



AP1-HTA-00-ZZ-RP-Y-0001

PROJECT TECHNICAL MEMORANDUM

JOB TITLE : Plot P1 Hotels, Manchester Airport
OUR REF : 27732
DATE : 21 May 2020
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ISSUED TO : Adam Hirst (BCEGI)

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**RE: PLOT P1 HOTELS, MANCHESTER AIRPORT
FACADE SOUND INSULATION**

Further to our ongoing acoustic input in relation to the proposed Hotel development at Plot P1 at Manchester Airport this memo provides a review of the MLM Consulting noise survey data and sets out the minimum window specifications needed to meet the Brand Standards internal noise levels for both the Ibis Budget and the Holiday Inn Hotels.

1.0 Brand Standards

1.1 IHG Standards (Holiday Inn)

The acoustic requirements for a Holiday Inn are provided in the IHG Technical Handbook Brady Safety, Engineering & Acoustics V6.0 dated November 2017.

1.2 Ibis Budget Standards

The acoustic requirements for an Ibis Budget Hotel are provided in two documents: The Construction and Renovation Guidelines Edition V0.1 (IBB_GB_WE_DPS_REF_C10) dated May 2016 and the Technical Corporate Standard, Acoustics produced in 2015 (ECO_CE_ING_GUI_010_1_ACOUSTICS).



2.0 Acoustic Criteria

2.1 Holiday Inn

Based on the documents referenced in Section 1.1, external noise intrusion into internal areas of the development shall be controlled to achieve the following ambient noise level criteria.

Location	Daytime (07:00-23:00)	Night time (23:00-07:00)
Bedrooms	$L_{Aeq,1\text{ hour}}$ 35 dB	$L_{Aeq,1\text{ hour}}$ 30 dB L_{AFmax} 45 dB
Reception/Lobby, Atrium, Retail Space	L_{Aeq} 50 dB	
Lobby Bar, All Day Dining, Gym & Fitness	L_{Aeq} 45 dB	
Fine Dining	L_{Aeq} 40 dB	
Meeting Room (20-100 persons)	L_{Aeq} 35 dB	
Meeting Room (100+persons)	L_{Aeq} 40 dB	
Spa/Relaxation	L_{Aeq} 45 dB	
Heart of House (ie BoH including Offices)	L_{Aeq} 45 dB	

Noise disturbance to guestrooms - from music in bars or restaurants, not controlled by the hotel, shall be controlled such that the L_{Fmax} , noise level is at least 10 dB below the prevailing L_{90} background noise level in the guestroom.

2.2 Ibis Budget

Based on the documents referenced in Section 1.2, external noise intrusion into internal areas of the development shall be controlled to achieve the following ambient noise level criteria.

Location	External Noise Intrusion Level (dB)		
	$L_{A10,10min}$	$L_{A01,10min}$	$L_{AFmax,T}$
Guestrooms (Airborne)	30	35	-
Guestrooms (Structure-borne)	-	-	28
Breakfast Area, Reception, Vending Area	40	50	-
Administrative Offices, Staff Rest	35	40	-



3.0 Noise Survey (MLM Consulting)

Noise measurements were carried out at 4No locations around the proposed site by MLM Consulting between Wednesday 14 and Monday 19 March 2018. These measurements were carried out with a view to establishing the prevailing noise climate in the vicinity of the proposed hotel buildings. The measurement locations are indicated on the plan overleaf, however, the full survey procedure has been excluded for brevity.



Site Plan (c/o MLM Consulting)

3.1 Results

The raw data for the noise survey carried out on site has been received on 20 March 2020. This raw data has been analysed by Hann Tucker with the view to establishing the minimum façade specifications for the development.

The octave band noise levels as used to inform the assessments herein are presented overleaf for reference.



