中國建築-利達聯營
CHINA STATE - LEADER JOINT VENTURE

Wan Chai Development Phase II –

Central – Wan Chai Bypass at Wan Chai West

Contract No. HK/2012/08

Noise Management Plan

for FEP-01/376/2009

Revision: 2

Revision	Date of Issue	Remarks	Prepared by	Checked by
0	10 Apr 2015	Revised as per ET's comments	James MA	Keith TSE
1	17 Jul 2015	Revised as per EPD's comments	James MA	Keith TSE
2	22 Sep 2015	Revised as per EPD's comments	James MA	Keith TSE

Table of Content

1 Introduction

Wan Chai Development Phase II – Central – Wan Chai Bypass at Wan Chai West (Contract No. HK/2012/08) is part of the Central - Wan Chai Bypass (CWB) including Road P2 and other roads which are classified as primary/district distributor roads covered under the Environmental Permit No. EP-376/2009.

China State – Leader Joint Venture was granted on 31 March 2015 a Further Environmental Permit (No. FEP-01/376/2009) for the Contract No. HK/2012/08 under the master Environmental Permit.

Under Condition 2.9 of Part C of the FEP-01/376/2009, a noise management plan has to be prepared and deposited by the permit holder to the EPD at least two weeks prior to the commencement of construction of the corresponding component(s) of the project.

The purpose of this Noise Management Plan is to provide an evaluation of the potential noise impact during construction phase of the project (Contract No. HK/2012/08) which is undertaken by China State – Leader Joint Venture (CSLJV).

2 Environmental Legislation, Policies, Plans, Standards and Criteria

Noise impacts have been assessed in accordance with the criteria and methodology given in the Technical Memoranda made under the Noise Control Ordinance (NCO).

The NCO provides the statutory framework for noise control. Assessment procedures and standards are set out in the following Technical Memoranda:

- Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM);
- Technical Memorandum on Noise from Construction Work in Designated Areas (DA-TM); and

3 Noise Limit

The NCO provides the statutory framework for noise control of construction work other than percussive piling using powered mechanical equipment (PME) between the hours of 1900 and 0700 or at any time on a general holiday

including Sunday (i.e. restricted hours). The noise limit is 75dB(A) Leq(30min) at the facades of dwellings and 70dB(A) Leq(30min) at the facades of schools (65dB(A) during examinations). The construction noise criteria are summarized in Table 1

Table 1 Daytime Construction Noise Criteria

Uses	Noise Level in Leq(30min), dB(A)
Domestic Premises	75
Educational Institution	70
Educational Institution (during examination)	65

Between 1900 and 0700 hours or at any time on a general holiday including Sunday, activities involving the use of powered mechanical equipment (PME) for the purpose of carrying out construction work is prohibited unless a Construction Noise Permit (CNP) has been obtained.

4 Identified Noise Sensitive Receivers (NSRs)

In order to evaluate the construction noise impact from the project (Contract No. HK/2012/08), representative noise sensitive receiver (NSR) for this project is selected for assessment and summarized in Table 3. The site layout plan (scale 1:1000) of the project works area under the FEP-01/376/2009 showing the relevant NSR is shown in Appendix I.

Table 3 List of Relevant NSR Selected for Noise Assessment

Relevant NSR	Use	Nearest Distance from Works Boundary
*The Hong Kong Academy for Performing Arts (Open Arena) (HKAPA)	Performing Arts Centre	190m

***:** NSR as identified in the WDII&CWB EIA Report (Register No.: AEIAR-125/2008) but this NSR has been changed from an open arena to an indoor central air-conditioned environment (photo as shown in Appendix I). As this NSR does not rely on opened windows for ventilation, the construction noise criteria as stipulated in the EIAO-TM and the construction noise impact

assessment are not applicable.

5 Construction Noise

The construction tasks which have emission of construction noise are shown as below and they belong to the same category of roadworks as shown in the approved EIA:

- At-grade roadworks;
- Resurfacing;
- Roads for temporary traffic diversion.

Types and number of powered mechanical equipment (PME) which would be used on site are shown in Appendix II.

6 Mitigation of Environmental Impacts

To reduce the noise during normal daytime working hours, it is recommended that the following noise reduction measures will be considered as far as practicable during construction:

6.1 Quiet Powered Mechanical Equipment (QPME)

Uses of the following QPME will be considered during construction phase of this Project to reduce noise impact:

- Excavator, wheeled/tracked
- Asphalt paver
- Road roller
- Roller, vibratory
- Dump truck

6.2 Multiple-phase Construction Schedule

The multiple-phase construction schedule as shown in Appendix III will be adopted as far as practicable during the construction.

6.3 Noise Reduction at Source

In order to reduce the noise generated by the stationary PME, movable acoustic shelter, flexible noise barriers and acoustic blanket will be considered for roadside works, if necessary.

The barrier and shelter are made of a sheeting not less than 5kg/m^2 or baffles which comprise of sound absorbing lining and lmm thick steel (or 10mm thick plywood) backing.

Typical details of the noise barrier are shown in Appendix IV.

