were carried out on the Sound Measuring Instrument with the Sound Level Calibrator, before and after the measurements. The difference in the calibration value before and after measurements should be no more than 0.5 dB.

8.2 White Noise was generated in the source room so that the transmitted sound level in the receiving room was at least 6 dB above the background noise level at all frequencies. Source and microphone positions were chosen according to ISO 10140-2:2010. Measurements were taken for three source positions, with six microphone positions in the source and receiving room respectively. The Level Difference $D = L_{p1} - L_{p2}$ as per defined in ISO 10140-2:2010 was then calculated.

8.3 For the purpose of estimating the Sound Reduction Index R, the reverberation time in the receiving room was measured according to ISO 3382-2, choosing two loudspeaker positions and six microphone positions.

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电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

8.4 The Sound Reduction Index R was calculated according to ISO 10140-2:2010 as:

$$R = L_{p1} - L_{p2} + 10\log(S / A)$$

where

L_{p1} is the average sound pressure level in the source room, in decibels;
L_{p2} is the average sound pressure level in the receiving room, in decibels;
S is the area of the test specimen, in square meters;
A is the equivalent sound absorption area in the receiving room, in square meters.

8.5 The Weighted Sound Reduction Index R_w was determined from the value of R in 1/3 octave bands with centre frequencies from 100 Hz to 3,150 Hz, following the procedure given in ISO 717-1:2013.

Note: Rw is a single-number values intended to give rating of airborne sound insulation in view to compare the performance of different systems.

9.0 Results

9.1 Calibration checks were carried out on the sound level meter before and after the measurements. The results were recorded below:

Sound level meter	Nor 150 (Channel 1)	Nor 150 (Channel 2)
Calibrator Reference	94.0 dB	94.0 dB
Before Measurement	94.0 dB	94.0 dB
After Measurement	94.0 dB	94.0 dB
Drift	0 dB	0 dB

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9.2 The Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW was determined in accordance with ISO 10140-2:2010 to achieve the following values:

1/3 Octave Band Centre Frequency（Hz）	Sound Reduction Index R（dB）	1/1 Octave Band Frequency Sound Reduction Index R（dB）
50	19.8	20.9
63	22.1	
80	21.2	
100	28.8	31.3
125	32.6	
160	34.3	
200	37.6	40.2
250	41.3	
315	44.0	
400	46.6	47.6
500	47.3	
630	49.3	
800	50.0	52.8
1000	53.8	
1250	58.2	
1600	60.2	61.8
2000	61.7	
2500	64.7	
3150	66.4	67.7
4000	68.3	
5000	68.7	
6300	67.8	57.8
8000	66.3	
10000	53.4	
Weighted Sound Reduction Index R_w (ISO 717-1:2013)	R_w (C;C_{tr}) = 51 (-2;-7)	
	Sum of unfavourable deviations: 31.4 dB	

9.3 The following graph shows the Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW plotted against frequency (dotted line) and the shifted reference curve (solid line), the bars show the values of the unfavourable deviations for each frequency band.

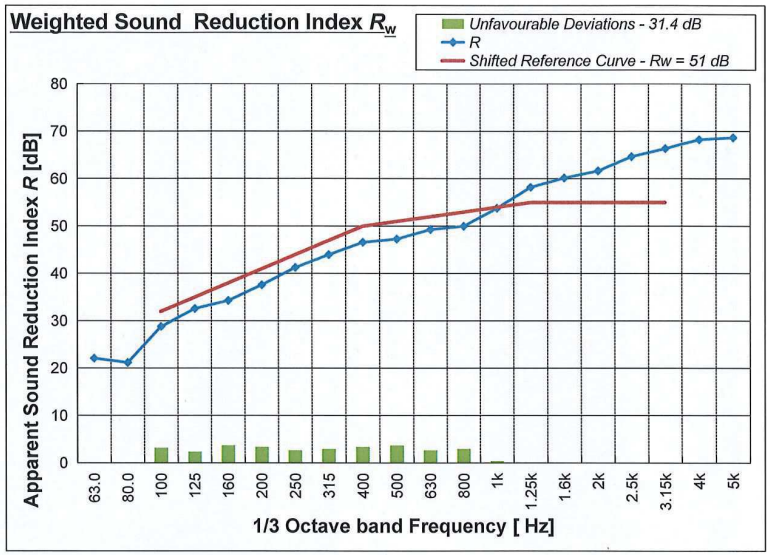

Figure 1: Sound Reduction Index R, reference curve for $R_w = 51$ dB
For SNAPAcoustics Noise Barrier Panels model SD150RW

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10.0 Appendix

10.1 Photograph of the test specimen installed for testing.

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****** END OF REPORT ******

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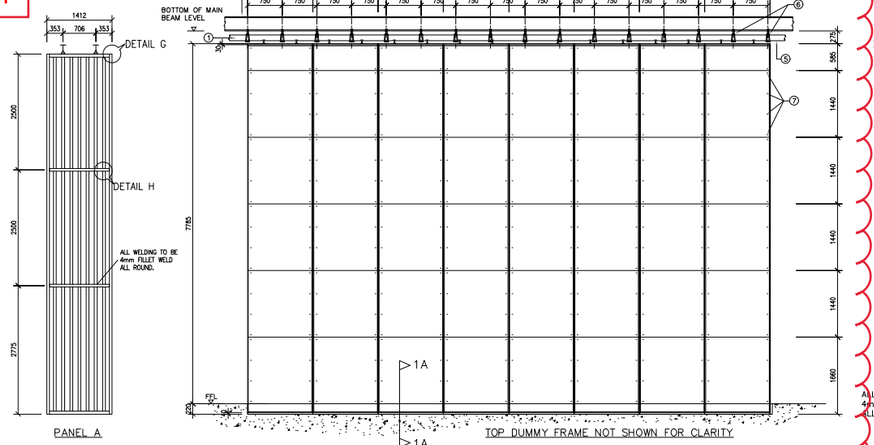
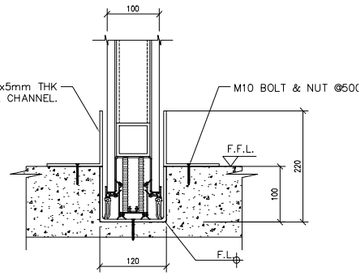
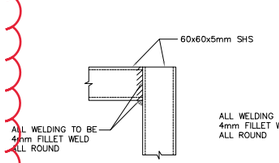
Design of "Kinetics" Acoustic Sliding Door

Door P1

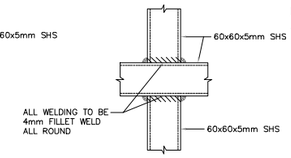




SECTION 1A–1A (ITEM 3)



DETAIL G



DETAIL H

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 JO / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL A	1.412m WIDTH PANEL FRAME	60x60x5mm SHS, 9 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
PANEL B	1.083m WIDTH PANEL FRAME	60x60x5mm SHS, 7 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 220mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mmΦ WASHER GRADE 4.6	–

DESIGN DATA:

1. LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

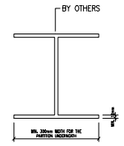
ELEVATION	WIND PRESSURE
0–5m	1.82kPa
5–10m	2.01kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

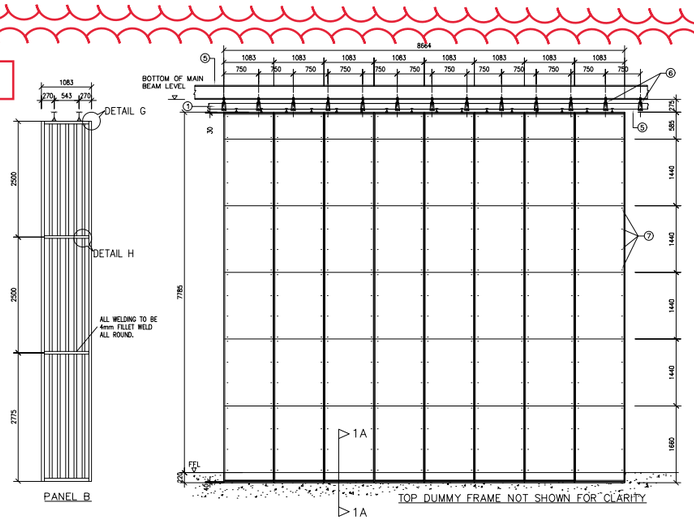
   DESIGN WIND PRESSURE = 0.7 X q:

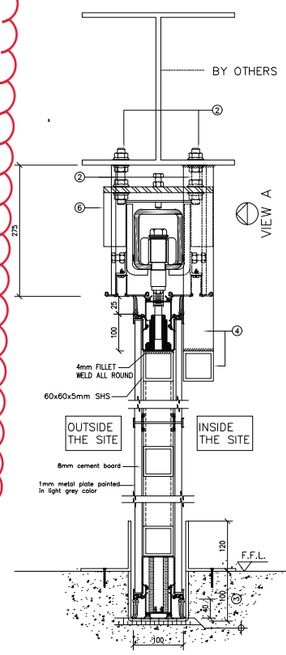
   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–7.5m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

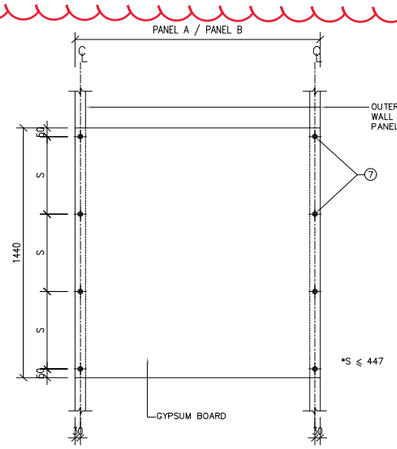
LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	7.854	0
LIVE LOAD	1.947	0.19635
WIND LOAD	0.1573	4.345



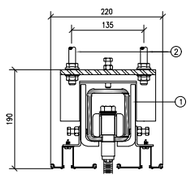
Door P2



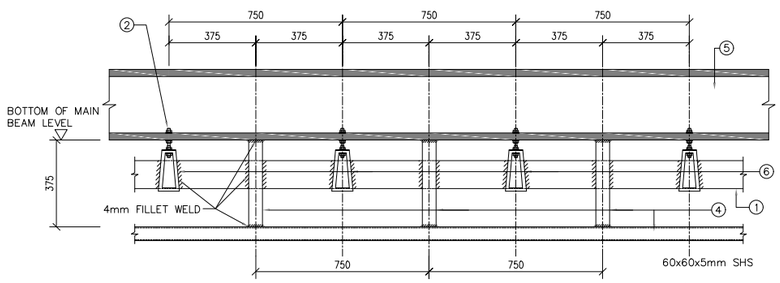




DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



ITEM 6



VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.: HKCKR/BTP/MDG/HMS/TSI/338223

ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A

PAPER SIZE	SCALE	PAGE
A3	N.T.S.	10/10

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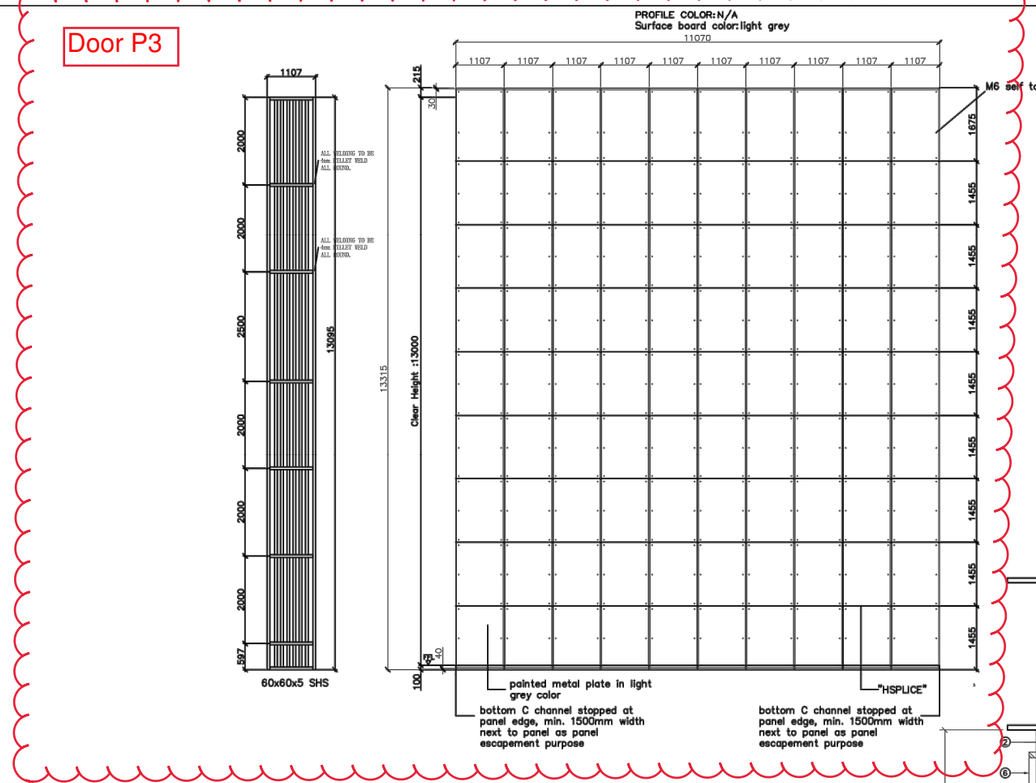
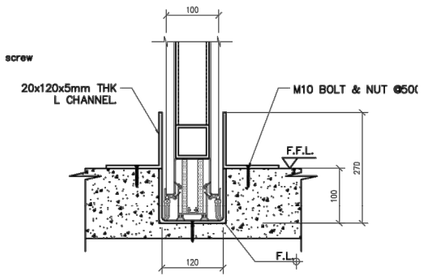
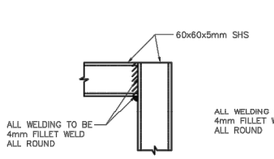
Door P3

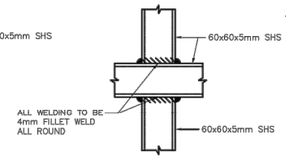




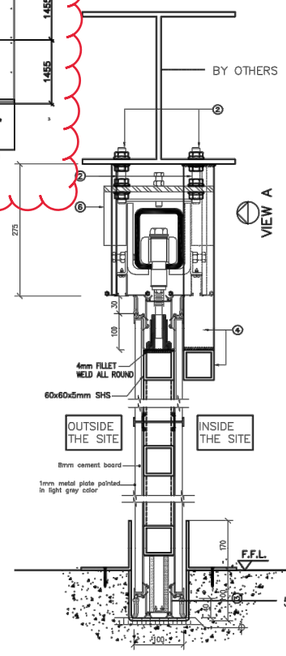
SECTION 1A–1A (ITEM 3)

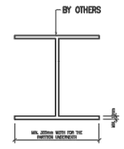


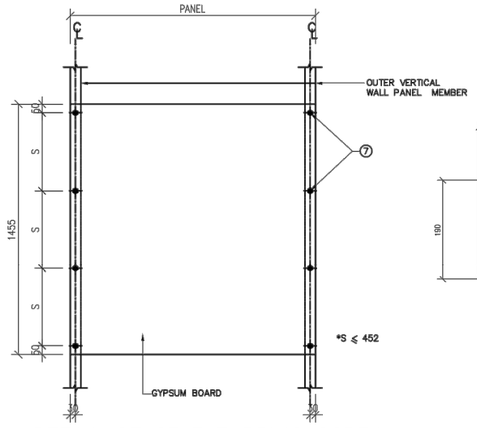
DETAIL G



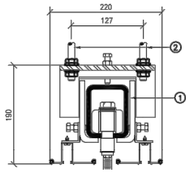
DETAIL H







DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



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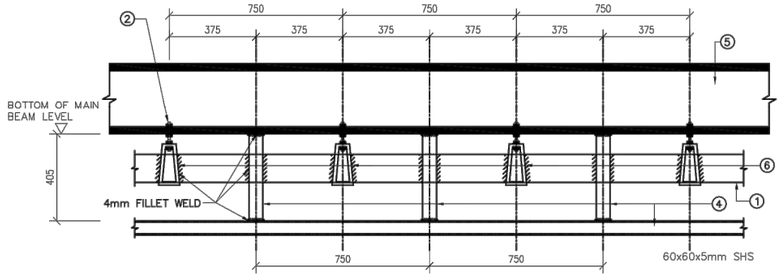

VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 J0 / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL	1.107m WIDTH PANEL FRAME	60x60x5mm SHS, 8 NOS. (VERT.) + 7 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 270mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mm# WASHER GRADE 4.6	–

DESIGN DATA:

1. Case1: q=0.75kpa
   Case2: LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

ELEVATION	WIND PRESSURE
0–5m	1.826kPa
5–10m	2.016kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

   DESIGN WIND PRESSURE = 0.7 X q:

   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–10m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (10–14m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

Case 1

LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	4.1932

Case 2

LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	8.0487

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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 13m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338224		
ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A
PAPER SIZE	SCALE	PAGE
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PRODUCT SPECIFICATIONS:

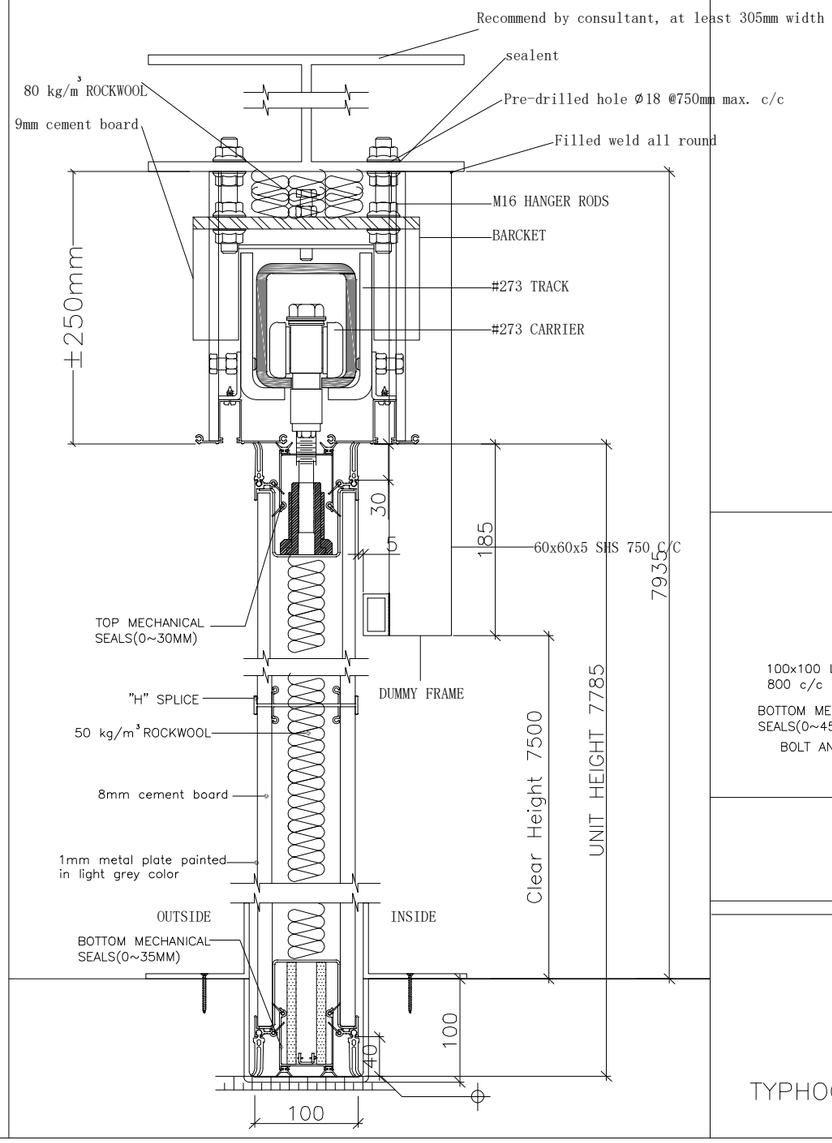
TYPE: 100 , STC: 53

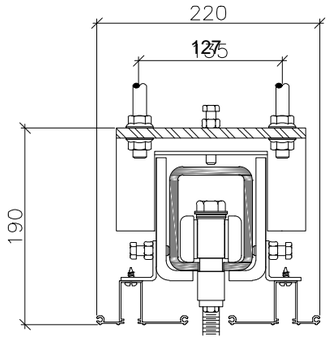
WEIGHT PER SQM: 97Kg/m². TOTAL WEIGHT OF OPERABLE WALL MUST BE CONSIDERED AND CHECKED IN STATICAL CALCULATION UNDER UNFAVOURABLE LOAD CONDITIONS. ALL FLANKING BUILDING ELEMENTS MUST ACHIEVE A MINIMUM, SOUND INSULATING VALUE OF STC 53

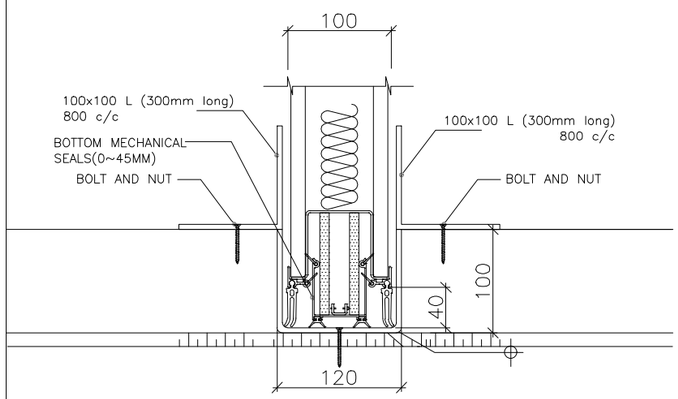
ATTENTION: IT IS NOT ALLOWED TO FIX OR CONNECT OTHER BUILDING PARTS TO OUR TRACKS. THE TRACK HAS TO REMAIN REMOVABLE FOR FIXING THE ELEMENTS.

