April 8, 2024

South Bay Equities LLC
1721 Stewart Street
Santa Monica, California 90404

Attention: Frank Bardi

Subject: **210 PCH Preschool**
Hermosa Beach
Exterior Noise and Exterior Façade Acoustical Analysis
Veneklasen Project No. 8519-001

Dear Frank:

Veneklasen Associates, Inc. (Veneklasen) has completed our review of the 210 PCH Preschool project located in Hermosa Beach, California. This report predicts the exterior noise levels at the site using computer modeling. Using this information, interior noise levels were calculated based on the exterior noise exposure and the construction types proposed. From this, the exterior façade design was determined. Operational noise from future playground activities at adjacent residences was also calculated. This report represents the results of our findings.

1.0 INTRODUCTION

This study was conducted to determine the impact of the exterior noise sources on the 210 PCH Preschool project located in Hermosa Beach, California. Veneklasen's scope of work included calculating the exterior noise levels impacting the site and determining the method, if any, required to reduce the interior and exterior sound levels to meet the applicable code requirements of the State of California and the City of Hermosa Beach.

The project consists of the conversion of 5,500 sf from retail to daycare in a 1-story type V-B Building. The project will include rooms, kitchen, outdoor playgrounds, and public parking. The project is bounded by existing residential and commercial uses to the north, residential uses to the west, 2nd Street to the south and the Pacific Coast Hwy (PCH) to the west. Veneklasen understands that the client will keep the existing 8 – 16 feet perimeter wall which will provide acoustical shielding to/from the outdoor playgrounds.

2.0 NOISE CRITERIA

CNEL (Community Noise Equivalent Level) is the 24-hour equivalent (average) sound pressure level in which the evening (7pm – 10pm) and nighttime (10 pm – 7 am) noise is weighted by adding 5 and 10 dB, respectively, to the hourly level. Since this is a 24-hour metric, short-duration noise events (truck pass-by's, buses, trains, etc.) are not as prominent in the analysis.

Leq (equivalent continuous sound level) is defined as the steady sound pressure level which, over a given period of time, has the same total energy as the actual fluctuating noise.

2.1 Interior Noise Levels - Residential

The State of California Building Code (Section 1206, "Sound Transmission") and the City of Hermosa Beach General Plan Noise Element (Table 6.3) states that interior CNEL values for school uses do not exceed 45 dBA in any room.

If the windows must be closed to meet an interior CNEL of 45 dBA, then a mechanical ventilating system or other means of natural ventilation may be required.

2.2 Exterior Noise Levels – Schools

The City of Hermosa Beach General Plan Noise Element (Table 6.3) states an acceptable CNEL exterior noise standard of 65 dBA CNEL which also applies to school playgrounds.

2.3 Exterior Operational Noise Levels – Playgrounds

The City of Hermosa Beach General Municipal Code, Title 8 *Health and Safety*, Chapter 8.24 *Noise Control*, states that "*the following activities shall be exempt from the provisions of this chapter… Activities conducted on public playgrounds, fully licensed and approved child day care facilities within residential areas as permitted by law, and public or private school grounds, including but not limited to school athletic and school entertainment events*".

In summary, the noise level coming from playgrounds to adjacent residential units is exempted from the Municipal Code.

3.0 EXTERIOR NOISE ENVIRONMENT

3.1 Noise Calculations – Computer Modeling

Veneklasen has utilized the Traffic Noise Model computer software program developed by the FHWA (Federal Highway Administration TNM 2.5) in order to predict vehicular noise levels at project location. Traffic on Pacific Coast Hwy is the primary source of noise affecting the site. Veneklasen also reviewed aircraft noise sources, and these are insignificant at this site. Veneklasen has calculated noise and traffic levels for 10 years in the future.

Traffic counts for local streets were obtained from the Caltrans official web page. The most and closest recent annual average daily traffic (AADT) at the project site was found for Pacific Coast Why (year 2021) which is shown below in Table 1.

