



# Brooks Acoustics Corporation

35 Talcottville Road, Suite 31 Vernon, Connecticut 06066 860-896-1081

Mr. Manny Gutierrez  
Gutierrez and Lozano Architects, P.A.  
2830 W. State Road 84, Suite 117  
Fort Lauderdale, Florida 33312

6 October 2022

Subject: Acoustical study and design evaluation – Warwick Pet Resort

Dear Mr. Gutierrez:

As requested, Brooks Acoustics Corporation (BAC) has conducted an acoustical study and design evaluation to evaluate the potential sound emissions from the proposed facility, to be located at the corner of Jefferson Boulevard and Williamsburg Drive in Warwick, Rhode Island, and any impact that those sounds may have on the surrounding neighborhood. Also, a sound management program was developed to promote a calm quiet environment at the facility. This program will minimize the impact from dog barking on the surrounding neighborhood.

Importantly, this evaluation has determined that the proposed facility as designed for this site will be **in compliance** with the requirements of the City of Warwick Noise Ordinance, Section 40-13.

The dominant sound sources are expected to be vehicles on Jefferson Boulevard and other area roads, the nearby rail line, and aircraft operating out of TF Green International Airport, about ½ mile from the site. The baseline ambient noise levels which will typically occur at the project site due to road traffic alone are expected to be consistently above 50 dBA. Brief events such as passing aircraft, trains and trucks can produce a level of 80 dBA or higher.

The sound levels due to barking dogs were estimated by acoustical analysis at several potentially sensitive locations. These locations include the nearest property line to the southwest, the nearest property line to the northwest, and the nearest residence located to the northwest.

These acoustical estimates were based on actual sound measurements of dogs induced to bark at an existing dog care facility, which was previously conducted by BAC. This analysis also included the beneficial effects of sound control design features which are included in the proposed building and outside runs.

The estimated sound level from barking dogs in an outside play yard to the nearest property line to the SW is **51 dBA**.

The estimated sound level at nearest property line to the NW is **46 dBA**.

The estimated sound level at the nearest residence to the NW is **42 dBA**.

The estimated sound level at the nearest residence to the NW from dogs inside the kennel is **25 dBA**.

Significantly, these estimated sound levels are *well below* the maximum permissible noise level of 60 dBA at the property line which is imposed by the City of Warwick between the hours of 8 am and 10 pm. The hours during which dogs will be allowed outside the building are between 8 am and 8 pm.

Further, the estimated sound levels are *consistent with or below* prevailing background sound levels in the area. Also, it would be highly unusual for the facility to reach these sound levels, because of the dog behavior management plan in place. Barking is an indicator that the dog requires attention.

As a part of the behavior management plan, a staff member trained in dog behavior will respond to a dog that barks and assess the situation. This is for the benefit and well-being of the dog and limits adverse effects on surrounding properties. Any outside barking will be minimal.

Based on this analysis, it is the opinion of BAC that with a reasonable degree of certainty that the establishment of this use by right *will be in harmony* with and compatible with its neighbors. It is expected that, the proposed facility will have *little or no impact* on the surrounding residential neighborhood.

In summary, the facility is expected to be *in compliance* with the City of Warwick sound level requirements.

### **Sound management program**

A sound management program for the proposed facility was developed. This program has three major elements, which are designed to reduce the potential for impact on the surrounding neighborhood. These sound management elements are:

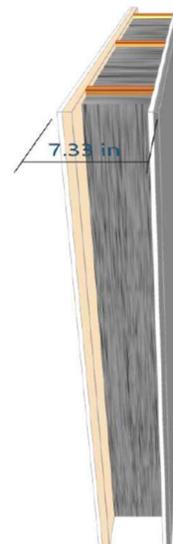
1. Sound isolation construction design for the facility building envelope.
2. Sound barrier walls outside the building, in the play zones, individual runs, and other critical property locations.
3. Dog behavior management program to address the needs of barking dogs.

### **Discussion**

1. The **building envelope** is designed to provide significant sound isolation from the interior to the exterior. A key component of the envelope is the main exterior wall assembly, which is to be designed to provide a sound transmission class (STC) rating of **STC 56**. The composite rating (with windows) is STC 39. A section of the exterior wall assembly is shown in the sketch below. Sound isolation calculations for these wall components and the composite wall are attached.

#### **Exterior wall assembly From outside to inside:**

Hardiplank fiber cement weather surface  
5/8 inch plywood  
2x6 studs  
5 inch fiberglass insulation (R-19)  
Hardiboard fiber cement tile backer  
Ceramic tile



This substantial exterior wall assembly is designed to contain the sound that a dog may generate inside the building and block it from reaching the outside.

2. **Sound barrier walls** of precast concrete 4 inches thick, which are 7 feet high will extend all around the dog runs are integral to the building design. These barrier walls will significantly reduce the sound levels which may reach the neighbor residences. The sound isolation calculation sheet is attached for the barrier wall, which provides a sound isolation rating of STC 49.

The facility building itself also constitutes a large sound barrier between the outside runs which are on the south side of the building and residences to the opposite side of the building.

3. A **behavior management program** will be instituted at the facility to address the needs of barking dogs. This program was developed based on the extensive experience of the facility team in evaluating and caring for dogs.

Facility policy is that when a dog barks, and specifically presents themselves with a consistent bark, a staff member trained in dog behavior will respond and assess the situation. A barking dog usually needs something. Knowledgeable trained dog behavior staff will determine the issue from which the bark derived and make accommodations. This is for the benefit and well-being of the dog and limits adverse effects on surrounding properties.

A calm and quiet environment is an essential element of the care provided by the facility. This is important for the well-being of the resident dogs, in order to give them the confidence that they are safe and secure. With that confidence in their safety the dogs' behavior will remain balanced and contented. With this in mind, resident dogs will be fed individually indoors and be given ample opportunity to rest throughout the day so as to remain calm and content.

### Summary

Dogs will be housed inside a sound-proof building envelope for the majority of their stay. They will be allowed time in outdoor play areas for fresh air and exercise, providing that they do not bark or cause issues with other dogs.

Barking is an indicator that the dog requires attention. As a part of the behavior management plan, a staff member trained in dog behavior will respond to a dog that barks and assess the situation. This is for the benefit and well-being of the dog and limits adverse effects on surrounding properties. Any outside barking will be minimal.

In addition, specific architectural, landscape and site design features will be employed to further protect neighboring homes and decrease the impact of sound. These features include sound dampening fences on individual runs, which also provide dog run sight line barriers between dogs, earthen and block wall sound barriers around critical property locations, and native landscape plantings will work in tandem to create a serene, quiet environment for all neighbors.

The above-described features of the facility sound management program are expected to perform such that the facility will conform to City of Warwick requirements, and that it will **not be detrimental** and will not disturb the comfort and repose of any person in the vicinity.

**Estimates of sound level at neighbor residences**

Acoustical calculations were made to estimate the sound levels due to barking dogs in the outside play yards.