AFTER INSTALLATION OF TRACKS A 10mm DEFLECTION OF THE BUILDING STRUCTURE HAS BEEN CONSIDERED.

Section View

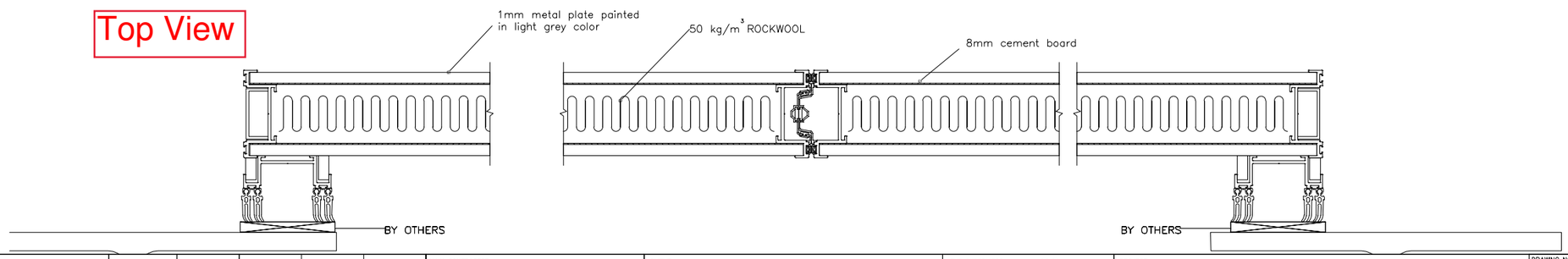






TYPHOON SITUATION

Top View



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MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338223		
ISSUE STATUS: FOR INFORMATION	CREATION DATE: 21/07/2020	REVISION: A
PAPER SIZE: A3	SCALE: N.T.S.	PAGE: 3/10

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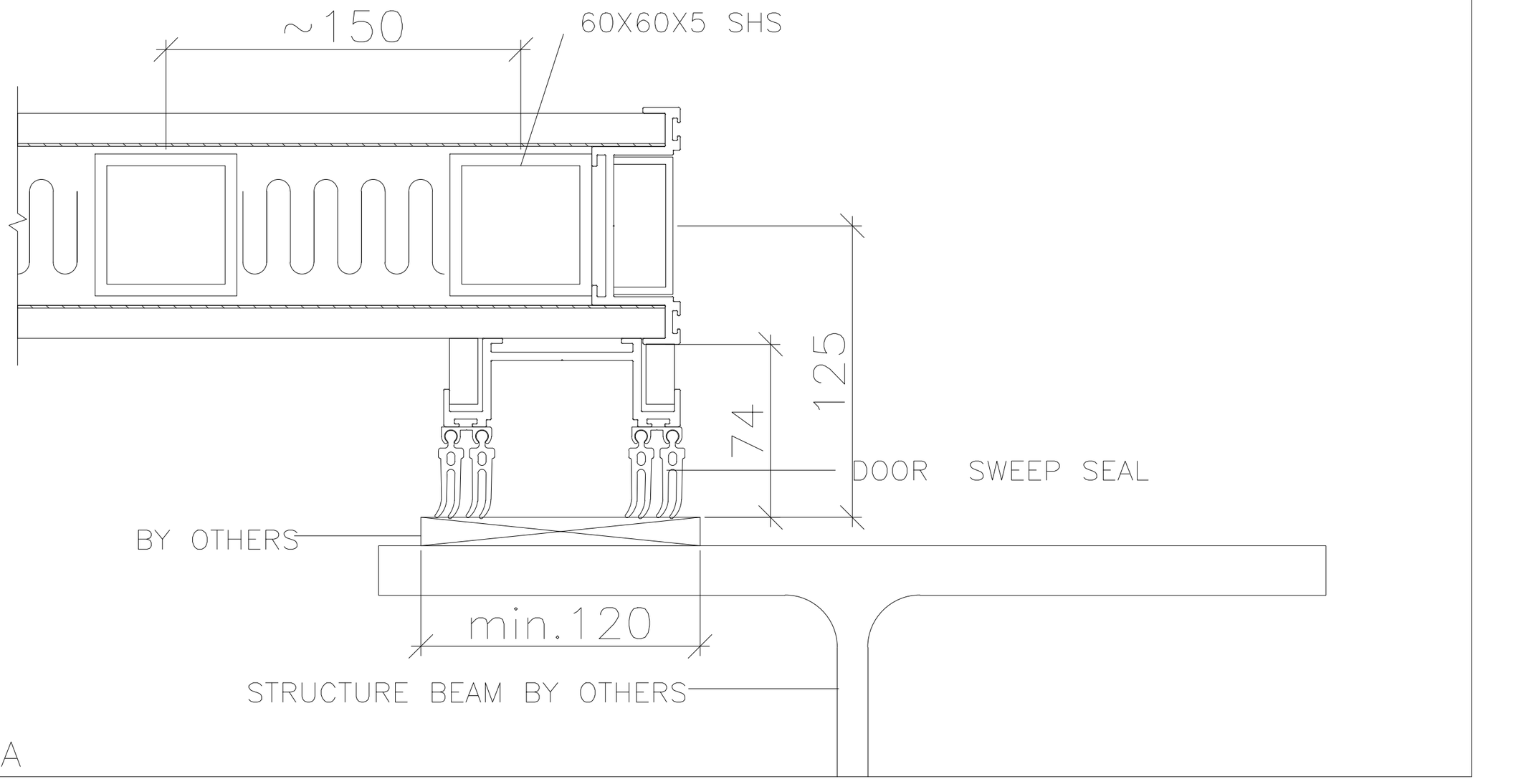

DETAIL A

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

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FOR INFORMATION	21/07/2020	A
PAPER SIZE	SCALE	PAGE
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Acoustic Test Report for "Kinetics" Sliding Door

Be it ELECTRIC or MANUAL operation, AEC offers a wide range of panel constructions and tracks designed to fit your specific need and budget. For life-of-the-building durability select one of the ALPHA® panel constructions.

advanced equipment CORPORATION

	Panel Type	Weight #/SQ. FT	Weight KG/M2	S.T.C	N.I.C.*	N.R.C.	Panel Thickness	Maximum Width	Maximum Height	Panel Face Sheet
Alpha	S	8.5	41.6	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	16-Ga. Steel or optional 14-Ga.
	T	9.1	44.5	54	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	Minimum 16-Ga. Steel
	U	9.7	47.5	53	42	-	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Steel
	P	12	58.7	49	42	0.65	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Perforated Steel
	X	10	48.9	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	14 or 16-Ga. Steel (1-Hr fire)
Sigma	A	5.9	28.9	49	40	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	B	6.4	31.3	50	41	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	C	6.9	33.8	51	41	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel
	D	7.4	36.2	52	42	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel

N.I.C.* when tested in accordance with ASTM E 336-97: Deduct 2 points when using ASTM E 336-05

With the exception of "X" (fire rated), all ALPHA and SIGMA panels are suitable for electric operation

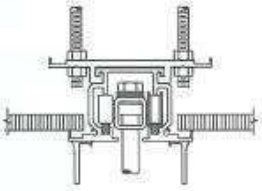
With the exception of "X" (fire rated), all ALPHA and SIGMA panel constructions are available as curved panels

ALPHA & SIGMA panels are one-piece steel weldments with face sheets welded to frame

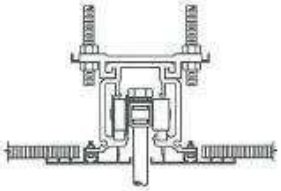
Maximum heights are for individual panel operation and may be less for hinged groups or electric operation

Advanced Equipment's family of extended warranty tracks produce easy, reliable, long term service with virtually no maintenance. These tracks are furnished with a 5 or 10-year warranty period that does not exclude normal wear and tear. Specify tracks #1a, #8 or #8b.

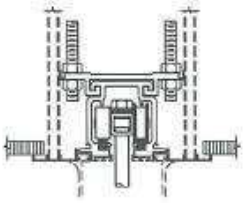
SUPERTRACK®



#1a 900-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
5-YEAR WARRANTY

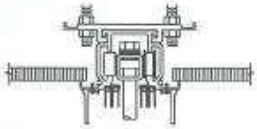


#8 1700-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

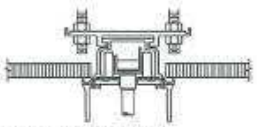


#8b 1500-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

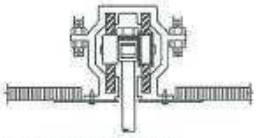
TRACK®



#1 800-pound trolley capacity
Composite track: Aluminum alloy track incorporating soffit trim. Manual or electric operation.
2-YEAR WARRANTY



#2 600-pound trolley capacity
Composite track: Aluminum case with steel running surface. Manual operation.
2-YEAR WARRANTY



#4 1,500-pound trolley capacity
Curve wall manual or electric.
5-YEAR WARRANTY

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DWspec™ provides Architects and Specification Developers with a fully interactive tool for developing operable wall specifications. As a Web-based application, DWspec requires no special software or downloads. DWspec produces one specification for your project even if your project has several walls each with differing characteristics. The user need not be familiar with Advanced Equipment products or their individual characteristics in order to produce a valid, error-free specification.

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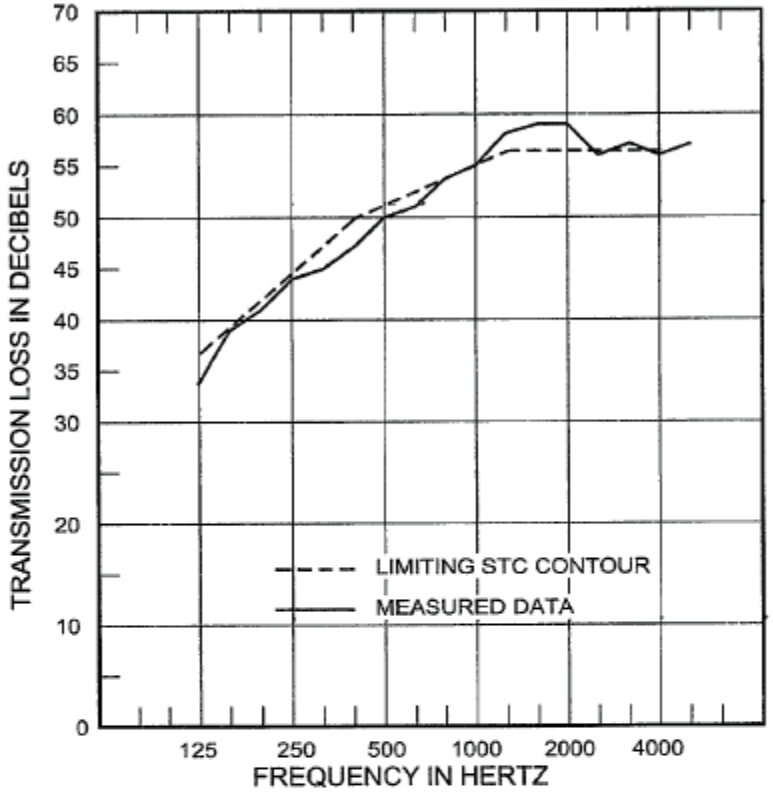
REFERENCE: WESTERN ELECTRO-ACOUSTIC LABORATORY, INC. REPORT #94-227



DESCRIPTION

THE TEST SPECIMEN WAS A FULLY OPERABLE ADVANCED EQUIPMENT CORPORATION **TYPE "U" PANEL** CONSTRUCTION IN A 14' X 9' TEST OPENING.

PROCEDURE

THE PROCEDURES FOR THIS TEST CONFORM TO THE PROVISION AND REQUIREMENTS OF A.S.T.M. E90-85, STANDARD METHOD FOR LABORATORY MEASUREMENT OF AIRBORNE SOUND TRANSMISSION LOSS OF BUILDING PARTITIONS.

RESULTS

THE SOUND TRANSMISSION CLASS RATING DETERMINED IN ACCORDANCE WITH A.S.T.M. E-413 WAS: **STC 53**

1/3 OCT BND CNTR FREQ	125	160	200	250	315	400	500	630	800
TL IN DB	34	37	41	44	45	47	50	52	54
95% CONFIDENCE IN dB DEFICIENCIES	1.80	2.64	1.48	0.69	1.55	1.03	0.90	0.91	0.89

1/3 OCT BND CNTR FREQ	1000	1250	1600	2000	2500	3150	4000	5000	STC
TL IN DB	55	57	59	59	56	57	56	57	53
95% CONFIDENCE IN dB DEFICIENCIES	.064	0.75	1.19	1.88	1.76	2.28	2.55	2.32	

SPECIMEN AREA: 114.75 SQ. FT.
TEMPERATURE: 70.6 DEG. F
RELATIVE HUMIDITY: 46 %
TEST DATE: JULY 16, 1995

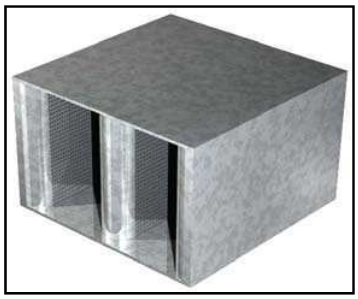
MYG
www.acoustic-hk.com

MANYA STEEL PRODUCTS MANUFACTORY

RECTANGULAR SILENCER

INTRODUCTION

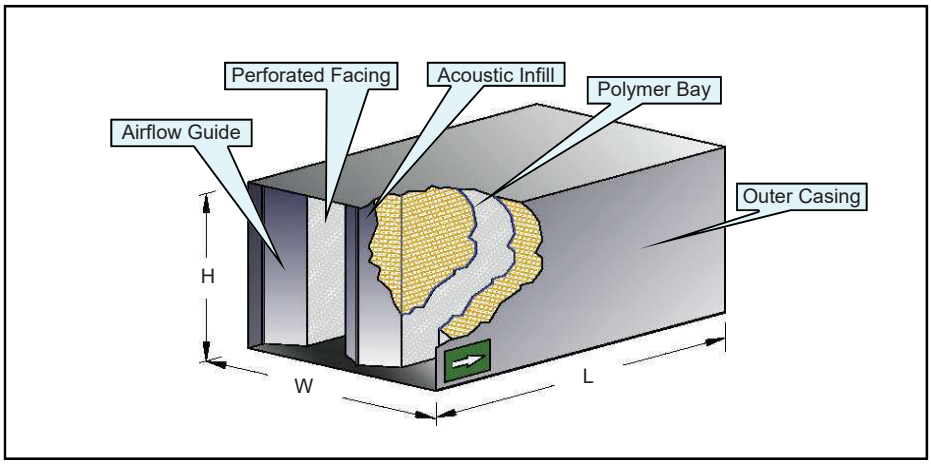
We often hear the noise from ventilation or heating systems that is hardly noticeable because it has no prominent features. The “MYG” rectangular silencer Model: MV series are mainly used in air flow intake, discharge and HVAC Ductwork systems. These silencers are offered in standard dimensions, which can be readily mounted onto the existing duct, combined with an easy calculation and selection method as well as be flexible to suit the client’s particular requirements.



Rectangle G.I. Silencer

MATERIALS AND CONSTRUCTION

Standard MYG MV series come with high quality materials, compact construction and assembled with “Pittsburg seam” with natural galvanized finish on the outer case. Both the outer and inter skins shall be made of pre-galvanized steel sheets and perforated steel sheets respectively. The weld affected areas and angle frames (optional) are to be protected with cold galvanizing paint finish or corrosion-resistant paint finish. Acoustic in fill using with inorganic glass fiber absorbent material with sufficient density functions to give the optimal intended performance.



MYG MV Series Rectangular Silencer

Specification of Standard Model

Materials	MYG Silencer MV Series
	Model: MV
Thickness of outer casing steel sheets	0.8 to 1.2mm
Thickness of inner perforated steel sheets	0.5mm
Acoustic infill density	32kg/m^3

**Others standard and materials are available base on customer request.*

OEM Factory Address : Langsha Industrial Zone, Qiao Tou Town, Dongguan City. Tel : 86-0769-345-3335 Fax : 86-0769-345-3337

APPLICATIONS

A wide variety of industrial applications can be considered when using "MYG" acoustic silencer for the control of airborne and duct-borne noise associated with common HVAC airflow systems. The use of silencers is to minimize the fan and blower noise at both the side inlets and outlets of the equipment. Commercial acoustic silencers are engineered to achieve a maximum insertion loss with a minimum pressure drop. Normally silencers are their type and applications as follows.