Table 1 – Historic AADT Data at Project Site, Pacific Coast Why

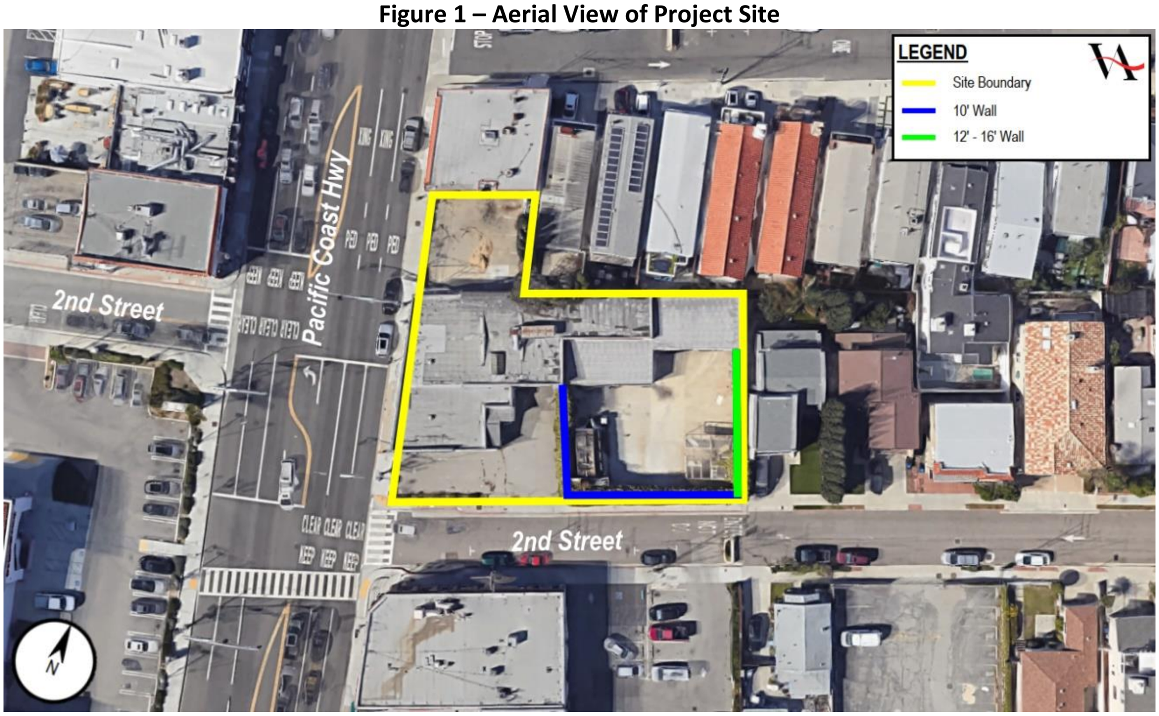
Location	Year	AADT (North + Southbound)	Average Increment per Year (2021 to 2034)	AADT in 2034 (1% increment per year)
Pacific Coast Hwy and Aviation Blvd	2021	104500	1%	118931
	2022	105545		
	2023	106600		
	2024	107666		
	2025	108743		
	2026	109831		
	2027	110929		
	2028	112038		
	2029	113159		
	2030	114290		
	2031	115433		
	2032	116587		
	2033	117753		
	2034	118931		

Table 2 show the CNEL and daytime noise levels calculated at different locations:

Table 2 – Calculated Sound Levels (per AADT 2034)

Location	CNEL, dBA	Leq Day (7am to 10pm), dBA
West Boundary (façades facing Pacific Coast Hwy, 20' from the closest street lane)	75	72
East Boundary (project site facing adjacent residents)	68	66

Figure 1 – Aerial View of Project Site



3.2 Sound Barrier at Property Limit

Veneklasen understands that the client will keep the existing 8 – 10 feet perimeter wall (south and west sides) which will provide acoustical shielding to outdoor playgrounds from the traffic noise coming from the Pacific Coast Hwy and 2nd Street (see Figure 1 above) and an existing 12 – 16 feet perimeter wall which will provide acoustical shielding from the playground to adjacent residents to the east.

