Brooks Acoustics Corporation
49 N. Federal Highway Pompano Beach, Florida 33062 754.229.1450

Mr. Charles Bonney-Ache
Alton Sobe LLC
1900 N. Bayshore Drive 1A
Miami, FL 33132

9 September 2016
PJ2015-1171-L01

Subject: Acoustical engineering study – Proposed Mixed Use Development – 929 Alton Road

Dear Mr. Bonney-Ache:

As requested, Brooks Acoustics Corporation (BAC) has conducted an acoustical engineering study to evaluate the potential sound emissions from a proposed mixed use retail, office and parking garage development to be located at 929 Alton Road in the Flamingo Historical District Overlay in Miami Beach, FL. The potential impact that those sounds may have on the surrounding neighborhood was evaluated. The proposed facility is described in an application from Alton Sobe. Also, a sound management program was developed to promote a quiet environment near the facility. This program will minimize any impact of the facility on the surrounding neighborhood.

An ambient baseline sound survey was conducted at three (3) locations for this study. Two survey test positions were on the east property line of the proposed site. Another test position was in the alley adjacent to the existing parking garage between 9th and 10 Streets. This study was conducted in conformance with accepted standard test and analysis methods. The baseline ambient average sound level, LAeq, ranged from 60 and 70 dBA at the site east property line depending on the local traffic and the other activities occurring near the site.

Another ambient baseline sound survey was conducted in the alley adjacent to the existing mixed use parking garage between 9th and 10 Streets. The baseline ambient average sound level, LAeq, was 61 dBA at that location.

The sound levels due to the proposed parking garage are expected to be minimized by the sound control design features which are incorporated into the development. An acoustical analysis was conducted which accounts for the sound control design features which are included in the proposed facility. The worst case sound levels from the proposed garage are expected to be below or consistent with the existing ambient background sound levels.

The acoustical engineering analysis indicates that the expected sound level at the residential property line location will be reduced from the existing level due to the beneficial properties of the proposed parking garage building.

Based on this analysis, it is the opinion of BAC that with a reasonable degree of engineering certainty the proposed facility will have **little or no negative impact** on nearby neighbors. The development is expected to result in a net beneficial impact which **improves the quality of life** in the neighborhood.

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Sound Level Standards

The limit for allowable sound emissions is mandated by the City of Miami Beach Ordinance Sections (Article IV – Noise) 46-151 to 46-162. The Ordinance specifies the types of prohibited sound sources in Miami Beach. A parking garage is not specifically addressed by the Ordinance.

Potential prohibited sound sources, such as unnecessary horns or signaling devices and shouting, which may be associated with the parking garage, are addressed in the Facility Sound Management Program.

Facility sound management program

A facility sound management program was developed. This program has several major elements, which are designed to reduce the potential for impact on the surrounding neighborhood. These sound control elements are focused on the open air parking deck on Floor 3A of the garage, as the principal potential sound source in the building. These features include:

1. A sound barrier wall on the west side of the open deck parking area (Floor 3A) which reduces the sound emissions to the nearby neighbors.

2. Sound reducing floor design which will reduce eliminate or the potential for tire squealing.

3. Acoustic sails which cover up to 50 percent of the open air parking deck on Floor 3A, to reduce any sound emissions which may occur there.

1. A proposed 6 foot high sound barrier wall will be installed on the west side of the Floor 3A parking level to minimize sound emissions which can leave the property. The barrier effect will reduce the sound levels of activities on that floor, such as possible car horns and human voices by as much as 15 dB, or 75 percent.

2. A floor treatment design will be installed such that tire squealing is virtually eliminated.

3. Acoustical sails will be installed above the open deck parking on floor 3A. The maximum coverage area allowed, up to 50 percent coverage, will be installed. This system is designed to reduce sound emissions from that area by as much as 3 dB, or 30 percent.

Sound survey test procedure

An ambient baseline sound survey test was conducted at the proposed mixed use site on the morning of Friday, 2 December 2016. The surrounding area includes commercial and residential uses. The survey test was conducted by Bennett Brooks of BAC. Field measurements of sound levels were performed in accordance with the requirements of accepted standard methods of environmental sound measurement.

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The **ambient baseline survey test positions** were selected at locations around the proposed facility site which fairly represent the baseline sound with respect to neighbors. **Positions 1 and 2** were located near the east property line adjacent to the nearest residential neighbors. **Position 3** was located in the alley adjacent to the existing parking garage to the west of the Alton Road between 9th and 10th Streets.

The microphone height at the each position was 5 feet.

An aerial photo of the proposed facility site is shown in Figure 1. Photographs of the test sites are given in Figure 2.

The baseline sound test was conducted on Friday, 2 December 2016, between 11 am and 1 pm.

The temperature at about 11 am was 77 degrees F, with about 88 percent relative humidity. The wind was out of the north at 0 to 3 mph. The sky condition was cloudy.

The field **acoustic measurement system** was a digital (Type 2) integrating logging sound level analyzer (iPad / Studio Six Digital). The acoustic measurement system was calibrated with equipment directly traceable to the U.S. National Institute for Standards and Technology (NIST).