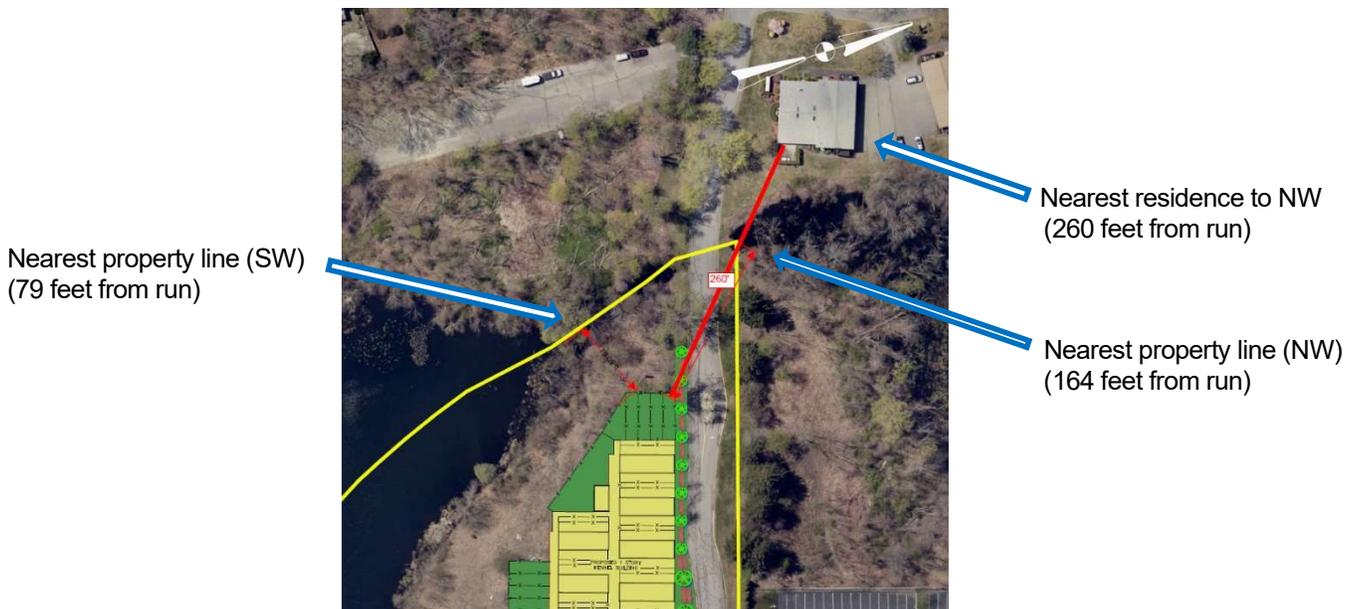
The source sound levels used for this analysis are based on measurements made by BAC at an existing operating dog care facility. The dogs were placed in outdoor runs (with no sound control) and excited to bark with dog biscuits and by walking another dog outside the runs for the dogs to see. The test distance was 10 feet. Note that at the tested location no visual or sound screens were in place so that the dogs could see each other, which induced further barking. The sound test environment is shown in Figure 1.

The exterior play yards (pens/runs) at the proposed facility were evaluated for potential impact on the neighborhood. Three receiver locations were evaluated, the nearest property line to the southwest, the nearest property line to the northwest, and the nearest residence to the northwest on Chatham Circle.

The source sound for each condition was characterized by taking the sound pressure level data for the dogs that were tested and adjusting those data, using a sound power relationship, to the appropriate number of dogs. In this case, it was assumed that a maximum of three dogs at a time would bark, due to the behavior management program. The source data in standard frequency octave bands at 10 feet distance were then applied to the analysis using the physical locations of the source and the receptor, and the particular circumstances of the building installation, as described above.

The source sound and location data were used as input to a computer modeling procedure which calculated the propagation of that sound through the atmosphere to the receptor position. The sound propagation calculation procedure accounts for the effects of the sources and facility building, barriers, and also distance and atmospheric conditions, in accordance with International Standard on the attenuation of sound during propagation outdoors, ISO 9613-2.

The site plan of the proposed facility is given in the Crossman Engineering drawing C4, dated July 2022, titled Proposed Aerial Map. The relevant portion of the site plan is shown below.



The source sound data are shown on the calculation Source Sheets, attached. The path and receiver calculations sheets which indicate the calculation results are also attached. Conservatively estimated sound barrier effects of the proposed facility and extended barrier walls are shown in the attached Barrier Attenuation Calculation sheets for the outside runs and for the exercise area, respectively.

The calculation results are summarized below:

<u>Source/receiver condition</u>	<u>Distance</u>	<u>Sound level</u>
Three (3) dogs in outside run	10 feet	86 dBA
Nearest property line to SW	79 feet	51 dBA
Nearest property line to NW	164 feet	46 dBA
Chatham Circle (nearest house)	260 feet	42 dBA
Chatham Circle – from <i>inside kennel</i>	260 feet	25 dBA

Based on this study, the proposed facility and site layout is expected to provide a significant reduction in the sound levels from the outside play yards to the property line and the neighbor residence on Chatham Circle. It is important to note that the sound level will *drop substantially* for houses at greater distances. Significantly, the projected sound levels at the neighbor residences are **below the prevailing background sound levels** in the area. The sound levels from dogs inside the building will be considerably lower, and essentially inaudible.

Therefore, if dog barking does occur at the proposed facility, it may be audible only during the quietest ambient conditions. Any outside barking will be minimal, and not long or continuous. It is expected that the operation of the facility will **not disturb the comfort and repose** of any person in the vicinity, and also be in compliance with the noise ordinance of the City of Warwick.

Further, as a result of the facility’s behavior management program, if dog barking is audible in the neighborhood, it will most likely be from a neighborhood dog and not from the proposed facility.

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



Figure 1, a. Sound test - 14 dogs induced to bark.



Figure 1, b. Sound test - 14 dogs induced to bark.

## **APPENDIX**

### **1- Sound Projection Data**

Sound source sheets

Sound path and receiver sheets

Outside sound barrier wall – barrier attenuation calculations

Exterior wall assembly – sound transmission calculations

Outside sound barrier wall – sound transmission calculations

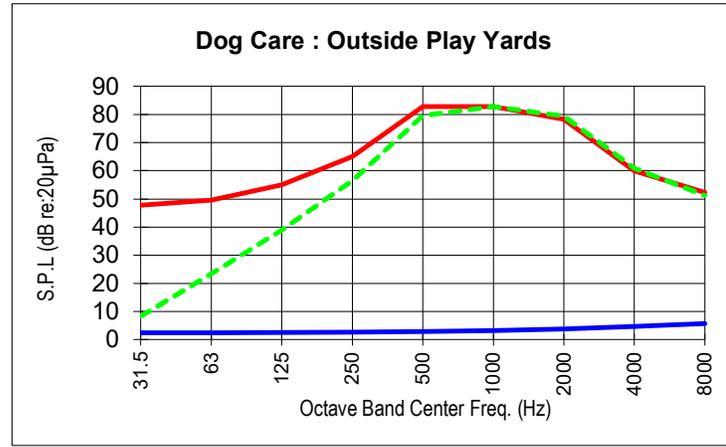
# Source Sheet

Source Group: Dog Care  
 Source Name: Outside Play Yards

Source Data: BAC A-wt  
 Source Level: 86 dB(A)  
 record distance: 10

Source Type: point

Coordinates: East North Elev.  
 0 0 2



Frequency	Data	Signature	A-weighted Signature	A-weighting Curve	freq.
31.5 Hz	15.0	<u>48</u>	8	-39.4	31.5
63.0 Hz	30.0	<u>50</u>	23	-26.2	63
125.0 Hz	45.6	<u>55</u>	39	-16.1	125
250.0 Hz	63.2	<u>65</u>	57	-8.6	250
500.0 Hz	86.3	<u>83</u>	80	-3.2	500
1000.0 Hz	89.5	<u>83</u>	83	0.0	1000
2000.0 Hz	86.1	<u>78</u>	79	1.2	2000
4000.0 Hz	67.6	<u>60</u>	61	1.0	4000
8000.0 Hz	57.9	<u>52</u>	51	-1.1	8000