MP1	Measured Octave Band Sound Pressure levels (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
$L_{Aeq,1h}$ (07:00-23:00)	74	67	65	66	71	65	51	43
$L_{Aeq,1h}$ (23:00-07:00)	74	67	65	65	70	64	54	49
L_{AFmax} (23:00-07:00)	88	82	77	75	78	73	65	60
$L_{A01,10min}$ (24h)	83	80	76	75	78	72	65	59
$L_{A10,10min}$ (24h)	78	77	71	69	69	75	69	55
MP2	Measured Octave Band Sound Pressure levels (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
$L_{Aeq,1h}$ (07:00-23:00)	77	67	62	60	61	57	50	41
$L_{Aeq,1h}$ (23:00-07:00)	72	65	61	59	60	56	49	41
L_{AFmax} (23:00-07:00)	86	80	84	79	71	60	55	53
$L_{A01,10min}$ (24h)	80	74	70	65	77	71	57	53
$L_{A10,10min}$ (24h)	75	69	64	62	63	62	63	55
MP3	Measured Octave Band Sound Pressure levels (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
$L_{Aeq,1h}$ (07:00-23:00)	72	66	63	63	67	60	48	40
$L_{Aeq,1h}$ (23:00-07:00)	72	66	64	64	66	60	52	44
L_{AFmax} (23:00-07:00)	84	85	81	80	73	59	44	35
$L_{A01,10min}$ (24h)	82	76	74	74	75	69	60	54
$L_{A10,10min}$ (24h)	76	71	68	68	70	64	54	46
MP4	Measured Octave Band Sound Pressure levels (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
$L_{Aeq,1h}$ (07:00-23:00)	75	71	67	65	67	61	56	50
$L_{Aeq,1h}$ (23:00-07:00)	75	69	65	63	66	59	51	45
L_{AFmax} (23:00-07:00)	84	82	73	70	74	71	62	62
$L_{A01,10min}$ (24h)	82	85	85	76	69	65	61	56
$L_{A10,10min}$ (24h)	78	72	69	67	69	64	60	55

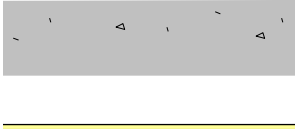


4.0 Facade Specifications

4.1 Roof

The roofing over guestrooms is understood to be 200 mm reinforced concrete slabs, with a density of ca. 2,300 kg/m³, and MF plasterboard ceilings. This construction should comfortably control traffic, aircraft and future tram noise intrusion when built to a good airtight standard.

Consideration must also be given to footfall where there are roof terraces above guestrooms. On this basis, it is recommended that provisions are made for a raised floor as below where rooftop terraces are proposed.

Location	Sketch	Specification for Rooftop Gardens/Terraces
Generic Roof		- Min. 200 mm concrete slab (ca. 2,300 kg/m³); - Circa. 150+ mm zone; - 12.5 mm plasterboard on lightweight metal frame.

4.2 External Walls

The external wall proposals for the Holiday Inn are detailed below:

	WALL TYPE 1A - 470MM EXTERNAL WALL - 12MM EQUITONE NATURA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 110MM (50+60) ROCKWOOL DUO SLAB INSULATION WITHIN 262 CAVITY ZONE / CP BOARD/150MM RWA45 ROCKWOOL INSULATION WITHIN SFS ZONE/ 2 X PLASTERBOARD ON VCL TO ACHIEVE REQUIRED FIRE RATING/3MM INTERNAL WALL FINISH
	WALL TYPE 1B - 520MM EXTERNAL WALL - 10MM EQUITONE LINEA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 110MM (50+60) ROCKWOOL DUO SLAB INSULATION WITHIN 310 CAVITY ZONE/CP BOARD/150MM RWA45 ROCKWOOL INSULATION WITHIN SFS ZONE/ 2 X PLASTERBOARD ON VCL TO ACHIEVE REQUIRED FIRE RATING/3MM INTERNAL WALL FINISH
	WALL TYPE 2A - 520 MM EXTERNAL WALL - 3MM SOTECH RAINSCREEN PANEL/ 110MM (50+60) ROCKWOOL DUO SLAB INSULATION WITHIN 310 CAVITY ZONE/CP BOARD/150MM RWA45 ROCKWOOL INSULATION WITHIN SFS ZONE/ 2 X PLASTERBOARD ON VCL TO ACHIEVE REQUIRED FIRE RATING/3MM INTERNAL WALL FINISH
	WALL TYPE 1E - 470MM EXTERNAL WALL - 12MM EQUITONE NATURA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 145MM ROCKWOOL INSULATION WITHIN 262 MM CAVITY ZONE/225MM CAST CONCRETE, PLASTERBOARD, WALL FINISH
	WALL TYPE 1F - 520MM EXTERNAL WALL - 10MM EQUITONE LINEA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 145MM ROCKWOOL INSULATION WITHIN 310MM CAVITY ZONE/225MM CAST CONCRETE, PLASTERBOARD, WALL FINISH

