SPECIFICATION

Project	**Spencer Place North**
Subject	**Façade Sound Insulation Acoustic Assessment**
Author	**Dermot Blunnie**
Date	**23 July 2019**
Ref.	**DB/18/10228NT01b**

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1.0 INTRODUCTION

The sound insulation performance of the façade for the proposed development at Spencer Place North, Spencer Dock, Dublin 1 is a key acoustic consideration for the project. It will dictate the magnitude of intrusive noise levels affecting the various internal spaces and hence is important in the context of comfort levels.

An environmental noise survey has been conducted to establish prevailing levels of noise at the development location. The resultant values have been used to assist with the calculation of performance requirements for the façade in order to achieve intrusive noise levels that are commensurate with current best practice requirements.

2.0 ACOUSTIC REQUIREMENTS

In order to identify appropriate design criteria for internal ambient noise levels reference has been made to British Standard BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*. The recommended design goals for internal ambient noise levels as per the guidance contained within BS 8233 are detailed in Table 1 overleaf. The noise levels are specified as an Equivalent Continuous Noise Level (L_{Aeq}) expressed over a 1-hour period there is also a specified instantaneous maximum value (L_{AFmax}) for the duration of the night period. The proposed L_{AFmax} criterion presented in Table 1 has been taken from the World Health Organisation (WHO) document *Guidelines for Community Noise* (1999).

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Location	Activity	Period	Criterion
Living / Dining Room	Resting	Daytime (07:00hrs to 23:00hrs)	40 dB $L_{Aeq,1hr}$
	Dining		35 dB $L_{Aeq,1hr}$
Bedroom	Daytime Resting		35 dB $L_{Aeq,1hr}$
	Sleeping	Night-time (23:00hrs to 07:00hrs)	30 dB $L_{Aeq,1hr}$
			45 dB L_{AFmax}

Table 1 Recommended Internal Noise Level Specifications

The design goals given in Table 1 apply to the intrusive noise from external sources only.

3.0 ENVIRONMENTAL NOISE SURVEY

An environmental noise survey was conducted to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description and measurement and assessment of environmental noise*. Specific details are set out below.

The noise survey was conducted over the course of five days from 28 June to 2 July 2018.

3.1 Measurement Locations

The monitoring locations are discussed below:

North Located along the northern boundary of the development site at Sherriff Street Upper. The dominate source of noise in this area was noted to be road traffic noise.

South Located along the southern boundary of the site close to the Luas stop at Mayor Street Upper. Luas activity was noticeable in the measured noise data with road traffic noise noted to be having less of an influence at this location.

Figure 1 indicates the approximate location of each measurement position.

Figure 1 Noise Survey Locations

3.2 Measurement Parameters

The survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. It is typically used as a descriptor for ambient noise.

L_{AFMax} is the maximum sound level that is exceeded during the survey period measured using fast weighting of 100 milliseconds.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

3.3 Summary of Measured Values

L_{Aeq} and L_{AFMax} values were measured at 5-minute intervals over the duration of the unattended monitoring survey. Figures 2 to 5 present the number of measured L_{Aeq} and L_{AFMax} events for each decibel level during the day and night periods for each location.