3.3 Overall Exterior Exposure

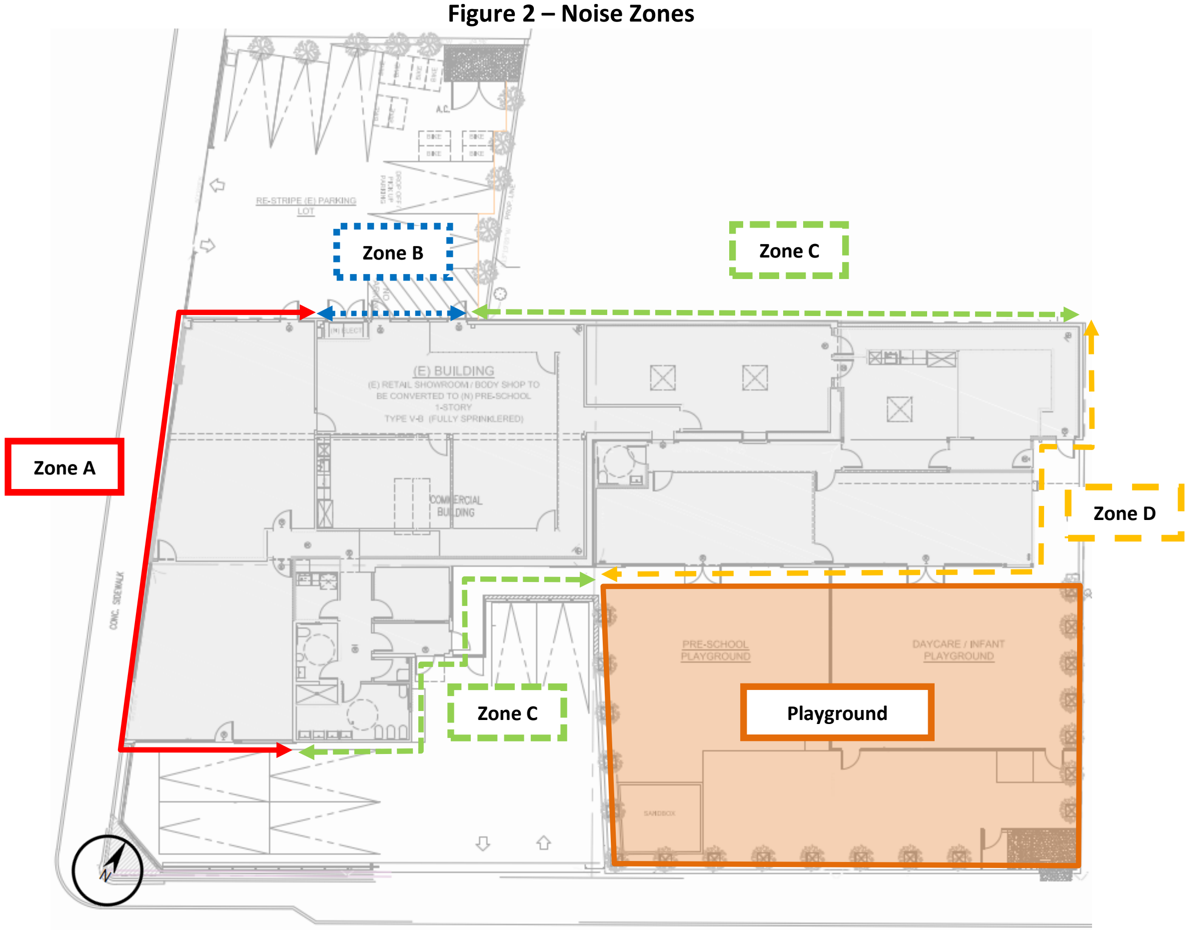
Based on the computer model, Veneklasen calculated the noise level at different locations across the project site. To simplify the presentation of the exterior noise levels, Veneklasen has separated the site into locations based on the sound exposure and required design features. The predicted sound levels at each zone, shown in Figure 2, are listed in Table 3 below.

Table 3 – Exterior Noise Levels

Location	Exterior Noise Level, CNEL, dBA
Zone A	75
Zone B	72

Zone C	68 – 70
Zone D (Façade Facing the Playground Area)	< 65
Playground Area	< 65

Figure 2 – Noise Zones



4.0 INTERIOR NOISE CALCULATION

4.1 Exterior Facade Construction

The client indicated that the exterior wall consists of exterior finish, plywood sheathing, wood studs, batt insulation in the cavity, and one (1) layer of gypsum board.

Veneklasen's calculations included the roof path, but this was insignificant in the interior noise level calculated.

Veneklasen utilized the glazing ratings (glass, frame and seals) shown in Appendix I. Appendix I shall be the acoustical specification for the exterior windows and doors.

4.2 Interior Average Noise Level (CNEL) – Residential

Veneklasen calculated the interior level within the preschool building given the calculated noise environment and the exterior facade construction described above. Calculations were based on the plans dated September 30, 2023. Table 4 shows the predicted interior CNEL noise levels based on the windows and doors with STC ratings as described in Appendix I.