The external wall proposals for the Ibis Budget are detailed below:

	WALL TYPE 1C - 520MM EXTERNAL WALL - 12MM EQUITONE NATURA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 110MM (50+60) ROCKWOOL DUO SLAB INSULATION WITHIN 262 CAVITY ZONE / CP BOARD/150MM RWA45 ROCKWOOL INSULATION WITHIN SFS ZONE/ 2 X PLASTERBOARD ON VCL TO ACHIEVE REQUIRED FIRE RATING/3MM INTERNAL WALL FINISH
	WALL TYPE 1D - 430MM EXTERNAL WALL - 12MM EQUITONE NATURA FIBRE CEMENT RAINSCREEN CLADDING PANEL/ 145MM ROCKWOOL INSULATION WITHIN 160 MM CAVITY ZONE/250MM CAST CONCRETE, PLASTERBOARD, WALL FINISH
	WALL TYPE 3A - ALUMINIUM LOUVRES POWDER COATED RAL 7021



We would expect that the above constructions would achieve the sound insulation performances below. These have been used to inform the minimum glazing specifications.

Wall Type	Calculated Octave Band Sound Reduction, R (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Wall Type 1A, 1E, 1C, 1D	30	47	52	57	61	61	69
Wall Type 1B, 1F	27	46	52	57	61	61	69
Wall Type 2A	20	42	49	54	58	57	64

Based on the above we have calculated the composite performance of the external walls based on Chapman Taylor 21 Series drawings dated April 2020 and from this we have established the minimum performance of the glazing in each space as detailed in Section 4.3.

4.3 Cladding, Windows and Curtain Walling

The following specification and façade mark-ups enclosed detail our recommended minimum octave band sound reduction indices for window systems. In all cases, it is essential that the system is tested in accordance with BS EN ISO 10140-2 and that the quoted minimum octave band sound reduction specifications are met by the system as a whole (not just the glass). The weighted overall performance figures are presented for guidance only.

Where structural glass or non-vision spandrel panels are proposed, they should provide sound reduction performance at least equal to that required of the cladding in order to maintain the acoustic integrity of the building envelope. This will likely required plasterboard linings within rooms.

The table below should be read in conjunction with the façade mark-ups enclosed (ie at the end of this document).

Façade		Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							Overall Min $R_w + C_{tr}$ (dB)
		63	125	250	500	1k	2k	4k	
A	Purple	30	36	46	46	49	56	58	46
B	Red	24	27	37	40	43	44	50	38
C	Orange	21	23	29	38	40	42	43	34
D	Green	20	22	21	32	37	42	43	28



It is essential that prospective suppliers can demonstrate compliance with the acoustic performance detailed in our specification rather than simply offering a generic glazing configuration, however, example glazing confirmation that could be capable of achieving the specifications set out above are outlined below:

Façade		Example Glazing configuration
A	Purple	Secondary Glazed System
B	Red	10/20/8.2lam
C	Orange	6/20/8.2lam
D	Green	8/16/4

4.3.1 Flanking Performance of Cladding/Glazing (including Curtain Walling)

Where curtain walling or lightweight cladding spans across party wall/floor lines, the system shall incorporate suitable elements against which the party floor/wall can be sealed to control sound flanking. The complete system shall be tested for flanking transmission and be proven to provide the following minimum weighted normalised flanking level differences when tested in a laboratory in general accordance with BS EN ISO 10848-2 and rated in accordance with BS EN ISO 717-1.

The specifications below are based on achieving the minimum Brand Standards for each Hotel and the Hea05 credit for BREEAM.