The nominal accuracy for the measurement system is ± 2 dB. A listing of the test equipment used in this survey is given in Table 1.

During these tests, the S6D sound analyzer instrument continuously recorded the sound level every second and computed the baseline ambient average level, Leq. Also, the instrument stored a variety of statistical and spectral acoustic parameters for the test period, updating those values every second.

The acoustics measurement **test protocol** for the instrument system was set to ANSI standard A-weighting for frequency and slow time weighting. Each test period was 10 minutes in duration. The internal clock of the iPad was synchronized with the NIST atomic clock to within a tolerance of 1 second.

During the test survey, observation logs and notes were written identifying test procedures and also significant sound generating events.

Data analysis

In this analysis, the measured sound levels were A-weighted. Sound level measurements which apply A-weighting are designated by the symbol "dBA". Applying A-weighting to the measurement simulates the average human hearing sensitivity for a wide range of sounds, specifically, greater sensitivity to high frequency sounds (whoosh, whine), and lesser sensitivity to low frequency sounds (thump, rumble). Therefore, this weighting is stipulated for virtually all government and industrial regulations.

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Sound Test Data Analysis -- Time history analysis

Detailed sound test results for each baseline ambient sound survey are given in the form of a **Time History Chart**, which shows the change in sound level over time for each test record.

Time history analysis of sound data can be very helpful for understanding the character of the tested acoustical environment. Simply stated, the sound level time history indicates the sound level that is measured at any given moment of time during the test period. In this analysis, the sound time history for the test is represented by a chart showing how the measured sound levels varied with time.

Test results

Baseline ambient sound test

The results of the baseline ambient sound test survey are given in Table 2, attached. As noted in Table 2, the measured baseline ambient average sound level (Leq) at both positions on the site east property line (Positions 1 and 2) ranged from **60 to 70 dBA,** depending on the traffic and other activities occurring in the area at the time. It is noted that this would be the baseline sound level range for the residences located to the east of the proposed mixed use site.

The measured baseline ambient average sound level (Leq) adjacent to the existing parking garage was **61 dBA.** This sound level was due primarily to cars passing in the alley, and to road traffic on 9th and 10th Streets. In addition, sound was emitted by the rear of the adjacent Cross Fit facility, and by the A/C unit at the adjacent retail building. The sound from Alton road was significantly muffled by the retail buildings to the east of the alley. There was no discernible sound emitted from the parking garage during the test.

The measured time history plot for the test record at Position 1 (site east property line location - south) is shown in Graph TH2016-1202-28 S6D, attached. Note that the highest measured sound level during the test period was 78 dBA.

The measured time history plot for the test record at Position 2 (site east property line location - north) is shown in Graph TH2016-1202-29 S6D, attached. Note that the highest measured sound level during the test period was 71 dBA.

The measured time history plot for the test record at Position 2 (parking garage alley) is shown in Graph TH2016-1202-33 S6D, attached. Note that the highest measured sound level during the test period was 84 dBA, due to a passing car in the alley.

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Estimates of facility sound levels at the east property line

Acoustical engineering calculations were made to estimate the sound levels at the site east property line due to activities on the open deck parking area (floor 3A). The source sound levels used for this analysis are based on standard data.

The expected maximum sound levels due to activities on the open parking deck are from shouting voices and car horns. The sound level for a raised male voice is 76 dBA at a distance of 1 m (3.3 ft), as documented in ASTM Standard E1130. The sound level of a car horn is typically 95 to 105 dBA at a distance of 1 m.

The location and site layout of the proposed facility was taken from the proposed site plan and building layout, as given in the IDEA Final Submittal drawing set dated 08-03-2016. The neighboring properties were also identified using the Google Earth aerial view software, as shown in Figure 1, attached.

The reduction of sound levels with increasing distance, from the source distance of 3.3 feet on the open deck parking of floor 3A, to the nearest property line is about 20 dBA. The reduction due to the design features of the Sound Management Program of the sound barrier wall and the acoustical sails is about 18 dBA. Acoustical engineering calculations for the sound barrier effect of the garage wall are attached. Therefore, the total reduction for Floor 3A is: 20 + 18 = 38 dBA.

Based on source sound levels and expected sound management feature reductions, the worst case estimated sound levels at the site east property line, at the second floor elevation, are as follows:

Source	Sound level
Raised voice at east property line (2nd fl elev)	39 dBA
Car horn at east property line (2nd fl elev)	57 to 67 dBA

A sound level of 39 dBA is equivalent to a very quiet whisper. A sound level of 67 dBA is equivalent to that of a normal conversation. The sound levels at neighbors further away from the proposed garage facility are expected to be even less, due to the greater distances involved.

The ventilation louvers which are designed for the enclosed upper parking levels, in conjunction with the increased distance from the east property line, are expected to provide similar sound reduction benefits.

Note that the worst case sound levels given above are expected to occur only occasionally, on an infrequent and intermittent basis.