Table 4 – Calculated Interior CNEL Noise Levels

Location	Exterior Noise Level, CNEL	Window/ Door Rating	Interior Noise Level, CNEL
Zone A	75	STC 37	≤ 45
Zone B	72	STC 33	< 45
Zone C	68 – 70	STC 30	< 45
Zone D	< 65		

4.3 Mechanical Ventilation - Residential

Because the windows and doors must be kept closed to meet the noise requirements, mechanical or other means of ventilation may be considered for all rooms in Zone A, B, C and D. The ventilation system shall not compromise the sound insulation capability of the exterior facade assembly.

5.0 EXTERIOR NOISE CALCULATION

5.1 Exterior Average Noise Level (CNEL) at Playgrounds from Traffic Noise

Based on drawings dated September 30, 2023, two (2) playground areas are planned to be located at the southeast side of the project site. Considering the shielding effect of the existing 10 feet tall perimeter wall (see Figure 1 above), the barrier is anticipated to attenuate the noise levels coming from the traffic by 11 dBA and the predicted exterior CNEL for this recreation area will be below CNEL 65 dBA. Therefore, no additional special design features are necessary to meet the city requirement.

Table 5 – Calculated Exterior Noise Levels at the Playground due to Traffic Noise

Location	Exterior Noise Level at the Playground Area due to Exterior Ambient Noise (Traffic), dBA	Attenuation due to Barrier, dBA
Playground Area	57	11

The following parameters have been considered on this calculation:

- Main noise source (Pacific Coast Hwy) to barrier distance: 90' (approximately)
- Source height (cars and trucks, average): 6'
- Observer (receptor) to barrier distance: 25'
- Observer (receptor) height: 5'
- Barrier height: 10'

The calculated attenuation per octave band (dB) is shown in Table 6 below.

Table 6 – Calculated Barrier Attenuation

Attenuation (dB) per Frequency Band								
63	125	250	500	1000	2000	4000	8000	Global
5	6	6	8	9	12	14	17	11

5.2 Exterior Average Noise Level (Leq) from Playgrounds to Adjacent Residential Properties

Anticipating 30 children playing with raised at the playground, and the shielding effect of the existing 12 – 16 feet tall perimeter wall, the calculated noise levels at the adjacent residencies to the east are shown in Table 7 below.

Table 7 – Calculated Exterior Noise Levels at Adjacent Properties due to Playground Activities

Location	Exterior Noise Level at Adjacent Property due to Playground Activities, dBA	Attenuation due to Barrier, dBA	Existing Background, dBA	Increase Above Ambient, dBA
Adjacent Residential Property	56	8	66	0

As shown above, the playground activities will not increase the existing ambient noise at the adjacent residential properties. The barrier is anticipated to attenuate the noise levels coming from the playground by 8 dBA.

The following parameters have been considered on this barrier calculation:

- Main noise source (playground) to barrier distance: 25' (approximately)
- Source height (kids playing): 4'
- Observer (receptor) to barrier distance: 8' (approximately)
- Observer (receptor) height: 18' (approximately)
- Barrier height: 16'

The calculated attenuation per octave band (dB) is shown in Table 8 below.

Table 8 – Calculated Barrier Attenuation

Attenuation (dB) per Frequency Band								
63	125	250	500	1000	2000	4000	8000	Global
5	6	6	7	8	10	13	16	8

6.0 SUMMARY

The following summarizes the acoustical items required to satisfy the noise criteria as described in this report.

Interior Noise

- Exterior wall assembly is acceptable as described in Section 4.1.
- The roof assembly was included in our calculations and is not a significant path of sound and can remain as designed.
- Windows and glass doors with minimum STC ratings as shown in Table 4 with STC ratings and Transmission Loss values specified in Appendix I are required. Appendix I shall be the acoustical specification for the exterior windows and doors.
- Residential mechanical ventilation, or other means of natural ventilation, may be required for all units within Zone A, B, C and D.

Exterior Noise

- The predicted exterior CNEL at the playground areas is below CNEL 65 dBA. Therefore, no additional design feature is necessary to meet the city requirement.
- The calculated noise from playground activities at adjacent residential properties will not increase the existing ambient noise.

Various noise design features may be utilized to satisfy the noise criteria described in this report. Alteration of design features that deviate from requirements should be reviewed by the acoustical consultant.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
Veneklasen Associates, Inc.