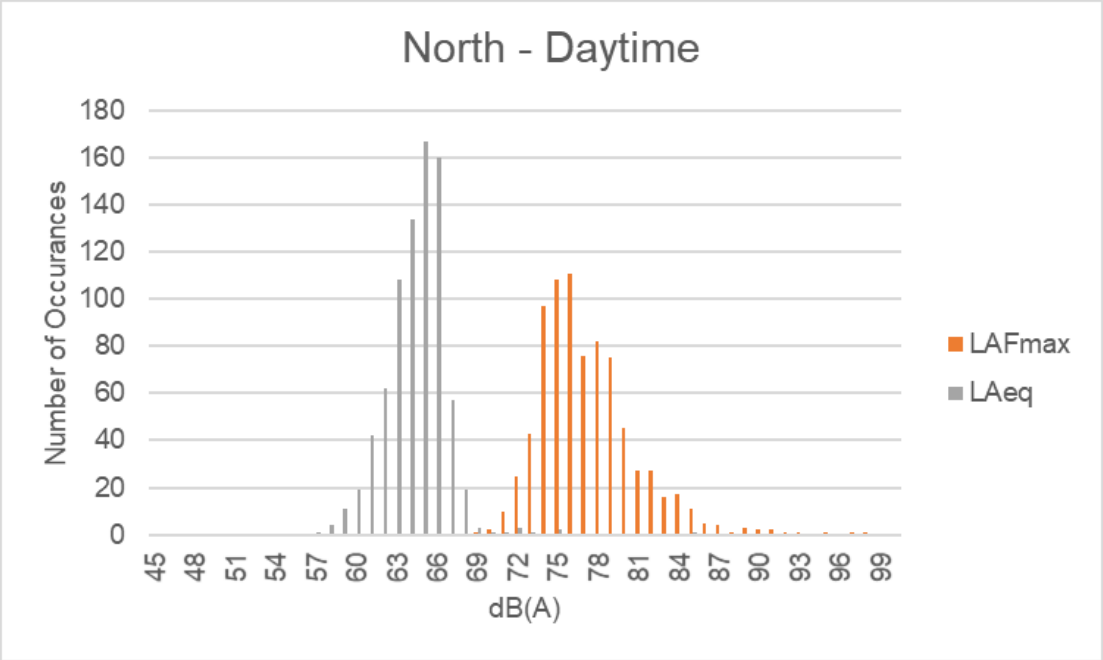

Figure 2 Number of events at each decibel level measured during the Day at Sheriff Street Upper

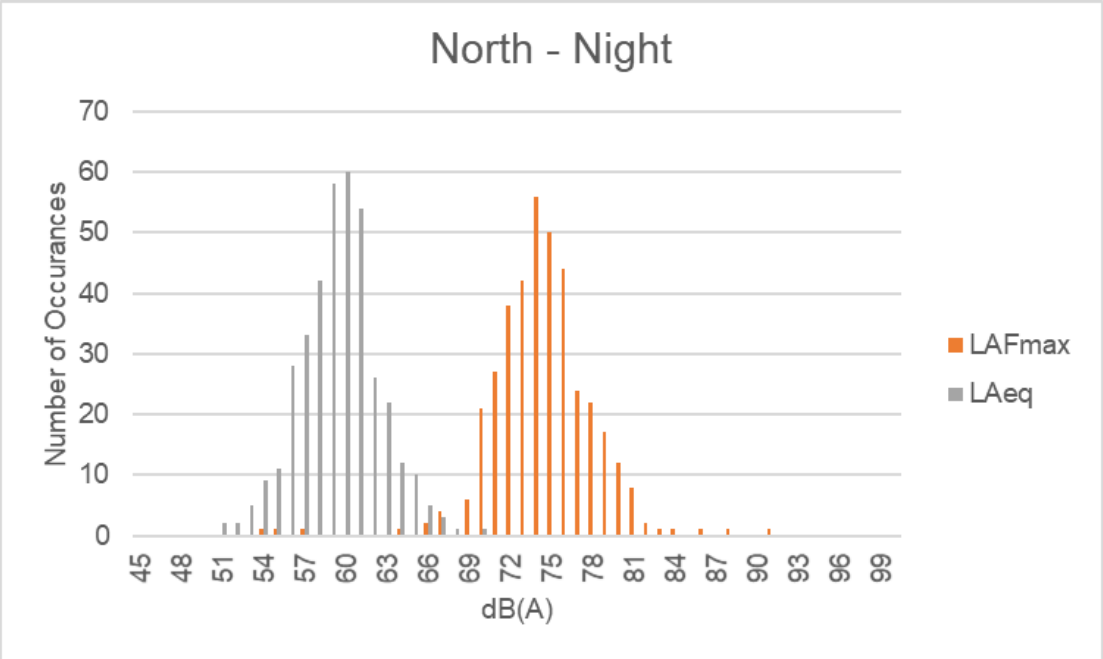

Figure 3 Number of events at each decibel level measured during the Night at Sheriff Street Upper

