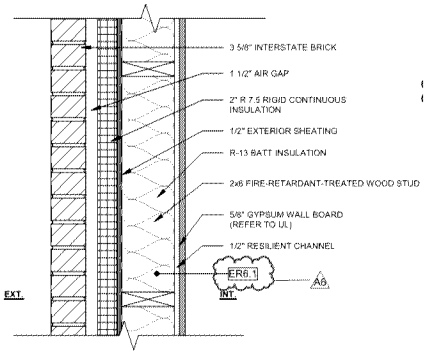
Case # PL2018-122
2325, 2349, 2357, 2373 EAST OLD SHAKOPEE RD
2300 EAST 86TH ST

Project Name: Hyatt House - Bloomington, MN
Project #: B4-133-1804

(Condition #19) Documentation on STC ratings for roof, ceiling, wall assemblies, windows, and doors. This documentation could come from the architect or a sound engineer.

Plans submitted for building permits must include documentation that construction will provide a Sound Transmission Class (STC) rating of at least 40 for roof, ceiling, and wall assemblies, STC rating of at least 30 for guest room windows, and STC rating of at least 20 for exterior doors unless a certified sound specialist documents the construction will provide a 20 dBA noise level reduction through alternative means.

1. **Sound Transmission Class (STC) rating of at least 40 for wall assemblies:**
   a) **Exterior walls:** Clark Dietrich RC Deluxe Resilient channel is added to **Exterior walls** as per Acoustical engineer recommendations to increase STC rating to OITC 32. Please refer to Partition & Floor Type sheet A-600 and Outdoor Noise Analysis report.



1 A-600 ER-6.1- EXTERIOR WOOD WALL WITH BRICK FINISH
1 1/2" = 1'-0"

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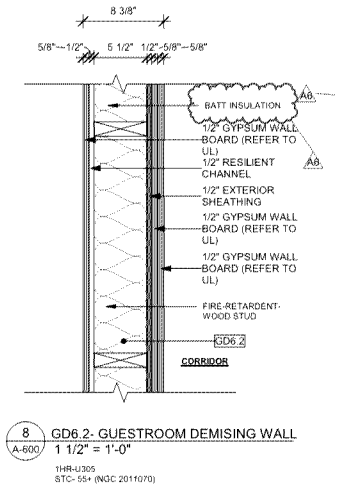
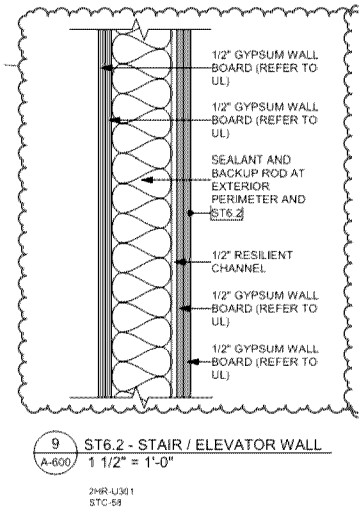
b) Demising Walls and Corridor walls: The wall assembly provided have 56 STC per the UL U305 Specifications. Please refer to Partition & Floor Type sheet A-600.



c) Wall assembly between the guestrooms and stairwells: have 58 STC rating as per USG-810219 test number. Also, a furring wall is added between the rooms which increase the STC requirements.



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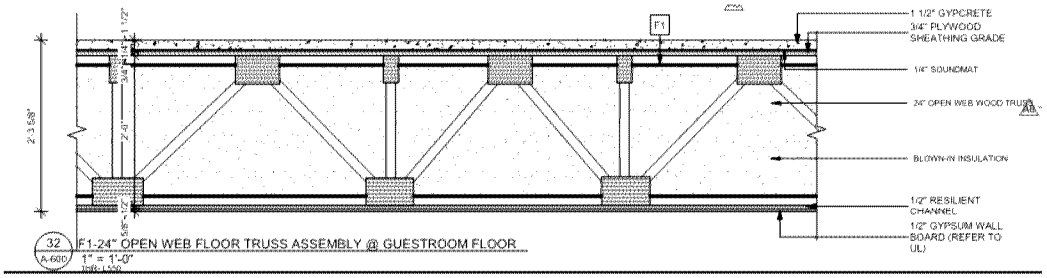
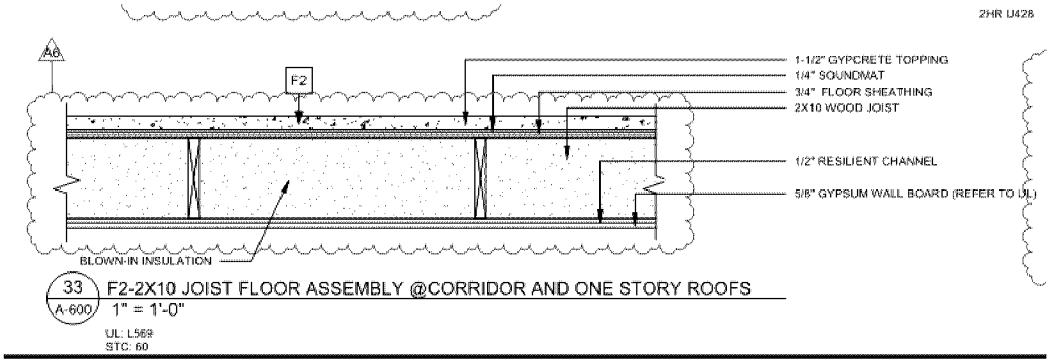
2. **Sound Transmission Class (STC) rating of at least 40 for floor ceiling assemblies:**

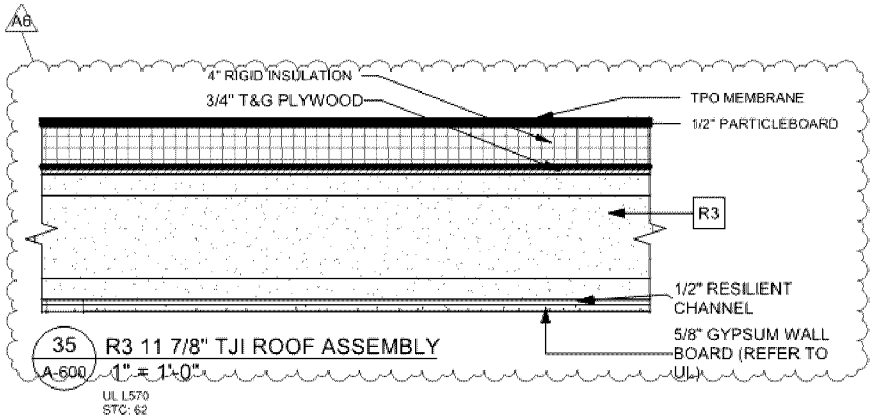
- **Guestroom-floor ceiling assembly** L550 have a STC rating of 62 as per RAL-0T04-05 & 06 sound test.



- **Corridor floor ceiling assembly** have a STC rating of 60 as per USG specification for UL569.



- **Guestroom Roof assembly** have a STC rating of 62 as per USG specification for UL570.



- Please refer to sheet A-600 for floor-ceiling assembly details.

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3. STC rating of at least 30 for guest room windows:

The Acoustical Engineer (esi engineering) has suggested the options for Windows selection with a minimum rating of OITC 30 which should be selected for construction:

a. **EFCO PX32 Inswing Casement Acoustic** - Operable Window Unit with a 5/16 inch glass, 7/16 inch air space, 7/32 inch glass glazing unit (OITC 31

b. **Mon-Ray DeVAC 660-SR Double Hung** with a glazing unit composition of 1/8 inch glass, 5/8 inch air space, 3/16 inch glass (OITC 31

c. The following notes for a minimum OITC 30 Rating and min STC 41 for guestrooms glazing are included in the window schedule plans:

NOTE:
-CLEAR ANODIZED GLAZING UNLESS SPECIFIED OTHERWISE BY BRAND OR OWNER;
-WINDOWS TO HAVE A OITC 30 RATING

a.

b.

GENERAL GUESTROOM GLAZING NOTES

1. MIN STC 33 ON GUESTROOMS WINDOWS
2. MIN STC 41 IF HOTEL IS BY HIGHWAY OR AIRPORT

c. Please refer to Sheet A-620 Window storefront schedule and Outdoor Noise Analysis report.

4. STC rating of at least 20 for exterior doors:

a. The following note for a minimum 30 STC Rating IS included in the door schedule plans:

17. DOOR BOTTOMS AT GUEST ROOMS: PEMKO 2173. FIRE RATED, ALLOWS AIR FLOW, AND KEEPS OUT LIGHT
18. MELAMINE DOORS SHOULD BE DOUBLED
19. EXTERIOR DOORS TO HAVE A MIN. 20 STC

b.

c. Please refer to Door schedule sheet A-610.