John LoVerde, *FASA*
Principal

Elias Montoya
Associate

APPENDIX I – GLAZING REQUIREMENTS

In order to meet the predicted interior noise levels described in Section 4.1, the glazing shall meet the following requirements:

Table 9 – Acoustical Glazing Requirements: Minimum Octave Band Transmission Loss and STC Rating

Nominal Thickness	Minimum Transmission Loss Octave Band Center Frequency (Hz)						Min. STC Rating
	125	250	500	1000	2000	4000	
1” dual	21	18	27	34	37	32	**30**
1” dual	22	21	30	36	37	36	**33**
1” dual	24	27	35	39	40	42	**37**

The transmission loss values in the table above can likely be met with the following glazing assemblies:

1. STC 30: 1/8” monolithic – 3/4” airspace – 1/8” monolithic
2. STC 33: 3/16” monolithic – 11/16” airspace – 1/8” monolithic
3. STC 37: 7/16" laminated – 3/8” airspace – 3/16” monolithic

An assembly’s frame and seals may limit the performance of the overall system. Therefore, the window and door systems selected for the project shall not be selected on the basis of the STC rating of the glass alone, but on the entire assembly including frame and seals. Additionally, the assemblies given above are provided as a basis of design, but regardless of construction, the octave band Transmission Loss (TL) and STC value of the system selected must meet the minimum values in Table 7 above.

Independent laboratory acoustical test reports should be submitted for review by the design team to ensure compliance with glazing acoustical performance requirements. Laboratories shall be accredited by the Department of Commerce National Voluntary Laboratory Accreditation Program (NVLAP). Labs shall be pre-approved by Veneklasen Associates. Tests shall be required to be performed in North America. Lab tests and lab reports shall be in compliance with ASTM standard E90 and be no more than 10 years old from the date of submission for this project.

If test reports are not available for a proposed assembly, the assembly, including frame, seals and hardware, shall be tested at an independent pre-approved NVLAP-accredited laboratory to demonstrate compliance with the requirements of this report. Veneklasen shall be invited to witness acoustical testing completed and reserves the right to exclude test reports from laboratories that are not pre-approved by Veneklasen.

APPENDIX II – GLOSSARY OF ACOUSTICAL TERMS

Term	Definition
Absorption	A property of material referring to how much sound it absorbs (as opposed to reflecting). In the context of this report, absorption refers to the total quantity of absorption within the receiving space. Absorption is measure in sabins.
A-weighting (dBA)	The sound pressure level in decibels as measured in an A-weighting filter network. The A-weighting de-emphasizes the low frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Decibel (dB)	A unit describing the amplitude of sound equivalent to 20 times the logarithm, to the base 10, of the ratio of the pressure of the sound to the reference pressure of 20 μPa. Used to quantify sound pressure levels.
Equivalent Sound Level (Leq)	The time-weighted average noise level during the stated measurement period.
Sabin	A unit used to describe absorption within a space. One sabin is equal to the absorption of a one-square-foot open window.
Sound Pressure Level (SPL)	The amplitude of sound when compared to the reference sound pressure level of 20 μPa. SPL is measured in dB.
Sound Transmission Class (STC)	A single-number metric used to describe the transmission loss performance of a material or assembly across the frequency spectrum. It is intended for use primarily when speech is the noise source.
Transmission Loss (TL)	A measure of the reduction in sound level as a sound wave passes through a material. The higher the transmission loss, the better the material's sound insulating properties.

APPENDIX III – ACOUSTICAL CALCULATION METHODS

Decibel Addition

Decibels are based on a logarithmic scale; defined as the logarithmic ratio between a measured sound pressure level and a reference sound pressure level. When decibels are added, they are not combined arithmetically, but logarithmically. Decibels are added according to the following equation.

$$SPL_{tot} = 10log\left(10^{\left(SPL_1/_{10}\right)}\right) + 10log\left(10^{\left(SPL_2/_{10}\right)}\right)$$

Where:
SPL_{tot} = Total Sound Pressure Level (dB or dBA)
SPL_1, SPL_2 = Sound Pressure Level 1, 2 (dB or dBA)

A-Weighting

A-weighting a spectrum is completed by applying standardized weighting factors to a frequency spectrum, either in octave bands or third-octave bands. These resultant A-weighted levels are summed using decibel addition to generate the overall A-weighted level, noted as dBA. In a report, spectral data is typically presented un-weighted, and the overall level is presented with A-weighting.