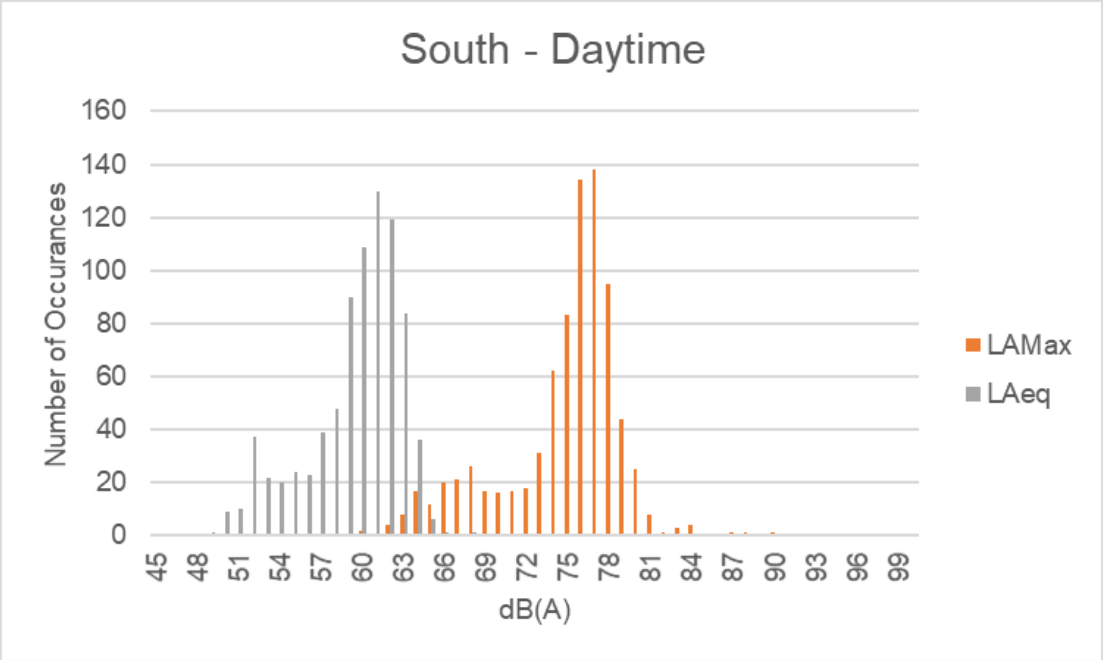

Figure 4 Number of events at each decibel level measured during the Day at Mayor Street Upper