- ☑ Air Discharge / Intake
- ☑ Duct Silencer
- ☑ Cross Talk Silencer
- ☑ Air Flow Splitter
- ☑ Standard Elbows
- ☑ Special Shaped Elbows
- ☑ Special Bend Elbows
- ☑ Packless Silencer

ENGINEERING DATA

Static Loss (Pressure Drop)

Determine pressure drop across silencer by the following formula:

Pressure drop, $\triangle P$ = PD x V^2 (Pa)

Where PD Value = Pressure loss coefficient

V = Face velocity in m/s (cross sectional size)

Insertion Loss of "MV" L-series, dB
Low Pressure (Airway 45%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVL2	600	0.48	2	4	9	12	19	19	11	4
MVL3	900	0.52	2	5	10	17	21	21	13	5
MVL4	1200	0.69	3	6	13	22	28	28	16	7
MVL5	1500	1.03	4	8	15	28	35	35	21	11
MVL6	1800	1.32	5	9	19	33	42	42	25	14
MVL7	2100	1.88	6	11	22	39	49	49	29	20
MVL8	2400	2.55	7	13	25	45	50	50	44	24
MVL9	2700	3.42	9	15	27	47	50	50	46	29

Insertion Loss of "MV" S-series, dB
Medium Pressure (Airway 33%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVS2	600	0.74	4	8	14	20	31	30	24	18
MVS3	900	0.92	5	10	18	27	34	36	30	21
MVS4	1200	1.72	6	14	24	37	46	46	40	26
MVS5	1500	2.3	8	18	27	42	50	50	46	31
MVS6	1800	3.1	9	19	34	50	50	50	50	39
MVS7	2100	4.4	11	23	40	50	50	50	50	49
MVS8	2400	6.4	13	25	45	50	50	50	50	50
MVS9	2700	8.7	14	27	48	50	50	50	50	50

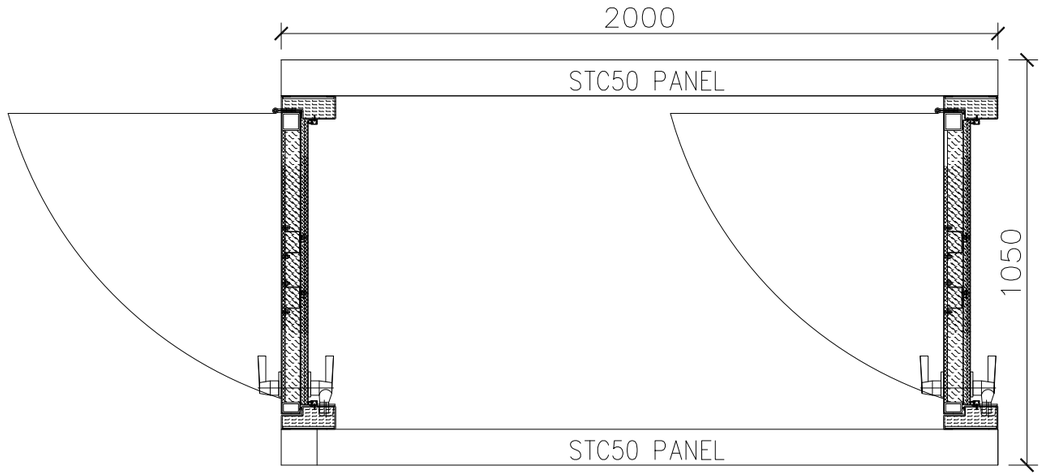
Length of each ventilation silencer = 2 x 1500mm

Insertion Loss of "MV" H-series, dB
High Pressure (Airway 22%)

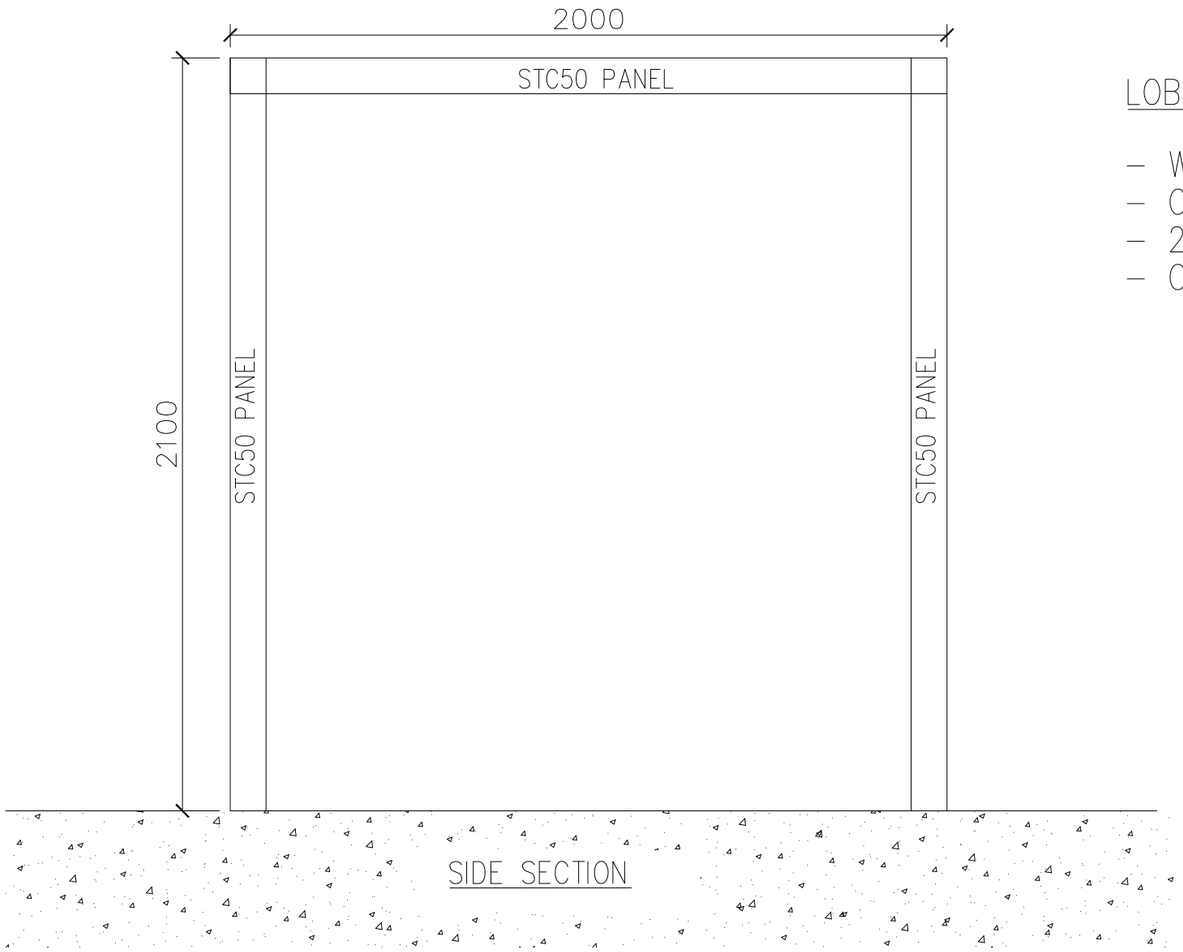
Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVH2	600	2.3	6	10	16	26	30	30	26	22
MVH3	900	3.4	9	16	24	37	48	50	50	39
MVH4	1200	5.1	11	21	31	49	50	50	50	46
MVH5	1500	8.1	14	25	39	50	50	50	50	50
MVH6	1800	12.1	16	29	46	50	50	50	50	50
MVH7	2100	16.5	18	33	50	50	50	50	50	50
MVH8	2400	21	20	37	50	50	50	50	50	50
MVH9	2700	23	22	39	50	50	50	50	50	50

DOUBLE DOOR LOBBY HOUSE

STC50 Acoustic Panel



LAYOUT



SIDE SECTION

LOBBY HOUSE DETAILS

- WALL PANEL BY STC50 (100mm THICKNESS)
- CEILING PANEL BY STC50 (100mm THICKNESS)
- 2 ACOUSTIC DOORS WITH AIR TIGHT HANDSET
- OVERALL SIZE: 2000L X 1050W X 2100H

PROJECT:			
TITLE: PRE-FABRICATED ACOUSTIC LOBBY HOUSE			
DRAWN:	CAD	DATE:	
CHECKED:	CAD	SCALE:	N.T.S.
DWG. NO.			

Contract No. HY/2018/08
Central Kowloon Route – Central Tunnel

PROJECT PLAN

CONSTRUCTION NOISE MITIGATION MEASURES PLAN

(Ma Tau Kok Shaft Worksite)

TABLE OF CONTENT

1. INTRODUCTION

1.1 Project Description

1.1.1 Bouygues Travaux Publics (BYTP) was commissioned by the Highway Department of the HKSAR as the Main Contractor for the Contract HY/2018/08 – Central Kowloon Route – Central Tunnel (CKR-CT). This Construction Noise Mitigation Measure Plan (CNMMP) is prepared for Central Kowloon Route – Ma Tau Kok Access Shaft (CKR-MTKS) with reference to the approved CNMMP for Central Kowloon Route – Kai Tak West (CKR-KTW) under the CKR Contract.

1.1.2 Highways Department (HyD) commissioned the Design and Construction Assignment for the Central Kowloon Route in Jun 1998. CKR is a duel 3-lane trunk road across central Kowloon linking the West Kowloon in the west and the proposed Kai Tak Development (KTD) in the east. The CKR will be about 4.7km long with an underground tunnel section of about 3.9km long there will be an underwater tunnel of about 370m long in Kowloon Bay to the north of the To Kwa Wan Typhoon Shelter. It will connect the West Kowloon Highway at Yau Ma Tei Interchange with the road network at Kowloon Bay and the future Trunk Road T2 at KTD which will connect to the future Tseung Kwan O – Lam Tin Tunnel (TKO-LTT) and Cross Bay Link (CBL). CKR, Trunk Road T2 and TKO-LTT will form a strategic highway link, namely Route 6, connecting West Kowloon and Tseung Kwan O. Consultancy studies for Trunk Road T2, TKO-LTT and CBL have been commissioned by CEDD. In addition, 3 ventilation buildings, which will be in Yau Ma Tei, Ho Man Tin and ex-Kai Tak airport area, are proposed to ensure acceptable air quality within the tunnel.

1.1.3 The Central Kowloon Route – Design and Construction Environmental Impact Assessment Report (Register No.: AEIAR-171/2013) was approved with conditions by the Environmental Protection Department (EPD) on 11 July 2013. An Environmental Permit (EP) (No. EP-457/2013) was issued on 9 Aug 2013. Variations of EP (VEP) was subsequently applied for and the latest EP (EP-457/2013/C) was issued by EPD on 16 Jan 2017.

1.1.4 The activities planned for the CKR-MTKS construction site under the EP include:

- Tunnel excavation (Tunneling & enlargement);
- Cut and cover tunnel.

The overall layout plan of CKR-CT and CKR-MTKS are enclosed in Annex A.

1.1.5 Condition 2.9 of the EP No. EP-457/2013/C stipulated that to further reduce the air-borne construction noise impacts on the NSRs: Grand Waterfront Tower 3 and Hang Chien Court Block J, the Permit Holder shall prepare the CNMMP to the Director of EPD for approval. The plan shall include:

(a) A schedule of construction works to be carried out at the works areas of the Project within 300m from the NSRs defined by EP;
(b) An updated construction methodology of the construction works;
(c) An updated Power Mechanical Equipment (PME) list for the construction works;
(d) An updated proposal of air-borne construction noise mitigation measures for the identified NSR as mentioned above, including the provision of noise barriers, enclosures;

(e) Other activities proposed by the Permit Holder; and
(f) An updated prediction of noise levels in accordance with the above updated information and mitigation proposals in place.

1.1.6 The CNMMP will be reviewed upon the proposed change of construction methods or materials. The updated PME listed in Table 1 represented the worst-case scenario which is practicable for completing the works required by the Contract within the scheduled timeframe.

2. CONSTRUCTION WORKS / ACTIVITIES OF THE PROJECT

2.1. The programme for the construction works described in above Section 1.1.5 are presented in Annex B.

2.2. The proposed construction works will generally follow the methodologies recommended in Chapter 3 of the approved EIA report. Drill and Blast methodology will be adopted for the construction of the central tunnel.

2.3. Application of electronic detonator will be adopted for blasting in certain tunnel sections. Electronic detonator was widely used in other tunnel projects in Hong Kong (HATS, WIL, XRL and TKO-LTT). Comparing to the traditional shock tube detonator system, qualitative review revealed that the improved design of electronic detonator can (1) eliminate the likelihood of failure caused by human errors and (2) provide a reliable control of ground vibration thus less ground-borne noise disturbance to the public is anticipated.

2.4. A summary of PME proposed for the construction works is shown in Table 1. The respective Sound Power Level (SWL) of the PME can be obtained from:

1) EPD's Technical Memorandum on Noise from Construction Work Other than Percussive Pilling.
2) List of SWLs of other commonly used PME or
3) British Standard 5228 – Part 1:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites.

As recommended in the EIA report, quiet equipment and adjustment in utilization rates should be adopted according to Appendix 5.4 of the EIA report to minimize the noise impact to the NSRs. Extra PME have been proposed to take account the latest construction programme and PME inventory in addition to the quiet PME proposed in the EIA report.

Table 1: Summary of PMEs proposed for construction works

PME (% Operation)	Reference	SWL, dB(A)*
Air blower (100%)	CNP 006	95
Air Compressor (50%)	CNP 002	99
Water Pump, submersible (electric) (100%)	CNP 283	85
Aerial work platform, working height ≤ 13m (50%)	BS5228 Table C.4/57	92
Grout mixer (50%)	CNP 105	87
Grout pump (50%)	CNP 106	102
Concrete Mixer (50%)	CNP 045	93
Concrete Lorry Mixer (30%)	CNP 044	104
Shotcreting machine (50%)	BS5228 Table D.6/13	105
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100
Light good vehicle < 5.5 tonne (50%)	CNP 143	98
Loader, wheeled (50%)	CNP 081	109
Ventilation fan (100%)	CNP 241	108
Excavator, tracked (50%)	EPD-07059	103
Breaker, excavator mounted (hydraulic) (50%)	BS5228 Table D.8/13	107
Rock drill, (hydraulic) (50%)	SIL EIA#	105

PME (% Operation)	Reference	SWL, dB(A)*
Mobile crane (50%)	EPD-09573	99

.

** Noise data refers to the Quiet Plant in Appendix 5.4 and Appendix 5.6a of the CKR EIA report.*

Sound Power Level refers to EPD website (Sound Power Level of other commonly used PME)

BS5228 – Code of practice for noise and vibration control on construction and open sites, and the Technical Memorandum on Noise from Construction Work Other than Percussive Piling (GW-TM) under the Noise Control Ordinance.

*** Series of this kind of PME with same or lower SWL will be adopted.*

 # Reference to Approved South Island Line (East) EIA

Referring to the construction programme, west bound (WB) and east bound (EB) tunnel excavation will be conducted at the same duration from April to December 2022. However, as the PMEs will be used alternatively, but not used at the same time, PME configuration will be same as that of solely either WB or EB tunnel excavation.

3. ASSESSMENT CRITERIA AND METHODOLOGY

3.1 Assessment Criteria

3.1.1 Noise impacts arising from the construction works at CKR-MTKS are assessed in accordance with the criteria given in the Technical Memoranda under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment. The daytime construction noise criteria are listed in Table 2.

Table 2: Daytime construction noise criteria

Use	Acceptable Noise Level in Leq (30-min), dB(A)
Residential	75

3.2 Assessment Methodology

3.2.1 Construction noise assessment was carried out according to the methodology adopted in the EIA report. The utilization rate for each PME was estimated individually for the corresponding activity to ensure it is practical and consistent with the assumptions made in the EIA report.

3.2.2 BYTP confirmed that the programme and plant inventory are reasonable and practicable allowing the completion of works within the schedule timeframe.

3.2.3 All mitigation measures and their effectiveness evaluated in the EIA report including adoption of quiet PME, percentage on-time for each PME, movable noise barrier and noise enclosure for the PME were considered in this CNMMP. Details of acoustic materials to construct the noise enclosure are enclosed in Annex G.

3.2.4 To predict the noise level, PMEs are divided into groups required for each respective construction task. The purpose is to identify the worst-case scenario representing those PME that will be in use concurrently at any time. The total Sound Pressure Level (SPL) of each construction task at the identified NSR is calculated, according to the Sound Power Level (SWL) of each PME and the distance attenuation to the NSRs. If more than one construction task will be carried out concurrently, the total SPL is predicted by adding up all SPL of concurrent construction tasks in logarithmic scale.

3.2.5 Tunnelling works will involve alternating cycles from drilling to mucking out. Therefore, tunnel excavation activities will be operated in sequence rather than concurrently. The relevant noise calculation is conducted in groups accordingly.

3.2.6 A positive 3dB(A) façade correction is added to the predicted noise level to account for the façade effect at the NSR.

4. NOISE SENSITIVE RECEIVERS

4.1 According to Condition 2.9 of the EP, Grand Waterfront Tower 3 and Hang Chien Court Block J were identified as a representative NSR for the assessment. The predicted noise levels at the identified NSRs are summarized in Table 3.

Table 3: Summary of Mitigated Noise Level Predicted at the Identified NSRs in EIA Report

NSR ID	NSR Description	Uses *[1]*	Criterion dB(A)	Max. Mitigated Noise Level, dB(A)*[2]*	Exceedance, dB(A) *[2]*
E-N12	Grand Waterfront Tower 3	R	75	75	-
E-N21	Hang Chien Court Block J	R	75	**79**	4

[1] R- Residential
[2] Bolded values mean exceedance of the relevant noise criteria.

4.2 The locations of identified NSRs are shown in Figure 1:

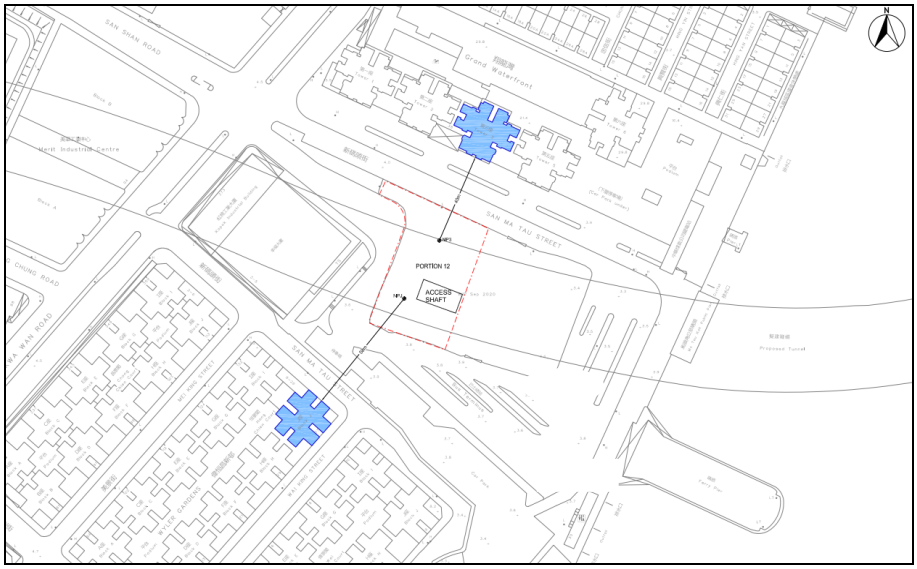


Figure 1: Location plan of identified NSRs

Photos of identified NSRs are presented in Annex C

5. ASSESSMENT OF CONSTRUCTION NOISE IMPACT

5.1. Mitigation Measures

5.1.1. The mitigation measures proposed in the EIA report will be adopted, i.e. Erection of movable barrier and noise enclosure. PME with adopted mitigation measures are summarized in Table 4.

5.1.2. Noise reduction of 5dB(A) is proposed for the movable barrier for the PME operating at surface.

5.1.3. All PME for tunnel excavation shall be operated at the shaft bottom (>35m below the ground level) with a noise enclosure covering the shaft. In this case, the barrier effect proposed for the PME operating inside the shaft is 20dB(A).

5.1.4. Shaft covers were constructed for the PME operating inside access shaft. The noise cover is made of 110mm thick noise panel. A 15.3m x 7.6m opening is remained for daytime operation, which will be closed by a removable cover during restricted hours. The removable cover is made of 110mm thick noise panel, including 2 layers of 5mm thick steel plate sandwiching 100mm thick rockwool infill (100kg/m^3). A 4.3m x 2.3m x 2.6m (H) ventilation chamber and 12.5m x 7.2m x 3.7m (H) tally room were installed at intake ventilation opening to enclose the silencer and ventilation fan. A triple door was installed at tally room for man access to make sure at least one door will be closed during man access. Details of the noise cover are presented in Annex D. PME with proposed mitigation measures are summarized in Table 4.

Table 4: Summary of PME with Proposed Mitigation Measures

PME (% Operation)	Proposed Mitigation Measures	Noise Reduction, dB(A)
Air blower (100%)	Noise enclosure	20 (Tunnel)
Air Compressor (50%)		
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Grout pump (50%)		
Grout mixer (50%)		
Shotcreting Machine (50%)		
Light good vehicle < 5.5 tonne (50%)		
Loader, wheeled (50%)		
Ventilation fan (100%)		
Excavator, tracked (50%)		
Breaker, excavator mounted (hydraulic) (50%)		
Rock drill, crawler mounted (hydraulic) (50%)		
Air Compressor (50%)	Movable barrier	5 (Surface)
Water Pump, submersible (electric) (100%)		
Aerial work platform, working height ≤ 13m (50%)		
Concrete Mixer (100%)		
Concrete Lorry Mixer (30%)		
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)		
Mobile crane (50%)		

5.1.5. According to the construction programme of MTKS, noise assessments at the NSRs with implementation of proposed mitigation measures are presented in Annex E. As mentioned in Section 2.4, PME configuration for WB and EB tunnel excavation will be same as solely either WB or EB tunnel excavation. The cumulative noise assessment for the NSRs due to the concurrent construction

activities – Central Kowloon Route – Kai Tak West (CKR-KTW) are presented in Annex F. The cumulative noise levels are summarized in Table 5.