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PL2018-122

esi engineering

July 2, 2018

Mr. Jay Bhakta
JR Hospitality
9333 Springbrook Drive NW
Minneapolis, Minnesota 55433

Subject: Summary Report
Aircraft Noise Control
Hyatt House – Bloomington, Minnesota

Dear Mr. Bhakta:

We understand there are concerns about aircraft noise at the site of a new Hyatt House hotel in Bloomington, Minnesota. The project site is located near the departure/arrival flight path for the Minneapolis-St. Paul (MSP) airport north/south runway. JR Hospitality requested that aircraft noise be measured at the site, and an analysis be performed to predict the noise levels inside guest rooms. The following is a summary of our findings.

ANALYSIS CONSIDERATIONS

Our analysis is based on the following:

1. Architectural drawings reviewed for this project were the "Issued For 30% Franchise" set prepared by Base4 and dated May 28, 2018.
2. The new Hyatt House hotel in Bloomington, Minnesota will be located at the northeast corner of E Old Shakopee Rd and E 86th St. As shown in Figure 1, the project site is south of the MSP Airport north/south runway and southeast of the Mall of America.
3. We are unaware of any Hyatt House requirements for noise levels inside guest rooms. Based on our experience with other similar hotel projects, we assume design goals of 45 dBA during daytime hours and 40 dBA at nighttime should be met. These criteria are hourly averages, not short duration noise limits, with daytime hours from 7:00 AM to 10:00 PM, and nighttime hours from10:00 PM to 7:00 AM.

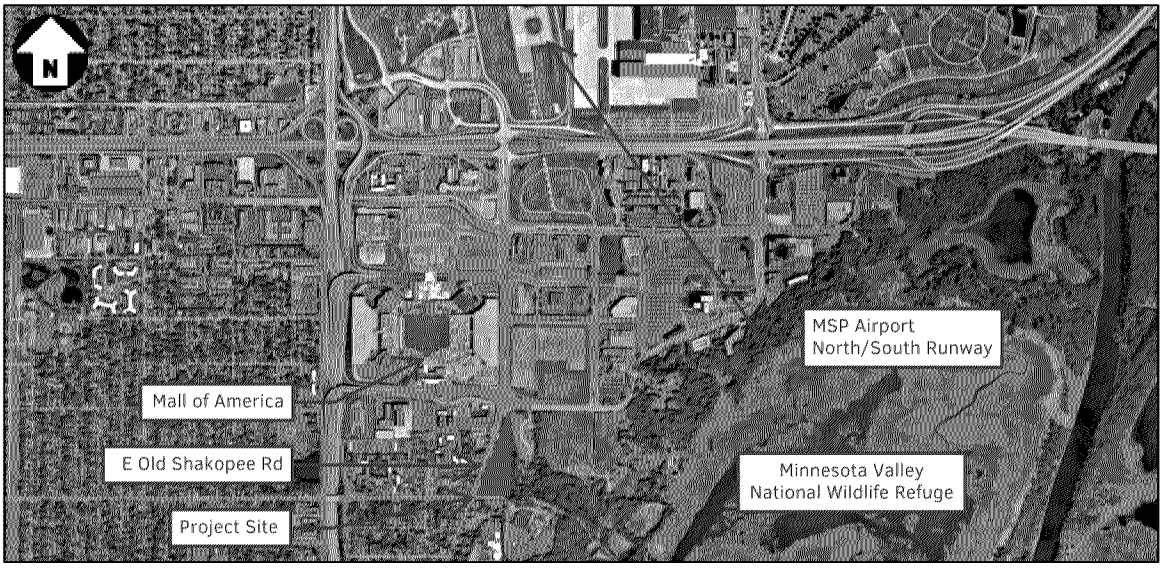

Figure 1 – Aerial image showing project site and nearby adjacencies.

4. The main MSP south runway flight path is about 2,000 feet east of the project site. Figure 2 shows a picture of a jet departing the airport from the south runway. In our review of the MAC FlightTracker website, it appears that jets sometime come within 1,000 feet of the site, but do not fly directly over.

5. The guest room exterior wall type is shown in Figure 3. Based on archived sound transmission loss data for building façades, we estimate the wall assembly has an outdoor-indoor transmission class (OITC[1]) rating of 27[2].

6. The guest room roof type is shown in Figure 4. Based on archived data for exterior building elements, we estimate the roof assembly has a rating of OITC 37[3]. The primary reason this rating is 10 points higher than the wall is due to the gypsum board ceiling being hung with resilient channel.

7. Guest room windows are assumed to have fixed aluminum frames with 1 inch insulated glazing units that consist of 1/4 inch glass, 1/2 inch air space, 1/4 inch glass. The laboratory tested rating for these windows is OITC 26[4].

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[1] As defined in ASTM standard E1332-, "outdoor-indoor transmission class, OITC, of a building façade or façade element, is a single-number rating calculated in accordance with Classification E1332 using measured values of sound transmission loss." The standard also states, "These ratings provide an evaluation and rank ordering of the performance of test specimens based on their effectiveness at controlling the sound of a specific outdoor sound spectrum called the reference source spectrum." It is based on laboratory tests of assemblies that serve as acoustical barriers, with higher values representing better insulation.

[2] Based on laboratory test report number TLA-99-071a by the National Research Council of Canada.

[3] Based on laboratory test report number TLF-98-059a by the National Research Council of Canada.

[4] Laboratory test report number RAL-TL13-097 for RAL, for EFCO Corporation, Series 3903 Fixed Window Mark: C.

Figure 2 – Photo of the project site looking north showing a southbound jet departing the airport with a flight path that is east of the project site.

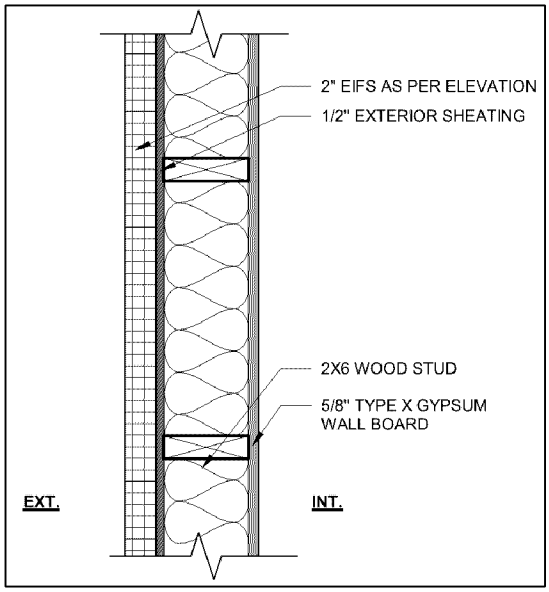

Figure 3 – Base4 detail of the guestroom exterior wall.

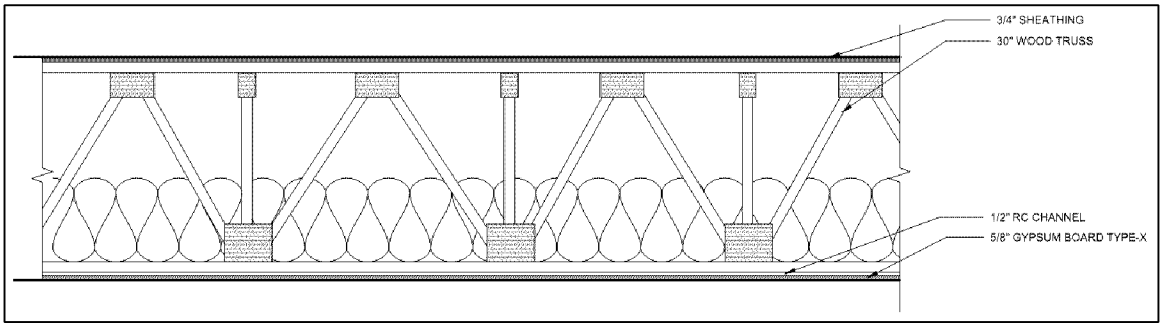

Figure 4 – Base4 detail of the guest room roof assembly.

8. We understand VTAC (vertical terminal air conditioner) units, such as the one shown in Figure 5, will condition air for guest rooms. These units penetrate the exterior façade and allow some sound to pass through them. The specific VTAC units have not yet been selected for this project. Based on our previous work with these units, we are making a worst-case assumption that the VTAC selection will have a rating no less than OITC 20.