Also, the estimated sound levels at the property line are below or consistent with the measured average ambient baseline levels in the area.

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Benefits of the proposed development

The proposed development is expected to produce a net sound level benefit to the residential neighborhood to the east. The building will provide a significant sound barrier to the existing noise sources along Alton Road. These noise sources include heavy road traffic and retail operations such as the Cross Fit facility, which plays loud music into the street.

An acoustical analysis of the building site indicates that the reduction in sound level due to the presence of the proposed building is expected to be the practical maximum of about 20 dBA. An acoustical engineering calculation for this case is attached.

Therefore, the building will reduce the noise from Alton Road by about 20 dBA, which will result in a noticeable benefit to the neighborhood. This benefit will significantly outweigh the intermittent and occasional sound from the garage, which is expected to be consistent with the current existing background sound levels.

An additional benefit will be realized associated with the approved 400 seat restaurant to the north, currently under construction. The restaurant will have valet parking located along the north property line of the proposed mixed use garage site. The proposed building will provide a sound barrier, which results in a substantial reduction in noise generated by that valet parking for the residences directly to the east and south.

Further, the garage is likely to reduce the traffic and parking on the side streets in the residential neighborhood. This will result in a reduction of related noise in the neighborhood.

The proposed mixed use garage development, with its sound management program in place, will result in a net benefit in terms of sound to the residential neighborhood. These benefits will improve the quality of life in the neighborhood.

Please contact me if you have any questions concerning these findings.

Very truly yours,
BROOKS ACOUSTICS CORPORATION

Bennett M. Brooks, PE, FASA, INCE
President

Attachments

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Figure 1. Aerial photograph of the proposed Mixed Use site and surrounding area.

Figure 2, a. Ambient background sound test - Position 1, south side of proposed mixed use site, viewing west. Note traffic on Alton Rd.

Figure 2, b. Ambient background sound test - Position 1, south side of proposed mixed use site, viewing south.

Figure 2, c. Ambient background sound test - Position 1, south side of proposed mixed use site, viewing north. Note construction site for new 400 seat restaurant with valet parking adjacent to site.

Figure 2, d. Ambient background sound test - Position 2, north side of proposed mixed use site, viewing west. Cross Fit facility across Alton Rd.

Figure 2, e. Ambient background sound test - Position 2, north side of proposed mixed use site, viewing east.

Figure 2, f. Ambient background sound test - Position 2, north side of proposed mixed use site, viewing north.

Figure 2, g. Traffic on Alton Road at proposed mixed use site, viewing south.

Figure 2, h. Traffic on Alton Road at proposed mixed use site, viewing north.

Figure 2, i. Ambient background sound test - Position 3, in alley next to existing mixed use retail and parking garage, viewing north, toward 10th Street.

Figure 2, j. Ambient background sound test - Position 3, in alley next to existing mixed use retail and parking garage, viewing south, toward 9th Street.

Alton Sobe LLC
Sound Survey
Miami Beach, FL

Table 1

ACOUSTIC INSTRUMENTATION SYSTEMS

2 December 2016

Data Acquisition Equipment

1. Apple - Computer Tablet - iPad Model MD542LL/A, S/N F4KL80F8F19L
2. Studio Six Digital - Microphone - iTestMic – SD2014, S/N FH10274
   Last laboratory calibration date 7/24/2015*
3. Studio Six Digital - Audio Tools - Acoustical Analysis software, Version 8.0.1

Laboratory Playback and Analysis Equipment

1. Lenovo (IBM) - Computer workstation
2. Microsoft - Excel 2013 Spreadsheet Program

*Note: Certificates of Calibration available upon request.

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Table 2

Summary -- Measured Ambient Sound Data

2-Dec-2016

Measured Sound Levels
A-weighted SPL in dB (re: 20 µPa)

Microphone at 5 feet above ground

Pos	Location	Time	Measured Baseline Sound Level average Leq dBA	Measured Baseline Sound Level maximum Lmax dBA	Observation Comments	Location Coordinates
1	Proposed mixed use site 929 Alton Road East property line 18 ft W of fence 40 ft N of adjacent building wall	11:10 AM	70	78	Cars, trucks, airplanes Construction machinery, leaf blowers	25˚ 46' 47.44" N 80˚ 8' 25.17" W
2	Proposed mixed use site 929 Alton Road East property line 18 ft W of fence 15 ft S of adjacent building wall	11:33 AM	60	71	Cars, trucks, airplanes Construction machinery, horns	25˚ 46' 48.15" N 80˚ 8' 25.26" W
3	Existing parking garage Alley between 9th & 10th Sts 10 ft E of garage building	12:37 PM	61	84	Cars passing in alley Local road traffic - 9th and 10th Streets Cars, trucks, busses, airplanes Cross fit music, horns, A/C unit	25˚ 46' 46.77" N 80˚ 8' 29.51" W