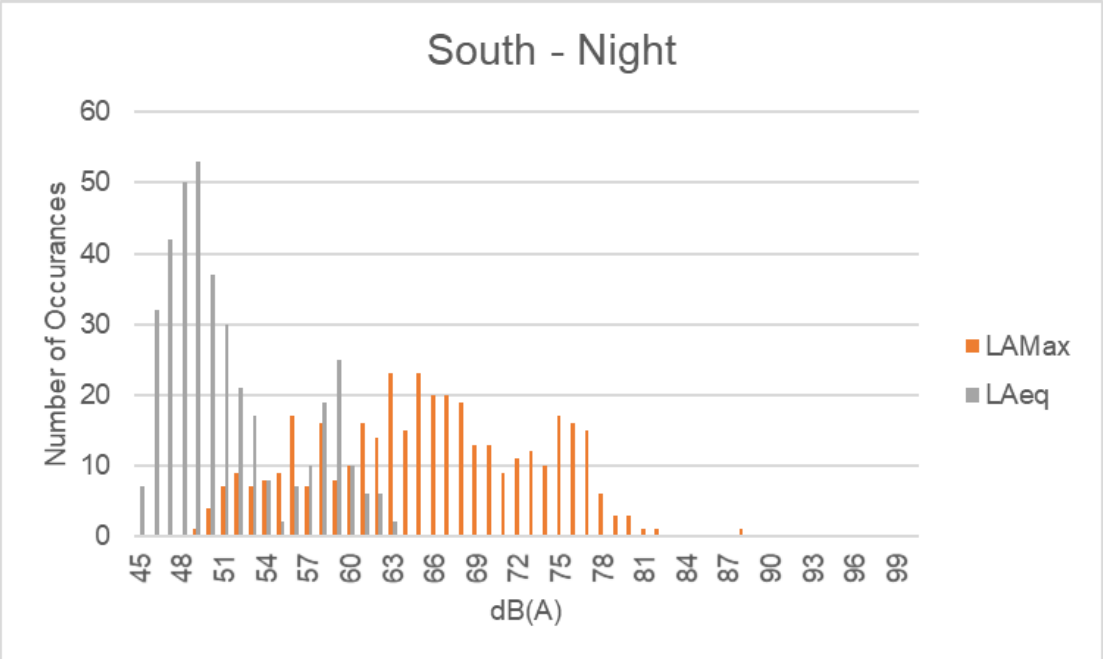

Figure 5 Number of events at each decibel level measured during the Night at Mayor Street Upper

Table 2 presents the assumed $L_{Aeq,\ 5\text{-}min}$ incident noise levels used for the purpose of this assessment, these noise levels have been derived from the previously presented measured noise levels.

Location	Period	Octave Band Centre Frequency (Hz)						Overall $L_{Aeq,T}$ dB(A)
		125	250	500	1k	2k	4k	
North	Day	66	65	63	65	61	51	68
	Night	63	63	60	61	55	46	64
South	Day	64	64	61	59	56	50	64
	Night	61	60	57	55	52	47	60

Table 2 Assumed Incident $L_{Aeq,\ 5\text{-}min}$ values

Table 3 presents the assumed L_{AFmax} incident noise levels used for the purpose of this assessment, these noise levels have been derived from the night time periods of the previously presented noise data.

Location	Period	Octave Band Centre Frequency (Hz)						Overall L_{AFmax} dB(A)
		125	250	500	1k	2k	4k	
North	Night	79	79	76	77	71	62	80
South		78	77	74	72	69	64	77

Table 3 Assumed Incident L_{Amax} values

4.0 CALCULATION ASSUMPTIONS

Calculations do not consider potential future noise emissions from external plant, however, the noise from road traffic is assumed to dominate the noise environment.

It has been assumed that no noisy plant or other noisy activities will take place in the courtyard area at Block 1.

Noise intrusion calculations from L_{AFmax} events have disregarded those events that are considered outliers and atypical of the general noise environment.

It is understood that the development will be mechanically ventilated and there will be no requirement for passive ventilation to the external areas, however, openable windows may be used for purge ventilation when required. Calculations relate to internal levels of noise from external noise sources only and do not take account of noise from internal building services.

5.0 AIRBORNE SOUND INSULATION PERFORMANCE

The assessment has identified two façade specifications for the development. The two façade areas are marked up in Figure 6. The area marked-up as Type 1 Façade requires a slightly increased sound insulation performance.

Façade glazing for Type 1 and Type 2 elevations should be selected to achieve the minimum sound insulation performances as outlined in Table 4.

Façade Spec, R_w (dB)	Octave Band Centre Frequency (Hz)						Overall R_w (dB)
	125	250	500	1k	2k	4k	
Type 1	25	32	38	41	42	51	40
Type 2	26	27	34	40	38	46	37