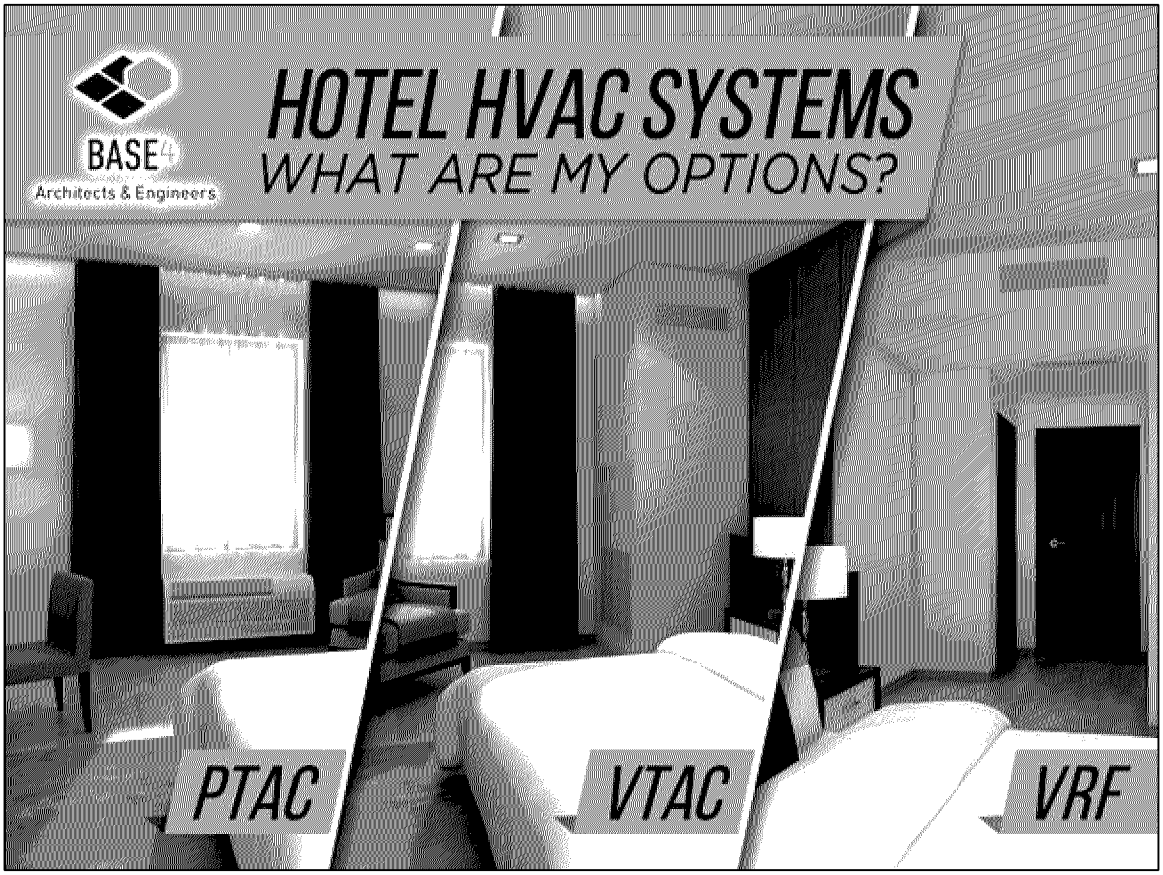

Figure 5 – Base4 image of PTAC, VTAC and VRF air conditioner options.

NOISE MEASUREMENTS

1. While on site, it was observed that the background noise levels are relatively quiet. There were occasional automobile passes on E Old Shakopee Rd, but other busier traffic on the nearest highways is not near enough to produce loud noise levels. However, when jets depart MSP airport using the north/south runway, the noise levels are significantly increased. Hotel guests may be bothered by this noise level change.

2. Outdoor ambient noise monitoring was performed continuously between 9:30 AM on Friday, May 11, 2018, and 5:20 AM on Monday, May 14, 2018. The monitoring equipment was located near the center of the project site (see Figure 6). Measurement time history data showing one second and hourly equivalent A-weighted sound pressure level (L_{Aeq})[5] results is provided in Attachment A. The hourly outdoor noise levels ranged from 49 dBA at night when the MSP south runway was not in use, to 70 dBA during the day when many jets were using the south runway for departures. Also, individual jet pass events had measured noise levels as high as 83 dBA during the nighttime and 93 dBA during the day.

Figure 6 – Panoramic photo looking north (left) to south (right) at the project site with the sound equipment chained to the nearest tree.

CALCULATION RESULTS AND RECOMMENDATIONS

Calculations were prepared to determine outdoor noise transmission into two guest room conditions: (1) top floor guest rooms with roof and wall exposure to the outside, and (2) inboard floor guest rooms with only wall exposure (see Figure 7). Based on the analysis conditions described above, the calculated hourly noise levels in the two guest room conditions are shown in Table 1 and plotted in Figures 8 and 9. In both cases, the calculation results meet the design goals for all hours of the day and night.

[5] Equivalent A-weighted sound pressure level, or L_{Aeq}, is the average overall sound pressure level measured in pascals during a particular time period that is then converted to decibels and given an A-weighting to match human hearing.

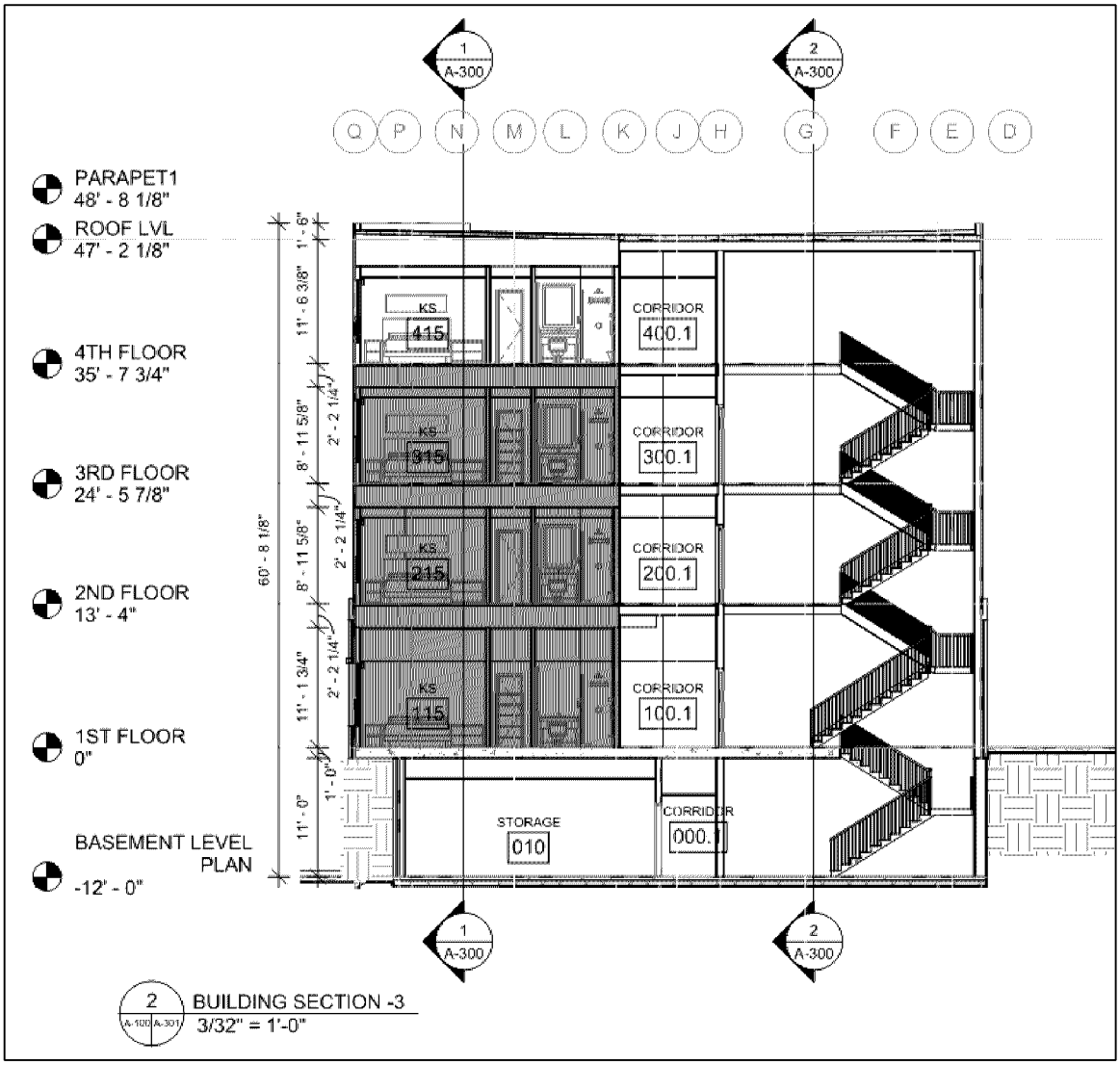

Figure 7 – Base4 building section showing a guest room with roof and wall exposure (highlighted yellow) and guest rooms with only wall exposure (highlighted green).