Table 5: Summary of Cumulative Noise Levels at the NSRs (Mitigated)

NSR ID	NSR Description	Uses	Criterion dB(A)	Mitigated Noise Level range dB(A)	Maximum Exceedance dB(A)	Exceedance Duration/Months
E-N12	Grand Waterfront Tower 3	R	75	63 - 75	0	0
E-N21	Hang Chien Court Block J	R	75	60 - 74	0	0

5.1.6. With the implementation of the above-mentioned mitigation measures, no exceedance of construction noise criterion is expected from the residual impacts. The comparison of residual impacts between CKR EIA and this CNMMP is shown in Table 6.

Table 6: Mitigated Construction Noise Impact at the Identified NSRs

NSR	Noise Criteria dB(A)	EIA Prediction					CNMMP Prediction				
		Max Noise Level dB(A)	Exceedance Duration (Month)				Max Noise Level dB(A)	Exceedance Duration (Month)			
			1-4 dB(A)	5 dB(A)	6 dB(A)	7 dB(A)		1-4 dB(A)	5 dB(A)	6 dB(A)	7 dB(A)
E-N21	75	79	6	-	.	-	74	-	-	-	-

5.1.7. According to cumulative noise assessment presented in Annex F, the predicted noise impact contributed from this project is insignificant comparing with the predicted noise impact from the concurrent project (CKR–KTW). Moreover, the maximum noise level predicted at the nearest NSR – Grand Waterfront Tower 3 due to the construction works of MTKS is 63 dB(A), the overall noise level is substantially dominated by the concurrent construction activity of CKR-KTW, and therefore the cumulative noise level does not cause exceedance but is significantly high.

6. CONCLUSION

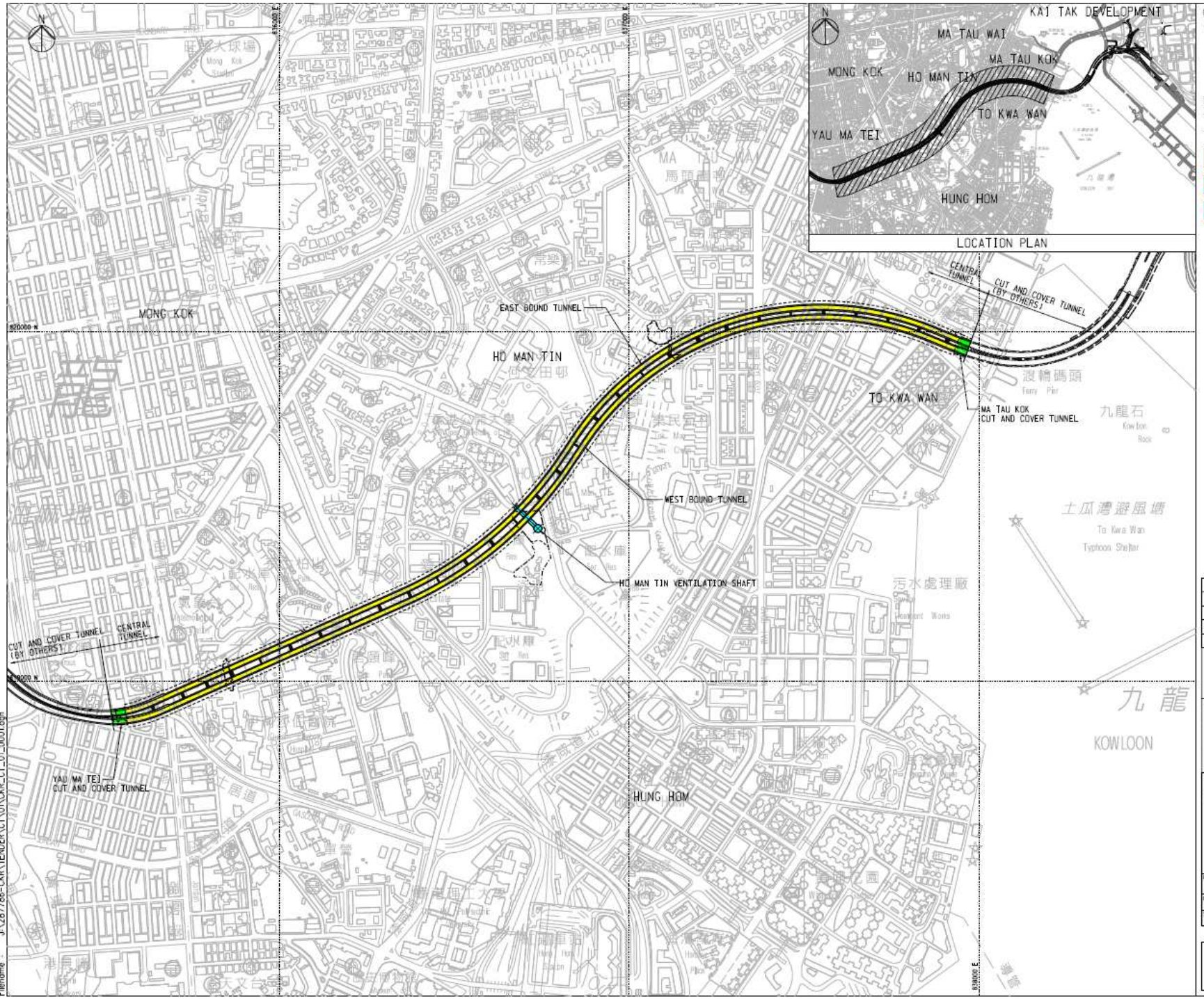
6.1. This CNMMP predicted the construction noise impact arising from the CKR-MTKS construction site to the identified NSRs. This plan has updated the information on PMEs and works programme which will be adopted by Bouygues Travaux Publics. The proposed mitigation measures including use of quiet QPME, movable barriers and noise enclosure will be implemented.

6.2. According to the CNMMP prediction, no noise exceedance is predicted at all the NSRs which is better than EIA prediction comparatively. The overall construction noise impact would be reduced for all two NSRs in terms of duration and noise level, when comparing with the EIA prediction.

6.3. This CNMMP will be subsequently reviewed and updated along the construction phase. Liaison with the affected parties will be carried out to minimize the construction noise impact as far as practicable. Attention will be paid to the construction activities which are predicted to give noise exceedances. Appropriate mitigation measure such as re-arrangement of noisy activities shall be implemented when necessary.

Annex A

Layout Plan of CKR-CT and CKR-MTKS



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. CKR/CT/01/0002 TO 0014 AND 0021 TO 0034 FOR BOUNDARY OF THE SITE AND SETTING OUT PLAN RESPECTIVELY.

LEGEND:

- BOUNDARY OF THE SITE (ABOVE GROUND)
- BOUNDARY OF THE SITE (UNDERGROUND)
- PROPOSED CENTRAL TUNNEL
- PROPOSED CUT AND COVER TUNNEL
- PROPOSED HO MAN TIN VENTILATION ADIT

Rev.	Description	By	Date
00	ISSUE FOR TENDER	JC	12/18

ARUP MOTT MACDONALD
Arup-Mott MacDonald Joint Venture

Project title: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Drawing title: PROJECT LAYOUT KEY PLAN

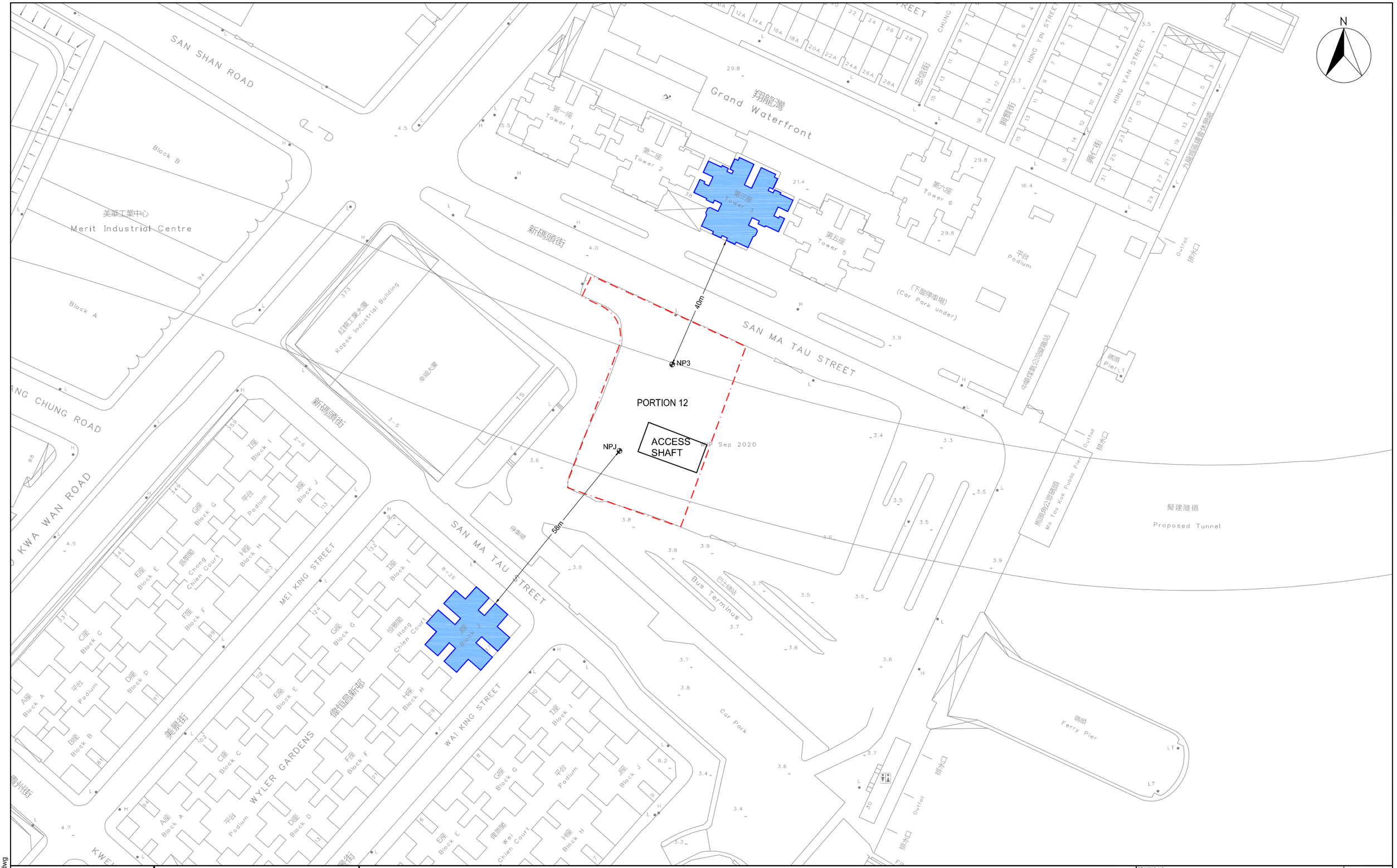
Drawing no.	Rev.
CKR/CT/01/0001	00

Drawn By	Checked By	Approved By
JL	AC	RC

Scale: 1:5000 @ A1 | Status: TENDER

路政署 HIGHWAYS DEPARTMENT
主要工程管理處 MAJOR WORKS PROJECT MANAGEMENT OFFICE

Printed by : 12/13/2018
Filename : J:\287786-CKR\TENDER\CT\ON\CKR_CT_01_0001.dgn



MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS	PROJECT: Contract No. HY/2018/08 Central Kowloon Route - Central Tunnel	DRAWING TITLE: CNMMP FOR MTK ACCESS SHAFT	DRAWING NO.: – / REVISION: –
			SCALE: 1:1000 (A3) / DATE: 2021.05.21
			FILE: R210521_MTK CNMMP.dwg / DRAWN: WWC

R210521_MTK CNMMP.dwg

Annex B

Construction Programme

Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

MTK Major Works Programme

item	Description of Works	Duration	Calendar Year / Month
			2021: Mar Apr May Jun Jul Aug Sep Oct Nov Dec; 2022: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec; 2023: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec; 2024: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1	Tunnel Excavation (WB Pilot TBM Tunnelling Enlargement)	16 months	
2	Tunnel Excavation (EB Tunnelling)	22 months	
3	Cut & Cover Tunnel	6 months	

From April to Dec-2021, WB & EB Tunnel excavation will be conducted at the same time, in which the PMEs between 2 tunnels will be used

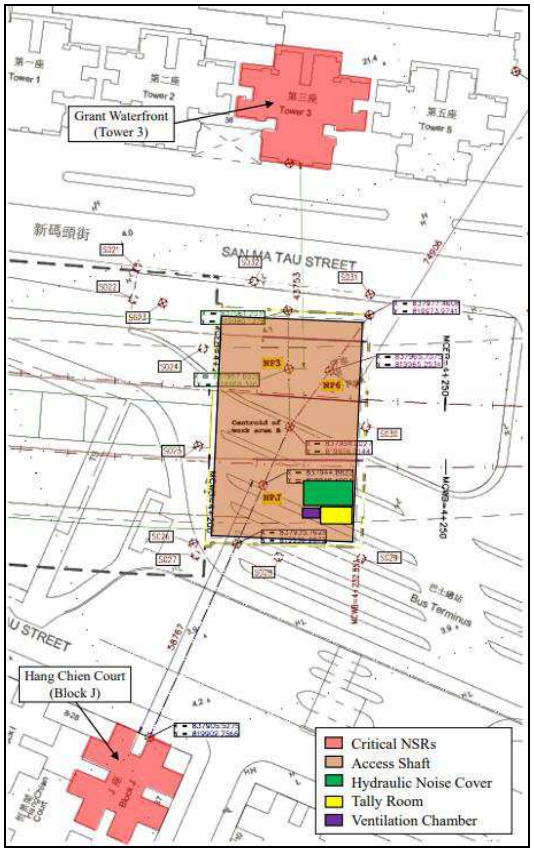
Annex C

Photo of Identified NSRs

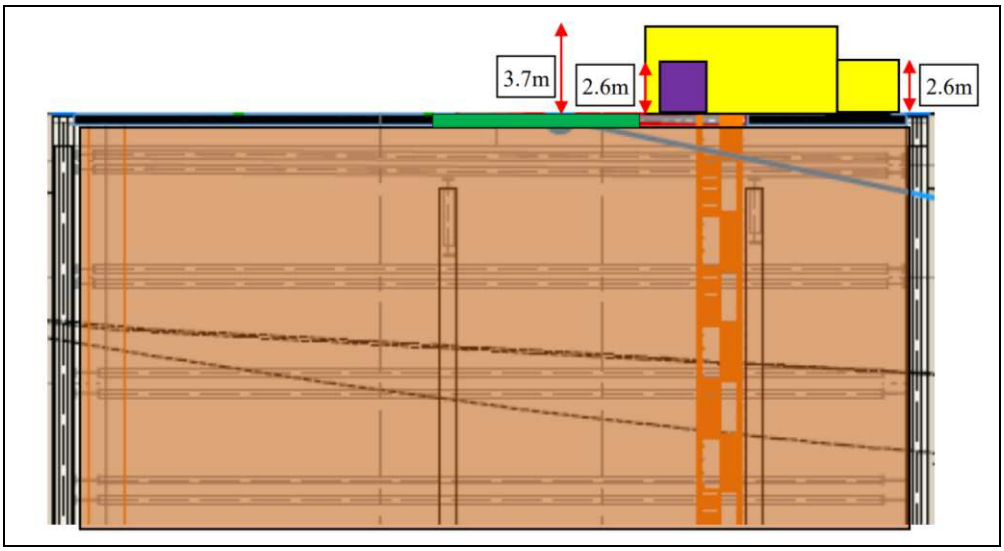
Noise Sensitive Reservoir Locations		
NSR	**Location**	**Photo**
E-N12	Grand Waterfront Tower 3	
E-N21	Hang Chien Court Block J	

Annex D

Details of Noise Enclosure

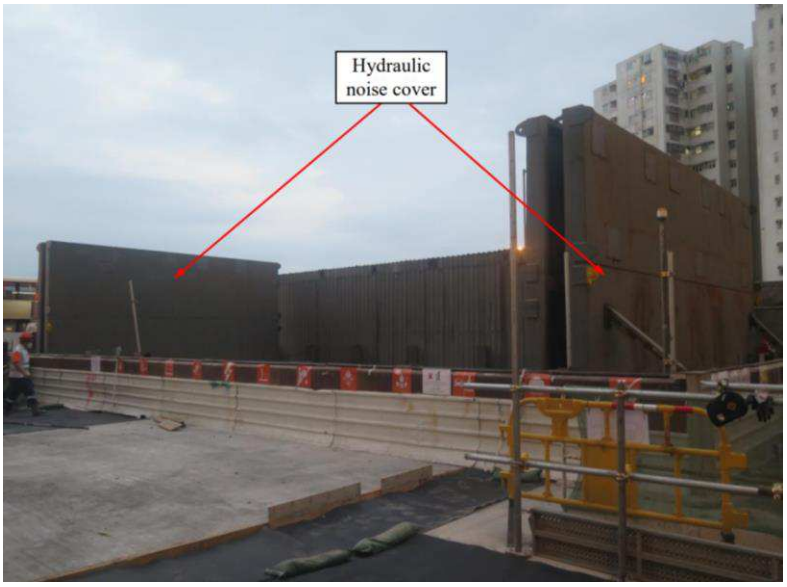


Site Plan of CKR Ma Tau Kok Access Shaft



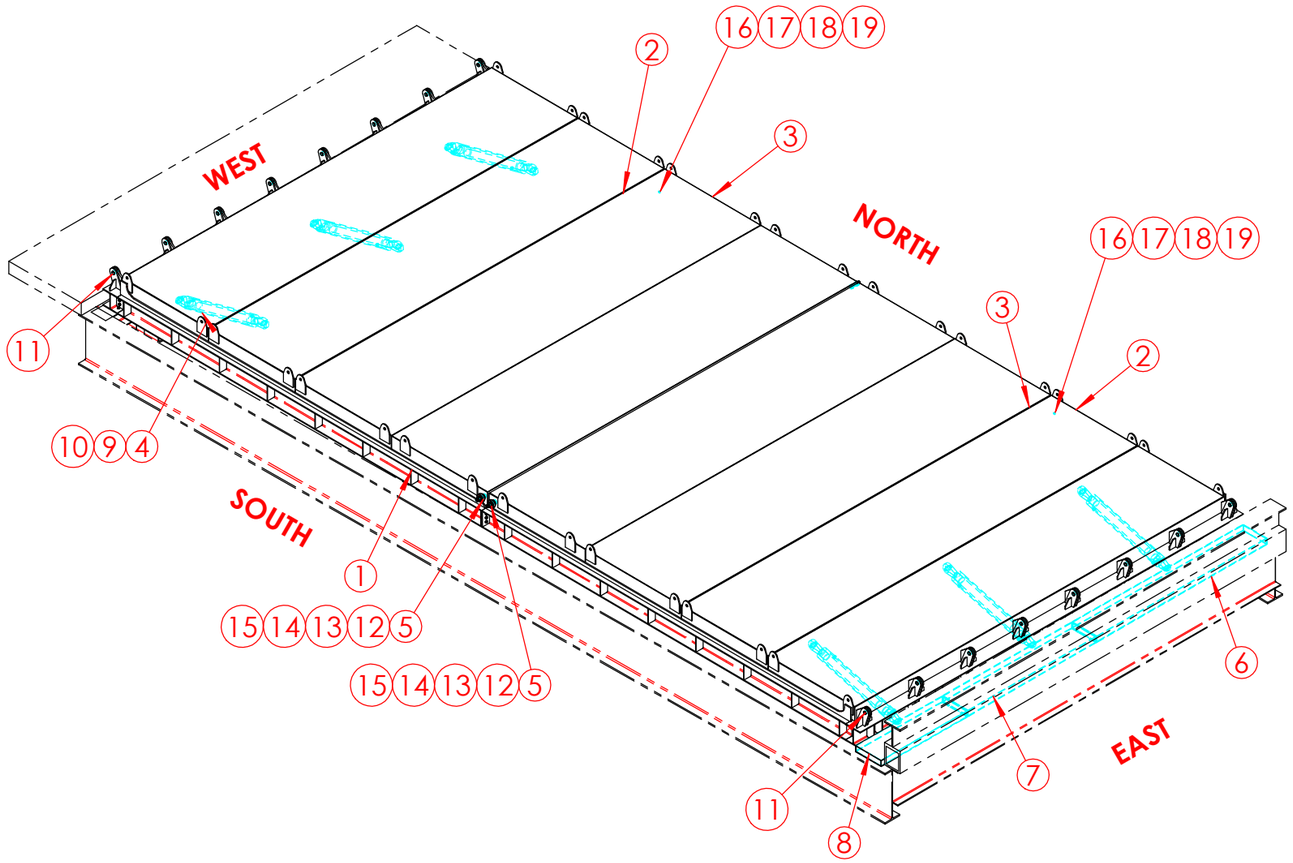
Section View of Ma Tau Kok Access Shaft

Photos of Removable Cover A



External View of Hydraulic Noise Cover (opened)