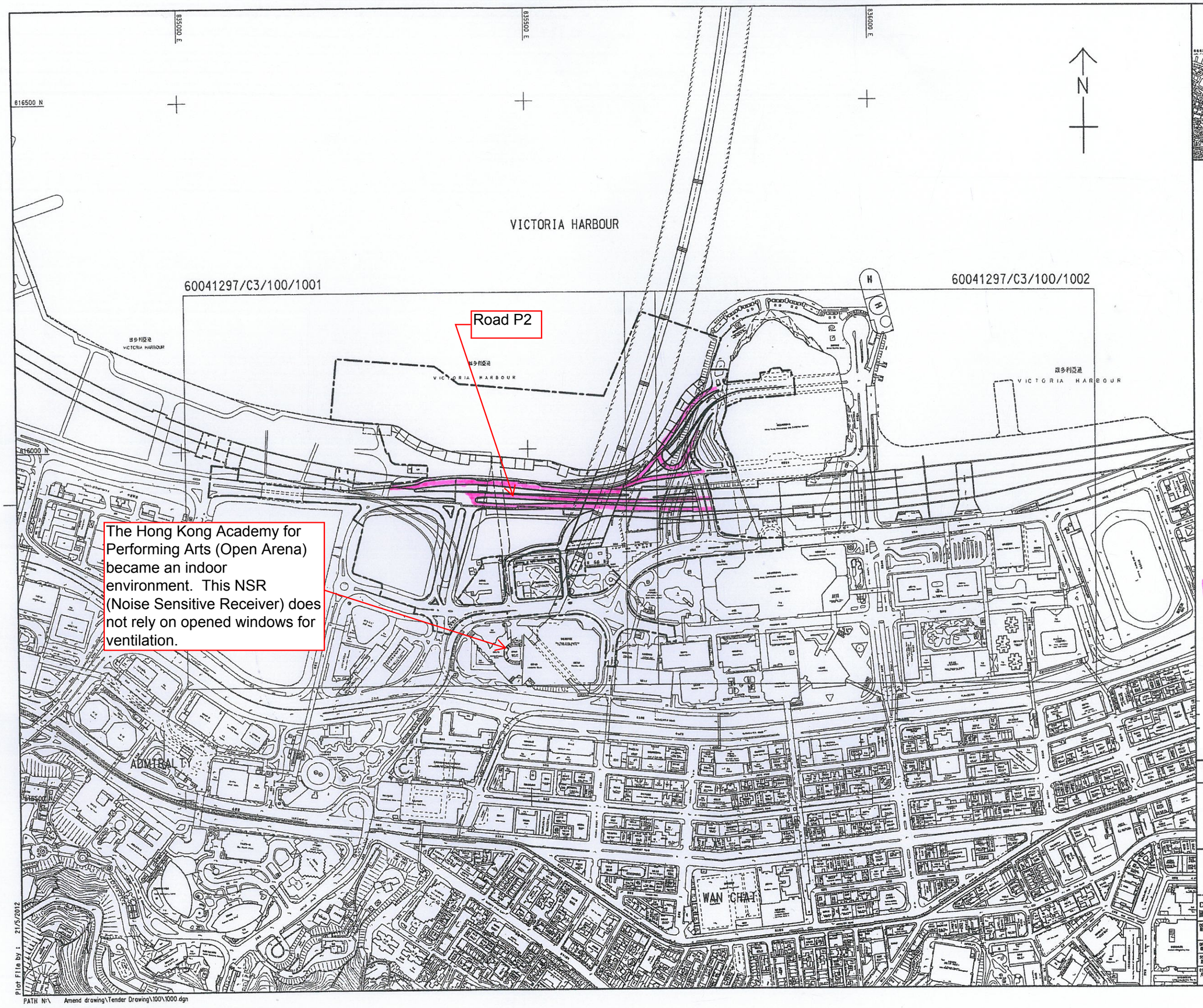
6.4 Other Mitigation Measures

The following good practices will be adopted when practical to alleviate noise impact:

- All PME to be used on site should be properly maintained;
- Silencers or mufflers on construction equipment should be utilized if possible and should be properly maintained.
- Mobile plant should be sited as far as away from NSRs as possible;
- Starting up the engines of all plant simultaneously should be avoided;
- PME known to emit noise strongly in one direction should, where possible, be orientated so that the noise is directed away from the nearby NSRs;
- Close liaison and communication with the neighbourhood including HKAPA should be maintained.

Appendix I

Site Layout Plan Showing the Relevant Noise Sensitive Receiver



KEY PLAN
SCALE 1 : 25000

LEGEND:

SITE BOUNDARY

Project Works Area under FEP-01/376/2009

WAN CHAI DEVELOPMENT PHASE II - CENTRAL - WAN CHAI BYPASS AT WAN CHAI WEST

Project Works Area

DRG.NO. 圖紙編號 Figure 1A

DESIGNED BY 設計 ST	CONTRACT NO. 合約編號 HK/2012/08	Dy. Dir. APPROVED 副處長 TKH	
DRAWN BY 繪圖 TS	STATUS 狀態		
SCALE 比例 A1 1:2500			
DIMENSIONS ARE IN 尺寸單位 METRES	© COPYRIGHT RESERVED 版權所有		

Plot File by : 21/5/2012
PATH N:\ Amend drawing\Tender Drawing\100\1000.dgn

HKAPA (Open Arena)

HKAPA (Current Status)

Appendix II

Types and Number of Powered Mechanical Equipment

Tentative List of Powered Mechanical Equipment

Powered Mechanical Equipment	No.
Excavator	2
Dump truck	2
Craned lorry	2
Asphalt paver	2
Road roller	1
Roller, vibratory	1
Piling, vibrating hammer	1