Table 1 – Outdoor Noise Transmission Calculation Results

Guest Room Location	Daytime		Nighttime	
	Maximum Hourly Noise Level	Hourly Design Goal	Maximum Hourly Noise Level	Hourly Design Goal
Top Floor	41 dBA	45 dBA	35 dBA	40 dBA
Inboard Floor	42 dBA		36 dBA	

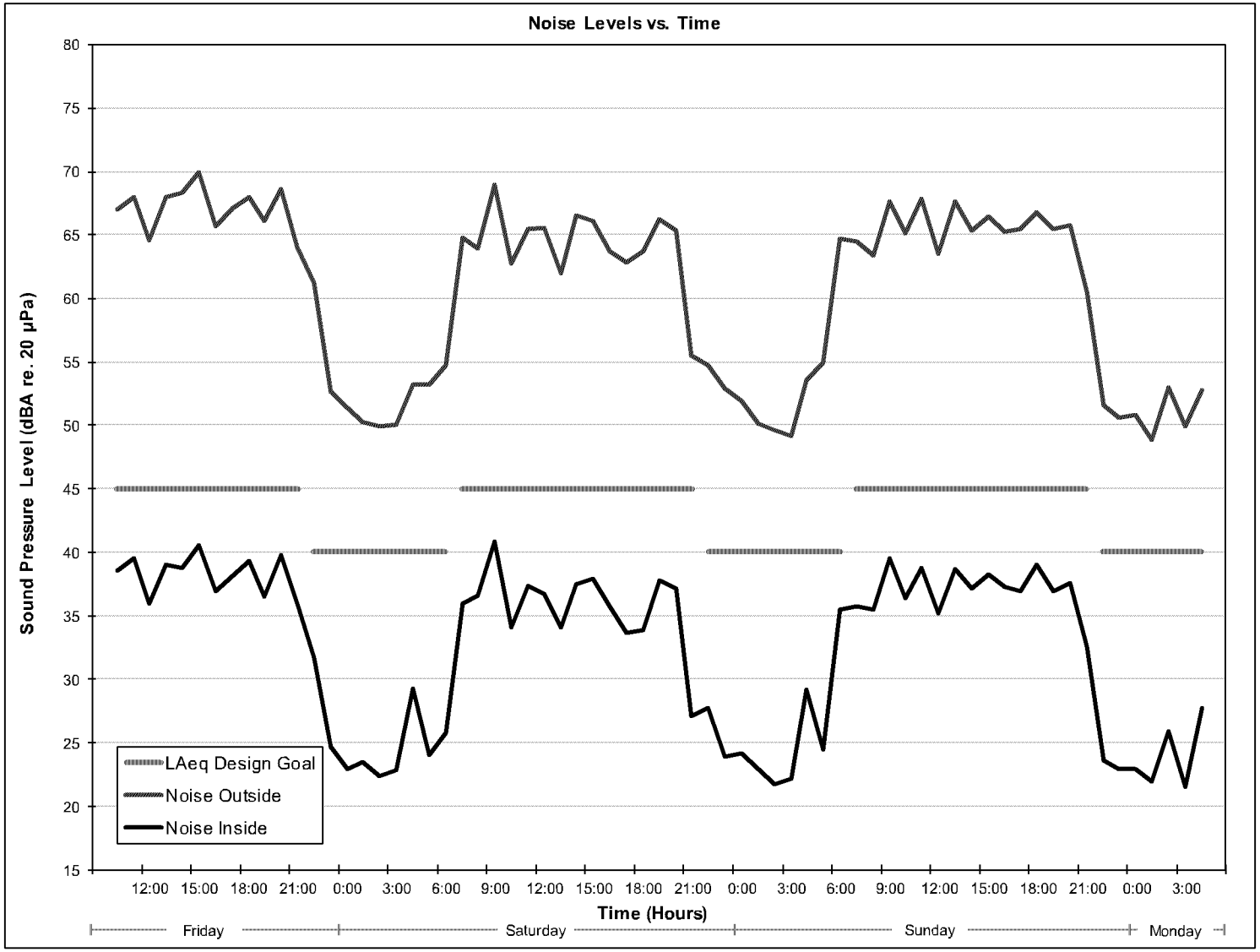

Figure 8 – As-designed top floor guest room, measured overall hourly time history, calculated indoor levels, and goals.

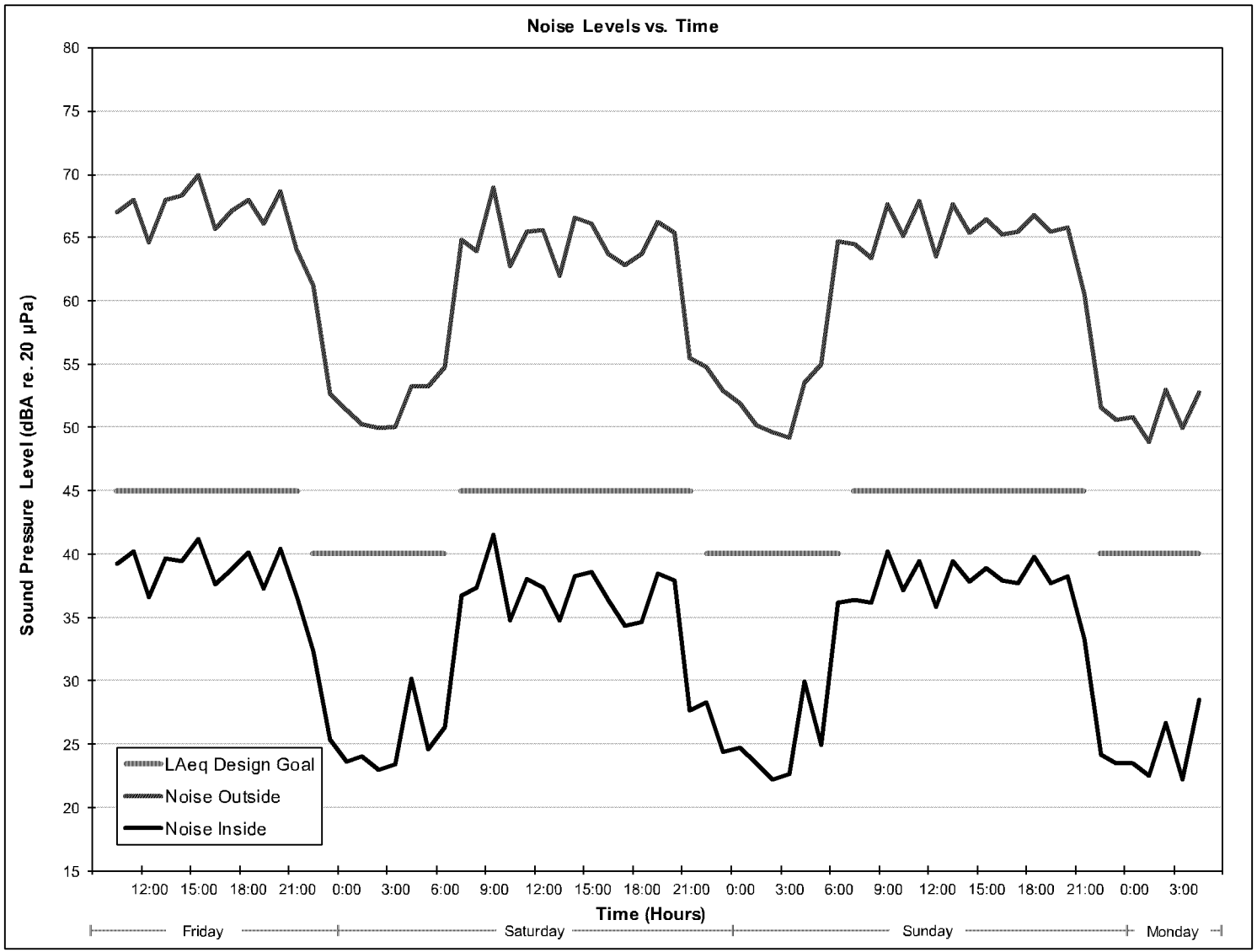

Figure 9 – As-designed inboard floor guest room, measured overall hourly time history, calculated indoor levels, and goals.

Even though the hourly design goals are met with the as-designed conditions, we are concerned that guests may be bothered by individual jet pass events during nighttime hours. According to a report by the World Health Organization[6], many people start to have sleep disturbance when maximum event noise levels exceed 45 dBA. Based on this finding, the team could consider using a maximum event design goal of 50 dBA during nighttime hours.

Calculations were prepared to evaluate individual event noise levels inside guest rooms for the loudest nighttime hour that was measured, which was Sunday, May 13th between 6:00 AM and 7:00 AM. The results of this analysis are plotted in Figure 11. During this nighttime hour, six events have maximum noise levels that exceed the 50 dBA criterion.

The north, east and south faces of the building are directly exposed to jet noise. For the measured event noise levels to meet the 50 dBA criterion, the guest room walls and windows on these building faces should be modified. We recommend the following:

1. Add resilient channel (ClarkDietrich RC Deluxe, no substitutes) to these exterior walls of the building. This modification increases the wall rating from OITC 27 to OITC 32[7]. Figure 10 shows the exterior wall type updated to include resilient channel.