BAC data  
 (A-wt)  
 for  
 kennel  
 outdoor runs  
 14 dogs

Data  
 adjusted  
 for  
 3 dogs

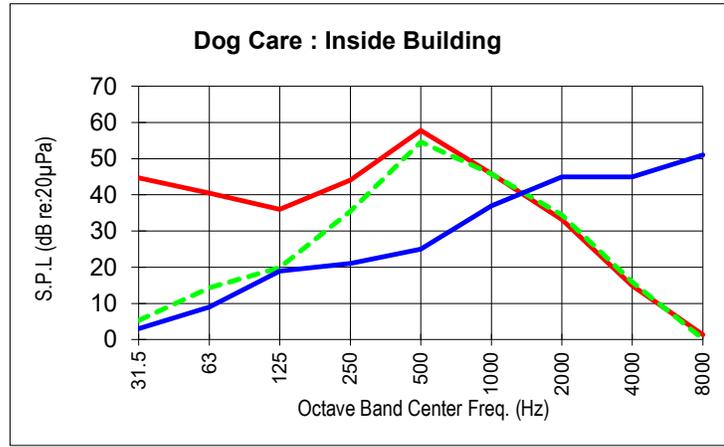
# Source Sheet

Source Group: Dog Care  
 Source Name: Inside Building

Source Data: BAC A-wt  
 Source Level: 55 dB(A)  
 record distance: 10

Source Type: point

Coordinates: East 0 North 0 Elev. 2



Frequency	Data	Bldg Wall Atten	Signature	A-weighted Signature	A-weighting Curve	freq.
31.5 Hz	15.0	3	<u>45</u>	5	-39.4	31.5
63.0 Hz	30.0	9	<u>41</u>	14	-26.2	63
125.0 Hz	45.6	19	<u>36</u>	20	-16.1	125
250.0 Hz	63.2	21	<u>44</u>	36	-8.6	250
500.0 Hz	86.3	25	<u>58</u>	55	-3.2	500
1000.0 Hz	89.5	37	<u>46</u>	46	0.0	1000
2000.0 Hz	86.1	45	<u>33</u>	34	1.2	2000
4000.0 Hz	67.6	45	<u>15</u>	16	1.0	4000
8000.0 Hz	57.9	51	<u>1</u>	0	-1.1	8000

BAC data  
 (A-wt)  
 for  
 kennel  
 outdoor runs  
 14 dogs

Data  
 adjusted  
 for  
 3 dogs

Composite  
 exterior  
 wall  
 assembly

**Warwick Pet Resort**

Based on BAC sound data and proposed site plan

Property Line Sound Study

Near north end of pond

Sound Projection: Proposed Dog Care

Proposed architectural layout with sound control

PROJECTED FROM: Dog Care  
 PROJECTED TO: Nearest property line to SW

Coordinates:

East	North	Elevation
-72.0	-32.0	5.0

RELATIVE HUMIDITY: 50%  
 TEMPERATURE: 72 deg. F  
 ATMOS. PRESS: 760 mm Hg

Criteria Level **60 dBA**  
 Total Sound Level **51 dBA**  
 Compliance? **YES**

FREQ.	AWT SPL	SOURCE		CONTRIBUTIONS
		#		AWT SPL
31.5 Hz	-18.9	1	Dog Care Outside Play Yards	51.3 dBA
63 Hz	-4.9	2	reserved --	-30.3 dBA
125 Hz	12.3	3	reserved --	-30.3 dBA
250 Hz	28.7	4	reserved --	-30.3 dBA
500 Hz	48.4	5	reserved --	-30.3 dBA
1000 Hz	47.2	6	reserved --	-30.3 dBA
2000 Hz	40.6	7	reserved --	-30.3 dBA
4000 Hz	20.4	8	reserved --	-30.3 dBA
8000 Hz	8.9	9	reserved --	-30.3 dBA
RMS:	51.3	10	reserved --	-30.3 dBA
		11	reserved --	-30.3 dBA
		12	reserved --	-30.3 dBA

Atmospheric attenuation: yes  
 Excess ground attenuation: yes  
 Source region hard, soft, mixed (h,s,m%): h  
 Receiver region hard, soft, mixed (h,s,m%): s  
 Middle region hard, soft, mixed (h,s,m%): s  
 Barrier shadowing: yes  
 Vegetation: yes

**PATH SHEET**

SOURCE 1: Dog Care Outside Play Yards TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 2.0	<u>Record Distance</u> 10.0 <u>Projection Dist.</u> 78.8
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Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	47.7	0.1	6.2	-3.0	9.2	0.0	17.9	20.5	-18.9
63 Hz	49.5	0.1	7.2	-3.0	10.2	0.0	17.9	21.3	-4.9
125 Hz	55.0	0.2	8.8	0.2	8.6	0.0	17.9	28.4	12.3
250 Hz	65.1	0.2	10.8	1.2	9.6	0.0	17.9	37.3	28.7
500 Hz	82.8	0.2	13.3	0.3	13.0	0.1	17.9	51.6	48.4
1000 Hz	82.8	0.3	16.0	-1.3	17.3	0.1	17.9	47.2	47.2
2000 Hz	78.2	0.3	18.8	-1.5	20.3	0.2	17.9	39.4	40.6
4000 Hz	59.9	0.4	20.0	-1.5	21.5	0.7	17.9	19.4	20.4
8000 Hz	52.3	0.6	20.0	-1.5	21.5	2.3	17.9	10.0	8.9
								53.3	51.3

**PATH SHEET**

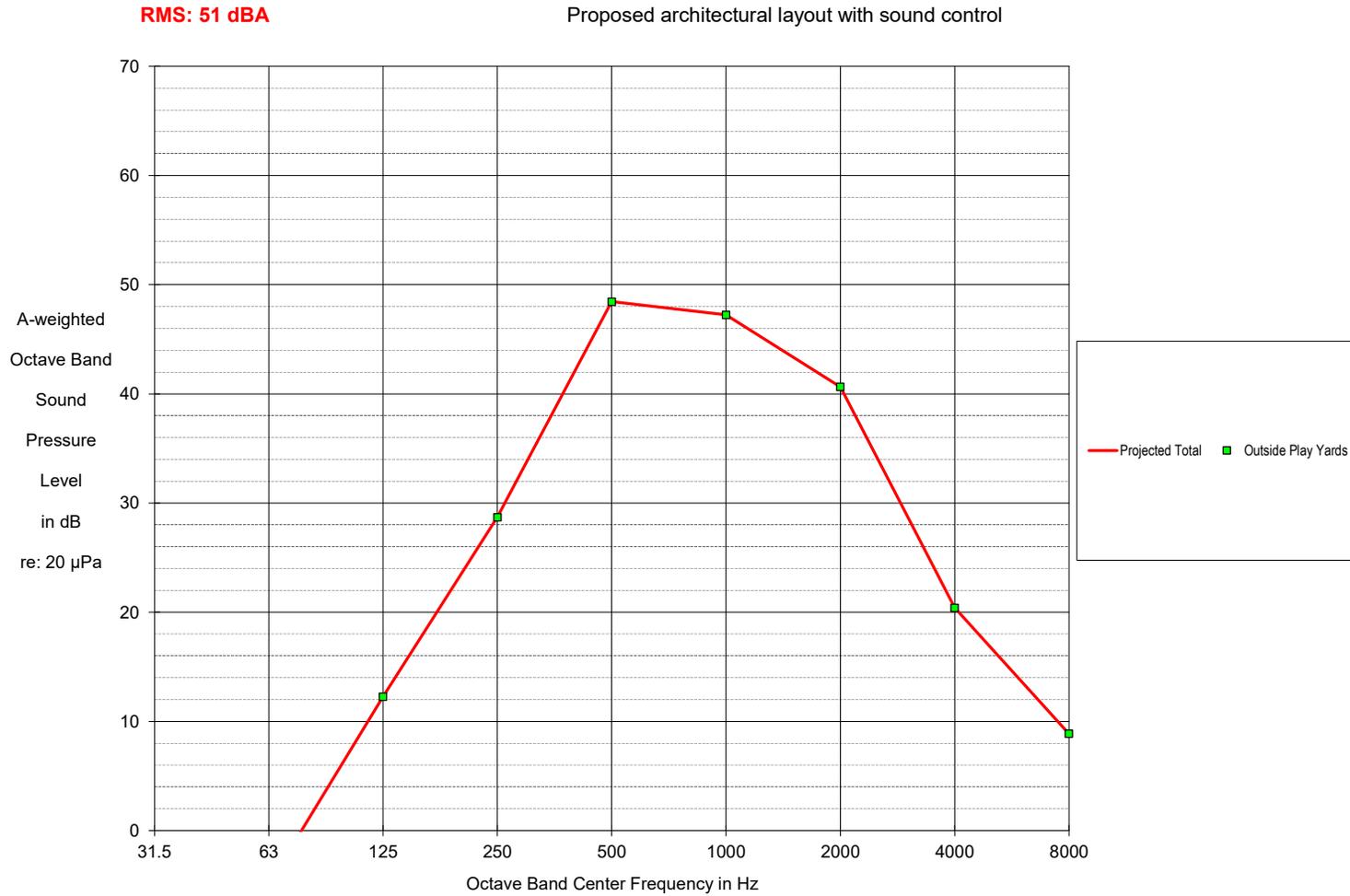
SOURCE 2: reserved -- TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 1.0	<u>Record Distance</u> 1.0 <u>Projection Dist.</u> 78.9
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Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	0.0	0.0	0.0	-3.0	-3.0	0.0	37.9	-34.9	-74.3
63 Hz	0.0	0.0	0.0	-3.0	-3.0	0.0	37.9	-34.9	-61.1
125 Hz	0.0	0.0	0.0	0.2	0.2	0.0	37.9	-38.2	-54.3
250 Hz	0.0	0.0	0.0	1.2	1.2	0.0	37.9	-39.1	-47.7
500 Hz	0.0	0.0	0.0	0.3	0.3	0.1	37.9	-38.3	-41.5
1000 Hz	0.0	0.0	0.0	-1.3	-1.3	0.1	37.9	-36.8	-36.8
2000 Hz	0.0	0.0	0.0	-1.5	-1.5	0.2	37.9	-36.7	-35.5
4000 Hz	0.0	0.0	0.0	-1.5	-1.5	0.7	37.9	-37.1	-36.1
8000 Hz	0.0	0.0	0.0	-1.5	-1.5	2.3	37.9	-38.8	-39.9
								-27.4	-30.3

Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source Contribution Plot

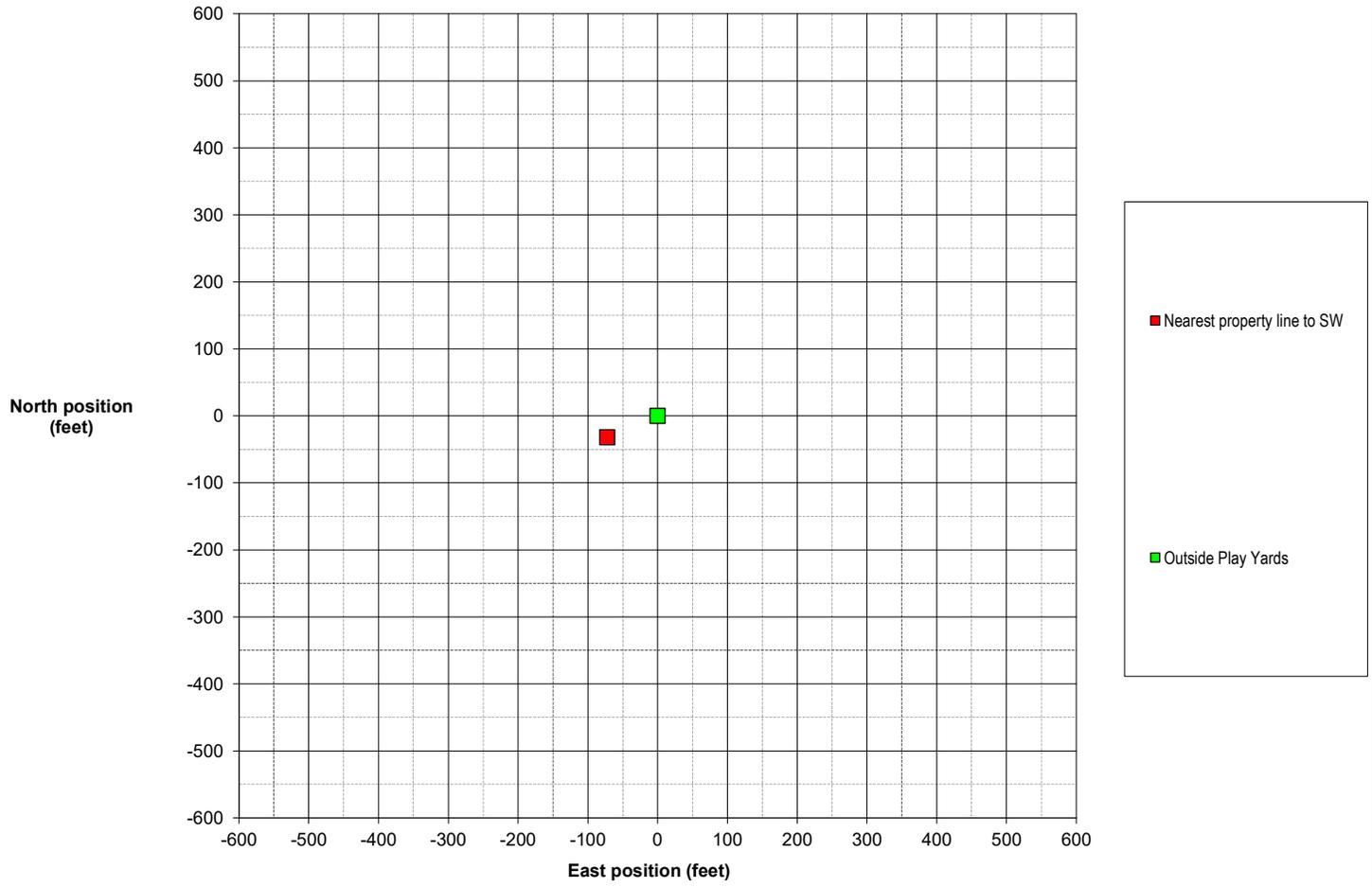
Nearest property line to SW  
Based on BAC sound data and proposed site plan  
Near north end of pond  
Proposed architectural layout with sound control



Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source - Receiver Location Plot Sound Source Contribution Plot Nearest property line to SW

**RMS: 51 dBA**



**Warwick Pet Resort**

Based on BAC sound data and proposed site plan

Property Line Sound Study

Property line toward nearest residence

Sound Projection: Proposed Dog Care

Proposed architectural layout with sound control

PROJECTED FROM: Dog Care  
 PROJECTED TO: Property line to NW

Coordinates:

East	North	Elevation
-149.0	69.0	5.0

RELATIVE HUMIDITY: 50%  
 TEMPERATURE: 72 deg. F  
 ATMOS. PRESS: 760 mm Hg

Criteria Level **60 dBA**  
 Total Sound Level **46 dBA**  
 Compliance? **YES**

FREQ.	AWT SPL	SOURCE		CONTRIBUTIONS
		#		AWT SPL
31.5 Hz	-25.2	1	Dog Care Outside Play Yards	45.7 dBA
63 Hz	-11.3	2	reserved --	-37.4 dBA
125 Hz	7.1	3	reserved --	-37.4 dBA
250 Hz	24.0	4	reserved --	-37.4 dBA
500 Hz	43.3	5	reserved --	-37.4 dBA
1000 Hz	41.0	6	reserved --	-37.4 dBA
2000 Hz	34.1	7	reserved --	-37.4 dBA
4000 Hz	13.3	8	reserved --	-37.4 dBA
8000 Hz	0.0	9	reserved --	-37.4 dBA
RMS:	45.7	10	reserved --	-37.4 dBA
		11	reserved --	-37.4 dBA
		12	reserved --	-37.4 dBA

Atmospheric attenuation: yes  
 Excess ground attenuation: yes  
 Source region hard, soft, mixed (h,s,m%): h  
 Receiver region hard, soft, mixed (h,s,m%): s  
 Middle region hard, soft, mixed (h,s,m%): s  
 Barrier shadowing: yes  
 Vegetation: yes