Appendix III

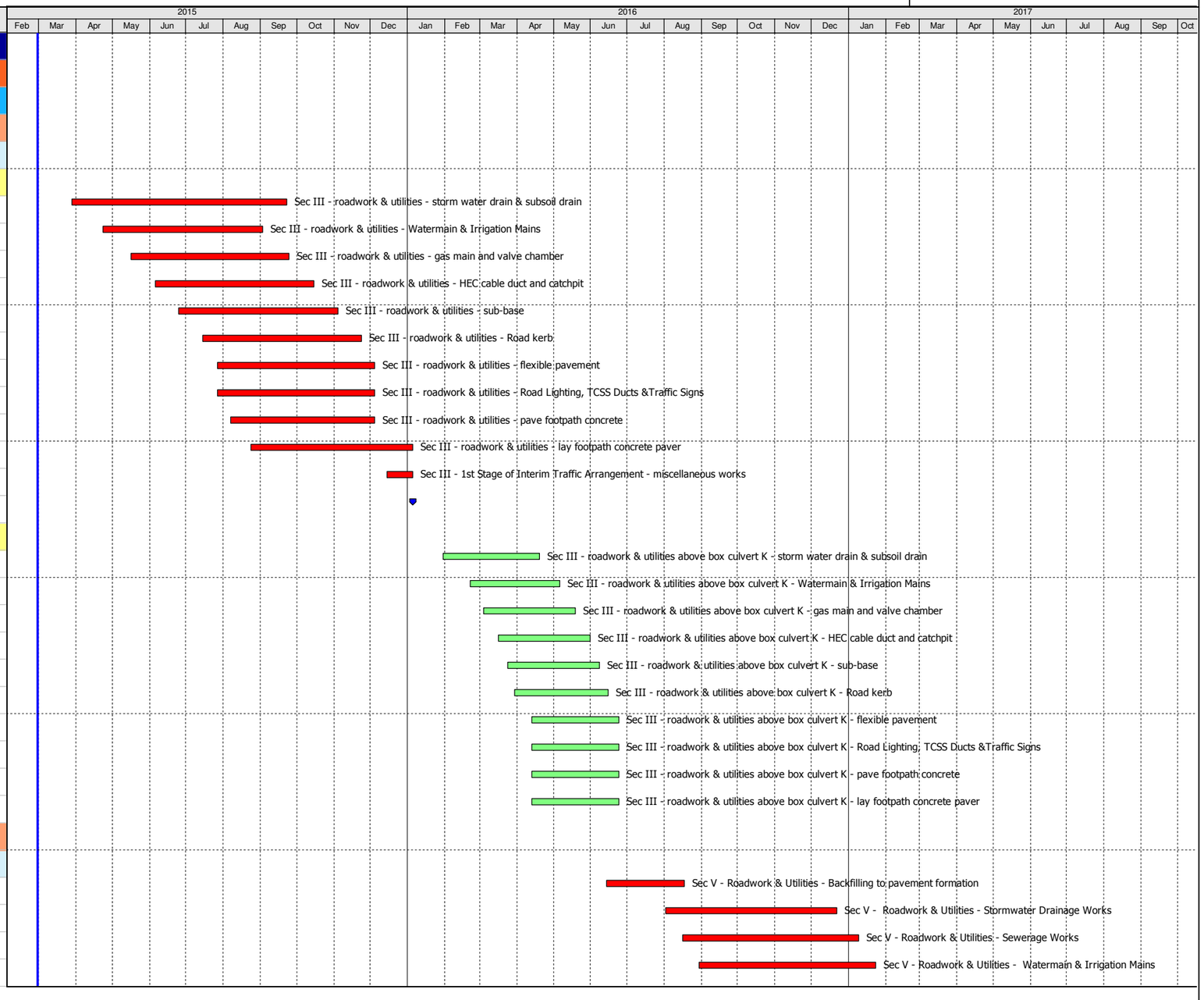
Multiple Phase Construction Schedule

Phase	Working Sequence
General	
1 (May 2015 to Jan 2016)	Earthworks
2 (May 2015 to Jan 2016)	Drainage
3 (May 2015 to Jan 2016)	Watermain
4 (May 2015 to Jan 2016)	Utilities
5 (May 2015 to Jan 2016)	Road including bitumen laying and resurfacing
6 (May 2015 to Jan 2016)	Interim traffic arrangement
Works after box culvert reinstatement	
1 (Feb 2016 to Jun 2016)	Earthworks
2 (Feb 2016 to Jun 2016)	Drainage
3 (Feb 2016 to Jun 2016)	Watermain
4 (Feb 2016 to Jun 2016)	Utilities
5 (Feb 2016 to Jun 2016)	Road including bitumen laying and resurfacing
Remaining works	
1 (Jul 2016 to May 2017)	Earthworks
2 (Jul 2016 to May 2017)	Drainage
3 (Jul 2016 to May 2017)	Watermain
4 (Jul 2016 to May 2017)	Utilities
5 (Jul 2016 to May 2017)	Road including bitumen laying and resurfacing

中國建築-利達聯營
CHINA STATE - LEADER JOINT VENTURE

CEDD Contract No. HK/2012/08
Wan Chai Development Phase II
Central - Wan Chai Bypass at Wan Chai West