Tally Room, ventilation Chamber and Man Access Doors



SCALE 1 : 90

NOTE:

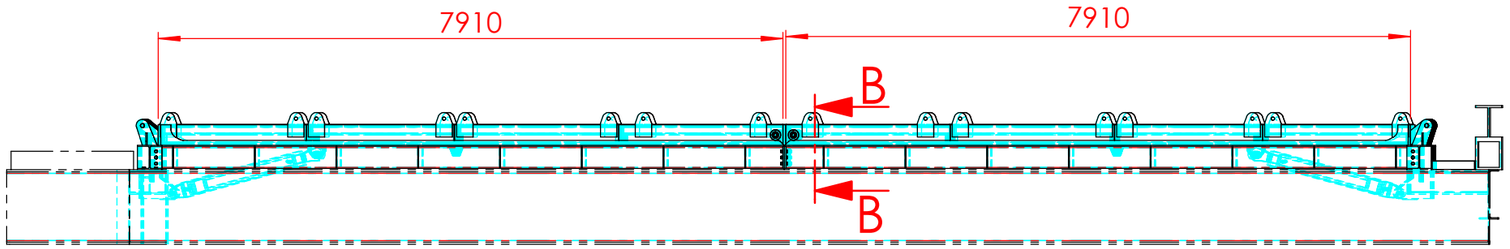
STIFFENERS HAS TO BE WELDED ON SITE BETWEEN BASEFRAME & 254x146x 31 UB (NORTH & SOUTH) WHEREVER NECESSARY

ITEM NO.	PartNO	DESCRIPTION	SPECIFICATION	MATERIAL	PART Wt	GROSS WT	QTY.	NOTES
19		NUT	M20				16	
18		LOCK WASHER	Ø20				16	
17		PLAIN WASHER	Ø20				16	
16		BOLT	M20x80				16	
15		NUT	M39				4	
14		LOCK WASHER	Ø39				4	
13		PLAIN WASHER	Ø39				4	
12		BOLT	M39x150				4	
11	HKCKR/BTP/TTS/MTS/TSI/537550/11	PIN-FRAME	Ø50x80	EN24	1		16	
10	HKCKR/BTP/TTS/MTS/TSI/537550/10	PIN-CYLINDER TOP	Ø40x105	EN24	1		6	
9	HKCKR/BTP/TTS/MTS/TSI/537550/09	PIN-CYLINDER BOTTOM	Ø50x115	EN24	2		6	
8	HKCKR/BTP/TTS/MTS/TSI/537550/08	PANEL-C			92		1	
7	HKCKR/BTP/TTS/MTS/TSI/537550/07	PANEL-B			133		1	
6	HKCKR/BTP/TTS/MTS/TSI/537550/06	PANEL-A			170		1	
5	HKCKR/BTP/TTS/MTS/TSI/537550/05	ROLLER ASSEMBLY			10		4	
4	HKCKR/BTP/TTS/MTS/TSI/537550/04	CYLINDER					6	
3	HKCKR/BTP/TTS/MTS/TSI/537550/03	FRAME-B			4776		2	
2	HKCKR/BTP/TTS/MTS/TSI/537550/02	FRAME-A			4550		2	
1	HKCKR/BTP/TTS/MTS/TSI/537550/01	BASEFRAME ASSEMBLY			6565		1	

MSL ENGINEERING

Eastfocus

材料 MAT.		設備名稱 ITEM			
數量 QTY.		圖紙名稱 DWG. NAME	SELF OPENING NOISE COVER-MTK	頁次 SHEET NO.	1/10
重量 WT.	26322				
審核 CHKD. BY		圖紙代號 DWG. NO.	HKCKR/BTP/TTS/MTS/TSI/537550/00	版次 REV.	E
設計 DESIGNER	SADISH	日期 DATE	02-12-2020	比例 SCALE	



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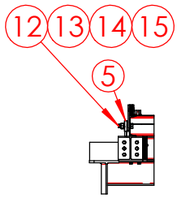

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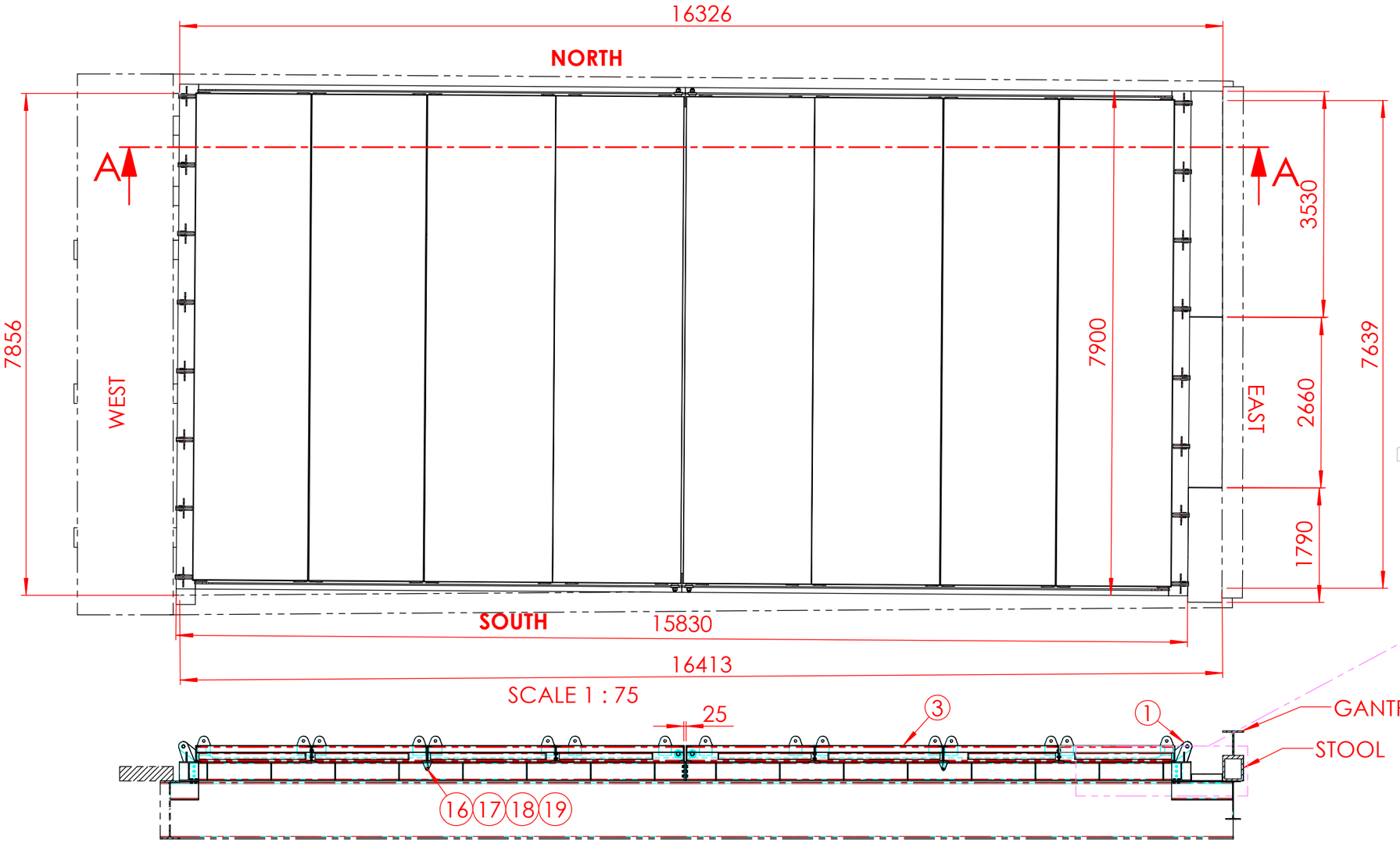

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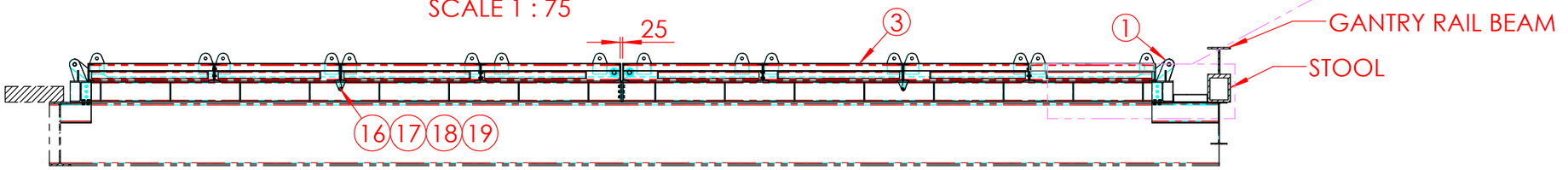

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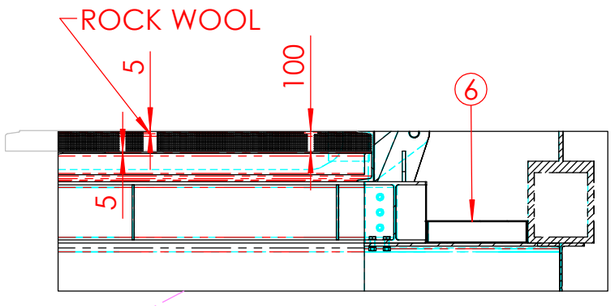

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SCALE 1 : 30

M&E ENGINEERING / Eastfocus				材料 MAT.		設備名稱 ITEM	
				數量 QTY.			
審核 CHKD. BY				重量 WT.	26322	圖紙名稱 DWG. NAME	SELF OPENING NOISE COVER-MTK (CLOSED)
設計 DESIGNER	SADISH	日期 DATE	02-12-2020	比例 SCALE		圖紙代號 DWG. NO.	HKCKR/BTP/TTS/MTS/TSI/537550/00

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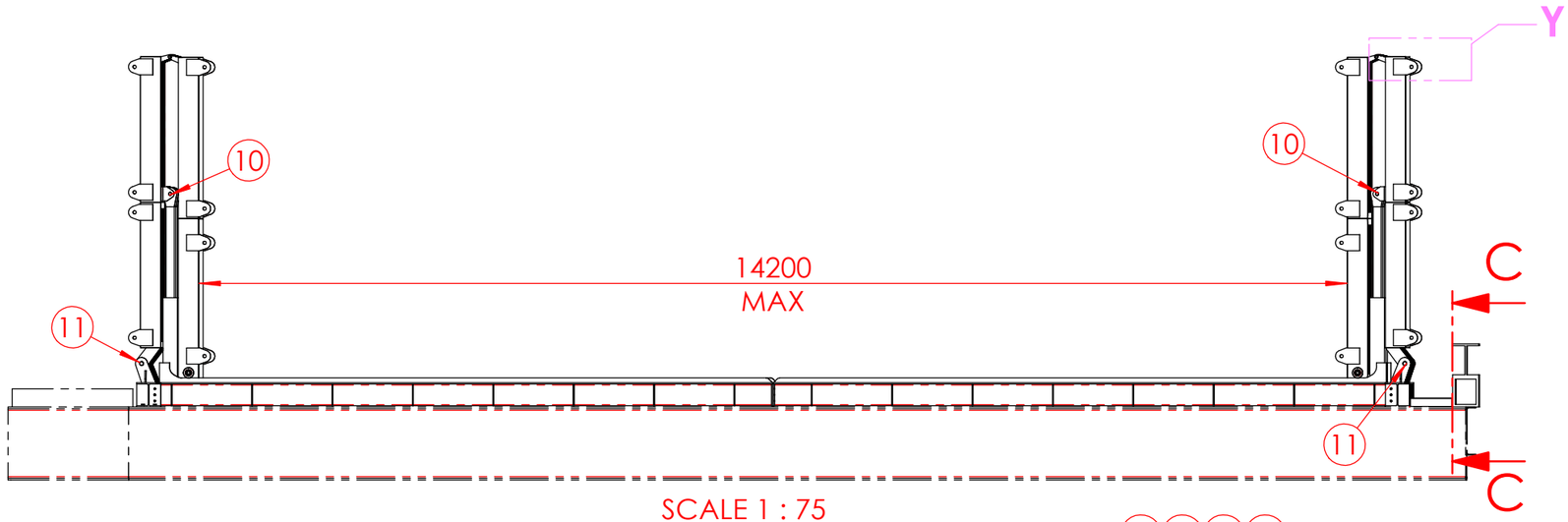

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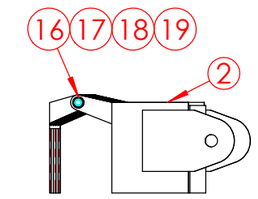

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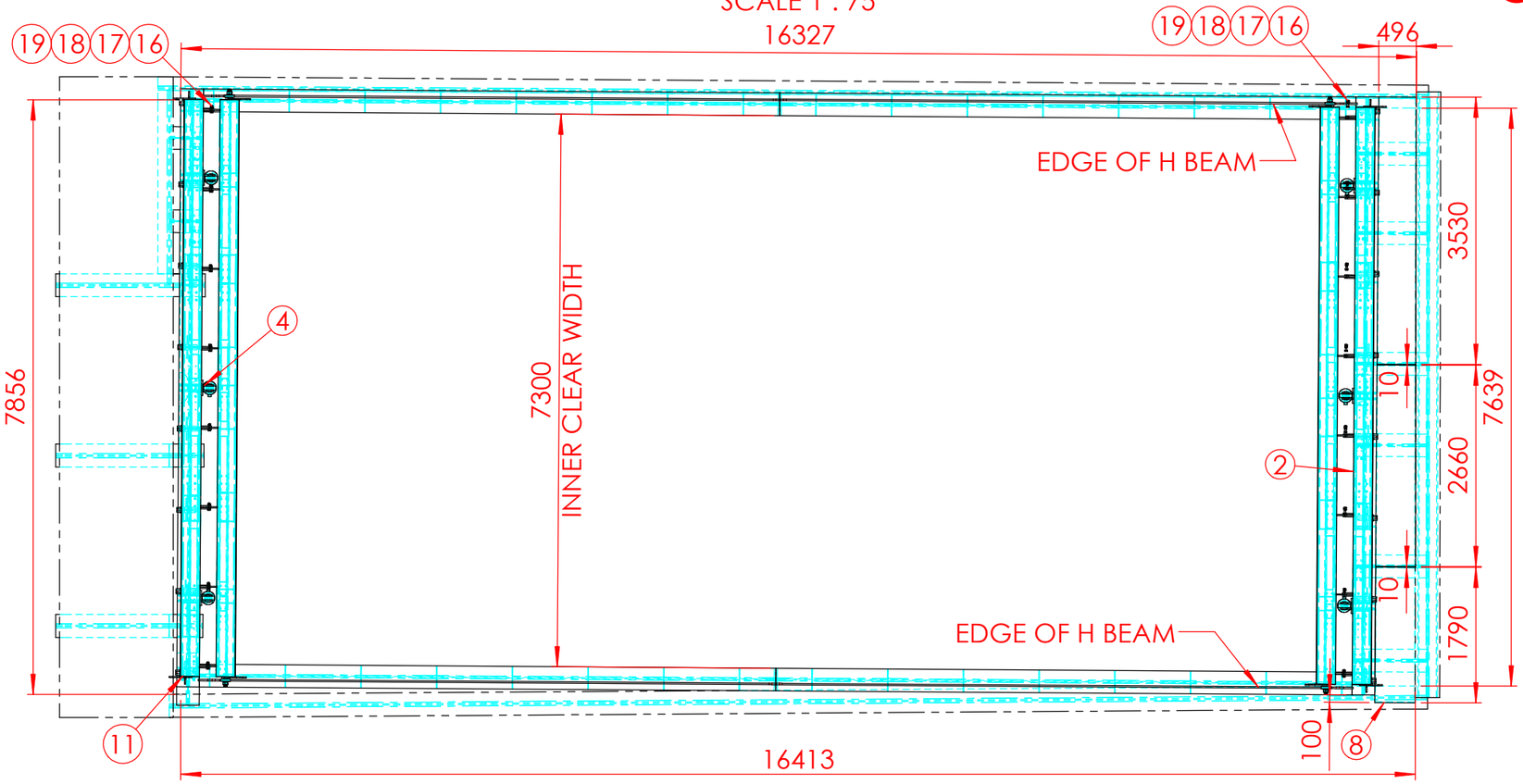

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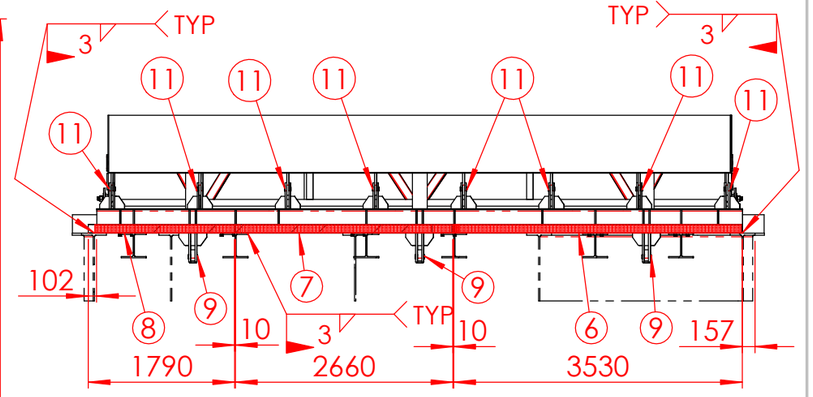

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SCALE 1 : 75

MSL ENGINEERING / Eastfocus				材料 MAT.		設備名稱 ITEM	
				數量 QTY.			
審核 CHKD. BY				重量 WT.	26322	圖紙名稱 DWG. NAME	SELF OPENING NOISE COVER-MTK (OPENED)
設計 DESIGNER	SADISH	日期 DATE	02-12-2020	比例 SCALE		圖紙代號 DWG. NO.	HKCKR/BTP/ITS/MTS/TSI/537550/00

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Annex E

Predicted Noise Level at the NSRs

Predicted Noise Level for NSR

Grand Waterfront Tower 3

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (EB Tunnelling & WB Pilot TBM Tunnelling Enlargement)									
Air Blower	CNP 006	95	6	103	40	-40	-20	3	45.98
Air Compressor (50%)	CNP 002	99	1	99	40	-40	-20	3	41.98
Water Pump, submersible (electric)	CNP 283	85	10	95	40	-40	-20	3	37.98
Mobile crane (50%)	EPD-09573	99	1	99	40	-40	-5	3	56.98
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	40	-40	-20	3	37.98
Grout pump (50%)	CNP 106	102	1	102	40	-40	-20	3	44.98
Grout mixer (50%)	CNP 105	87	1	87	40	-40	-20	3	29.98
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	40	-40	-20	3	47.98
Loader, wheeled (50%)	CNP 081	109	1	109	40	-40	-20	3	51.98
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	40	-40	-5	3	57.98
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	40	-40	-20	3	40.98
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	40	-40	-5	3	50.98
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	40	-40	-20	3	45.98
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	40	-40	-20	3	49.98
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	40	-40	-20	3	47.98
Ventilation fan	CNP 241	108	1	108	40	-40	-20	3	50.98
								Total CNL	**62.81**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	40	-40	-20	3	45.98
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	40	-40	-5	3	61.98
Grout pump (50%)	CNP 106	102	1	102	40	-40	-20	3	44.98
Grout mixer (50%)	CNP 105	87	1	87	40	-40	-20	3	29.98
Mobile crane (50%)	EPD-09573	99	1	99	40	-40	-5	3	56.98
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	40	-40	-5	3	57.98
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	40	-40	-5	3	48.98
								Total CNL	**64.55**