**PATH SHEET**

SOURCE 1: Dog Care Outside Play Yards TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 2.0	<u>Record Distance</u> 10.0 <u>Projection Dist.</u> 164.2
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Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	47.7	0.1	6.1	-3.0	9.1	0.0	24.3	14.2	-25.2
63 Hz	49.5	0.1	7.2	-3.0	10.2	0.0	24.3	14.9	-11.3
125 Hz	55.0	0.2	8.7	1.4	7.3	0.0	24.3	23.2	7.1
250 Hz	65.1	0.2	10.8	2.9	7.9	0.1	24.3	32.6	24.0
500 Hz	82.8	0.2	13.2	1.5	11.7	0.1	24.3	46.5	43.3
1000 Hz	82.8	0.3	15.9	-1.1	17.0	0.3	24.3	41.0	41.0
2000 Hz	78.2	0.3	18.7	-1.5	20.2	0.5	24.3	32.9	34.1
4000 Hz	59.9	0.4	20.0	-1.5	21.5	1.4	24.3	12.3	13.3
8000 Hz	52.3	0.6	20.0	-1.5	21.5	4.8	24.3	1.1	0.0
								47.9	45.7

**PATH SHEET**

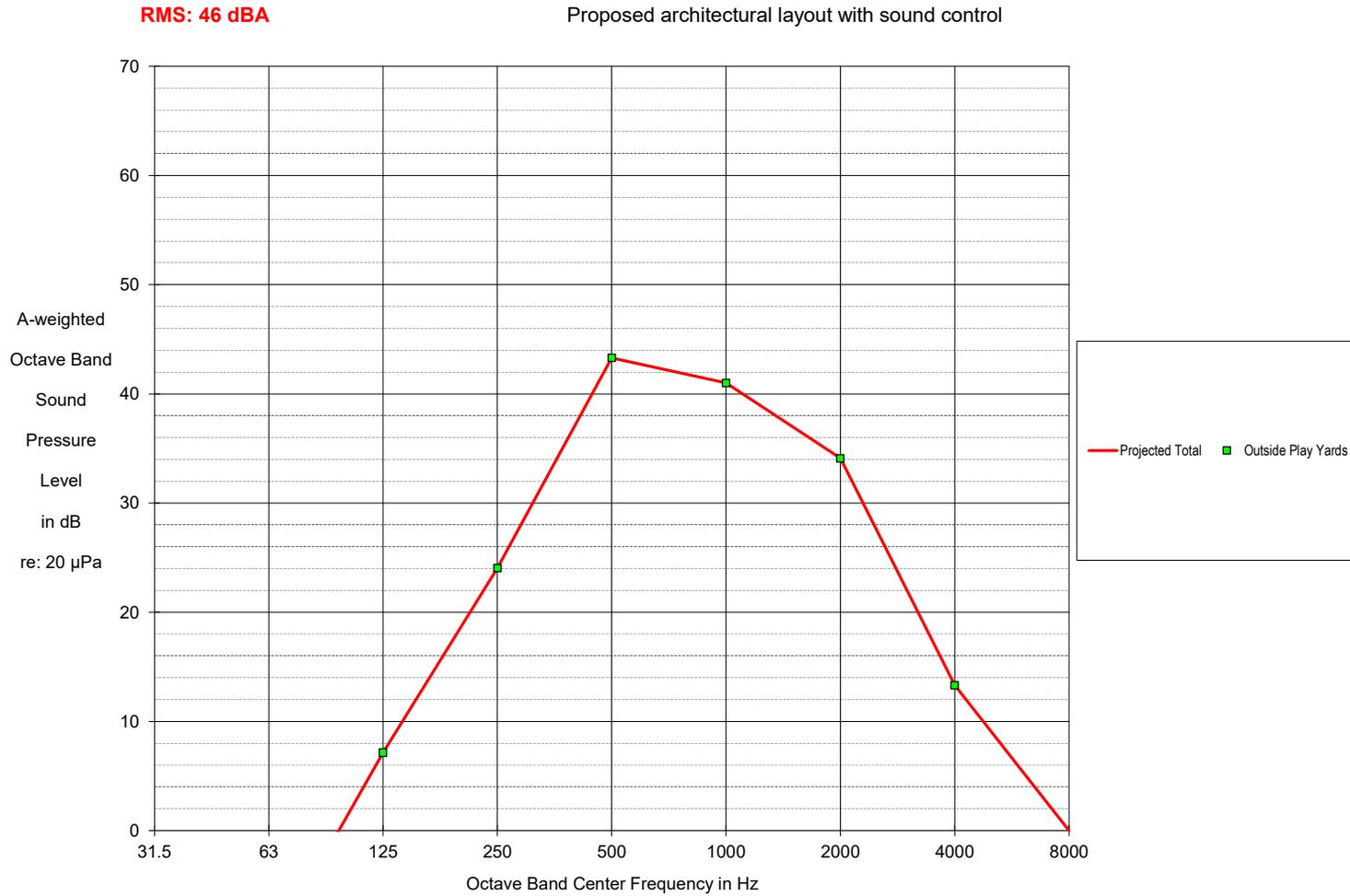
SOURCE 2: reserved -- TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 1.0	<u>Record Distance</u> 1.0 <u>Projection Dist.</u> 164.2
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Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	0.0	0.0	0.0	-3.0	-3.0	0.0	44.3	-41.3	-80.7
63 Hz	0.0	0.0	0.0	-3.0	-3.0	0.0	44.3	-41.3	-67.5
125 Hz	0.0	0.0	0.0	1.4	1.4	0.0	44.3	-45.7	-61.8
250 Hz	0.0	0.0	0.0	2.9	2.9	0.1	44.3	-47.3	-55.9
500 Hz	0.0	0.0	0.0	1.5	1.5	0.1	44.3	-46.0	-49.2
1000 Hz	0.0	0.0	0.0	-1.1	-1.1	0.3	44.3	-43.5	-43.5
2000 Hz	0.0	0.0	0.0	-1.5	-1.5	0.5	44.3	-43.3	-42.1
4000 Hz	0.0	0.0	0.0	-1.5	-1.5	1.4	44.3	-44.2	-43.2
8000 Hz	0.0	0.0	0.0	-1.5	-1.5	4.8	44.3	-47.6	-48.7
								-34.4	-37.4

Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source Contribution Plot Property line to NW