Activity ID	Activity Name	Orig Dur	Early Start	Early Finish	Road & Drain
HK/2012/08 Revised Works Programme Rev.4 (Revised as of 28-Feb-15) - Road & Drain					
Works for Section Completion					
Construction					
Section III - Road D11 & Part of Road P2, Area 4, Implement 1st Stage ITA					
Roadwork & Utilities					
General					
SIII10040	Sec III - roadwork & utilities - storm water drain & subsoil drain	145	28-Mar-15	22-Sep-15	Road
SIII10060	Sec III - roadwork & utilities - Watermain & Irrigation Mains	110	23-Apr-15	02-Sep-15	Road
SIII10080	Sec III - roadwork & utilities - gas main and valve chamber	110	16-May-15	24-Sep-15	Road
SIII10100	Sec III - roadwork & utilities - HEC cable duct and catchpit	110	05-Jun-15	15-Oct-15	Road
SIII10120	Sec III - roadwork & utilities - sub-base	110	25-Jun-15	04-Nov-15	Road
SIII10140	Sec III - roadwork & utilities - Road kerb	110	15-Jul-15	23-Nov-15	Road
SIII10160	Sec III - roadwork & utilities - flexible pavement	110	27-Jul-15	04-Dec-15	Road
SIII10180	Sec III - roadwork & utilities - Road Lighting, TCSS Ducts &Traffic Signs	110	27-Jul-15	04-Dec-15	Road
SIII10200	Sec III - roadwork & utilities - pave footpath concrete	100	07-Aug-15	04-Dec-15	Road
SIII10220	Sec III - roadwork & utilities - lay footpath concrete paver	110	24-Aug-15	05-Jan-16	Road
SIII10485	Sec III - 1st Stage of Interim Traffic Arrangement - miscellaneous works	16	15-Dec-15	05-Jan-16	Road
SIII10490	Achievement of Section III of the Works	0		05-Jan-16	Road
Works after the Box Culvert Reinstatement					
SIII10300	Sec III - roadwork & utilities above box culvert K - storm water drain & subsoil drain	60	30-Jan-16	19-Apr-16	Road
SIII10320	Sec III - roadwork & utilities above box culvert K - Watermain & Irrigation Mains	60	22-Feb-16	06-May-16	Road
SIII10340	Sec III - roadwork & utilities above box culvert K - gas main and valve chamber	60	04-Mar-16	19-May-16	Road
SIII10360	Sec III - roadwork & utilities above box culvert K - HEC cable duct and catchpit	60	16-Mar-16	31-May-16	Road
SIII10380	Sec III - roadwork & utilities above box culvert K - sub-base	60	24-Mar-16	08-Jun-16	Road
SIII10400	Sec III - roadwork & utilities above box culvert K - Road kerb	60	30-Mar-16	15-Jun-16	Road
SIII10420	Sec III - roadwork & utilities above box culvert K - flexible pavement	60	13-Apr-16	24-Jun-16	Road
SIII10440	Sec III - roadwork & utilities above box culvert K - Road Lighting, TCSS Ducts &Traffic Signs	60	13-Apr-16	24-Jun-16	Road
SIII10460	Sec III - roadwork & utilities above box culvert K - pave footpath concrete	60	13-Apr-16	24-Jun-16	Road
SIII10480	Sec III - roadwork & utilities above box culvert K - lay footpath concrete paver	60	13-Apr-16	24-Jun-16	Road
Section V - Remaining At-Grade Road; Remove 2nd Stage ITA					
Roadwork & Utilities					
SV10020	Sec V - Roadwork & Utilities - Backfilling to pavement formation	55	14-Jun-16	17-Aug-16	Road
SV10040	Sec V - Roadwork & Utilities - Stormwater Drainage Works	120	02-Aug-16	22-Dec-16	Road
SV10060	Sec V - Roadwork & Utilities - Sewerage Works	120	16-Aug-16	09-Jan-17	Road
SV10080	Sec V - Roadwork & Utilities - Watermain & Irrigation Mains	120	30-Aug-16	23-Jan-17	Road



Current Milestone
Actual Work
Critical Remaining Work
Remaining Work
Remaining Level of Effort

Working Programme for Road P2 (Roadworks and Utilities)

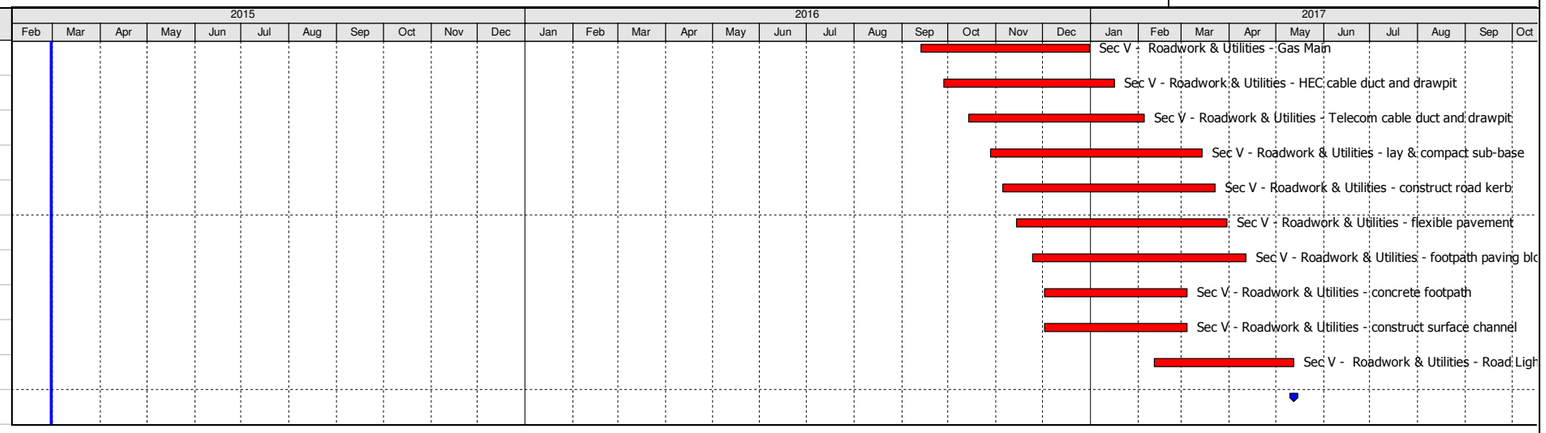
(Ref. to RWP 4.0 - Sec III & V)