WALLS

Hotel	Location	Minimum Sound Flanking Specification
Holiday Inn & Ibis Budget	Guestroom to Guestroom	55 dB $D_{nf,w} + C_{tr}$
Holiday Inn	Meeting Room to Meeting Room	55 dB $D_{nf,w}$
Holiday Inn	BoH Areas to BoH Areas	50 dB $D_{nf,w}$
Ibis Budget	BoH Areas to BoH Areas	50 dB $D_{nf,w}$

FLOORS

Hotel	Location	Minimum Sound Flanking Specification
Holiday Inn & Ibis Budget	Guestroom to Guestroom	55 dB $D_{nf,w} + C_{tr}$
Holiday Inn	Guestroom to Public Area	55 dB $D_{nf,w} + C_{tr}$
Holiday Inn	Guestroom to Crew Lounge	55 dB $D_{nf,w} + C_{tr}$
Holiday Inn	Guestroom to Gym	65 dB $D_{nf,w}$
Holiday Inn	Guestroom to Kitchen	65 dB $D_{nf,w}$
Ibis Budget	Guestroom to LV Switch Room	61 dB $D_{nf,w} + C$ and D_{nf} (125-250 Hz) $\geq$ 46dB
Ibis Budget	Guestroom to Greywater Treatment Room	65 dB $D_{nf,w} + C$ and D_{nf} (125-250 Hz) $\geq$ 50dB



The supplier must demonstrate through developed design details that vulnerable areas subjected to the passage of unwanted sound i.e. flanking transmission have been so developed along with trades immediately adjoining the cladding to satisfy the above.

For guidance, to adequately control flanking transmission in curtain walling systems and party floors, we would initially suggest provisions are made for:-

- The party floors to be sealed to 2No. separate transoms (slab and ceiling interfaces);
- The gap between slab edge and curtain walling system sealed full height with a cavity closer.
- A continuous steel angle shall fix and fully seal the curtain walling system to the slab.
- For stick systems, continuous mullions must be broken at the slab edge with acoustic foam inserts applied, as required, depending on the system-type.
- For gym and kitchen to guestroom, the sound flanking requirement is extremely onerous and provisions should be made to completely decouple the curtain walling at this slab edge with mullions capped.

For modular window units (or unitised curtain walling), frames would need to be fully isolated at the party floor line and the need for the supplier to provide laboratory test data would be paramount.

NB For guidance on available acoustic products and solutions for cladding systems, we would provide Siderise as a suitable supplier (contact: Mike Carrick, 0208 391 3650).

4.4 Test Data

Fully detailed test reports from independent acoustic test authorities shall be supplied. All test reports shall be in English or, a full English translation. Test data should include the $\frac{1}{3}$ octave band results from 100Hz to 3150Hz inclusive, together with the corresponding octave band results from 125Hz to 4000Hz inclusive.

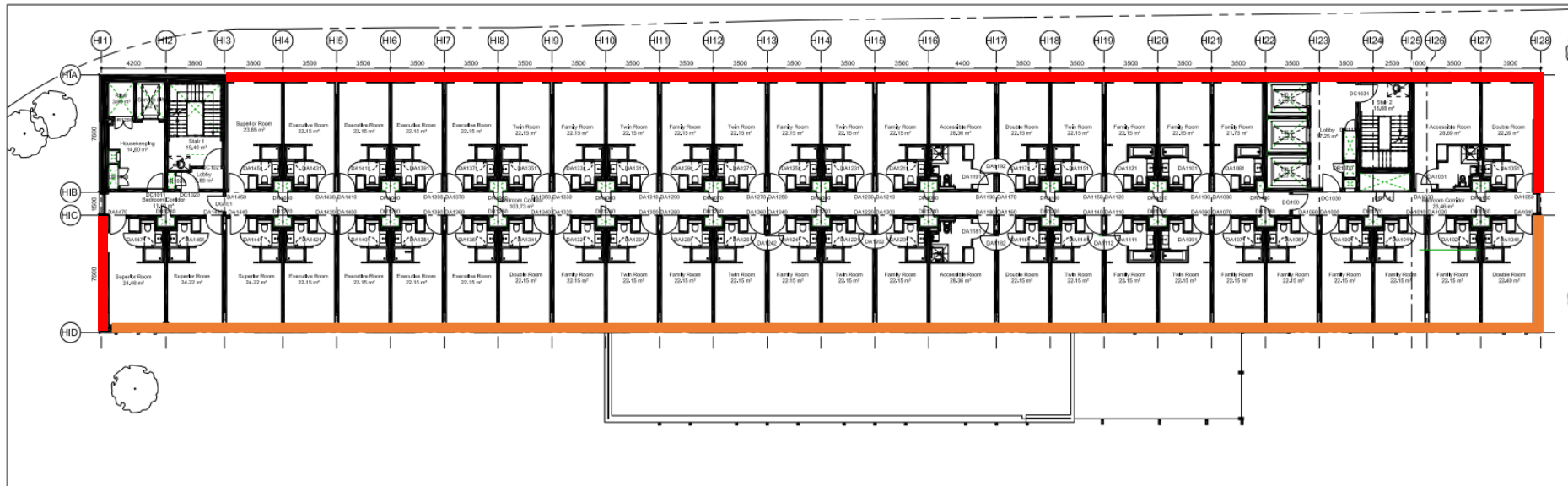
The test report shall be provided for test samples which are representation of the complete system for the relevant facades - including frames, joints, seals, spandrel panels and opening lights and vents (as appropriate). The samples proposed should be approved by HTA.