Weather observations: 11:00 AM 77 deg F, RH 88%, cloudy, wind north ~0 to 3 mph

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Sound Survey

Miami Beach, FL

Ambient Background Sound Survey

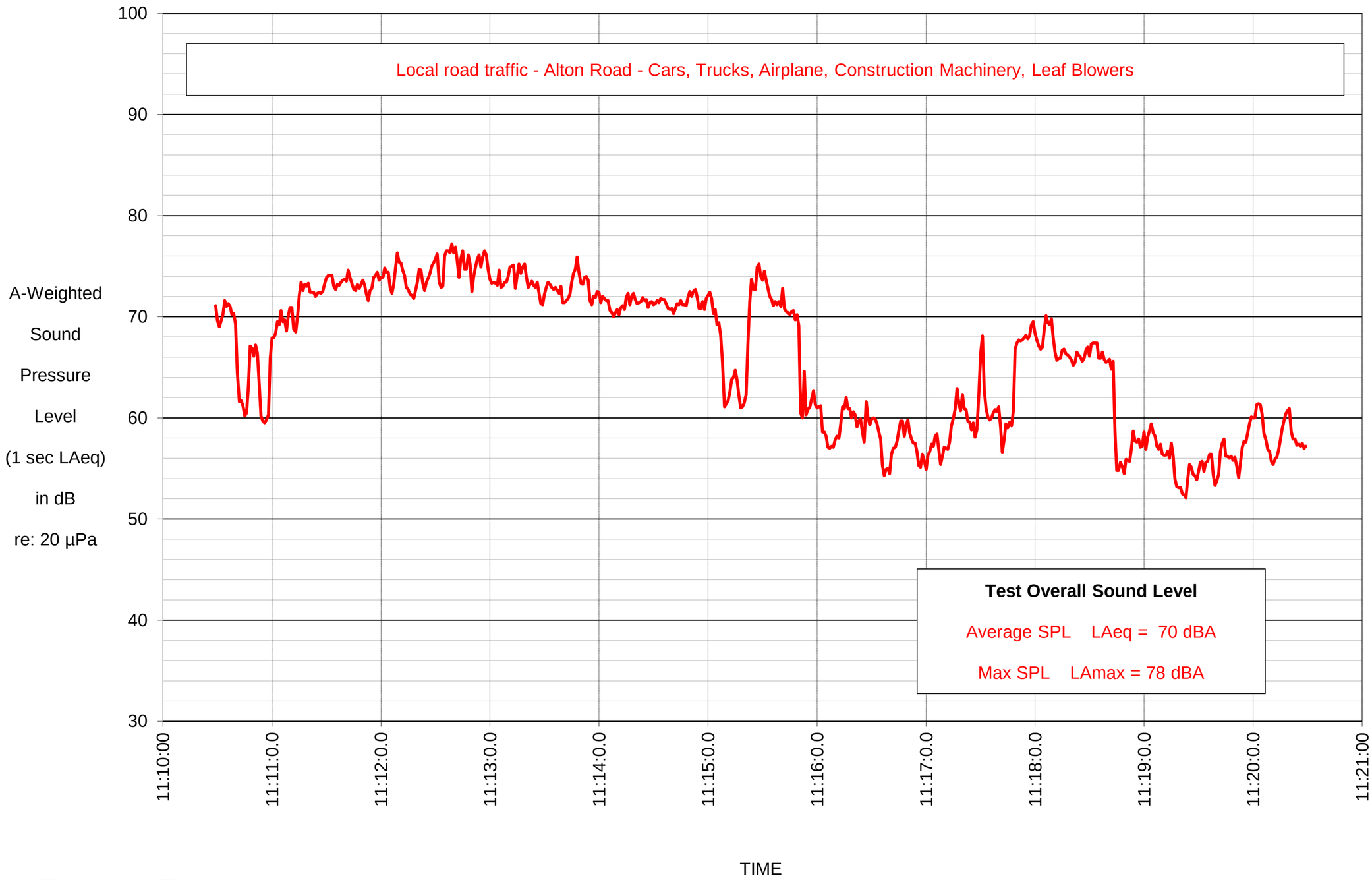
Proposed mixed use site - 929 Alton Road