Date	Revision	Checked	Approved
20-May-15	Rev. A		

中國建築-利達聯營
CHINA STATE - LEADER JOINT VENTURE

CEDD Contract No. HK/2012/08
Wan Chai Development Phase II
Central - Wan Chai Bypass at Wan Chai West

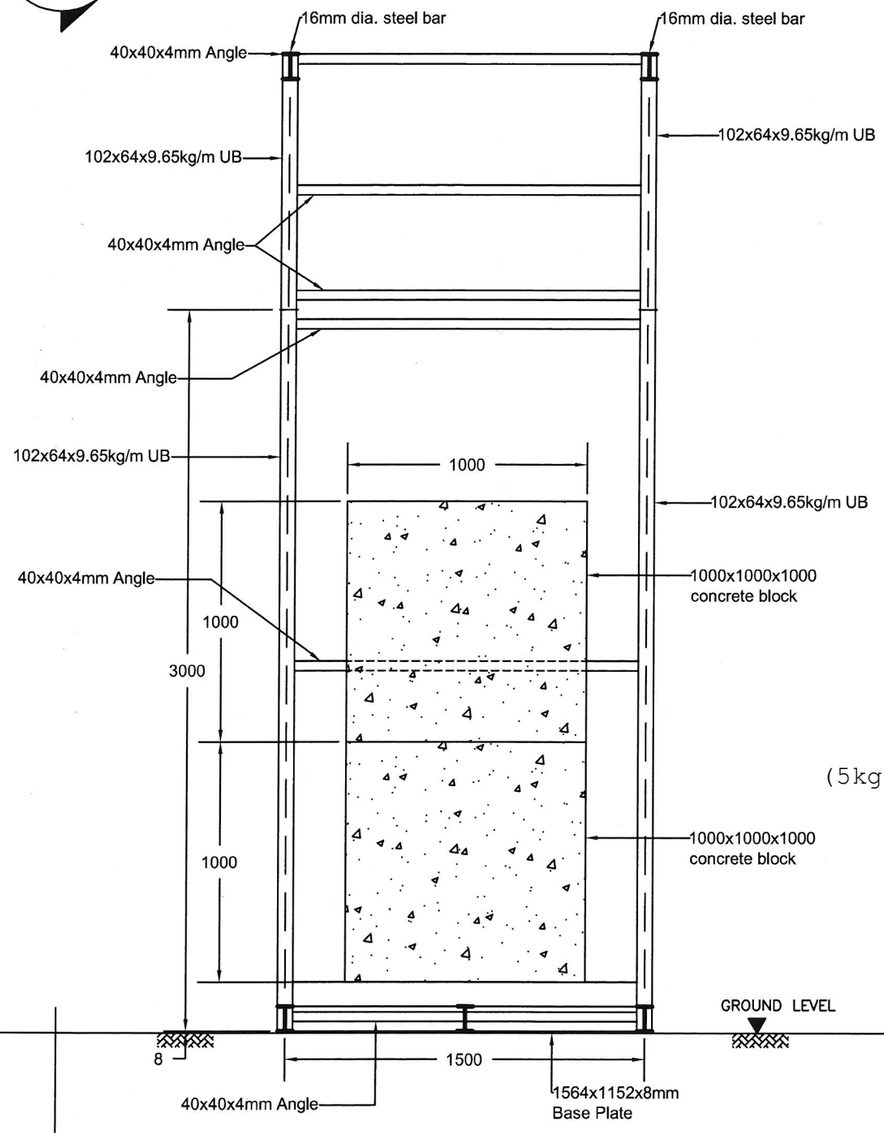
Activity ID	Activity Name	Orig Dur	Early Start	Early Finish	Road & Drain
SV10100	Sec V - Roadwork & Utilities - Gas Main	90	13-Sep-16	31-Dec-16	Road
SV10120	Sec V - Roadwork & Utilities - HEC cable duct and drawpit	90	28-Sep-16	16-Jan-17	Road
SV10140	Sec V - Roadwork & Utilities - Telecom cable duct and drawpit	90	14-Oct-16	04-Feb-17	Road
SV10160	Sec V - Roadwork & Utilities - lay & compact sub-base	110	28-Oct-16	14-Mar-17	Road
SV10180	Sec V - Roadwork & Utilities - construct road kerb	110	05-Nov-16	22-Mar-17	Road
SV10200	Sec V - Roadwork & Utilities - flexible pavement	110	14-Nov-16	30-Mar-17	Road
SV10220	Sec V - Roadwork & Utilities - footpath paving block	110	24-Nov-16	11-Apr-17	Road
SV10240	Sec V - Roadwork & Utilities - concrete footpath	72	02-Dec-16	04-Mar-17	Road
SV10260	Sec V - Roadwork & Utilities - construct surface channel	72	02-Dec-16	04-Mar-17	Road
SV10280	Sec V - Roadwork & Utilities - Road Lighting, TCSS Ducts &Traffic Signs	72	11-Feb-17	12-May-17	Road
SV10300	Achievement of Section V of the Works	0		12-May-17	Road