Predicted Noise Level for NSR

Hang Chien Court Block J

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Tunnel Excavation (EB Tunnelling & WB Pilot TBM Tunnelling Enlargement)									
Air Blower	CNP 006	95	6	103	58	-43	-20	3	42.75
Air Compressor (50%)	CNP 002	99	1	99	58	-43	-20	3	38.75
Water Pump, submersible (electric)	CNP 283	85	10	95	58	-43	-20	3	34.75
Mobile crane (50%)	EPD-09573	99	1	99	58	-43	-5	3	53.75
Aerial work platform, working height ≤ 13m (50%)	BS 5228 Table C.4	92	2	95	58	-43	-20	3	34.75
Grout pump (50%)	CNP 106	102	1	102	58	-43	-20	3	41.75
Grout mixer (50%)	CNP 105	87	1	87	58	-43	-20	3	26.75
Shotcrete machine (50%)	BS5228 Table D.6/13	105	1	105	58	-43	-20	3	44.75
Loader, wheeled (50%)	CNP 081	109	1	109	58	-43	-20	3	48.75
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	58	-43	-5	3	54.75
Light good vehicle < 5.5 tonne (50%)	CNP 143	98	1	98	58	-43	-20	3	37.75
Concrete Mixer, electric (Ground surface) (50%)	CNP 045	93	1	93	58	-43	-5	3	47.75
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	58	-43	-20	3	42.75
Breaker, excavator mounted, hydraulic (50%)	BS5228 Table D.8/13	107	1	107	58	-43	-20	3	46.75
Rock drill (hydraulic) (50%)	SIL EIA	105	1	105	58	-43	-20	3	44.75
Ventilation fan	CNP 241	108	1	108	58	-43	-20	3	47.75
								Total CNL	**59.59**

Project Specific PME Item	Reference	SWL dB(A)	No. of Items	Total SWL, dB(A)	Dist. From NSR, m	Dist. Corr., dB(A)	Screening Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
Cut & Cover Tunnel									
Excavator, tracked (Access shaft) (50%)	EPD-07059	103	1	103	58	-43	-20	3	42.75
Concrete Lorry Mixer (30%)	CNP 044	104	1	104	58	-43	-5	3	58.75
Grout pump (50%)	CNP 106	102	1	102	58	-43	-20	3	41.75
Grout mixer (50%)	CNP 105	87	1	87	58	-43	-20	3	26.75
Mobile crane (50%)	EPD-09573	99	1	99	58	-43	-5	3	53.75
Dump Truck, 5.5 tonne < GVW ≤ 38 tonne (30%)	CNP 068	100	1	100	58	-43	-5	3	54.75
Water Pump, submersible (electric) (Ground surface)	CNP 283	85	4	91	58	-43	-5	3	45.75
								Total CNL	**61.33**

Annex F

Cumulative Noise Level at the NSRs

Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

Cumulative Noise Assessment - CKR-CT & CKR-KTW		Calendar Year / Month																																							
Period with concurrent activities - Mar 2021 - Feb 2023		2021										2022												2023												2024						
NSR ID	NSRs	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
CKR-CT Construction Noise Level, dB(A)																																									
E-N12	Grand Waterfront Tower 3	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63						65	65	65	65	65	65
E-N21	Hang Chien Court Block J	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60						61	61	61	61	61	61
CKR-Kai Tak West Construction Noise Level, dB(A)																																									
E-N12	Grand Waterfront Tower 3	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	74	74	73	65																		
E-N21	Hang Chien Court Block J	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	74	73	73	73	75	73	74	71	67																		
Cumulative Construction Noise Level, dB(A) (Including CKR-Kai Tak West & CKR-CT)																																									
E-N12	Grand Waterfront Tower 3	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	74	74	73	67	63	63	63	63	63							65	65	65	65	65	65
E-N21	Hang Chien Court Block J	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	74	73	73	73	75	73	74	71	68	60	60	60	60	60						61	61	61	61	61	61

As shown in the above table, the cumulative construction noise level is dominated by construction noise from CKR-KTW. The contribution from CKR-CT is negligable in the overall noise level.

Annex G

Details of Acoustic Materials for Construction of Noise Enclosure

- “NAP” Noise panel (SD 150RW)
- “Kinetics” Acoustic Sliding Door
- “MYG” Silencer and Man-access Lobby House

Report Ref. No.	:	STR 20027
Issue Date	:	15 July 2020
Project Ref. No.	:	J 20027
Sample No.	:	YP 20027
Customer	:	NAP Acoustics (Far East) Ltd.
Address Of Customer	:	Room 1811, 18/F Hong Kong Plaza, 188 Connaught Road West, Hong Kong

Laboratory Measurement Report for Airborne Sound Insulation to ISO 10140-2 for SNAPAcoustics Noise Barrier Panels model SD150RW

Prepared By : Ms. Vivian Ou (Test Engineer)
BEng., AMMOIA

Checked By : Ms. Vita Feng (Quality Control Manager)
BEng., MMOIA

Approved By : *Ir.* K. K. Iu (Laboratory Manager)
Registered Professional Engineer
B. Sc.(Eng.), MPhil, C.Eng., MCIBSE, MIE Aust., MHKIE, FHKIOA, MIOA, FMOIA, MHKIQEP, MASA

盈普声学(惠州)有限公司声学实验室
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CONTENTS

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1.0 Introduction

SUPREME NAP Acoustics (Huizhou) Co. Ltd. Laboratory was invited by NAP Acoustics (Far East) Ltd. to determine room-to-room airborne sound insulation of SNAPAcoustics Noise Barrier Panels model SD150RW in accordance with ISO 10140-2:2010.

The test specimen was installed at the test aperture between two Reverberation Rooms at No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China. The volume of the source room named Saturn and the receiving room named Uranus were 127 m^3 and 90.6 m^3 respectively. The structural opening dimensions of the test aperture between two rooms was 4,130 (W) x 3,280 (H) mm.

2.0 Date & Time

Sample was received on 30 June 2020.
Test was conducted from 16:00 to 17:30 on 10 July 2020.

3.0 Environmental Conditions

	Source room	Receiving room
温度 Temperature	31.7 deg. C	31.6 deg. C
湿度 Relative humidity	63 %	65 %

4.0 Test Conducted By

Ms. Fanni Lin	Test Engineer
Mr. Amber Lin	Test Engineer

地址：广东省惠州市惠阳区秋长镇桔园路56号
Add: No. 56, Ju Yuan Road, Qiu Chang Town, Huiyang, Huizhou, China
电话：（Tel）:0752-3806880 传真：0752-3919311
电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

5.0 Reference Standards

- "ISO 10140-2:2010 Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation "
- "ISO 3382-2:2008 Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms"
- "ISO 717-1:2013 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation"

6.0 Description of the test specimen

6.1 The test specimen was said to be SNAPAcoustics Noise Barrier Panels model SD150RW in thickness of 150 mm. The solid outer shell of the panel was made of 0.8 mm galvanized steel sheet with calcium silicate board in density of 1550 kg/m^3 as damping materials. The sound absorption face was made of 0.5 mm thick galvanized steel sheet having perforation of 23 %. The panels were filled with 60 kg/m^3 rock wool and covered with black fiberglass tissue.

6.2 The test specimen consisted of 7 pieces of the said Noise Barrier Panels in size of 3,200 mm (L) x 565 mm (W). The panels were installed into the test aperture which joined together to form an overall size of 12.7 m^2.

6.3 Photograph of the test specimen installed for testing was given in Appendix 10.

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7.0 Instrumentation

The instrumentation used for the measurement was as follows:

7.1 Norsonic Type 150 Dual-Channel Investigator complying with IEC 61672-1 (Class 1) / ANSI S1.43-1997 (Type 1), with 1/3 octave bands filter complying with IEC 61260 / ANSI S1.11-2004 Class 0 / ANSI S1.11-1986, Order 3, Type 0-C, for sound pressure levels measurements. Microphone extension cables, and internal sound source were used during the measurements.

7.2 Omni Power Sound Source Type Nor 276 and power amplifier Nor 280.

7.3 Bruel & Kjaer Sound Level Calibrator Type 4231, complying with IEC 60942.

8.0 Measurement Procedure

8.1 Calibration checks were carried out on the Sound Measuring Instrument with the Sound Level Calibrator, before and after the measurements. The difference in the calibration value before and after measurements should be no more than 0.5 dB.

8.2 White Noise was generated in the source room so that the transmitted sound level in the receiving room was at least 6 dB above the background noise level at all frequencies. Source and microphone positions were chosen according to ISO 10140-2:2010. Measurements were taken for three source positions, with six microphone positions in the source and receiving room respectively. The Level Difference $D = L_{p1} - L_{p2}$ as per defined in ISO 10140-2:2010 was then calculated.

8.3 For the purpose of estimating the Sound Reduction Index R, the reverberation time in the receiving room was measured according to ISO 3382-2, choosing two loudspeaker positions and six microphone positions.

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电邮（E-mail）:reslab@supnap.com 网址（http）:www.supremeacoustics.com

8.4 The Sound Reduction Index R was calculated according to ISO 10140-2:2010 as:

$$R = L_{p1} - L_{p2} + 10\log(S / A)$$

where

L_{p1} is the average sound pressure level in the source room, in decibels;
L_{p2} is the average sound pressure level in the receiving room, in decibels;
S is the area of the test specimen, in square meters;
A is the equivalent sound absorption area in the receiving room, in square meters.

8.5 The Weighted Sound Reduction Index R_w was determined from the value of R in 1/3 octave bands with centre frequencies from 100 Hz to 3,150 Hz, following the procedure given in ISO 717-1:2013.

Note: Rw is a single-number values intended to give rating of airborne sound insulation in view to compare the performance of different systems.

9.0 Results

9.1 Calibration checks were carried out on the sound level meter before and after the measurements. The results were recorded below:

Sound level meter	Nor 150 (Channel 1)	Nor 150 (Channel 2)
Calibrator Reference	94.0 dB	94.0 dB
Before Measurement	94.0 dB	94.0 dB
After Measurement	94.0 dB	94.0 dB
Drift	0 dB	0 dB

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9.2 The Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW was determined in accordance with ISO 10140-2:2010 to achieve the following values:

1/3 Octave Band Centre Frequency（Hz）	Sound Reduction Index R（dB）	1/1 Octave Band Frequency Sound Reduction Index R（dB）
50	19.8	20.9
63	22.1	
80	21.2	
100	28.8	31.3
125	32.6	
160	34.3	
200	37.6	40.2
250	41.3	
315	44.0	
400	46.6	47.6
500	47.3	
630	49.3	
800	50.0	52.8
1000	53.8	
1250	58.2	
1600	60.2	61.8
2000	61.7	
2500	64.7	
3150	66.4	67.7
4000	68.3	
5000	68.7	
6300	67.8	57.8
8000	66.3	
10000	53.4	
Weighted Sound Reduction Index R_w (ISO 717-1:2013)	R_w (C;C_{tr}) = 51 (-2;-7)	
	Sum of unfavourable deviations: 31.4 dB	

9.3 The following graph shows the Sound Reduction Index of SNAPAcoustics Noise Barrier Panels model SD150RW plotted against frequency (dotted line) and the shifted reference curve (solid line), the bars show the values of the unfavourable deviations for each frequency band.

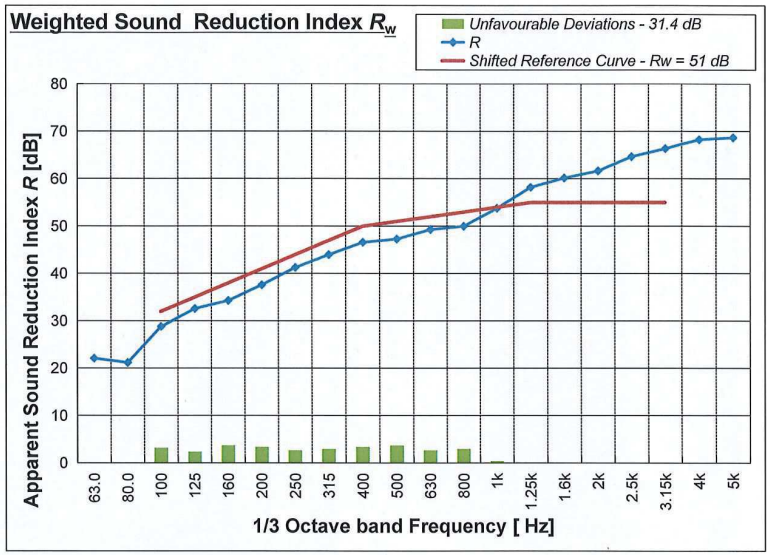

Figure 1: Sound Reduction Index R, reference curve for $R_w = 51$ dB
For SNAPAcoustics Noise Barrier Panels model SD150RW

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10.0 Appendix

10.1 Photograph of the test specimen installed for testing.

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****** END OF REPORT ******

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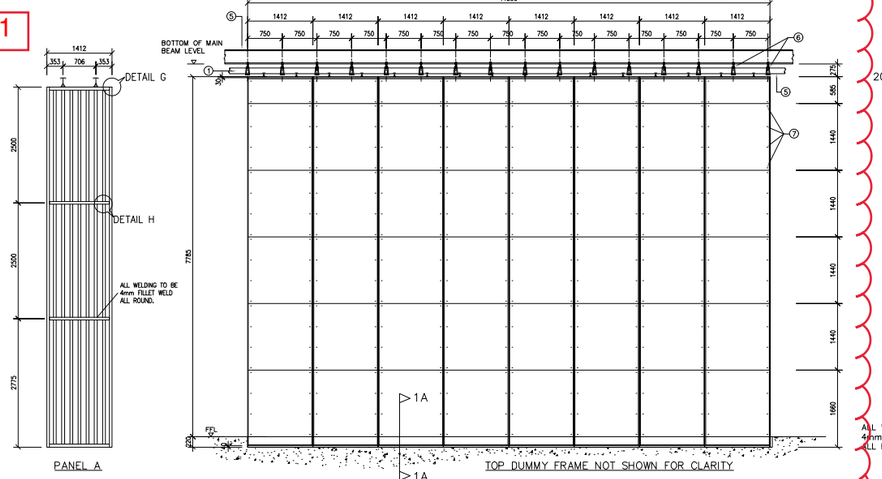
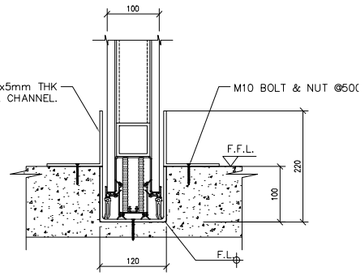
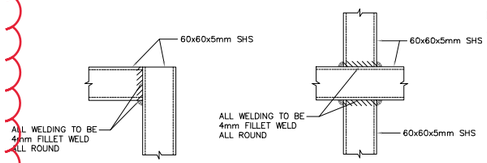
Design of "Kinetics" Acoustic Sliding Door

Door P1





SECTION 1A–1A (ITEM 3)



DETAIL G DETAIL H

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 JO / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL A	1.412m WIDTH PANEL FRAME	60x60x5mm SHS, 9 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
PANEL B	1.083m WIDTH PANEL FRAME	60x60x5mm SHS, 7 NOS. (VERT.) + 4 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 220mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mmΦ WASHER GRADE 4.6	–

DESIGN DATA:

1. LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

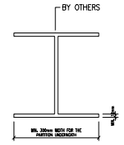
ELEVATION	WIND PRESSURE
0–5m	1.82kPa
5–10m	2.01kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

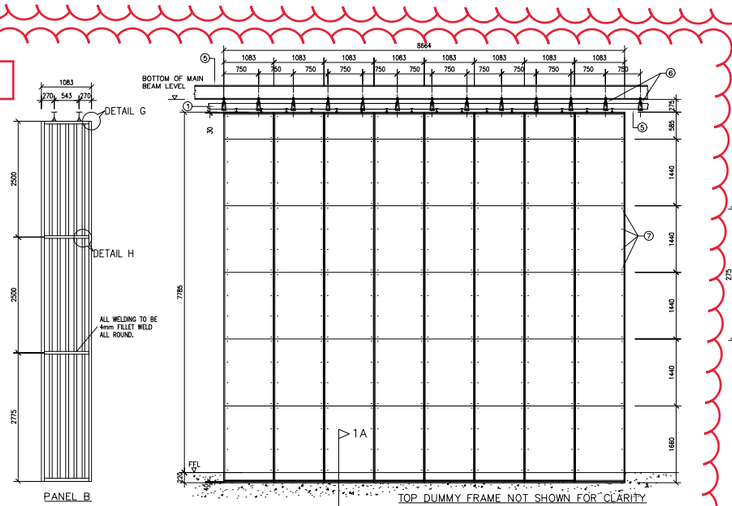
   DESIGN WIND PRESSURE = 0.7 X q:

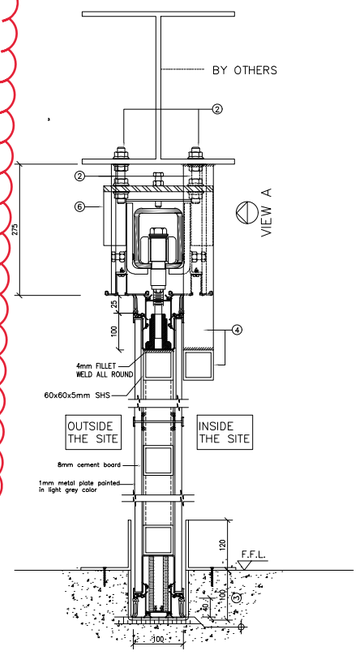
   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–7.5m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

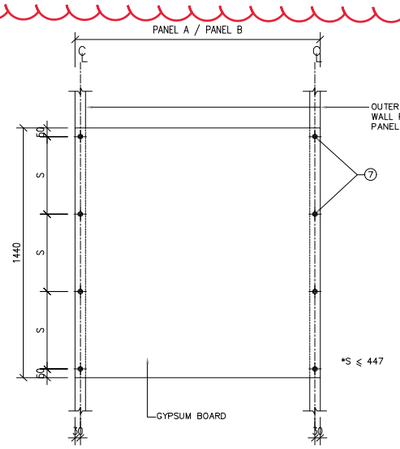
LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	7.854	0
LIVE LOAD	1.947	0.19635
WIND LOAD	0.1573	4.345