The octave band A-weighting correction factors are shown in the table below:

	Octave Band Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
A-weighting Correction Factor (dB)	-26	-16	-9	-3	0	+1	+1	-1

Acoustical Shielding

The presence of adjacent buildings or facades, changes in terrain, parapets, and other similar barriers provide acoustical shielding, reducing the sound level incident on the exterior facades. Common locations where acoustical shielding occurs include, but are not limited to, the roof, the back, and sides of the building that are not directly facing the noise source.

Acoustical shielding due to building geometry can be separated into two categories: reduction due to reduced area of exposure (side of a building) and shielding from barriers (such as a parapet or sound wall).

Reduction as a result of reduced area of exposure is calculated according to the following equation:

$$\Delta SPL = 10\log_{10}\left(\frac{\theta_{exp}}{180}\right)$$

Where:
ΔSPL = Change in Sound Pressure Level (dB)
θ_{exp} = Angle of exposure (degrees)

Acoustical Attenuation due to Distance

Sound pressure level reduction due to distance is calculated according to the following equation:

$$SPL_2 = SPL_1 + C_S \log\left(\frac{r_1}{r_2}\right)$$

Where:
SPL_1 = Sound Pressure Level at Location 1 (dB or dBA)
SPL_2 = Sound Pressure Level at Location 2 (dB or dBA)
C_S = Source Coefficient; 20 for point source, 10 for a line source
r_1 = Location 1 distance from source (ft.)
r_2 = Location 2 distance from source (ft.)

In some situations, the C_S value is between 10 and 20; selection of this number is an engineering judgment based on the relationship between the source and receiver as well as the type of source.

Interior Noise Calculation

The interior noise calculation takes into account the exterior noise level, the transmission loss of the glazing (including glass, frame, and seals), wall, and roof/ceiling systems, the finishes within the space, and noise exposure due to building geometry and acoustic shielding. The interior sound level is calculated using the equation:

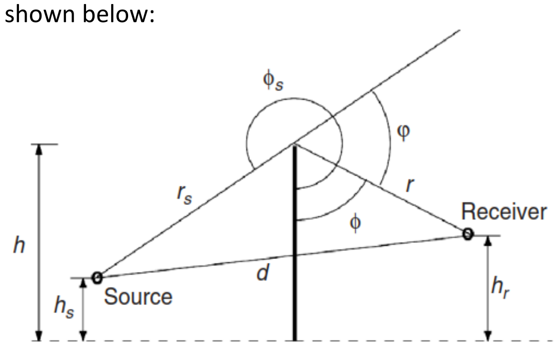
$$SPL_I = SPL_E + 10\,log_{10}(A) - 10log_{10}(R) - TL + 6$$

Where:
SPL_I = the Interior Sound Pressure Level (dB or dBA)
SPL_E = Exterior Sound Pressure Level (dB or dBA)
A = Surface Area exposed to Exterior Noise (sq.ft.)
R = Room Absorption Coefficient (sabins)
TL = Sound Transmission Loss of Exterior Façade Assembly (dB)

This calculation is performed for each exposed façade individually. The total interior sound level is found by using decibel addition to sum the sound level from all exposed facades.

Sound Barrier Calculation

The sound attenuation provided by a barrier varies according to the locations (or geometry) of the sound source, the barrier edge and the receptor, as shown below:



Where:
h_s = Source height (ft)
r_s = Distance between the sound source and the top of the barrier (ft)
h_r = Receiver height (ft)
r = Distance between the top of the barrier and the receiver (ft)

h = Barrier height (ft)
d = Distance between the source and the receiver (ft)

The attenuation calculation is performed for each frequency band individually (in dB) and is given by:

$$\boldsymbol{Attenuation\ (dB) = 5 + C\ log_{10}\left(\frac{\sqrt{2\pi N}}{tanh\sqrt{2\pi N}}\right)}$$

Where:
C = 20 (for point sources) and 15 (for line sources)
N (Fresnel Number) = $\pm\frac{2}{\lambda}\ (rs + r + d)$
λ = Frequency wavelength
tanh = Hyperbolic tangent function

The total sound attenuation is found by using decibel addition to sum the sound level from all attenuated frequency bands.