Near east property line - south side of site

Date: 2-Dec-16

Time: 11:10 AM

Position: 1



BAC Time History TH2016-1202-28 S6D

BAC Project PJ2016-1212-L01

BAC Time History TH2016-1202-28 S6D

Alton Sobe LLC

Sound Survey

Miami Beach, FL

Ambient Background Sound Survey

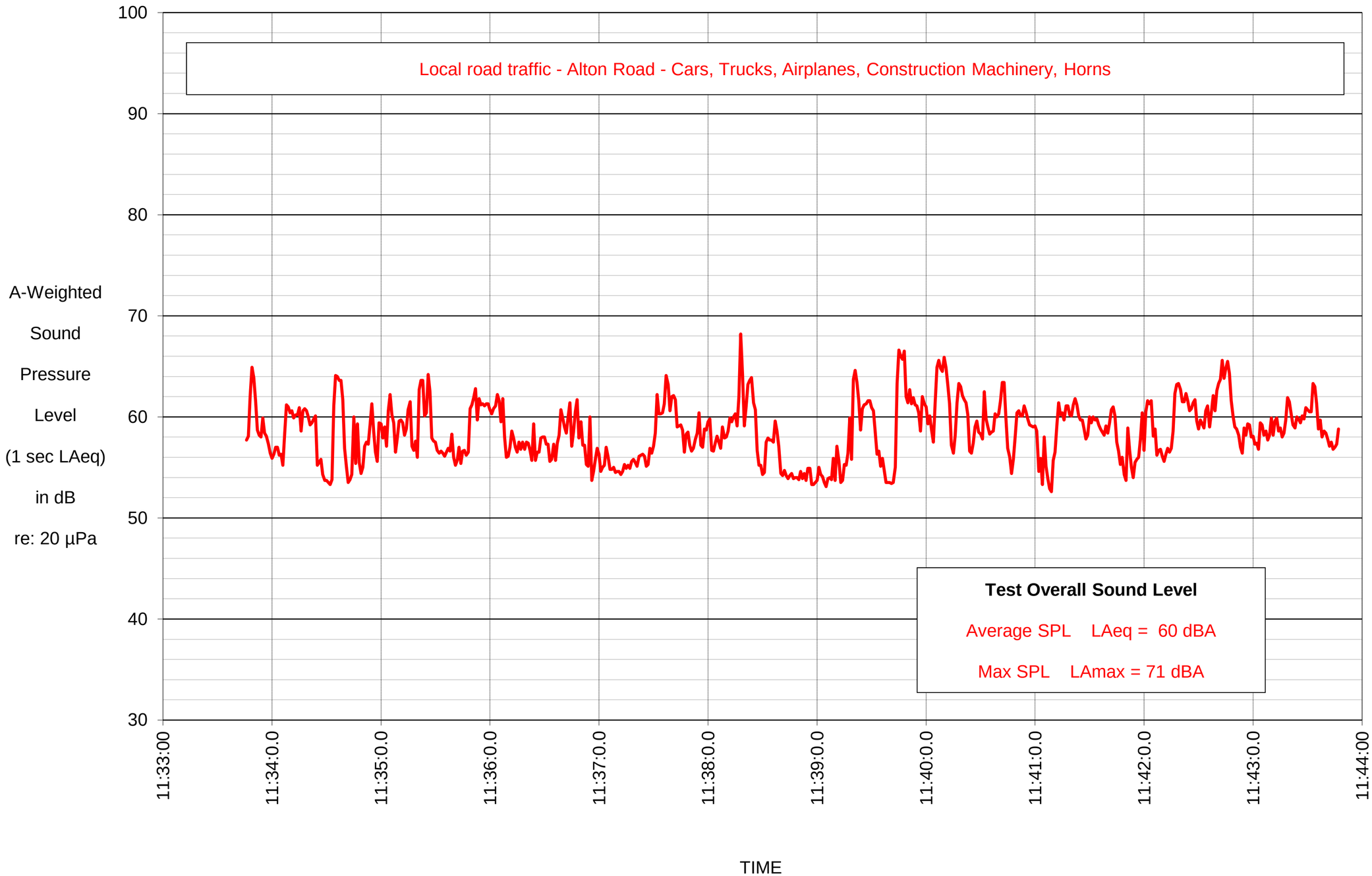
Proposed mixed use site - 929 Alton Road