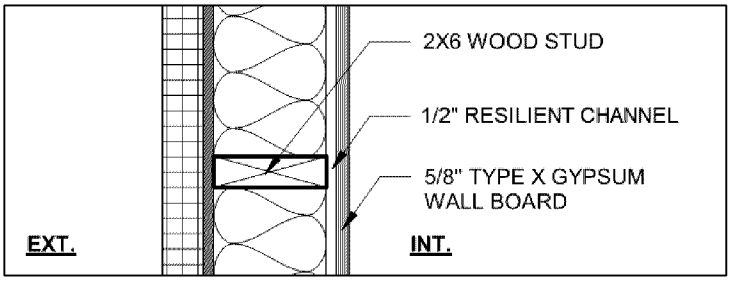

Figure 10 – Detail of the guest room exterior wall with resilient channel.

2. Select windows with a minimum rating of OITC 30. A couple options are:
    a. EFCO PX32 Inswing Casement Acoustic - Operable Window Unit with a 5/16 inch glass, 7/16 inch air space, 7/32 inch glass glazing unit (OITC 31[8])
    b. Mon-Ray DeVAC 660-SR Double Hung with a glazing unit composition of 1/8 inch glass, 5/8 inch air space, 3/16 inch glass (OITC 31[9])

Figure 12 shows the worst-case nighttime hour noise levels inside a guest room with these wall and window modifications, which shows that none of the events exceed the 50 dBA criterion. No modifications to the roof assembly or VTAC unit are needed.

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[6] World Health Organization, Night Noise Guidelines for Europe, 2009
[7] Based on laboratory test report number TLA-99-061a by the National Research Council of Canada.
[8] Laboratory test report number RAL-TL13-193 by Riverbank Acoustical Laboratories.
[9] Laboratory test report number RAL-TL13-193 by Riverbank Acoustical Laboratories.

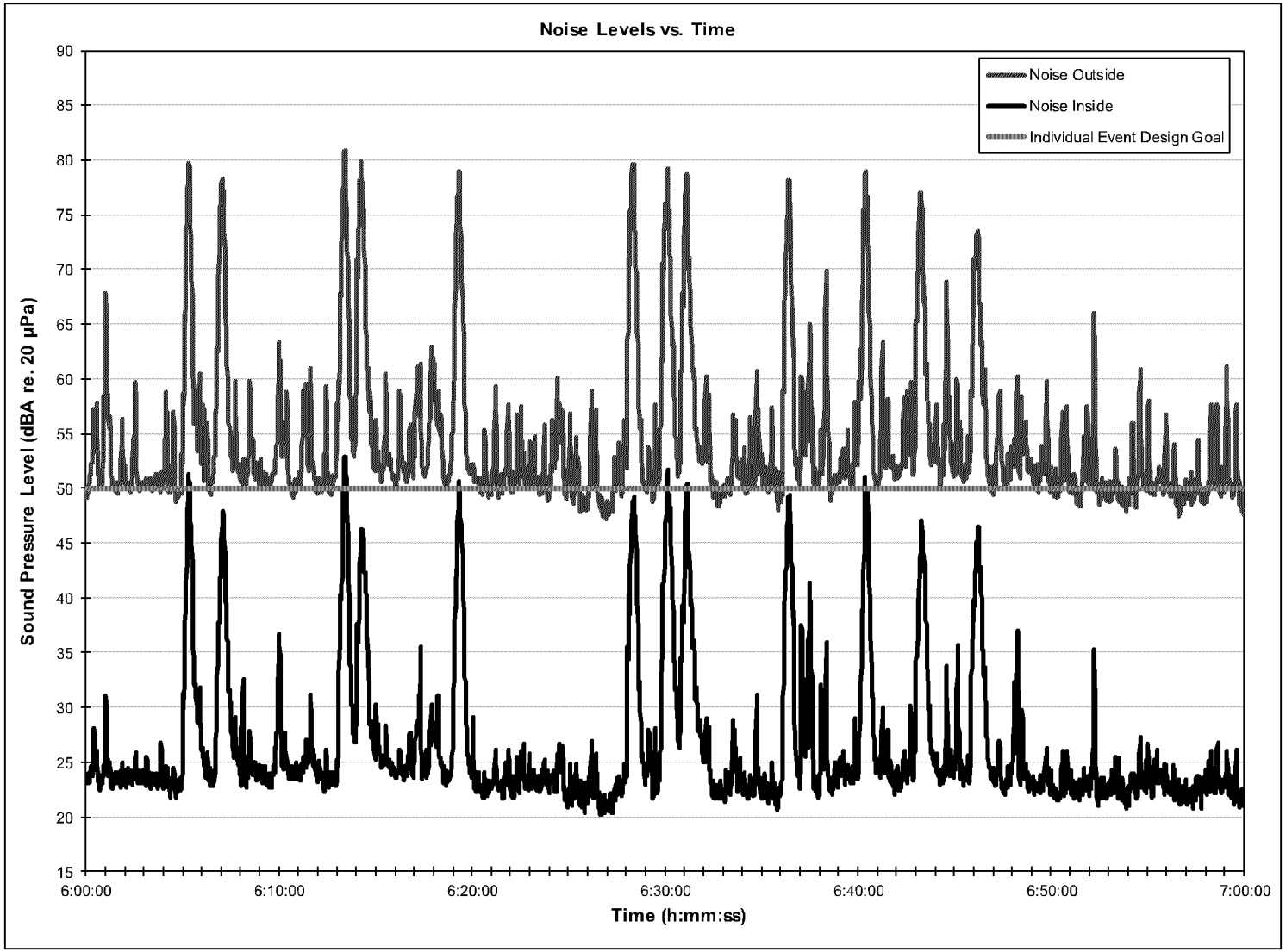

Figure 11 – As-designed inboard floor guest room, measured one-second time history, calculated indoor levels, and goal.

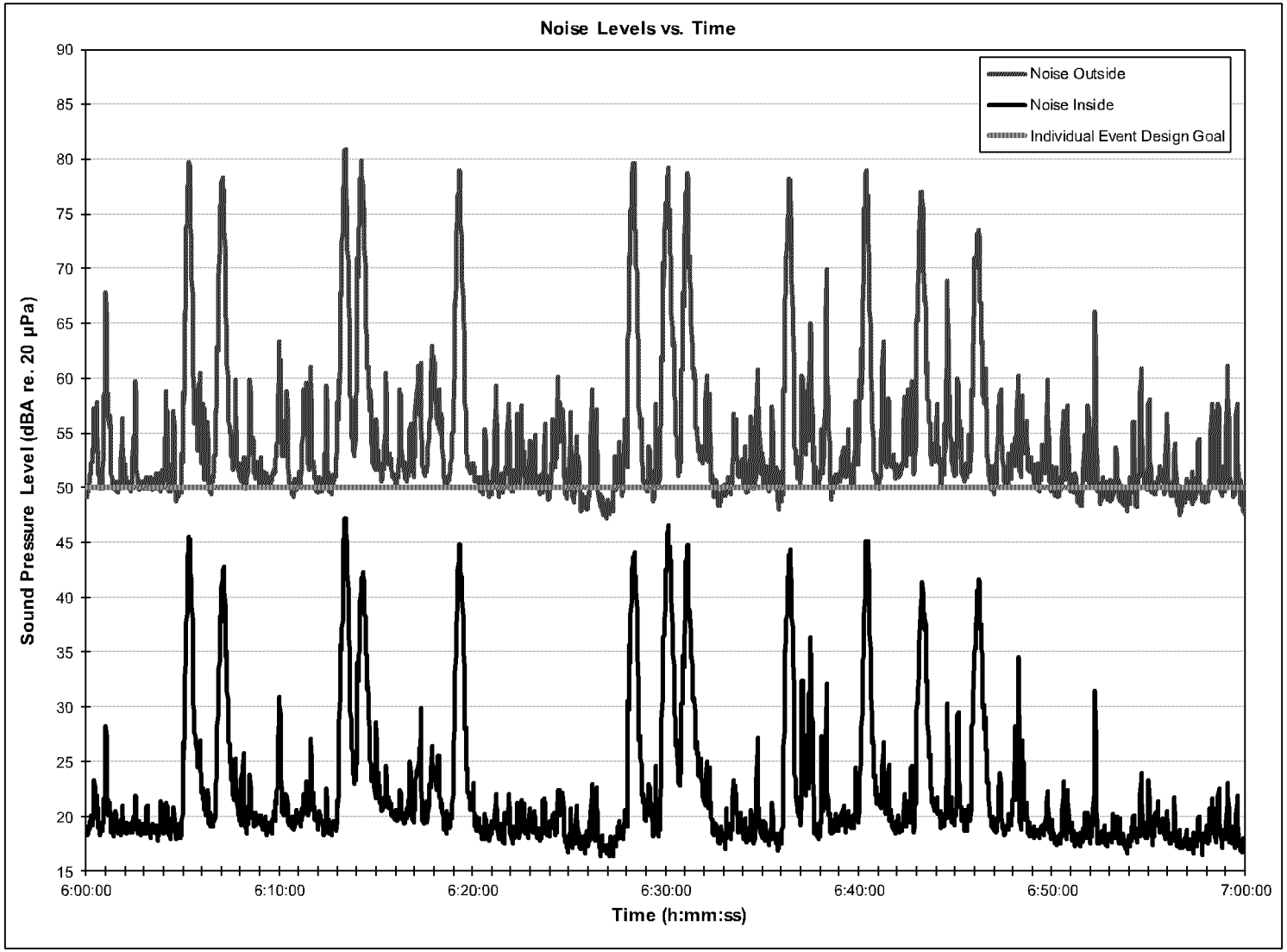

Figure 12 – Modified inboard floor guest room, measured one-second time history, calculated indoor levels, and goal.