Table 4 Minimum Sound Reduction Indices (SRI) for Façade

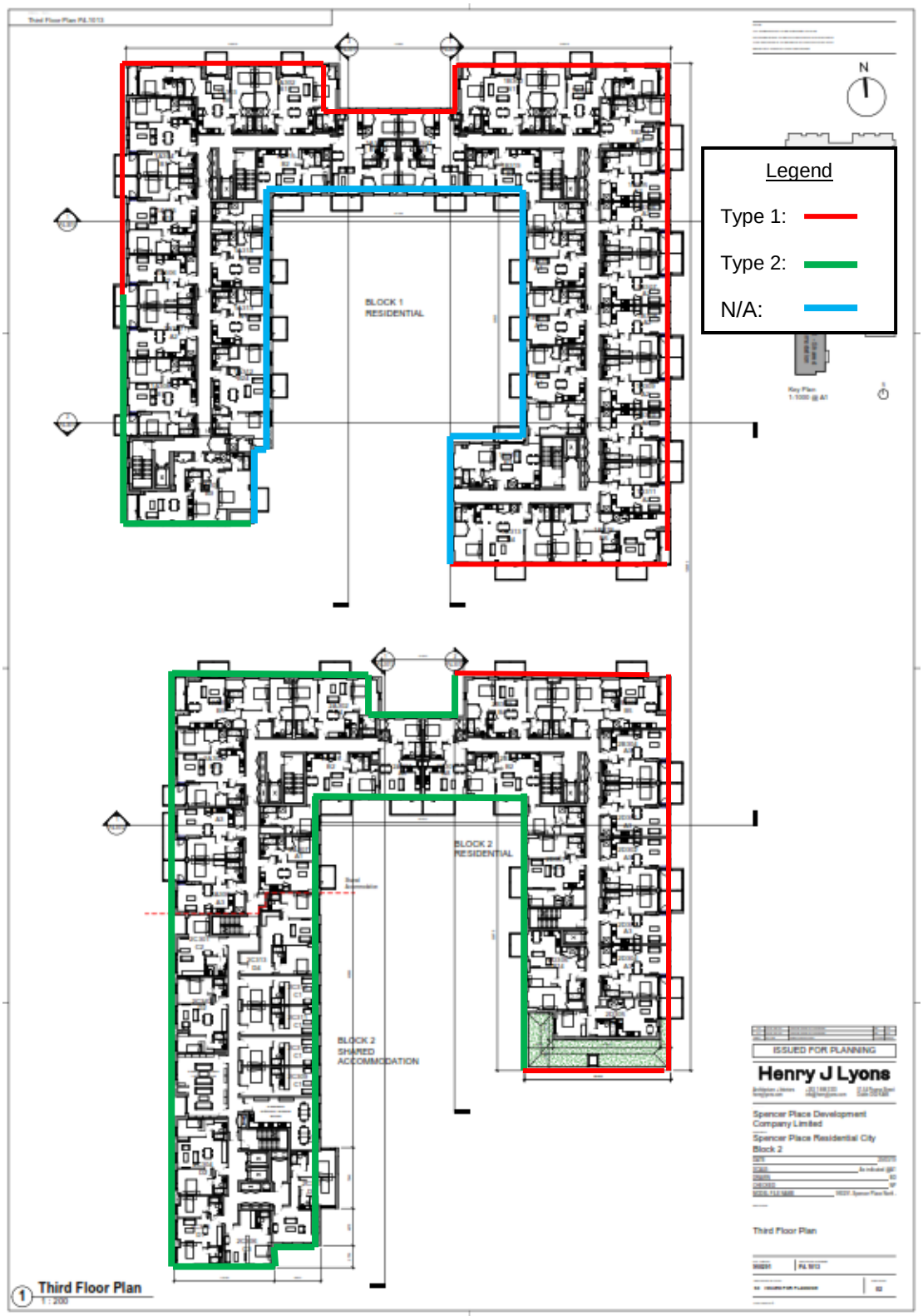

Figure 6 Façade Elevation Mark-up

6.0 CONCLUSION

AWN Consulting has undertaken an assessment of intrusive noise for the proposed development at Spencer Place North, Dublin 1. A performance requirement has been calculated for the glazed elements of the façade. The calculations do not take account of noise emissions from internal building services.

Appendix A provides a detailed Façade Sound Insulation Performance Specification.

APPENDIX A

Façade Sound Insulation Performance Specification

PROPOSED DEVELOPMENT AT SPENCER PLACE NORTH

Façade Sound Insulation Performance Specification

Reference: DB/18/10228NT01b
Issue Date: 23 July 20189

A1.0 INTRODUCTION

A1.1 This specification contains the sound insulation performance requirements for external façade elements to be used in the proposed development situated at Spencer Place North in Dublin 1.

A1.2 The performance requirements set out herein are applicable to entire "glazing systems".

A1.3 For the purposes of assessing acoustic performance, "glazing system" shall be taken to mean any and all of the component parts that form part of the element under consideration, i.e. the cladding material, masonry, insulation, plasterboard linings etc. and for "glazed elements" the glass, frames, seals and any openable elements.

A2.0 AIRBORNE SOUND INSULATION PERFORMANCE

A2.1 The external glazing systems proposed for the development shall provide sound insulation performance that meets or exceeds the octave band Sound Reduction Indices listed in Table A1 and shown in Figure A1.