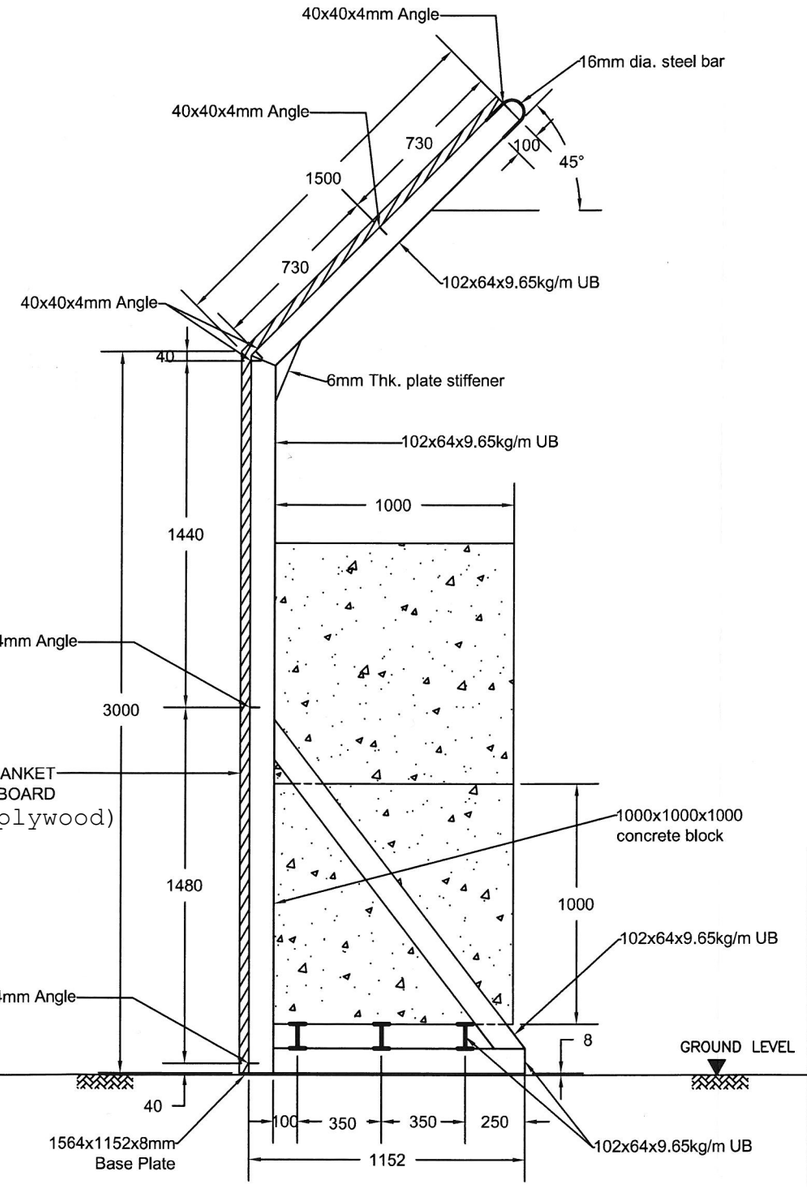
Appendix IV

Details of a Typical Noise Barrier

A



ELEVATION



SIDE VIEW A

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. DO NOT SCALE THE DRAWING.
3. UNLESS OTHERWISE SPECIFIFED ALL STRUCTURAL STEEL SHALL BE GRADE Q235B(GB)
4. UNLESS OTHERWISE SPECIFIFED ALL STRUCTURAL STEEL SHALL CONNECTED BY WELD CONNECTION.
5. ALL WELDED TO BE 6mm FILLET WELD ALL ROUND UNLESS OTHERWISE STATED.

CONTRACT NO. HK/2012/08
WAN CHAI DEVELOPMENT PHASE II – CENTRAL – WAN CHAI BYPASS AT WAN CHAI WEST

TITLE

Movable Noise Barrier

DRAWING BY: H. Li

SCALE: N.T.S

DATE OF DRAWING ISSUE: 12–JUL–2013

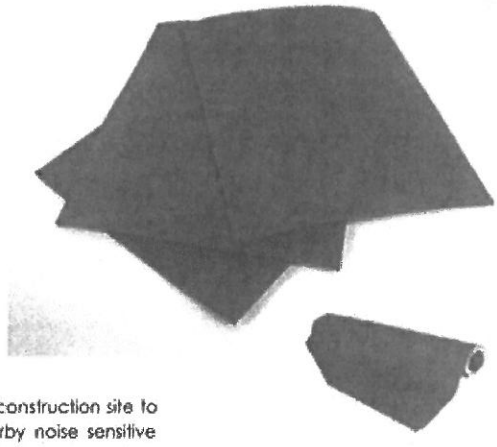
DRG. NO. HK-2012-08/CDB/SK/00124

ACOUSTIC BARRIER
TYPE WB
(CONSTRUCTION APPLICATION)

Description

Wilhams WB Barrier is a high-density mineral loaded thermoplastic polymer plasticised with phalate esters and containing mineral fillers. Black in colour, ecologically neutural and recyclable.