Near east property line - north side of site

Date: 2-Dec-16

Time: 11:33 AM

Position: 2



BAC Time History TH2016-1202-29 S6D

BAC Project PJ2016-1212-L01

BAC Time History TH2016-1202-29 S6D

Alton Sobe LLC

Sound Survey

Miami Beach, FL

Ambient Background Sound Survey

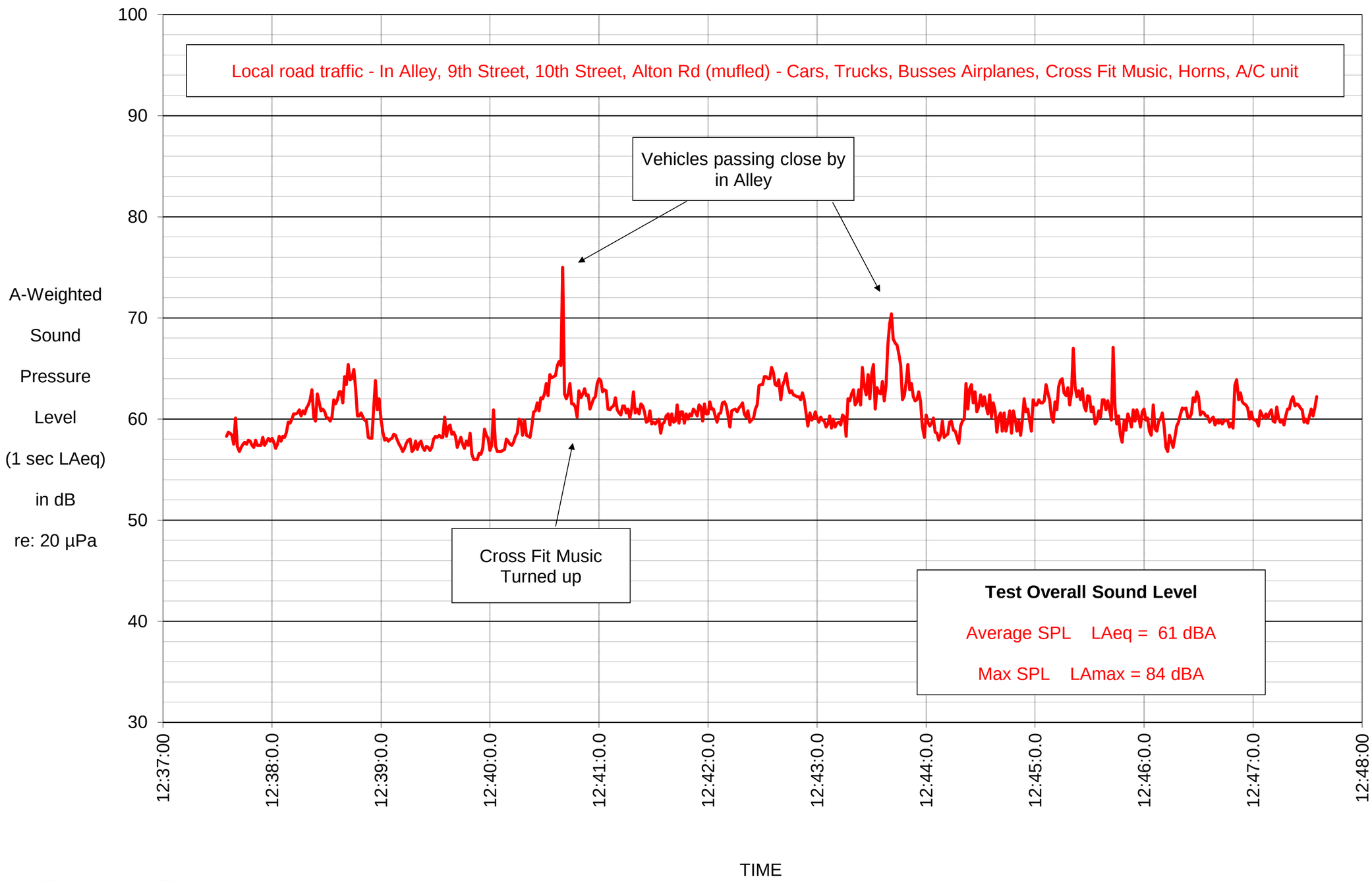
In Alley between Stores on Alton Road and Parking Garage

Behind Able Baker and Go-Go

Date: 2-Dec-16

Time: 12:37 PM

Position: 3



BAC Time History TH2016-1202-33 S6D

BAC Project PJ2016-1212-L01

BAC Time History TH2016-1202-33 S6D

BARRIER ATTENUATION CALCULATION
Proposed Mixed Use Development - 929 Alton Road
Source: Open deck parking Floor 3A (car horn) -- Receiver: Residence (2nd fl elev)

(* Indicates values to be input in feet -- baseline elev. 10 ft)

$h_b := 28$ *Height of barrier

$h_s := 24$ *Height of source

$h_r := 15$ *Height of Receiver

$d_{sb} := 5$ *Distance from source to barrier

$d_{br} := 35$ *Distance from barrier to receiver

$c := 344$ Speed of sound (m/s)

$n := 0..8$

$f_n := 31.25 \cdot 2^n$ Frequency of peak (Hz)

$\lambda_n := \frac{c}{f_n}$ Wavelength of peak (meters)

$D_{br} := d_{br} \cdot .3048$ $D_{br} = 10.668$

$D_{sb} := d_{sb} \cdot .3048$ $D_{sb} = 1.524$

$H_{sb} := (h_b - h_s) \cdot .3048$ $H_{sb} = 1.219$

$H_{br} := (h_b - h_r) \cdot .3048$ $H_{br} = 3.962$

The path distances specific to the geometry of the installation -- in meters

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$ $R_{sb} = 1.952$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$ $R_{br} = 11.38$

Fresnel Number

$$N_n := \frac{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}{\lambda_n}$$

$C := 10$

C=10 for receiver over reflecting plane (close to ground)