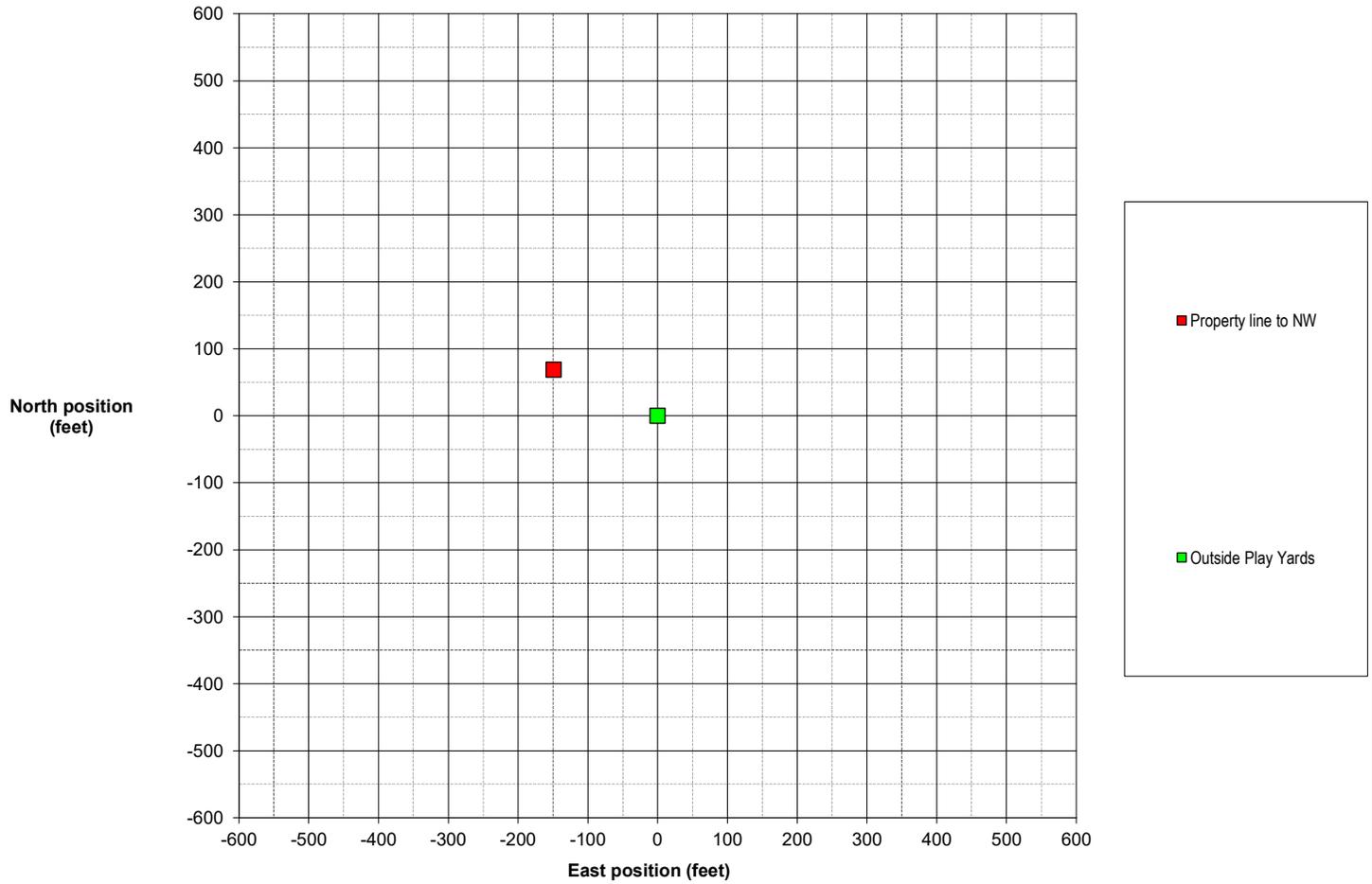
Based on BAC sound data and proposed site plan  
Property line toward nearest residence  
Proposed architectural layout with sound control



Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source - Receiver Location Plot Sound Source Contribution Plot Property line to NW

**RMS: 46 dBA**



**Warwick Pet Resort**

Based on BAC sound data and proposed site plan

Property Line Sound Study

Nearest residence (located to NW)

Sound Projection: Proposed Dog Care

Proposed architectural layout with sound control

PROJECTED FROM: Dog Care  
 PROJECTED TO: Nearest Residence (NW)

Coordinates:

East	North	Elevation
-205.0	160.0	5.0

RELATIVE HUMIDITY: 50%  
 TEMPERATURE: 72 deg. F  
 ATMOS. PRESS: 760 mm Hg

Criteria Level **60 dBA**  
 Total Sound Level **42 dBA**  
 Compliance? **YES**

FREQ.	AWT SPL	SOURCE		CONTRIBUTIONS
		#		AWT SPL
31.5 Hz	-28.6	1	Dog Care Outside Play Yards	42.2 dBA
63 Hz	-14.6	2	reserved --	-42.0 dBA
125 Hz	3.9	3	reserved --	-42.0 dBA
250 Hz	21.3	4	reserved --	-42.0 dBA
500 Hz	40.1	5	reserved --	-42.0 dBA
1000 Hz	37.0	6	reserved --	-42.0 dBA
2000 Hz	29.9	7	reserved --	-42.0 dBA
4000 Hz	8.5	8	reserved --	-42.0 dBA
8000 Hz	-6.8	9	reserved --	-42.0 dBA
RMS:	42.2	10	reserved --	-42.0 dBA
		11	reserved --	-42.0 dBA
		12	reserved --	-42.0 dBA

Atmospheric attenuation: yes  
 Excess ground attenuation: yes  
 Source region hard, soft, mixed (h,s,m%): h  
 Receiver region hard, soft, mixed (h,s,m%): s  
 Middle region hard, soft, mixed (h,s,m%): s  
 Barrier shadowing: yes  
 Vegetation: yes

**PATH SHEET**

SOURCE 1: Dog Care Outside Play Yards TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 2.0	<u>Record Distance</u> 10.0 <u>Projection Dist.</u> 260.1
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Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	47.7	0.1	6.1	-2.4	8.5	0.0	28.3	10.8	-28.6
63 Hz	49.5	0.1	7.1	-2.4	9.5	0.0	28.3	11.6	-14.6
125 Hz	55.0	0.2	8.7	2.2	6.5	0.0	28.3	20.0	3.9
250 Hz	65.1	0.2	10.7	4.0	6.7	0.1	28.3	29.9	21.3
500 Hz	82.8	0.2	13.1	2.3	10.8	0.2	28.3	43.3	40.1
1000 Hz	82.8	0.3	15.8	-1.0	16.8	0.4	28.3	37.0	37.0
2000 Hz	78.2	0.3	18.6	-1.5	20.1	0.8	28.3	28.7	29.9
4000 Hz	59.9	0.4	20.0	-1.5	21.5	2.2	28.3	7.5	8.5
8000 Hz	52.3	0.6	20.0	-1.5	21.5	7.6	28.3	-5.7	-6.8
								44.5	42.2

**PATH SHEET**

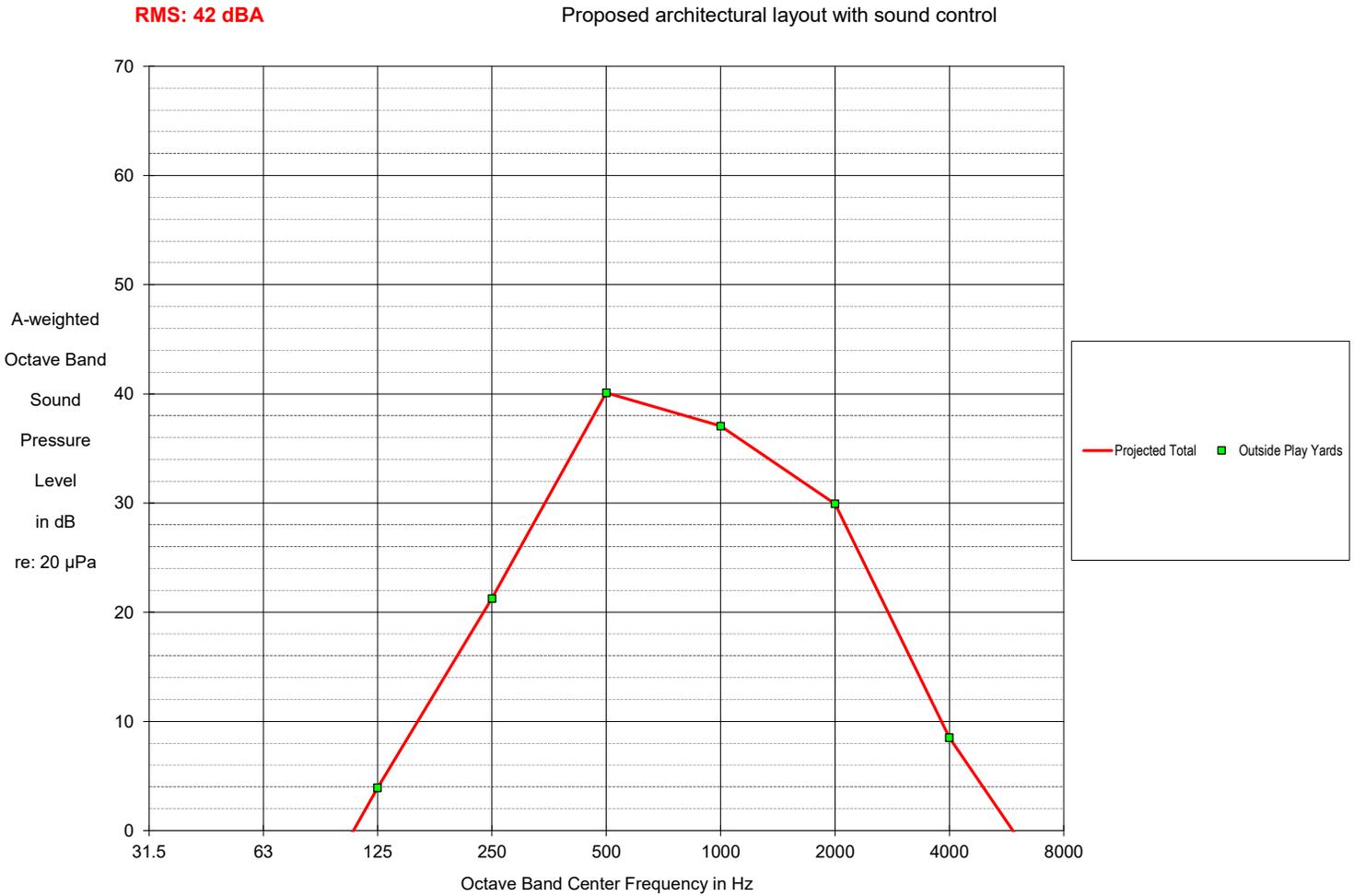
SOURCE 2: reserved -- TYPE: point	<u>COORDINATES</u> East 0.0 North 0.0 Elevation 1.0	<u>Record Distance</u> 1.0 <u>Projection Dist.</u> 260.1
---	--	---

Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	0.0	0.0	0.0	-2.1	-2.1	0.0	48.3	-46.2	-85.6
63 Hz	0.0	0.0	0.0	-2.1	-2.1	0.0	48.3	-46.2	-72.4
125 Hz	0.0	0.0	0.0	2.2	2.2	0.0	48.3	-50.5	-66.6
250 Hz	0.0	0.0	0.0	4.0	4.0	0.1	48.3	-52.5	-61.1
500 Hz	0.0	0.0	0.0	2.3	2.3	0.2	48.3	-50.9	-54.1
1000 Hz	0.0	0.0	0.0	-1.0	-1.0	0.4	48.3	-47.7	-47.7
2000 Hz	0.0	0.0	0.0	-1.5	-1.5	0.8	48.3	-47.6	-46.4
4000 Hz	0.0	0.0	0.0	-1.5	-1.5	2.2	48.3	-49.0	-48.0
8000 Hz	0.0	0.0	0.0	-1.5	-1.5	7.6	48.3	-54.4	-55.5
								-39.2	-42.0

Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source Contribution Plot Nearest Residence (NW)

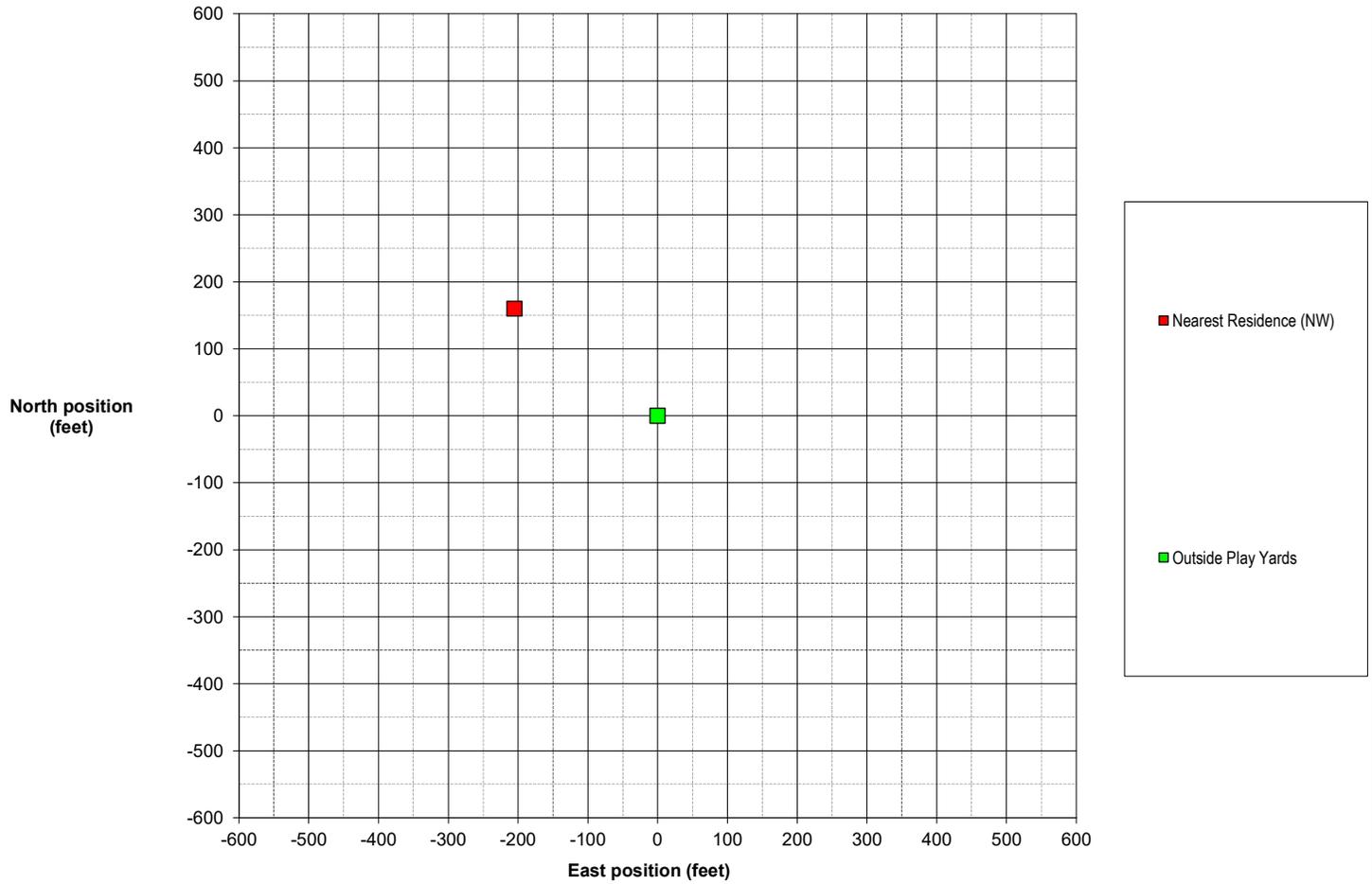
Based on BAC sound data and proposed site plan  
Nearest residence (located to NW)  
Proposed architectural layout with sound control



Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source - Receiver Location Plot Sound Source Contribution Plot Nearest Residence (NW)

**RMS: 42 dBA**



**Warwick Pet Resort**

Based on BAC sound data and proposed site plan

Property Line Sound Study

Nearest residence (located to NW) from Inside Building

Sound Projection: Proposed Dog Care

Proposed architectural layout with sound control

Coordinates:

PROJECTED FROM: Dog Care (inside building)  
 PROJECTED TO: Nearest Residence (NW)