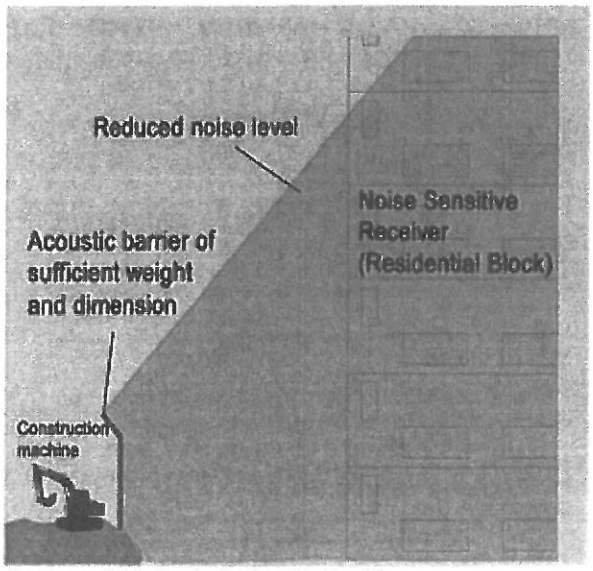
- Available in sheet or roll form
- Flexible and easily cut
- Easy to handle and install
- Available in 3 standard weights (5 kg/m², 7.5 kg/m² & 10 kg/m²)
- Provide a cost effective sound barrier solution
- Available with self-adhesive backing or Class 'O' foil facing
- Clip on quick install track available (see installation guide for details)



Application

WB Acoustic barrier material could be used as temporary noise barrier at construction site to screen the noise from construction machineries or noisy activities to nearby noise sensitive receivers. Acoustic barrier installed in the transmission path between noise sources (eg. pumps, excavator, generators, etc.) and noise sensitive receivers could screen part of the noise and create a quiet zone at the receiver side.

Noise reduction of barrier could be enhanced by using sound absorptive material facing noise source side. Wilhams fire rated PUNF foam could be one of the recommended material.



Temporary Noise Barrier for Construction Site

Temporary Noise Barrier Screening Noise to Sensitive Receivers (Former Marine Police Headquarter, TST)

ACOUSTIC BARRIER
TYPE WB
(CONSTRUCTION APPLICATION)

Physical Information

	Model	
	WB5	WB10
Available Surface Density:	5kg/m²	10kg/m²
Nominal Thickness:	2.0mm	4.5mm
Size (mm):	5000x1200 (Roll size)	2000x1200 (Sheet size)

** Available in other custom made sizes upon request
Self adhesive backing and factory applied foam combination is also available.

Technical Information

Wilhams WB barrier material conforms to the following specifications:

- Tensile strength : 88kPa
- Indentation Hardness : 156N
- Operating Temperature : (Static) -30 to 65℃
- Fire Resistance Properties :

  BS 476 : Pt5 : 1979 (Ignitability) - P

  BS 476 : Pt12 : 1997 (Ignitability) - No Substained Ignition

  BS 476 : Pt7 : 1987 - Class 1 (With Alum. Foil Facing)

  Flammability (FMVSS302) - Self Extinguishing

Installation Guidelines

Wilhams WB barrier is simple to install either direct to the noise source or in conjunction with a spaced layer, the product can be laid directly. The barrier can be fixed in placed by mechanical means i.e. pins, hangers or banding, or bonding using a polyurethane based contact adhesive (Wilhams Type A7153).

For WB barrier material supplied with a self-adhesive backing, it is important to ensure that the surface is clean and free from dust and grease. After aligning the barrier material, peel back the release paper and adhere to the surface. Note, self-adhesive versions should not be relied on as the only method of support when fixing in a vertical or inverted position and additional mechanical means of support must be employed.

Snap on installation track for WB barrier (as picture shown) is also available for ease of fixing.

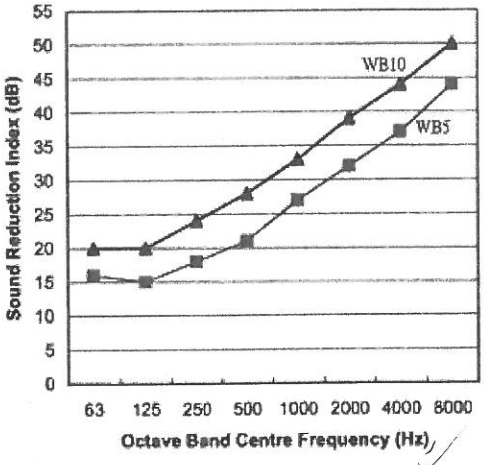
Acoustic Performance

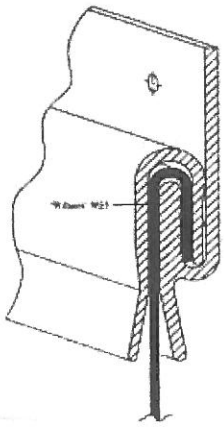
Wilhams WB barrier material is a high performance acoustic material capable to reduce sound effectively. Sound Reduction Index (SRI) for material at respective density is shown below.