CONCLUSIONS

ESI Engineering was asked to evaluate aircraft noise transmission into future guest rooms at the new Hyatt House hotel in Bloomington, Minnesota. Ambient noise at the project site was relatively quiet with occasional automobile passes on E Old Shakopee Rd. However, aircraft departures and arrivals from the MSP airport north/south runway were significantly louder than the background noise levels. Measured hourly outdoor noise levels ranged from 49 dBA at night to 70 dBA during the day, with individual jet pass levels measured at up to 83 dBA during the nighttime and 93 dBA during the day.

With the current exterior façade design, calculations found that the highest hourly outdoor noise levels inside guest rooms are 36 dBA during the nighttime and 42 dBA during the daytime, which meet the hourly design goals of 40 dBA and 45 dBA, respectively. No modifications to the existing design are needed to meet the hourly noise level design goals.

However, because jet passes near the project site are relatively loud compared to the background noise level, the project team could consider using a guest room nighttime design goal of 50 dBA for individual jet pass events. During the loudest measured nighttime hour, six events have maximum noise levels that exceed the 50 dBA criterion. To meet the criterion, the following modifications to the exterior walls and windows on the north, east and south faces of the building are needed:

- Add resilient channel to the guest room exterior wall type, which increases the wall rating form OITC 27 to OITC 32.
- Use windows with a minimum rating of OITC 30.

With these modifications, the highest jet pass noise levels inside guest rooms during the loudest nighttime hour are 47 dBA or less, which meets the 50 dBA criterion and provides some room for variability in construction quality that is inherent in most projects.

This analysis only provides estimates for guest room noise levels and the built conditions may be different due to variations in jet noise levels, the quality of exterior wall construction, or flanking sound paths if windows or VTAC units are not completely sealed.

We appreciate the opportunity to work with JR Hospitality on this project to serve the needs of Hyatt House and remain available to assist in the resolution of these and any other matters. Please let us know if you have any questions or need more information.

Sincerely,

Ryan L. Skoug, P.E. (Acoustics/Oregon)
Consulting Engineer
ESI Engineering, Inc.

Anthony J. Baxter, P.E.
Principal
ESI Engineering, Inc.

Attachments

PL201800122
PL2018-122

Attachment A

Outdoor Sound Measurement Data

Hyatt House Aircraft Noise Control – July 2, 2018

PL201800122
PL2018-122

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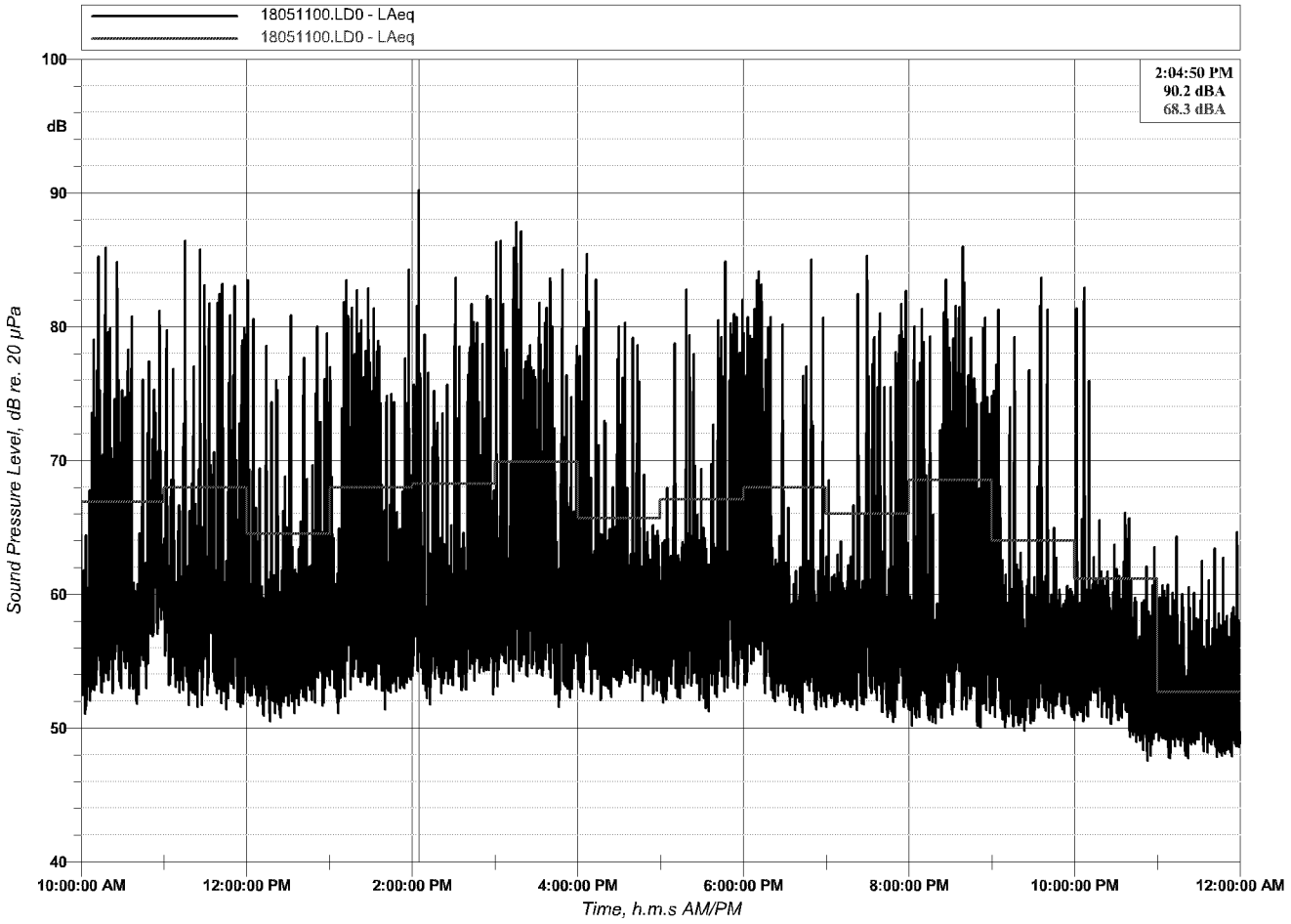
Acoustic Test Results

Minneapolis, Minnesota | o: 952.831.4646 | esi-engineering.com

Project No:	P2450	**Analyzer:**	Larson Davis 831 s/n 3553
Project:	JR Hospitality - Hyatt House Aircraft Noise	**Preamplifier:**	Larson Davis PRM831 s/n 029391
Location:	Bloomington, Minnesota	**Microphone:**	Larson Davis 377B20 s/n 137686
Engineer:	R.L. Skoug	**Calibrator:**	Bruel & Kjaer 4231 s/n 3009047
		Last Calibrated:	February 20, 2018

Location:	Project Site	**Meteorology:**	Temperature: 48 °F - 53 °F Wind Speed / Dir.: 8-21 MPH / E Humidity: 54% - 74%
Date:	5/11/2018		
Start Time:	9:30:59 AM		
End Time:	12:00:00 AM	**Calibration Check:**	Calibration Frequency: 1 kHz Initial Calibration: 93.9 dB Final Calibration: 93.9 dB Last Cal. Check: 5/14/18 @ 11:26 AM
Run Time:	52141.0 seconds		
Measurements:	Friday - One Second and Hourly Ambient Noise Levels A-Weighted Results		



Noise Monitoring
Measured Hourly LAeq Data

Time	LAeq	Time	LAeq	Time	LAeq
10:00:00 AM	67 dBA	3:00:00 PM	70 dBA	8:00:00 PM	69 dBA
11:00:00 AM	68 dBA	4:00:00 PM	66 dBA	9:00:00 PM	64 dBA
12:00:00 PM	65 dBA	5:00:00 PM	67 dBA	10:00:00 PM	61 dBA
1:00:00 PM	68 dBA	6:00:00 PM	68 dBA	11:00:00 PM	53 dBA
2:00:00 PM	68 dBA	7:00:00 PM	66 dBA		