Façade Spec, R_w (dB)	Octave Band Centre Frequency (Hz)						Overall R_w (dB)
	125	250	500	1k	2k	4k	
Type 1	25	32	38	41	42	51	40
Type 2	26	27	34	40	38	46	37

Table A1 Minimum Sound Reduction Indices for External Facade Systems (R, dB)

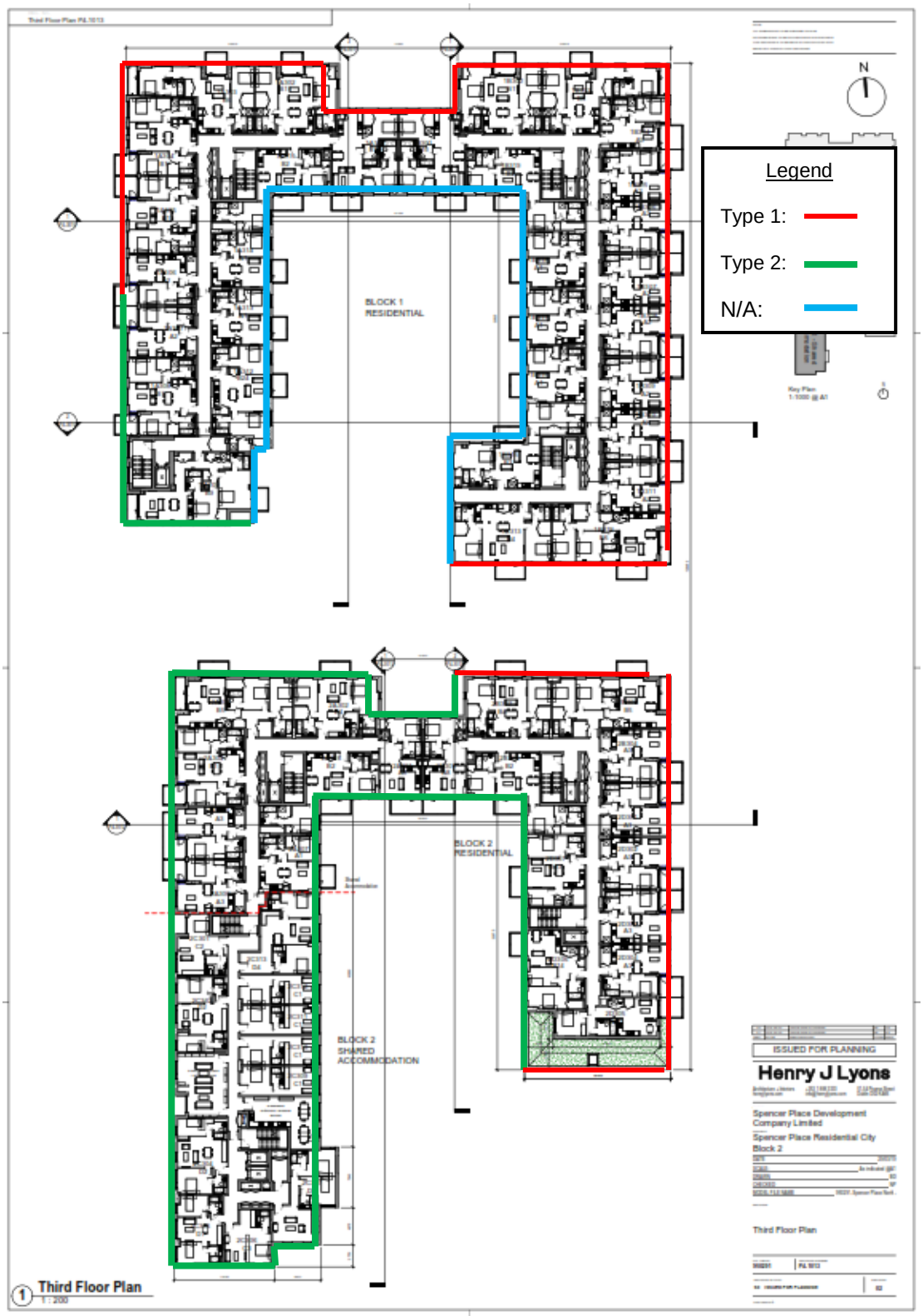

Figure A1 Façade Elevation Mark-up

A2.2 The façade contractor shall demonstrate that the proposed systems meet the relevant requirements by furnishing the results of sound insulation tests conducted in an acoustic test facility and/or the provision of detailed acoustic calculations completed by a suitably qualified acoustic consultant.