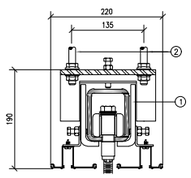
Door P2



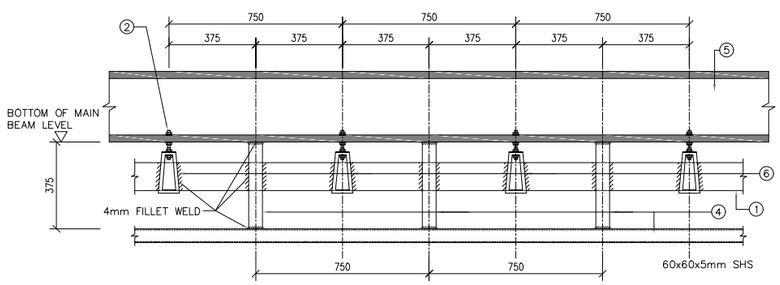




DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



ITEM 6



VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

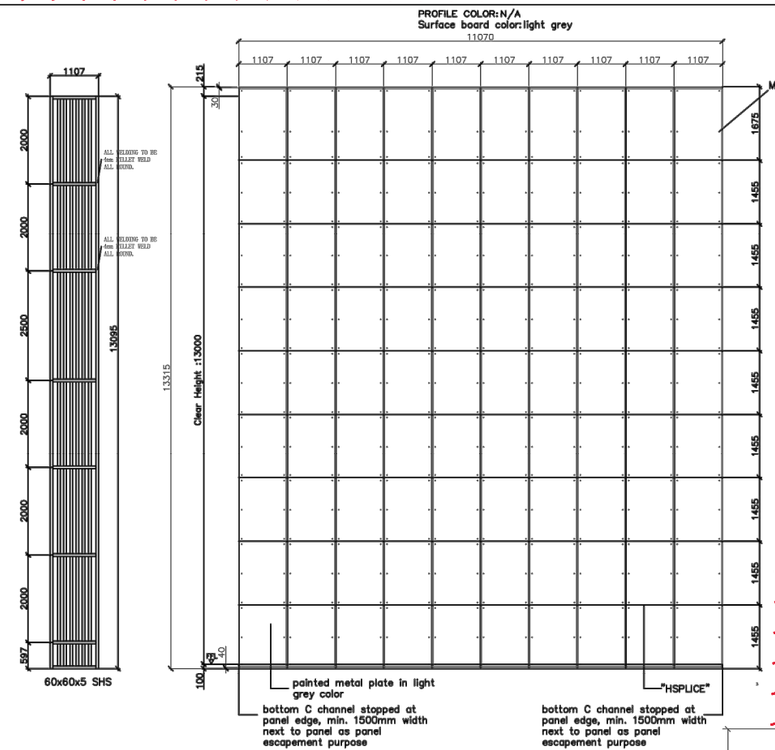
PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

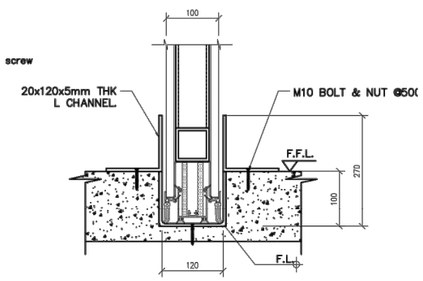
DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338223		
ISSUE STATUS: FOR INFORMATION	CREATION DATE: 21/07/2020	REVISION: A
PAPER SIZE: A3	SCALE: N.T.S.	PAGE: 10/10

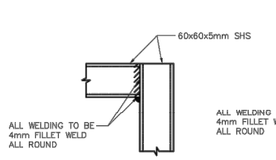
mdg-hms-tsi-338217_a.dwg

Door P3

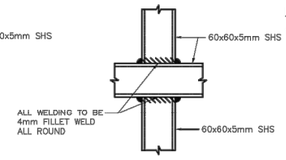




SECTION 1A–1A (ITEM 3)



DETAIL G



DETAIL H

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN mPD EXCEPT OTHERWISE SPECIFIED.
2. THE CONSTRUCTION WORK TO BE DESIGNED IN ACCORDANCE WITH HONG KONG BUILDING (CONSTRUCTION) REGULATIONS 1990 AND CODE OF PRACTICE FOR THE STRUCTURAL USE OF STEEL 2011.
3. ALL STRUCTURAL STEEL MEMBERS (CLASS 1) TO BE COMPLY WITH STRUCTURAL USE OF STEEL 2011 TO BSEN 10025 & BSEN 10219 S275 J0 / EXCEPT OR OTHERWISE STATED
4. ALL STEEL MEMBERS TO BE WELDED AT JOINTS WITH 4mm ALL ROUND FILLET WELD UNLESS OTHERWISE STATED WELDING CAPACITY = 220N/mm²
5. ALL WELDING TO BE COMPLIED WITH BS EN 1011 PART1 : 1998 PART 2 : 2001 AND ELECTRODES TO BS EN 440 : 1995

MEMBER SIZE SCHEDULE:

ITEM	NAME	SIZE	REMARKS
①	TOP TRACK	120 x 96 x 6mm THK. CHANNEL	GRADE Q 235
PANEL	1.107m WIDTH PANEL FRAME	60x60x5mm SHS, 8 NOS. (VERT.) + 7 NOS. (HORI.) PER FRAME	GRADE S275
②	HANGER BOLT FIXING	2 NOS. OF M12 GRADE 4.6	SPACED AT 750mm c/c MAX
③	FLOOR EMBEDDED	MIN. 270mm	GRADE S275
④	TOP DUMMY FRAME	60 x 60 x 5mm SHS	GRADE S275 HANGER SPACED AT 750mm c/c
⑤	TOP MAIN BEAM	DESIGN & CONSTRUCT BY OTHERS	–
⑥	TOP MOUNT BRACKET	PROPRIETARY PRODUCT	–
⑦	SELF TAPPING SCREW	M6 WITH 8mm# WASHER GRADE 4.6	–

DESIGN DATA:

1. Case1: q=0.75kpa
   Case2: LOADING FOR THE MOVABLE NOISE BARRIER:
   BASE WIND PRESSURE ON TEMPORARY SHELTER q:

ELEVATION	WIND PRESSURE
0–5m	1.826kPa
5–10m	2.016kPa
10–20m	2.23kPa

   REDUCTION FACTOR = 0.7 (TEMPORARY SHELTER)

   DESIGN WIND PRESSURE = 0.7 X q:

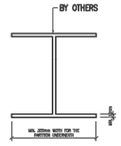
   DESIGN WIND PRESSURE = 1.94 x 0.7 = 1.274 kPa (0–5m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (5–10m)
   DESIGN WIND PRESSURE = 2.01 x 0.7 = 1.407 kPa (10–14m)
2. THE MOVABLE NOISE BARRIER WITH WEIGHT OF 97kg/m².
3. THE LIVE LOAD OF THE MOVABLE NOISE BARRIER IS 25% DEAD LOAD OF THE PARTITION.
4. THE SIZE OF THE MAIN BEAM SUPPORTING THE MOVABLE BARRIER WILL BE DESIGNED BY OTHERS. (BUT THEY SHOULD HAVE A MINIMUM 300mm WIDTH FOR OUR FIXING THE MEMBERS.
5. THE TOP MAIN BEAM SUPPORT SHOULD BE RESISTED THE FOLLOWING WORKING LOADING ALONG THE PARTITION TRACK.

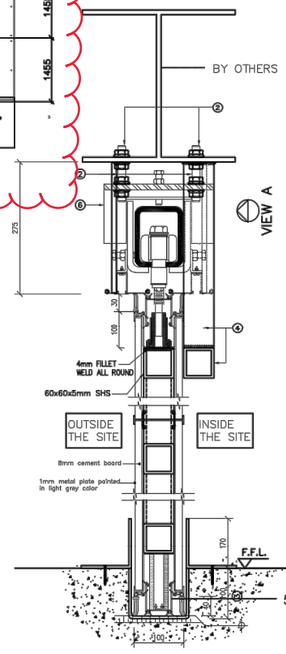
Case 1

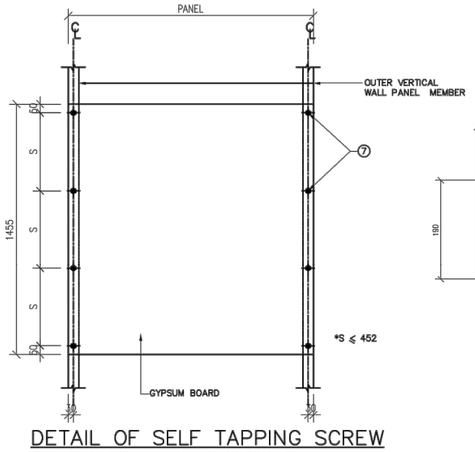
LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	4.1932

Case 2

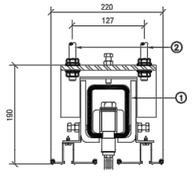
LOADING	VERTICAL LOAD kN/m	HORI. LOAD kN/m
DEAD LOAD	14.135	0
LIVE LOAD	3.531	0.353375
WIND LOAD	0.165	8.0487







DETAIL OF SELF TAPPING SCREW TO PANEL A & PANEL B



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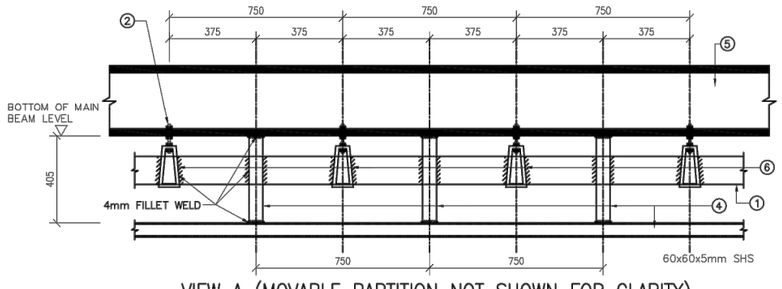

VIEW A (MOVABLE PARTITION NOT SHOWN FOR CLARITY)

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN–CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD — Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 13m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338224		
ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A
PAPER SIZE	SCALE	PAGE
A3	N.T.S.	5/5

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PRODUCT SPECIFICATIONS:

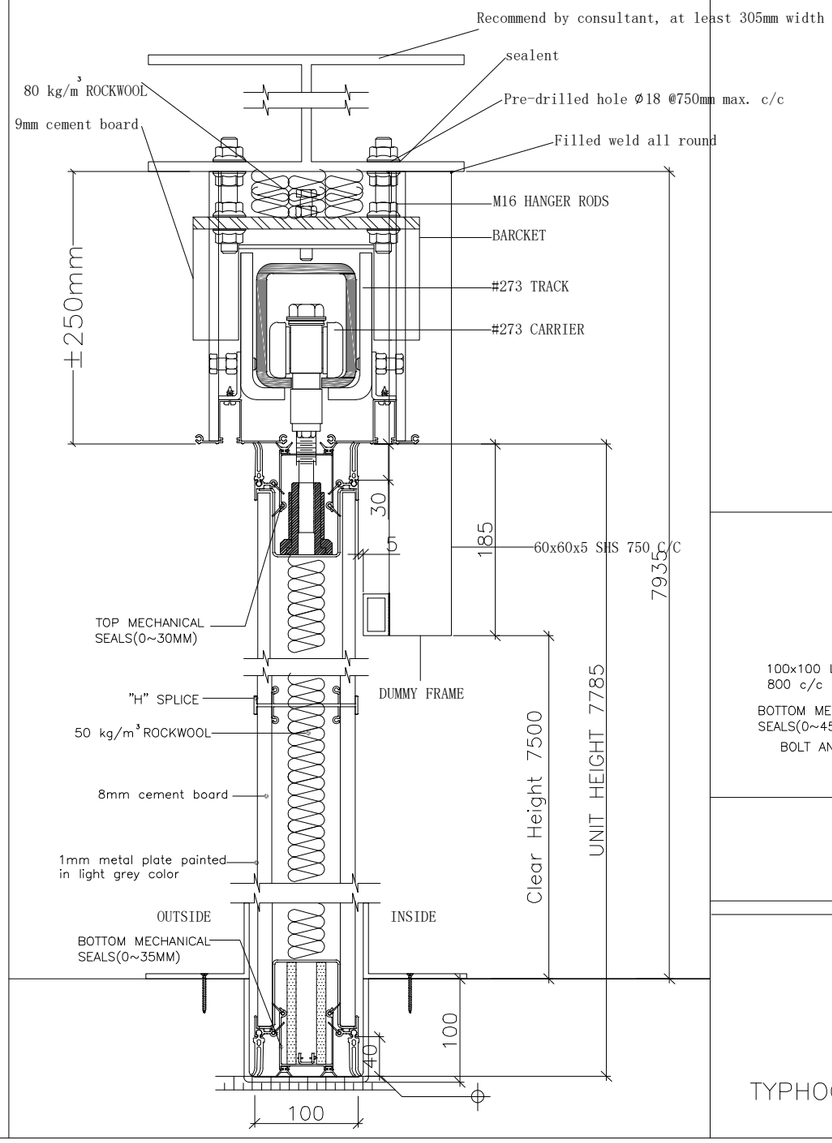
TYPE: 100 , STC: 53

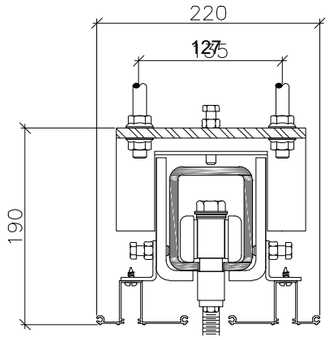
WEIGHT PER SQM: 97Kg/m². TOTAL WEIGHT OF OPERABLE WALL MUST BE CONSIDERED AND CHECKED IN STATICAL CALCULATION UNDER UNFAVOURABLE LOAD CONDITIONS. ALL FLANKING BUILDING ELEMENTS MUST ACHIEVE A MINIMUM, SOUND INSULATING VALUE OF STC 53

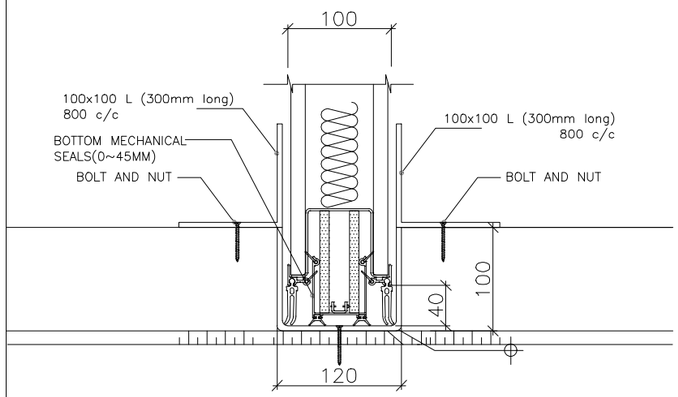
ATTENTION: IT IS NOT ALLOWED TO FIX OR CONNECT OTHER BUILDING PARTS TO OUR TRACKS. THE TRACK HAS TO REMAIN REMOVABLE FOR FIXING THE ELEMENTS.

AFTER INSTALLATION OF TRACKS A 10mm DEFLECTION OF THE BUILDING STRUCTURE HAS BEEN CONSIDERED.

Section View

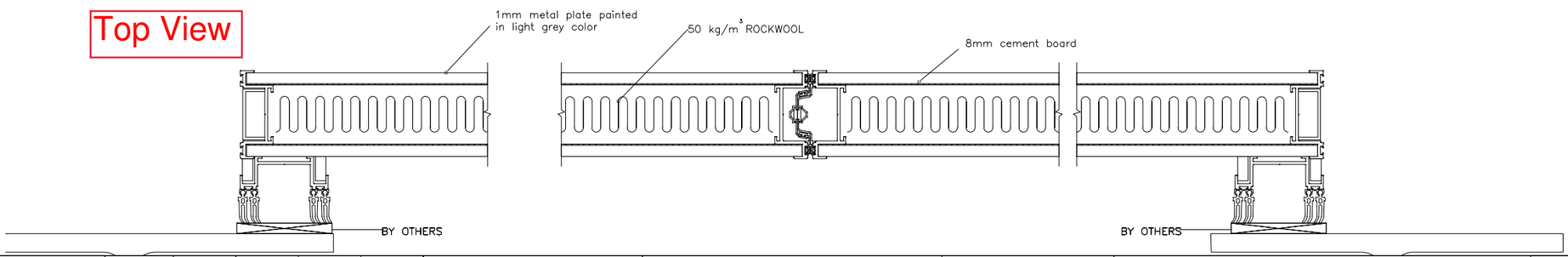






TYPHOON SITUATION

Top View



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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.: HKCKR/BTP/MDG/HMS/TSI/338223

ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A

PAPER SIZE	SCALE	PAGE
A3	N.T.S.	3/10

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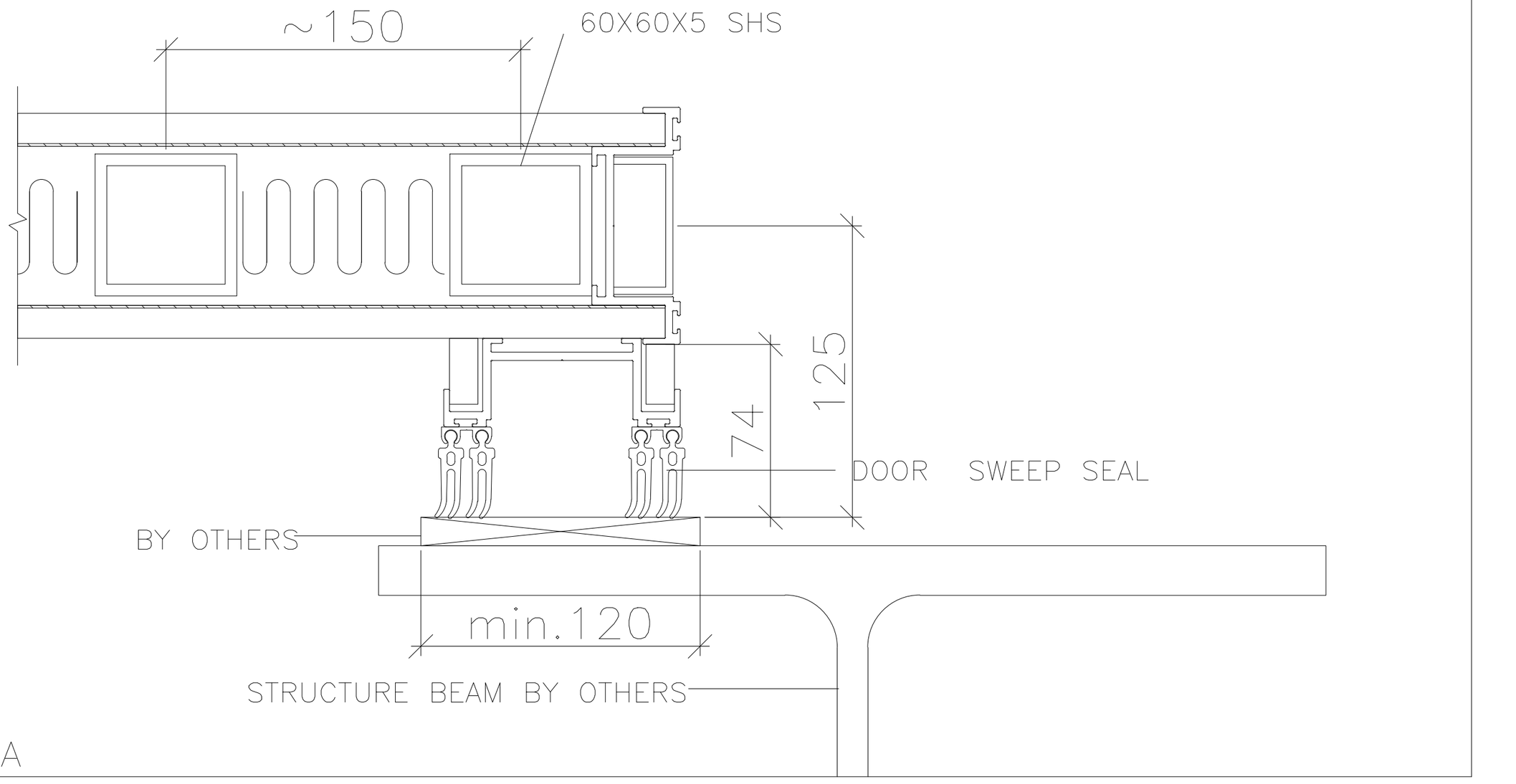

DETAIL A

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
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A	FIRST ISSUE	21/07/2020	KNC	KNC	KNC	KNC

MAIN CONTRACTOR: BOUYGUES TRAVAUX PUBLICS

CLIENT: 路政署 HIGHWAYS DEPARTMENT

THE SUPERVISOR: ARUP / MOTT MACDONALD
Arup-Mott MacDonald Joint Venture

CONTRACTOR'S TEMPORARY WORK DESIGNER: aurecon

PROJECT: Contract No. HY/2018/08
Central Kowloon Route - Central Tunnel

DRAWING TITLE: HO MAN TIN (SURFACE)
DETAIL DRAWING OF 7.5m NOISE ENCLOSURE DOOR

DRAWING NO.		
HKCKR/BTP/MDG/HMS/TSI/338223		
ISSUE STATUS	CREATION DATE	REVISION
FOR INFORMATION	21/07/2020	A
PAPER SIZE	SCALE	PAGE
A3	N.T.S.	8/10

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Acoustic Test Report for "Kinetics" Sliding Door

Be it ELECTRIC or MANUAL operation, AEC offers a wide range of panel constructions and tracks designed to fit your specific need and budget. For life-of-the-building durability select one of the ALPHA® panel constructions.

advanced equipment CORPORATION

	Panel Type	Weight #/SQ. FT	Weight KG/M2	S.T.C	N.I.C.*	N.R.C.	Panel Thickness	Maximum Width	Maximum Height	Panel Face Sheet
Alpha	S	8.5	41.6	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	16-Ga. Steel or optional 14-Ga.
	T	9.1	44.5	54	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	Minimum 16-Ga. Steel
	U	9.7	47.5	53	42	-	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Steel
	P	12	58.7	49	42	0.65	4" (102mm)	60" (1.52M)	60FT (18.3M)	14-Ga. Perforated Steel
	X	10	48.9	53	42	-	3.5" (89mm)	60" (1.52M)	35FT (10.7M)	14 or 16-Ga. Steel (1-Hr fire)
Sigma	A	5.9	28.9	49	40	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	B	6.4	31.3	50	41	-	3.5" (89mm)	54" (1.37M)	24FT (7.3M)	Minimum 20-Ga. Steel
	C	6.9	33.8	51	41	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel
	D	7.4	36.2	52	42	-	3.5" (89mm)	54" (1.37M)	35 FT (10.7M)	Minimum 18-Ga. Steel

N.I.C.* when tested in accordance with ASTM E 336-97: Deduct 2 points when using ASTM E 336-05

With the exception of "X" (fire rated), all ALPHA and SIGMA panels are suitable for electric operation

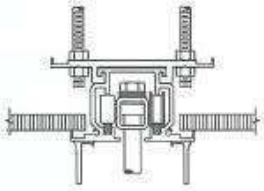
With the exception of "X" (fire rated), all ALPHA and SIGMA panel constructions are available as curved panels

ALPHA & SIGMA panels are one-piece steel weldments with face sheets welded to frame

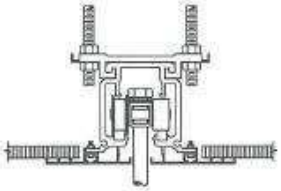
Maximum heights are for individual panel operation and may be less for hinged groups or electric operation

Advanced Equipment's family of extended warranty tracks produce easy, reliable, long term service with virtually no maintenance. These tracks are furnished with a 5 or 10-year warranty period that does not exclude normal wear and tear. Specify tracks #1a, #8 or #8b.

