PHILIP DUNBAVIN ACOUSTICS LTD

Alder House, Willow Tree Park, Booths Lane, Lymm, Cheshire, WA13 0GH
Tel: 01925 759380 Fax: 01925 759320 email: maxdesalis@pdaltd.com

ATTENTION:	Daniel Kitson	DATE:	23rd June 2014
COMPANY:	GMG Associates Ltd	FROM:	Max de Salis
EMAIL	daniel@kitsonarchitecture.co.uk cc: PKing@qhotels.co.uk mark@gmg-associates.co.uk, mark@kitsonarchitecture.co.uk	NO. OF PAGES	4

Our Ref: MDS/7452/0778/01

Dear Daniel,

Re: Midland Hotel Sound Insulation Performance with Refurbished Existing Windows – Comparison between Existing and Up-rated Secondary Glass

Please find the following comparison of predicted noise break-in during the construction of the proposed Second City Crossing (SCC) with and without internal secondary glass upgrades:

1.0 Introduction

The desired noise criterion for internal noise levels due to noise break-in at the Midland Hotel, Manchester during the construction of the proposed Second City Crossing (SCC) has been taken from BS8233:1999 "Sound insulation and noise reduction for buildings – Code of practice". BS8233 recommends "reasonable" upper limiting criteria of 40dBL_{Aeq} for bedrooms and meeting rooms.

2.0 Initial Analysis of Existing Systems

Internal noise levels at the hotel were predicted with the current configuration of windows for comparison with the above BS8233 criteria using the calculated façade noise reduction and including for exposure to the 89dBL_{Aeq} external construction noise levels predicted in the TfGM ES with a typical associated construction noise spectrum. These calculations projected noise levels of 50-60dBL_{Aeq} during closest works within bed rooms facing onto the works, with levels of up to 60dBL_{Aeq} expected in meeting / function rooms.

3.0 Recommendations for Compliant Systems

Further assessment has shown that to meet the requirements of BS8233 would require replacement of at least the inner window lights with 12.8mm laminate glazing in brand new sealed frames, and refurbishment of the external lights to a good seal. In addition at least a 300mm cavity between inner and external frames would be required.

4.0 Alternative System Up-rating just Secondary Glass and not Frames

While Section 3.0 details an adequate system to meet the criteria from BS8233, it was understood that the changing of the secondary frames would not be allowed due to heritage restrictions. This means that the criteria will be exceeded.

In light of this, to reduce the impact of the exceedances a compromise has been proposed including; replacement of inner light glazing (not frames) with thicker 10.8mm laminate glass, refurbishment of internal and external framing to a good seal, incorporation of temporary absorbent acoustic reveals for the duration of the construction. All of the above is proposed while maintaining the existing cavities between primary and secondary glazing which range from 100mm to 450mm.

5.0 Comparison of System using Up-rated Secondary Glass with System retaining Original Secondary Glass

It is understood that, due to heritage considerations, there is still some resistance to the replacement of the glass within the existing secondary glazing systems. This would further reduce the sound insulation performance of the glazing thus resulting in even higher internal noise levels.

The following table gives a comparison of predicted maximum noise levels due to SCC construction noise based on: i) refurbished windows with existing glazing, and ii) refurbished windows with up-rated 10.8mm laminated glass within the existing secondary frames. The table is based on a rock-breaking noise source which will be one of the loudest single noise sources used during the construction:

Table 1: Summary of Predicted Internal Noise Levels at Midland Hotel during Construction of (Closest works) of the Second City Crossing – Rock-breaker Works

Room	**Existing Refurbished Windows Predicted Noise Level (dB L_{Aeq})**	**Exceedance of Criteria (dB L_{Aeq})**	**Existing Refurbished with Upgraded Secondary Glass Predicted Noise Level (dB L_{Aeq})**	**Exceedance of Criteria (dB L_{Aeq})**	***Improvement (dB L_{Aeq})***
Alexandra Suite	35	-	N/A	-	*N/A*
Trafford Room	42	2	38	-	*4*
Stanley Suite	42	2	39	-	*3*
Chester Suite	43	3	40	-	*3*
Derby Suite	42	2	38	-	*4*
Fairclough Suite	54*	14*	36**	- **	*18*
Bed 003-006	42	2	41	1	*1*
Bed 001 and 007	46	6	42	2	*4*
Bed 002	44	4	41	1	*3*
Bed 009 and 010	45	5	42	2	*3*
Bed 112 and 114	46	6	43	3	*3*
Bed 115 and 116	47	7	44	4	*3*
Bed 119 and 120	46	6	42	2	*4*

*Mixture of primary and secondary windows.
**New secondary windows here where originally only single glazed exist.

As shown the predictions with upgraded secondary glass are such that all but two of the rooms will be within 3dB of the required criteria, with 3dB being the threshold of a noticeable step change in noise level, thus meaning that exceedance could be argued as being “negligible” to “minor” in terms of relative noise impact between the two systems. Without the upgraded secondary glass the majority of bedrooms are 4dB or more above the criteria thus meaning a “moderate” to “major” increase.

The majority of loudest operations would be expected to be from rock-breaker operations. However, there will also be significant noise from diesel engine operations which will also cause occasional exceedances of BS8233 criteria. The upgraded secondary glass will give significant improvement to this noise source also, although degrees of improvement vary from the rock-breaker source in Table 1 due to the lower frequency character of the diesel engine noise. Improvements compared to predictions retaining existing glass are given below:

Table 2: Summary of Predicted Internal Noise Levels at Midland Hotel during Construction of (Closest works) of Second City Crossing – Improvements due to Up-rated Secondary Glass for Diesel Engine Noise Sources

Room	***Improvement (dB L_{Aeq})***
Alexandra Suite	*N/A*
Trafford Room	*2*
Stanley Suite	*3*
Chester Suite	*4*
Derby Suite	*4*
Fairclough Suite	*11*
Bed 003-006	*7*
Bed 001 and 007	*6*
Bed 002	*1*
Bed 009 and 010	*4*
Bed 112 and 114	*5*
Bed 115 and 116	*2*
Bed 119 and 120	*3*

6.0 Conclusion

In reality the noise break-in will be a mixture of the rock-breaking noise source and the diesel engine sources. As such the improvements due to the up-rated glazing and the exceedances of criteria will range between those in Tables 1 and 2. From the noise levels in Table 1 the following can be stated:

- ***Without*** upgraded secondary glass the exceedances of the criteria from BS8233 in the majority of rooms could be described as ranging between “moderate” and “major”.

- ***With*** upgraded secondary glass the exceedances of the criteria from BS8233 in the majority of rooms could be described as ranging between “negligible” and “minor”.

Based on the noise levels in Tables 1 and 2 it can be stated that significant improvements will be achieved using the up-rated glazing for both diesel engine and rock-breaker noise sources.

I hope the above meets with your requirements, however if you need any further clarification please do not hesitate to contact me.

Yours sincerely,



Max de Salis
Principal Consultant