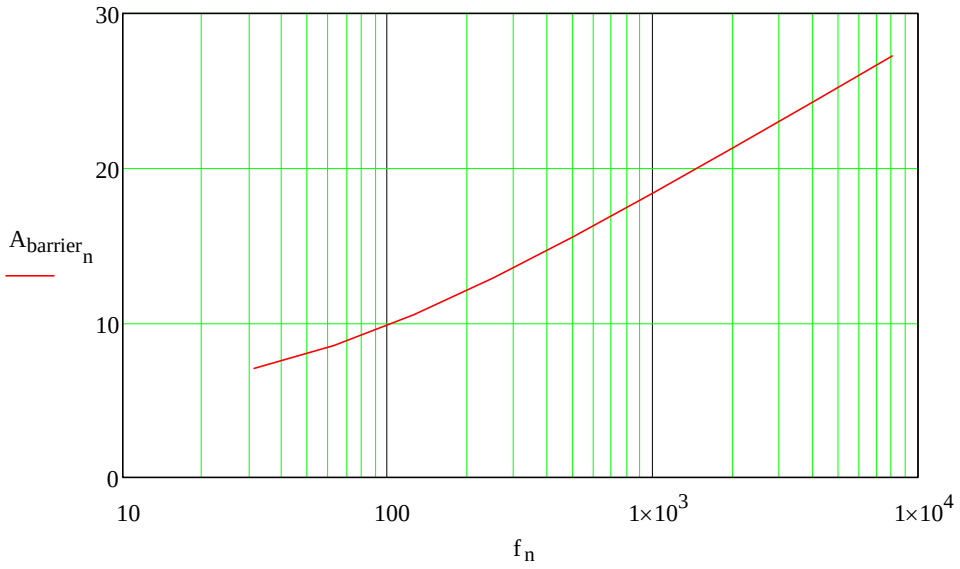
$$A_{barrier_n} := 10 \cdot \log\left[3 + C \cdot N_n \cdot \exp\left[-\frac{1}{2000} \cdot \sqrt{\frac{R_{sb} \cdot R_{br} \cdot (D_{sb} + D_{br})}{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}}\right]\right]$$

Barrier Attenuation

$$A_{barrier} = \begin{pmatrix} 7 \\ 8.5 \\ 10.5 \\ 12.9 \\ 15.6 \\ 18.4 \\ 21.3 \\ 24.3 \\ 27.2 \end{pmatrix}$$

31.5
63
125
250
500
1000
2000
4000
8000

Note: Practical limit for barrier attenuation is 20 dB


30
20
10
0
$A_{barrier_n}$
10
100
1×10^3
1×10^4
f_n

BARRIER ATTENUATION CALCULATION
Proposed Mixed Use Development - 929 Alton Road
Source: Open deck parking Floor 3A (raised voice) -- Receiver: Residence (2nd fl elev)

(* Indicates values to be input in feet -- baseline elev. 10 ft)

$h_b := 28$ *Height of barrier

$h_s := 27$ *Height of source

$h_r := 15$ *Height of Receiver

$d_{sb} := 10$ *Distance from source to barrier

$d_{br} := 35$ *Distance from barrier to receiver

$c := 344$ Speed of sound (m/s)

$n := 0..8$

$f_n := 31.25 \cdot 2^n$ Frequency of peak (Hz)

$\lambda_n := \frac{c}{f_n}$ Wavelength of peak (meters)

$D_{br} := d_{br} \cdot .3048$ $D_{br} = 10.668$

$D_{sb} := d_{sb} \cdot .3048$ $D_{sb} = 3.048$

$H_{sb} := (h_b - h_s) \cdot .3048$ $H_{sb} = 0.305$

$H_{br} := (h_b - h_r) \cdot .3048$ $H_{br} = 3.962$

The path distances specific to the geometry of the installation -- in meters

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$ $R_{sb} = 3.063$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$ $R_{br} = 11.38$

Fresnel Number

$$N_n := \frac{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}{\lambda_n}$$

$C := 10$

C=10 for receiver over reflecting plane (close to ground)

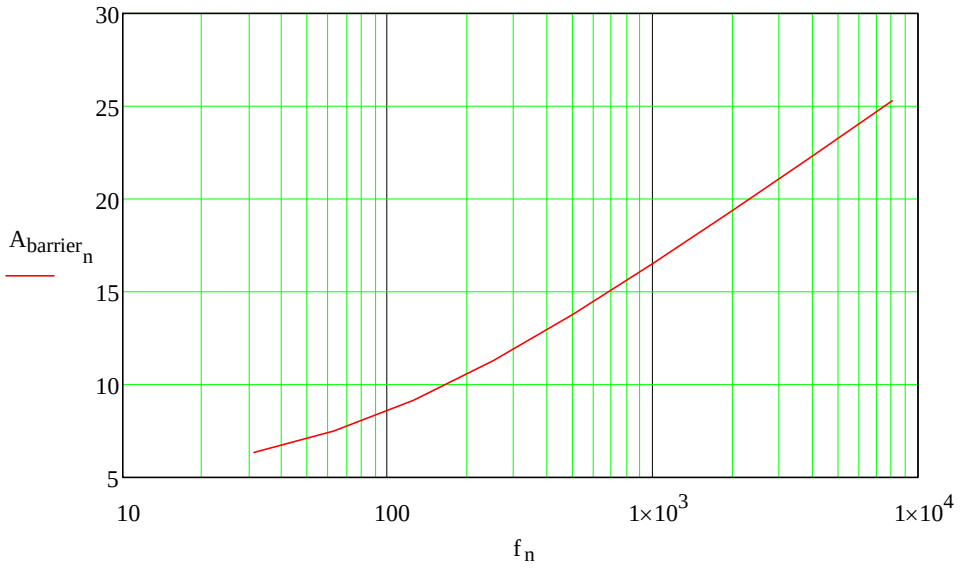
Barrier Attenuation

$$A_{barrier_n} := 10 \cdot \log\left[3 + C \cdot N_n \cdot \exp\left[-\frac{1}{2000} \cdot \sqrt{\frac{R_{sb} \cdot R_{br} \cdot (D_{sb} + D_{br})}{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}}\right]\right]$$