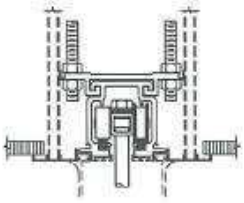
SUPERTRACK®



#1a 900-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
5-YEAR WARRANTY

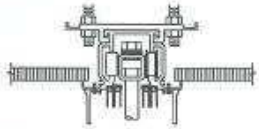


#8 1700-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

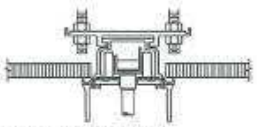


#8b 1500-pound trolley capacity
Composite track: Aluminum case with CR steel bar running surface. Manual or electric operation.
10-YEAR WARRANTY

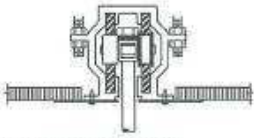
TRACK®



#1 800-pound trolley capacity
Composite track: Aluminum alloy track incorporating soffit trim. Manual or electric operation.
2-YEAR WARRANTY



#2 600-pound trolley capacity
Composite track: Aluminum case with steel running surface. Manual operation.
2-YEAR WARRANTY



#4 1,500-pound trolley capacity
Curve wall manual or electric.
5-YEAR WARRANTY

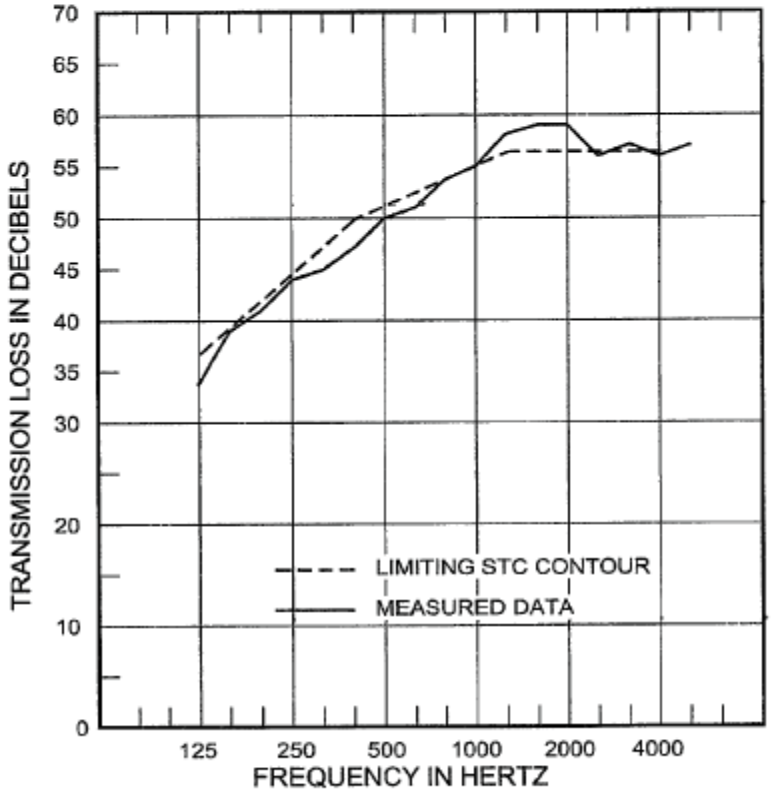
DWspec™

DWspec™ provides Architects and Specification Developers with a fully interactive tool for developing operable wall specifications. As a Web-based application, DWspec requires no special software or downloads. DWspec produces one specification for your project even if your project has several walls each with differing characteristics. The user need not be familiar with Advanced Equipment products or their individual characteristics in order to produce a valid, error-free specification.

www.advancedequipment.com Operable Wall Specifications as easy as 1,2,3...

advanced® equipment CORPORATION

REFERENCE: WESTERN ELECTRO-ACOUSTIC LABORATORY, INC. REPORT #94-227



DESCRIPTION

THE TEST SPECIMEN WAS A FULLY OPERABLE ADVANCED EQUIPMENT CORPORATION **TYPE "U" PANEL** CONSTRUCTION IN A 14' X 9' TEST OPENING.

PROCEDURE

THE PROCEDURES FOR THIS TEST CONFORM TO THE PROVISION AND REQUIREMENTS OF A.S.T.M. E90-85, STANDARD METHOD FOR LABORATORY MEASUREMENT OF AIRBORNE SOUND TRANSMISSION LOSS OF BUILDING PARTITIONS.

RESULTS

THE SOUND TRANSMISSION CLASS RATING DETERMINED IN ACCORDANCE WITH A.S.T.M. E-413 WAS: **STC 53**

1/3 OCT BND CNTR FREQ	125	160	200	250	315	400	500	630	800
TL IN DB	34	37	41	44	45	47	50	52	54
95% CONFIDENCE IN dB DEFICIENCIES	1.80	2.64	1.48	0.69	1.55	1.03	0.90	0.91	0.89

1/3 OCT BND CNTR FREQ	1000	1250	1600	2000	2500	3150	4000	5000	STC
TL IN DB	55	57	59	59	56	57	56	57	53
95% CONFIDENCE IN dB DEFICIENCIES	.064	0.75	1.19	1.88	1.76	2.28	2.55	2.32	

SPECIMEN AREA: 114.75 SQ. FT.
TEMPERATURE: 70.6 DEG. F
RELATIVE HUMIDITY: 46 %
TEST DATE: JULY 16, 1995

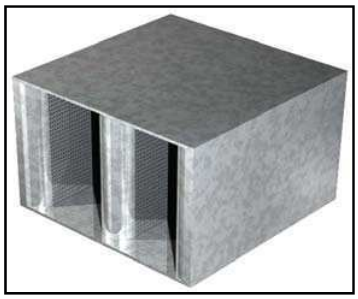
MYG
www.acoustic-hk.com

MANYA STEEL PRODUCTS MANUFACTORY

RECTANGULAR SILENCER

INTRODUCTION

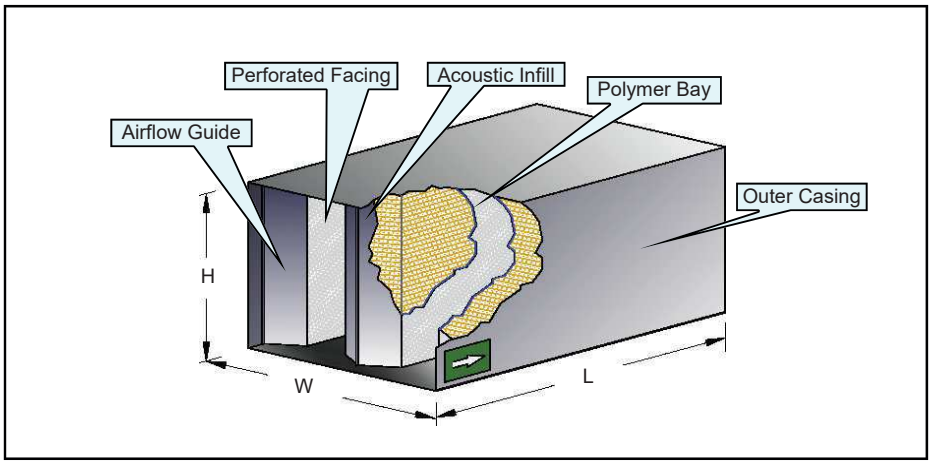
We often hear the noise from ventilation or heating systems that is hardly noticeable because it has no prominent features. The “MYG” rectangular silencer Model: MV series are mainly used in air flow intake, discharge and HVAC Ductwork systems. These silencers are offered in standard dimensions, which can be readily mounted onto the existing duct, combined with an easy calculation and selection method as well as be flexible to suit the client’s particular requirements.



Rectangle G.I. Silencer

MATERIALS AND CONSTRUCTION

Standard MYG MV series come with high quality materials, compact construction and assembled with “Pittsburg seam” with natural galvanized finish on the outer case. Both the outer and inter skins shall be made of pre-galvanized steel sheets and perforated steel sheets respectively. The weld affected areas and angle frames (optional) are to be protected with cold galvanizing paint finish or corrosion-resistant paint finish. Acoustic in fill using with inorganic glass fiber absorbent material with sufficient density functions to give the optimal intended performance.



MYG MV Series Rectangular Silencer

Specification of Standard Model

Materials	MYG Silencer MV Series
	Model: MV
Thickness of outer casing steel sheets	0.8 to 1.2mm
Thickness of inner perforated steel sheets	0.5mm
Acoustic infill density	32kg/m^3

**Others standard and materials are available base on customer request.*

OEM Factory Address : Langsha Industrial Zone, Qiao Tou Town, Dongguan City. Tel : 86-0769-345-3335 Fax : 86-0769-345-3337

APPLICATIONS

A wide variety of industrial applications can be considered when using "MYG" acoustic silencer for the control of airborne and duct-borne noise associated with common HVAC airflow systems. The use of silencers is to minimize the fan and blower noise at both the side inlets and outlets of the equipment. Commercial acoustic silencers are engineered to achieve a maximum insertion loss with a minimum pressure drop. Normally silencers are their type and applications as follows.

- ☑ Air Discharge / Intake
- ☑ Duct Silencer
- ☑ Cross Talk Silencer
- ☑ Air Flow Splitter
- ☑ Standard Elbows
- ☑ Special Shaped Elbows
- ☑ Special Bend Elbows
- ☑ Packless Silencer

ENGINEERING DATA

Static Loss (Pressure Drop)

Determine pressure drop across silencer by the following formula:

Pressure drop, $\triangle P$ = PD x V^2 (Pa)

Where PD Value = Pressure loss coefficient

V = Face velocity in m/s (cross sectional size)

Insertion Loss of "MV" L-series, dB
Low Pressure (Airway 45%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVL2	600	0.48	2	4	9	12	19	19	11	4
MVL3	900	0.52	2	5	10	17	21	21	13	5
MVL4	1200	0.69	3	6	13	22	28	28	16	7
MVL5	1500	1.03	4	8	15	28	35	35	21	11
MVL6	1800	1.32	5	9	19	33	42	42	25	14
MVL7	2100	1.88	6	11	22	39	49	49	29	20
MVL8	2400	2.55	7	13	25	45	50	50	44	24
MVL9	2700	3.42	9	15	27	47	50	50	46	29

Insertion Loss of "MV" S-series, dB
Medium Pressure (Airway 33%)

Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVS2	600	0.74	4	8	14	20	31	30	24	18
MVS3	900	0.92	5	10	18	27	34	36	30	21
MVS4	1200	1.72	6	14	24	37	46	46	40	26
MVS5	1500	2.3	8	18	27	42	50	50	46	31
MVS6	1800	3.1	9	19	34	50	50	50	50	39
MVS7	2100	4.4	11	23	40	50	50	50	50	49
MVS8	2400	6.4	13	25	45	50	50	50	50	50
MVS9	2700	8.7	14	27	48	50	50	50	50	50

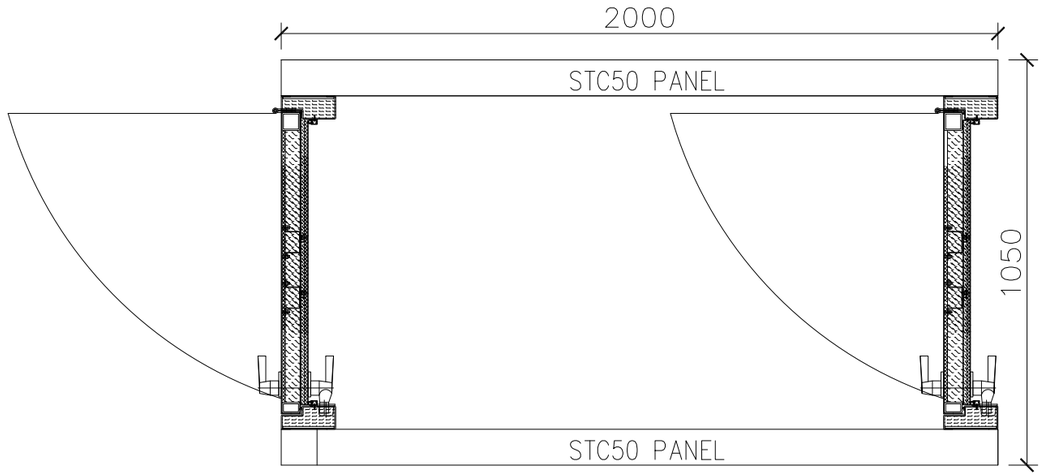
Length of each ventilation silencer = 2 x 1500mm

Insertion Loss of "MV" H-series, dB
High Pressure (Airway 22%)

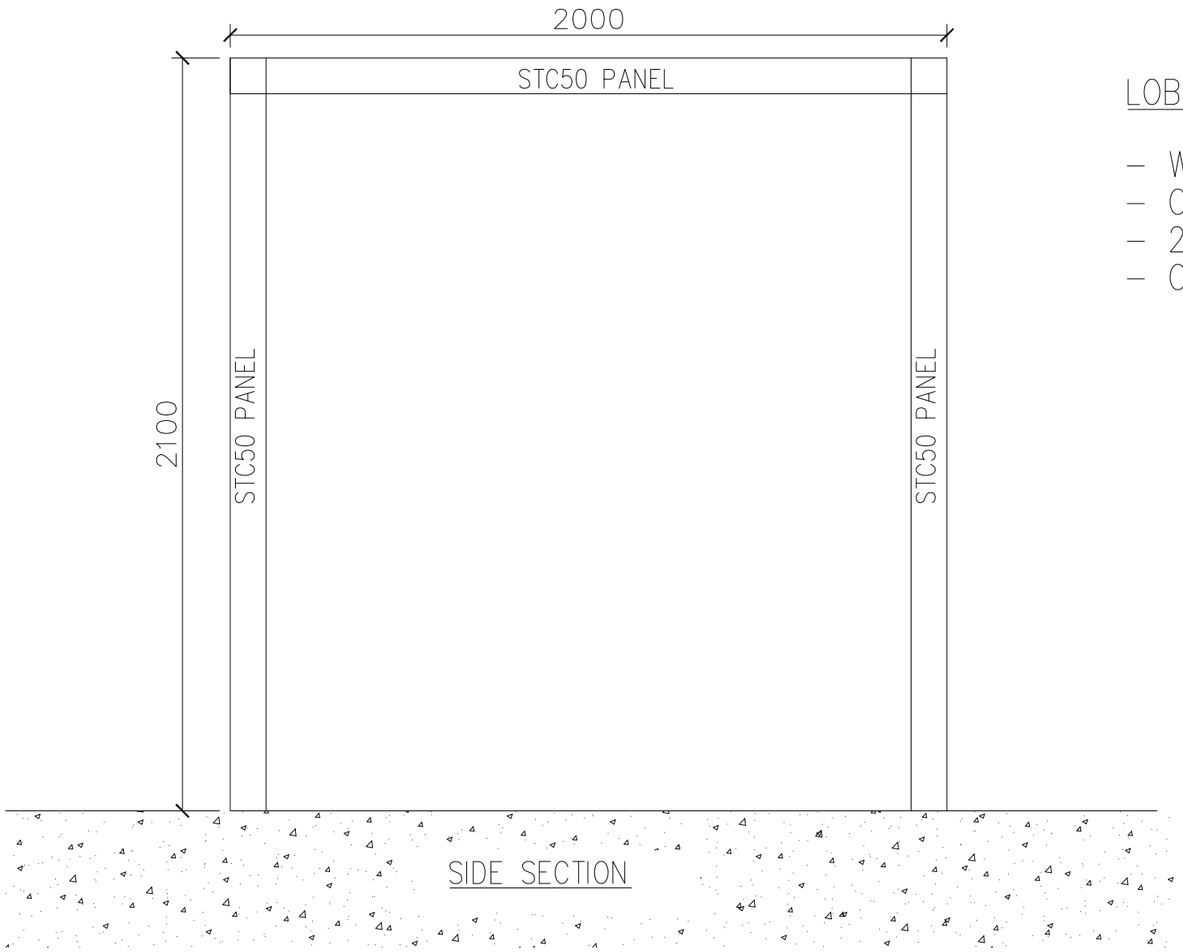
Model	Length	PD Value	OCTAVE BAND CENTRE FREQUENCY (Hz)							
			63	125	250	500	1K	2K	4K	8K
MVH2	600	2.3	6	10	16	26	30	30	26	22
MVH3	900	3.4	9	16	24	37	48	50	50	39
MVH4	1200	5.1	11	21	31	49	50	50	50	46
MVH5	1500	8.1	14	25	39	50	50	50	50	50
MVH6	1800	12.1	16	29	46	50	50	50	50	50
MVH7	2100	16.5	18	33	50	50	50	50	50	50
MVH8	2400	21	20	37	50	50	50	50	50	50
MVH9	2700	23	22	39	50	50	50	50	50	50

DOUBLE DOOR LOBBY HOUSE

STC50 Acoustic Panel



LAYOUT



SIDE SECTION

LOBBY HOUSE DETAILS

- WALL PANEL BY STC50 (100mm THICKNESS)
- CEILING PANEL BY STC50 (100mm THICKNESS)
- 2 ACOUSTIC DOORS WITH AIR TIGHT HANDSET
- OVERALL SIZE: 2000L X 1050W X 2100H

PROJECT:			
TITLE: PRE-FABRICATED ACOUSTIC LOBBY HOUSE			
DRAWN:	CAD	DATE:	
CHECKED:	CAD	SCALE:	N.T.S.
DWG. NO.			