For and on behalf of
HANN TUCKER ASSOCIATES

Jake Howarth
BEng (Hons), AMIOA



Façade Specification Mark-up (GF – Holiday Inn)



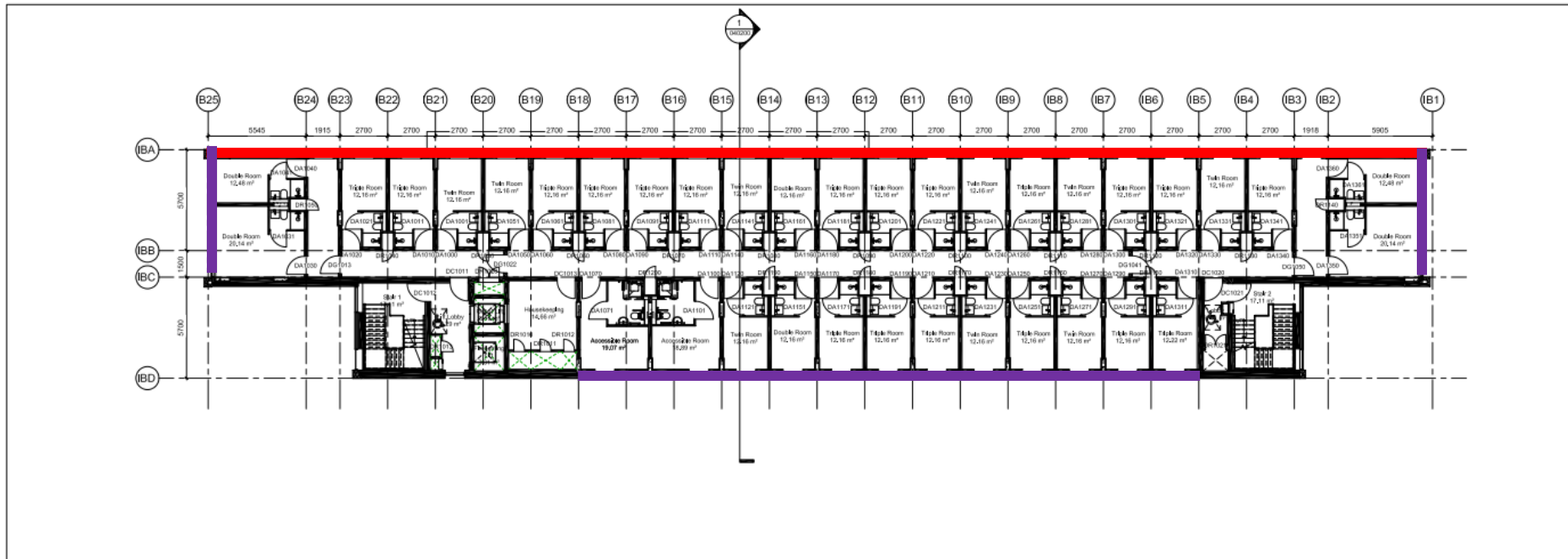
Façade Specification Mark-up (Guestroom Floors – Holiday Inn)



Façade Specification Mark-up (Gym and Lounge Floor)



Façade Specification Mark-up (GF – Ibis Budget)



Façade Specification Mark-up (Guestroom Floors – Ibis Budget)