$$A_{barrier} = \begin{pmatrix} 6.3 \\ 7.5 \\ 9.2 \\ 11.3 \\ 13.8 \\ 16.5 \\ 19.4 \\ 22.3 \\ 25.3 \end{pmatrix}$$

31.5
63
125
250
500
1000
2000
4000
8000

Note: Practical limit for barrier attenuation is 20 dB


30
25
20
15
10
5
$A_{barrier_n}$
10
100
1×10^3
1×10^4
f_n

BARRIER ATTENUATION CALCULATION
Proposed Mixed Use Development - 929 Alton Road
Source: Alton Road traffic -- Receiver: Residence to East (2nd fl elev)

(* Indicates values to be input in feet -- baseline elev. 10 ft)

$h_b := 55$ *Height of barrier

$h_s := 3$ *Height of source

$h_r := 15$ *Height of Receiver

$d_{sb} := 10$ *Distance from source to barrier

$d_{br} := 160$ *Distance from barrier to receiver

$c := 344$ Speed of sound (m/s)

$n := 0..8$

$f_n := 31.25 \cdot 2^n$ Frequency of peak (Hz)

$\lambda_n := \frac{c}{f_n}$ Wavelength of peak (meters)

$D_{br} := d_{br} \cdot .3048$ $D_{br} = 48.768$

$D_{sb} := d_{sb} \cdot .3048$ $D_{sb} = 3.048$

$H_{sb} := (h_b - h_s) \cdot .3048$ $H_{sb} = 15.85$

$H_{br} := (h_b - h_r) \cdot .3048$ $H_{br} = 12.192$

The path distances specific to the geometry of the installation -- in meters

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$ $R_{sb} = 16.14$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$ $R_{br} = 50.269$

Fresnel Number

$$N_n := \frac{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}{\lambda_n}$$

$C := 10$

C=10 for receiver over reflecting plane (close to ground)

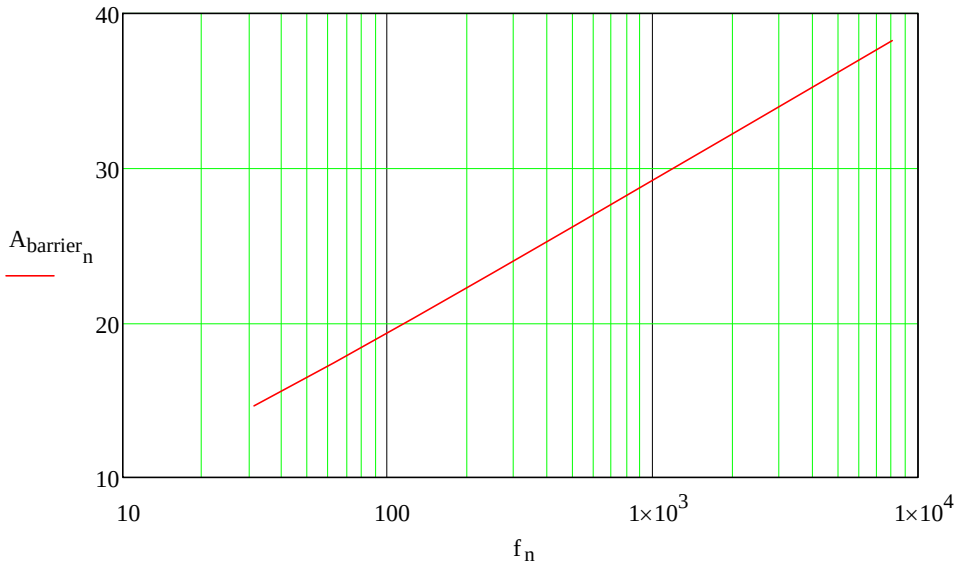
Barrier Attenuation

$$A_{barrier_n} := 10 \cdot \log\left[3 + C \cdot N_n \cdot \exp\left[-\frac{1}{2000} \cdot \sqrt{\frac{R_{sb} \cdot R_{br} \cdot (D_{sb} + D_{br})}{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}}\right]\right]$$

$$A_{barrier} = \begin{pmatrix} 14.6 \\ 17.4 \\ 20.3 \\ 23.2 \\ 26.2 \\ 29.2 \\ 32.2 \\ 35.2 \\ 38.2 \end{pmatrix}$$

31.5
63
125
250
500
1000
2000
4000
8000

Note: Practical limit for barrier attenuation is 20 dB


40
30
20
10
$A_{barrier_n}$
10
100
1×10^3
1×10^4
f_n