Figure A1

PL201800122
PL2018-122

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Acoustic Test Results

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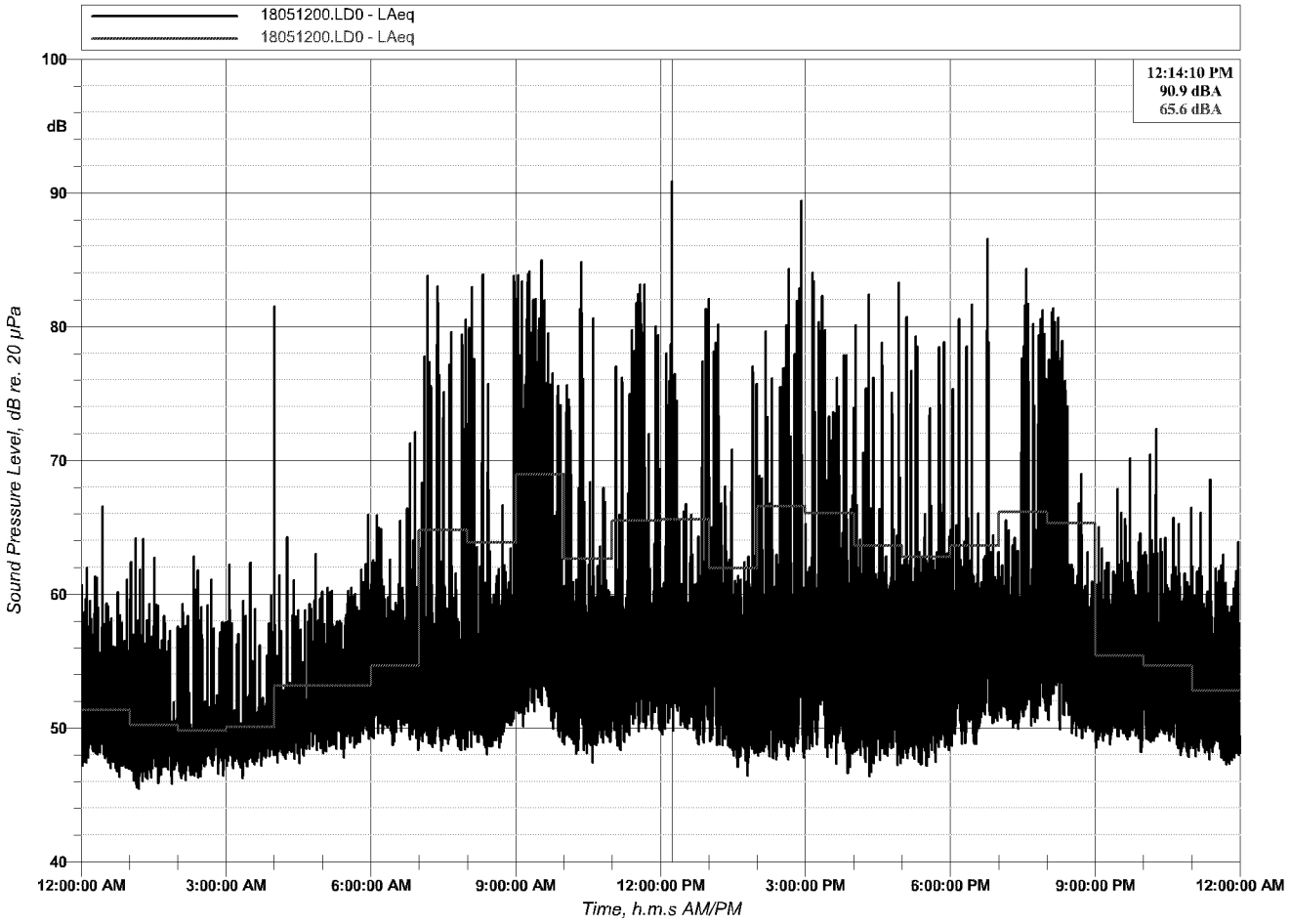
Project No:	P2450	**Analyzer:**	Larson Davis 831 s/n 3553
Project:	JR Hospitality - Hyatt House Aircraft Noise	**Preamplifier:**	Larson Davis PRM831 s/n 029391
Location:	Bloomington, Minnesota	**Microphone:**	Larson Davis 377B20 s/n 137686
Engineer:	R.L. Skoug	**Calibrator:**	Bruel & Kjaer 4231 s/n 3009047
		Last Calibrated:	February 20, 2018

Location:	Project Site	**Meteorology:**	Temperature: 47 °F - 61 °F Wind Speed / Dir.: 0-16 MPH / E Humidity: 32% - 83%
Date:	5/12/2018		
Start Time:	12:00:00 AM		
End Time:	12:00:00 AM	**Calibration Check:**	Calibration Frequency: 1 kHz Initial Calibration: 93.9 dB Final Calibration: 93.9 dB Last Cal. Check: 5/14/18 @ 11:26 AM
Run Time:	86400.0 seconds		
Measurements:	Saturday - One Second and Hourly Ambient Noise Levels A-Weighted Results		



Noise Monitoring
Measured Hourly LAeq Data

Time	LAeq	Time	LAeq	Time	LAeq	Time	LAeq
12:00:00 AM	51 dBA	6:00:00 AM	55 dBA	12:00:00 PM	66 dBA	6:00:00 PM	64 dBA
1:00:00 AM	50 dBA	7:00:00 AM	65 dBA	1:00:00 PM	62 dBA	7:00:00 PM	66 dBA
2:00:00 AM	50 dBA	8:00:00 AM	64 dBA	2:00:00 PM	67 dBA	8:00:00 PM	65 dBA
3:00:00 AM	50 dBA	9:00:00 AM	69 dBA	3:00:00 PM	66 dBA	9:00:00 PM	55 dBA
4:00:00 AM	53 dBA	10:00:00 AM	63 dBA	4:00:00 PM	64 dBA	10:00:00 PM	55 dBA
5:00:00 AM	53 dBA	11:00:00 AM	66 dBA	5:00:00 PM	63 dBA	11:00:00 PM	53 dBA

Figure A2

PL201800122
PL2018-122

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Acoustic Test Results

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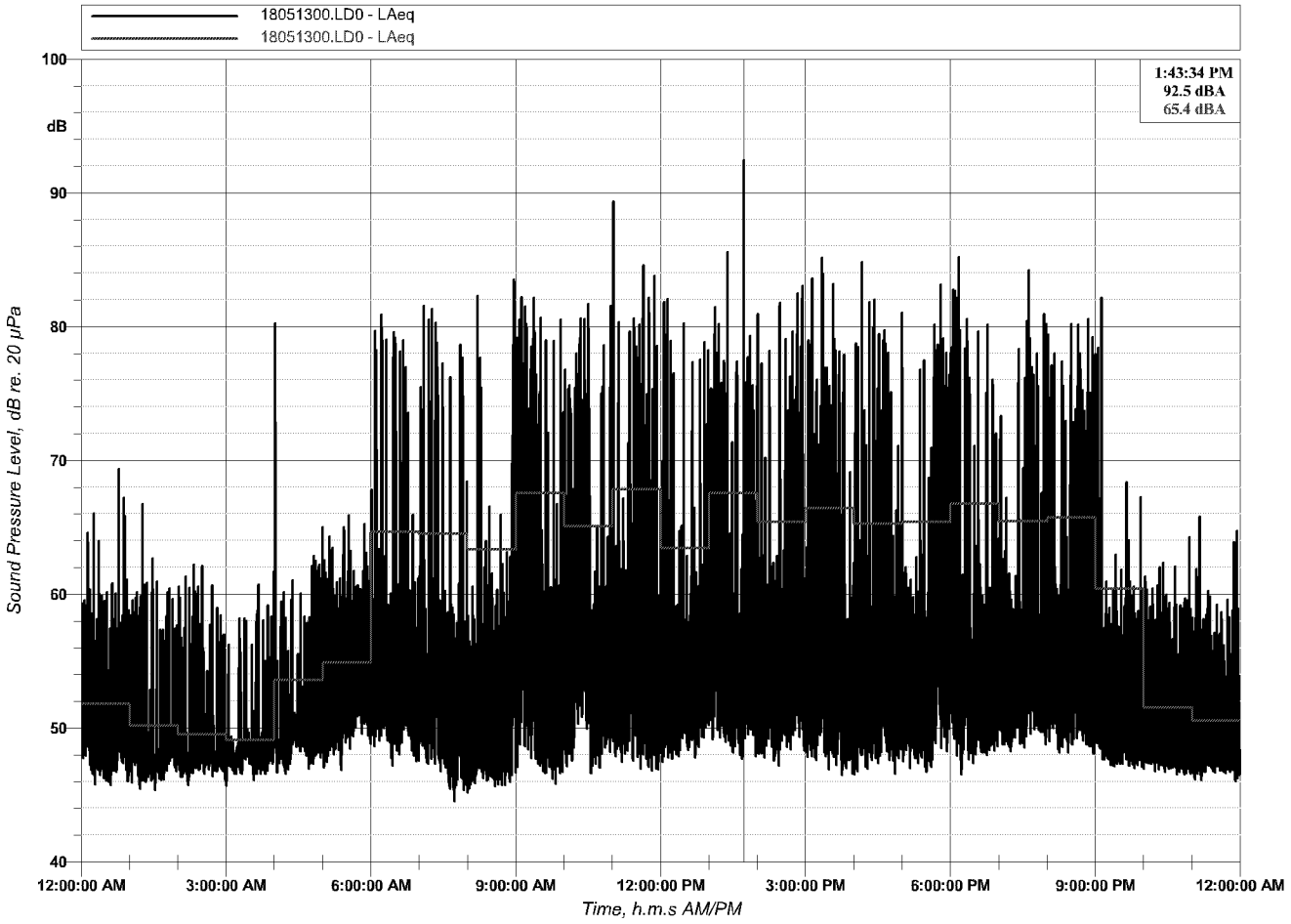
Project No:	P2450	**Analyzer:**	Larson Davis 831 s/n 3553
Project:	JR Hospitality - Hyatt House Aircraft Noise	**Preamplifier:**	Larson Davis PRM831 s/n 029391
Location:	Bloomington, Minnesota	**Microphone:**	Larson Davis 377B20 s/n 137686
Engineer:	R.L. Skoug	**Calibrator:**	Bruel & Kjaer 4231 s/n 3009047
		Last Calibrated:	February 20, 2018