A2.3 In the event that such data is not to hand, sound insulation tests should be conducted in accordance with the guidance set out in Section A.4.0 of this specification.

A3.0 CONTROL OF FLANKING NOISE TRANSFER

A3.1 Any curtain wall façades shall be designed such that values for sound insulation performance across vertical and horizontal junctions with separating partitions and floors respectively are equal to or greater than the figures given in Table A2.

Location	Weighted Flanking Normalized Level Difference ($D_{n,f,w}$, dB)
Apartment Accommodation	58
Circulation	58
Plant Rooms	60
Reception / Lobby	58

Table A2 Minimum Requirements for Flanking Noise Control ($D_{n,f,w}$, dB)

A3.2 Sufficient data shall be furnished, in the form of test results and/or any corroborating analyses deemed necessary, in order to satisfactorily demonstrate compliance with the performance specification.

A3.3 In the event that such data is not to hand, sound insulation tests should be conducted in accordance with the guidance set out in Section A.4.0 of this specification.

A3.4 The external façade works shall be able to accommodate simple airtight seals to partitions where applicable, in order to limit flanking noise transfer. This shall be achieved both for partitions that butt onto the back of mullions and for partitions that continue over either side of the mullion, without displaying board edges to the exterior (features to be incorporated into frame design to allow this).

A4.0 GENERAL REQUIREMENTS IN RESPECT OF LABORATORY TESTS

A4.1 The guidance set out in this section is applicable in the event that it is deemed necessary to conduct sound insulation tests in order to demonstrate compliance with the performance specifications set out above.

A4.2 Airborne sound insulation tests shall be conducted and reported fully in accordance with the guidance set out in BS EN ISO 10140: 2010: *Acoustics – Laboratory measurement of sound insulation of building elements – Part 2. Measurement of airborne sound insulation*.

A4.3 The degree of flanking noise control afforded by the facade systems shall be demonstrated by way of laboratory measurements conducted in general accordance with ISO 10848-2:2017 Acoustics. Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms – *Part 2: Application to Type B elements when the junction has a small influence*. The results of measurement shall be standardized to a reverberation time of 0.5 seconds and shall be weighted in accordance with ISO 717-1: 2013: *Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation*.

A4.4 Test samples shall be at least $10m^2$ in area and shall be fully representative of all constituent components making up the element under consideration.

A4.5 The acoustic test facility shall be suitably accredited or otherwise approved. Details of said facility shall be furnished at least eight weeks before the proposed test date.

A4.6 Details of proposed tests shall be provided to the Architect and AWN Consulting at least eight weeks before the proposed test date.

A4.7 The façade walling contractor shall provide test reports in English (or accompanied by a full English translation) demonstrating compliance with the required sound insulation performance.

A4.8 Note that any and all tests may be witnessed by members of the Design Team.

A5.0 IN-SITU PERFORMANCE

A5.1 The glazing contractor shall ensure that the installation and workmanship is of such a standard as to ensure that the Apparent Sound Reduction Index (R') in any one octave band is no more than 2dB lower than the corresponding value as listed in Table A1.

A5.2 The *in-situ* performance shall be verified by AWN Consulting, by way of tests conducted in accordance with the guidance set out in International Standard ISO 16283-3:2016: *Acoustics. Field measurement of sound insulation in buildings and of building elements. Façade sound insulation*.

A5.3 The glazing and or curtain walling contractor shall undertake all works necessary to ensure that there is no significant occurrence of noise as result of creaking, rattling, whistling or any other noises due to the effects of thermal/structural movement or wind/air movement. The maxima associated with such noise shall not be permitted to exceed an in-room level of 35dB L_{AFmax}.