Model/ Surface Weight	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Ave. SRI
WB5 (5kg/m²)	16	15	18	21	27	32	37	44	26dB
WB10 (10kg/m²)	20	20	24	28	33	39	44	50	33dB

*Note: R_w - rating according to BS EN ISO 717-1: 1997

Sound Reduction Index for WB5 & WB10



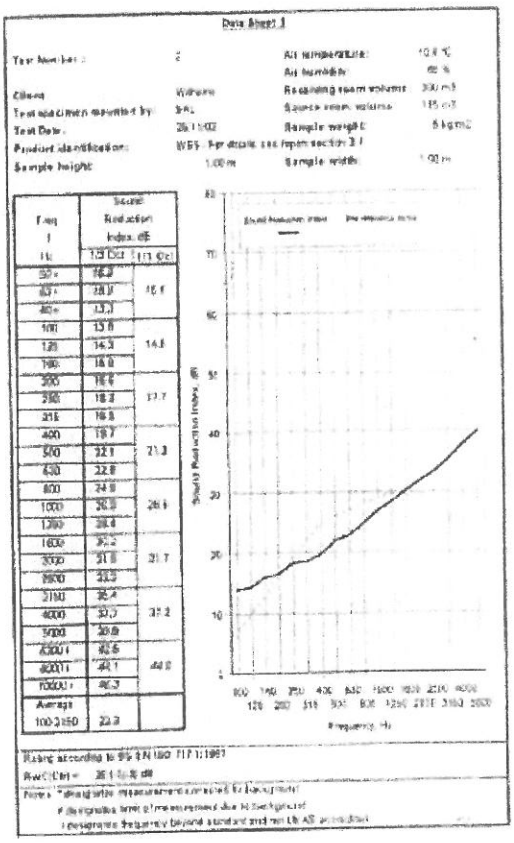


* Optional Quick Installation Track Available on Request

ACOUSTIC BARRIER
TYPE WB
(CONSTRUCTION APPLICATION)

Technical Report on Acoustic Performance
(Conducted by Sound Research Laboratories Limited)

For WB5 (5kg/ m²)



Data Sheet 1

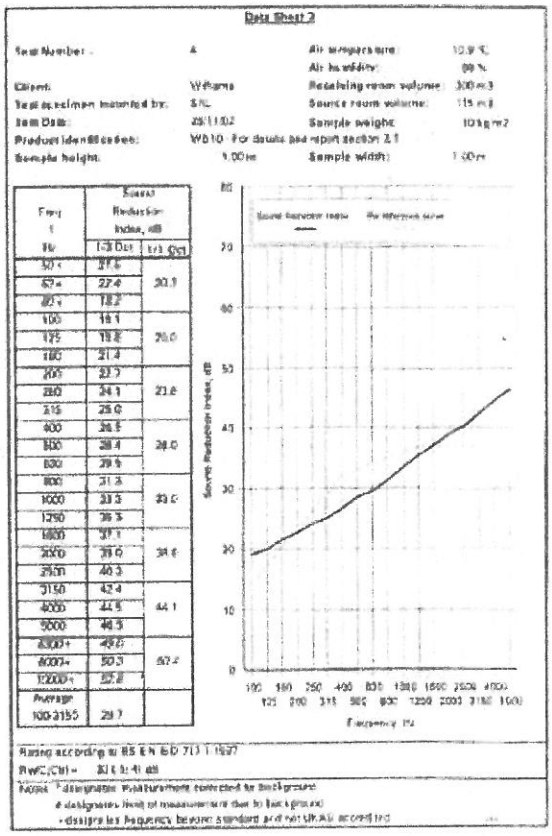
Test Number: 2 — Air temperature: 10.6 °C — Air humidity: 69 %
Client: Williams — Receiving room volume: 300 m3
Test specimen mounted by: SRL — Source room volume: 115 m3
Test Date: 25/11/02 — Sample weight: 5 kg/m2
Product identification: WB5 - For details see report section 2.1
Sample height: 1.00 m — Sample width: 1.00 m

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/3 Oct
50 +	16.2	
63 +	18.0	16.1
80 +	13.1	
100	13.8	
125	14.3	14.8
160	16.0	
200	16.6	
250	18.3	17.7
315	16.5	
400	19.7	
500	22.1	21.3
630	22.8	
800	24.9	
1000	26.0	26.6
1250	28.4	
1600	29.2	
2000	31.6	31.7
2500	33.0	
3150	35.4	
4000	37.0	37.2
5000	39.8	
6300 +	42.6	
8000 +	44.1	44.0
10000 +	46.3	
Average 100-3150	22.3	

Rating according to BS EN ISO 717-1:1997
RwC(Ctr) = 26 (-1; -3) dB

Note: + designates measurements corrected for background
designates level of measurement due to background
+ designates frequency beyond standard and not UKAS accredited

For WB10 (10kg/ m²)



Data Sheet 2

Test Number: 4 — Air temperature: 10.9 °C — Air humidity: 69 %
Client: Williams — Receiving room volume: 300 m3
Test specimen mounted by: SRL — Source room volume: 115 m3
Test Date: 25/11/02 — Sample weight: 10 kg/m2
Product identification: WB10 - For details see report section 2.1
Sample height: 1.00 m — Sample width: 1.00 m

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/3 Oct
50 +	27.6	
63 +	27.4	20.3
80 +	18.2	
100	18.1	
125	19.8	20.0
160	21.4	
200	23.7	
250	24.1	23.8
315	25.0	
400	26.5	
500	28.4	28.0
630	29.5	
800	31.3	
1000	33.3	33.0
1250	34.5	
1600	37.1	
2000	39.0	38.8
2500	40.3	
3150	42.4	
4000	44.5	44.1
5000	46.5	
6300 +	49.0	
8000 +	50.3	50.2
10000 +	52.2	
Average 100-3150	29.7	

Rating according to BS EN ISO 717-1:1997
RwC(Ctr) = 30 (-1; -4) dB

NOTE: + designates measurements corrected for background
designates level of measurement due to background
+ designates frequency beyond standard and not UKAS accredited

***Note: R_w - Rating according to BS EN ISO 717-1: 1997**