Location:	Project Site	**Meteorology:**	Temperature: 45°F - 71 °F Wind Speed / Dir.: 0-9 MPH / S Humidity: 55% - 93%
Date:	5/13/2018		
Start Time:	12:00:00 AM		
End Time:	12:00:00 AM	**Calibration Check:**	Calibration Frequency: 1 kHz Initial Calibration: 93.9 dB Final Calibration: 93.9 dB Last Cal. Check: 5/14/18 @ 11:26 AM
Run Time:	86400.0 seconds		
Measurements:	Sunday - One Second and Hourly Ambient Noise Levels A-Weighted Results		



Noise Monitoring
Measured Hourly LAeq Data

Time	LAeq	Time	LAeq	Time	LAeq	Time	LAeq
12:00:00 AM	52 dBA	6:00:00 AM	65 dBA	12:00:00 PM	63 dBA	6:00:00 PM	67 dBA
1:00:00 AM	50 dBA	7:00:00 AM	65 dBA	1:00:00 PM	68 dBA	7:00:00 PM	65 dBA
2:00:00 AM	50 dBA	8:00:00 AM	63 dBA	2:00:00 PM	65 dBA	8:00:00 PM	66 dBA
3:00:00 AM	49 dBA	9:00:00 AM	68 dBA	3:00:00 PM	66 dBA	9:00:00 PM	60 dBA
4:00:00 AM	54 dBA	10:00:00 AM	65 dBA	4:00:00 PM	65 dBA	10:00:00 PM	52 dBA
5:00:00 AM	55 dBA	11:00:00 AM	68 dBA	5:00:00 PM	65 dBA	11:00:00 PM	51 dBA

Figure A3

PL201800122
PL2018-122

esi engineering

Acoustic Test Results

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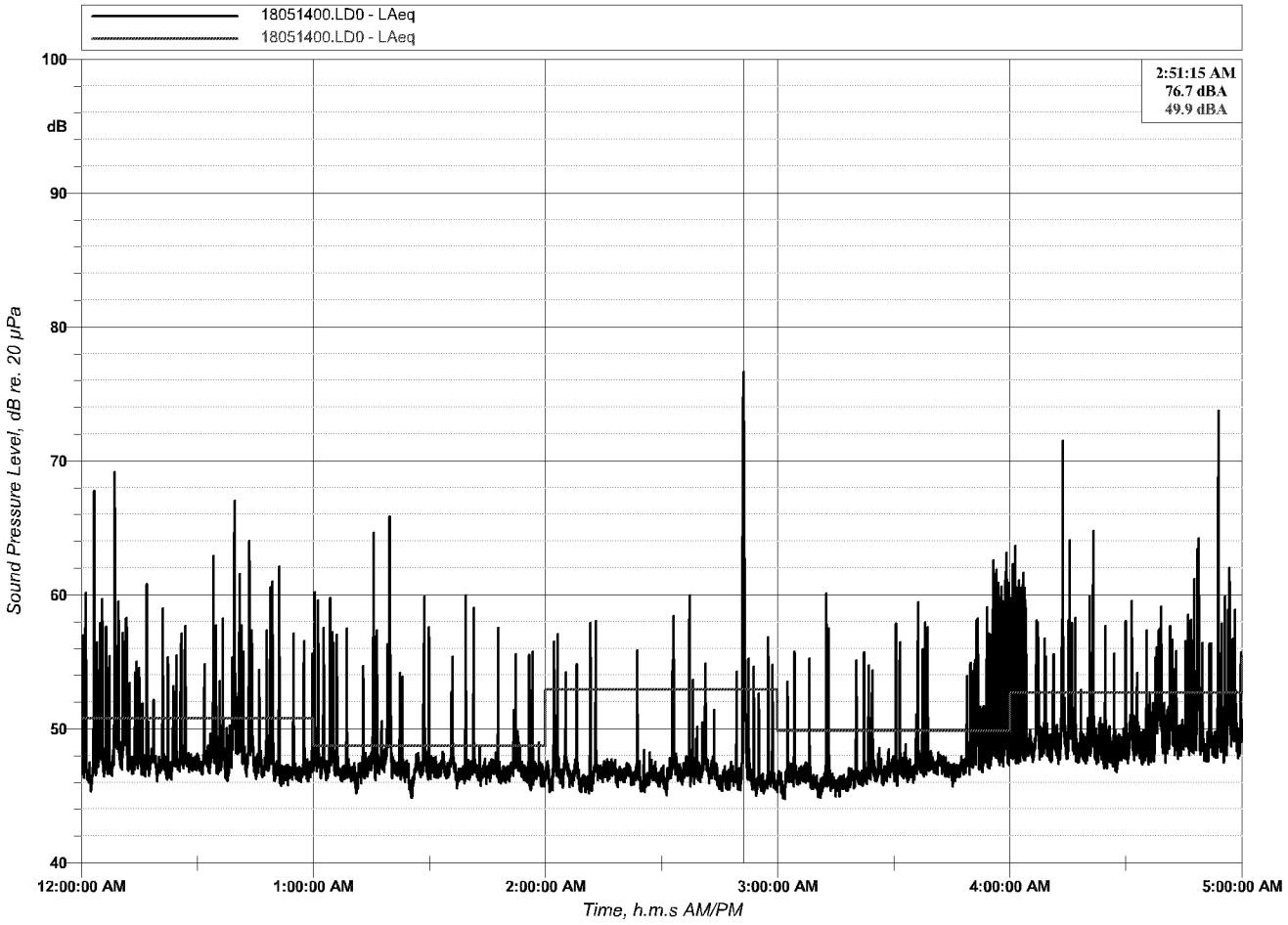
Project No:	P2450	**Analyzer:**	Larson Davis 831 s/n 3553
Project:	JR Hospitality - Hyatt House Aircraft Noise	**Preamplifier:**	Larson Davis PRM831 s/n 029391
Location:	Bloomington, Minnesota	**Microphone:**	Larson Davis 377B20 s/n 137686
Engineer:	R.L. Skoug	**Calibrator:**	Bruel & Kjaer 4231 s/n 3009047
		Last Calibrated:	February 20, 2018

Location:	Project Site	**Meteorology:**	Temperature: 59 °F - 62 °F Wind Speed / Dir.: 0-4 MPH / SW Humidity: 80% - 90%
Date:	5/14/2018		
Start Time:	12:00:00 AM		
End Time:	11:25:57 AM	**Calibration Check:**	Calibration Frequency: 1 kHz Initial Calibration: 93.9 dB Final Calibration: 93.9 dB Last Cal. Check: 5/14/18 @ 11:26 AM
Run Time:	41157.0 seconds		
Measurements:	Monday - One Second and Hourly Ambient Noise Levels A-Weighted Results		



Noise Monitoring Measured Hourly LAeq Data	
Time	LAeq
12:00:00 AM	51 dBA
1:00:00 AM	49 dBA
2:00:00 AM	53 dBA
3:00:00 AM	50 dBA
4:00:00 AM	53 dBA

Figure A4