East	North	Elevation
-205.0	160.0	5.0

RELATIVE HUMIDITY: 50%

TEMPERATURE: 72 deg. F

ATMOS. PRESS: 760 mm Hg

Criteria Level **60 dBA**  
 Total Sound Level **25 dBA**

Compliance?  
**YES**

FREQ.	AWT SPL	SOURCE		CONTRIBUTIONS
		#		AWT SPL
31.5 Hz	-20.7			
63 Hz	-11.7	1	Dog Care Outside Play Yards	24.7 dBA
125 Hz	-10.8	2	reserved --	-42.0 dBA
250 Hz	2.9	3	reserved --	-42.0 dBA
500 Hz	23.5	4	reserved --	-42.0 dBA
1000 Hz	17.9	5	reserved --	-42.0 dBA
2000 Hz	6.5	6	reserved --	-42.0 dBA
4000 Hz	-13.5	7	reserved --	-42.0 dBA
8000 Hz	-34.4	8	reserved --	-42.0 dBA
		9	reserved --	-42.0 dBA
RMS:	24.7	10	reserved --	-42.0 dBA
		11	reserved --	-42.0 dBA
		12	reserved --	-42.0 dBA

Atmospheric attenuation: yes  
 Excess ground attenuation: yes  
 Source region hard, soft, mixed (h,s,m%): h  
 Receiver region hard, soft, mixed (h,s,m%): s  
 Middle region hard, soft, mixed (h,s,m%): s  
 Barrier shadowing: no  
 Vegetation: yes

**PATH SHEET**

SOURCE 1: Dog Care  
 Outside Play Yards  
 TYPE: point

COORDINATES  
 East 0.0  
 North 0.0  
 Elevation 2.0

Record Distance  
 10.0  
Projection Dist.  
 260.1

Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	44.7	0.1	0.0	-2.4	-2.4	0.0	28.3	18.7	-20.7
63 Hz	40.5	0.1	0.0	-2.4	-2.4	0.0	28.3	14.5	-11.7
125 Hz	36.0	0.2	0.0	2.2	2.2	0.0	28.3	5.3	-10.8
250 Hz	44.1	0.2	0.0	4.0	4.0	0.1	28.3	11.5	2.9
500 Hz	57.8	0.2	0.0	2.3	2.3	0.2	28.3	26.7	23.5
1000 Hz	45.8	0.3	0.0	-1.0	-1.0	0.4	28.3	17.9	17.9
2000 Hz	33.2	0.3	0.0	-1.5	-1.5	0.8	28.3	5.3	6.5
4000 Hz	14.9	0.4	0.0	-1.5	-1.5	2.2	28.3	-14.5	-13.5
8000 Hz	1.3	0.6	0.0	-1.5	-1.5	7.6	28.3	-33.7	-34.8
								28.2	24.7

**PATH SHEET**

SOURCE 2: reserved  
 --  
 TYPE: point

COORDINATES  
 East 0.0  
 North 0.0  
 Elevation 1.0

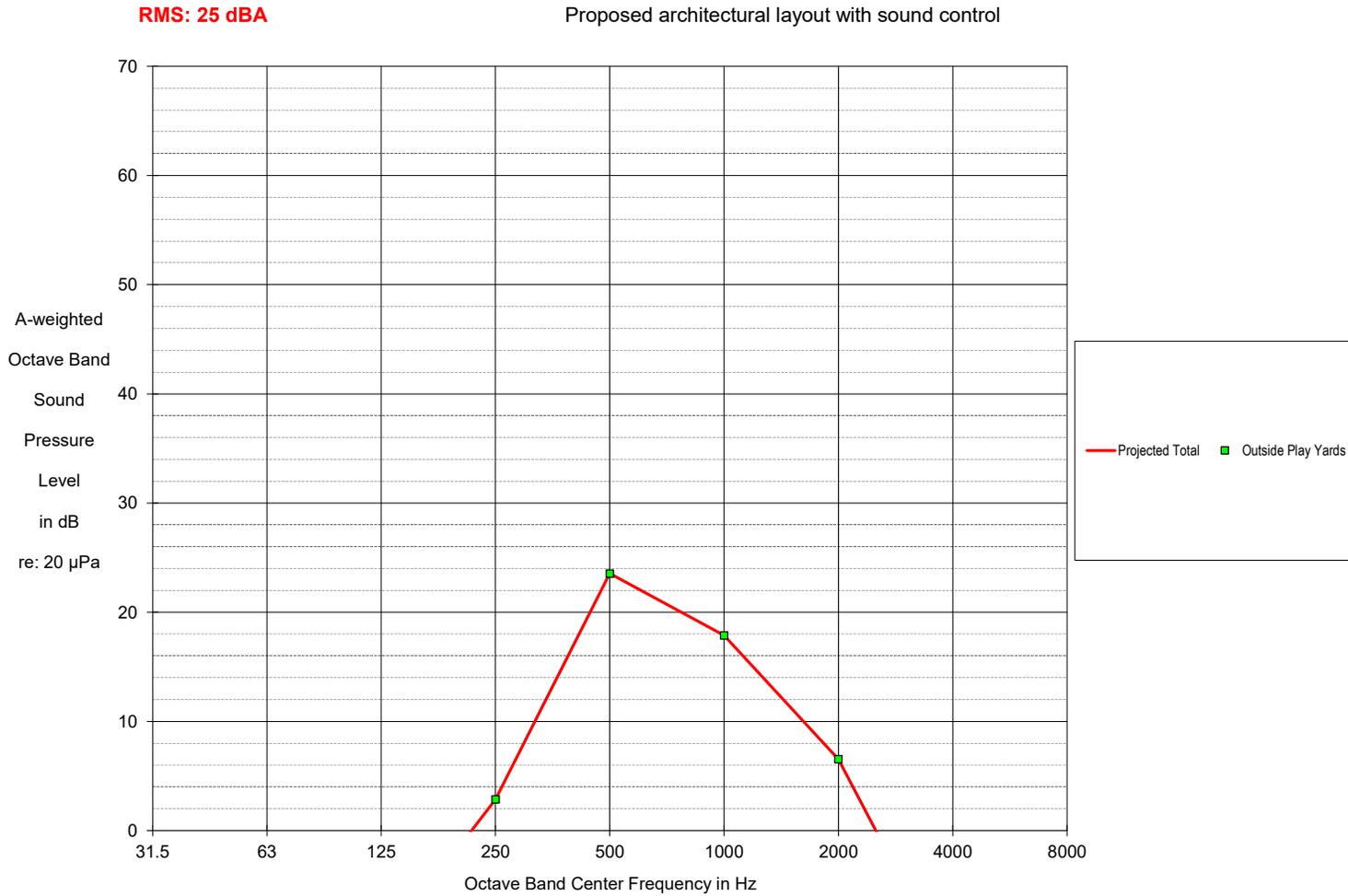
Record Distance  
 1.0  
Projection Dist.  
 260.1

Freq.	Source	Vegetation	Shadowing	Ground Atten	Net		Distance Atten	Contribution	Awt Contrib.
					Barrier Atten	Atmospheric			
31.5 Hz	0.0	0.0	0.0	-2.1	-2.1	0.0	48.3	-46.2	-85.6
63 Hz	0.0	0.0	0.0	-2.1	-2.1	0.0	48.3	-46.2	-72.4
125 Hz	0.0	0.0	0.0	2.2	2.2	0.0	48.3	-50.5	-66.6
250 Hz	0.0	0.0	0.0	4.0	4.0	0.1	48.3	-52.5	-61.1
500 Hz	0.0	0.0	0.0	2.3	2.3	0.2	48.3	-50.9	-54.1
1000 Hz	0.0	0.0	0.0	-1.0	-1.0	0.4	48.3	-47.7	-47.7
2000 Hz	0.0	0.0	0.0	-1.5	-1.5	0.8	48.3	-47.6	-46.4
4000 Hz	0.0	0.0	0.0	-1.5	-1.5	2.2	48.3	-49.0	-48.0
8000 Hz	0.0	0.0	0.0	-1.5	-1.5	7.6	48.3	-54.4	-55.5
								-39.2	-42.0

Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source Contribution Plot Nearest Residence (NW)

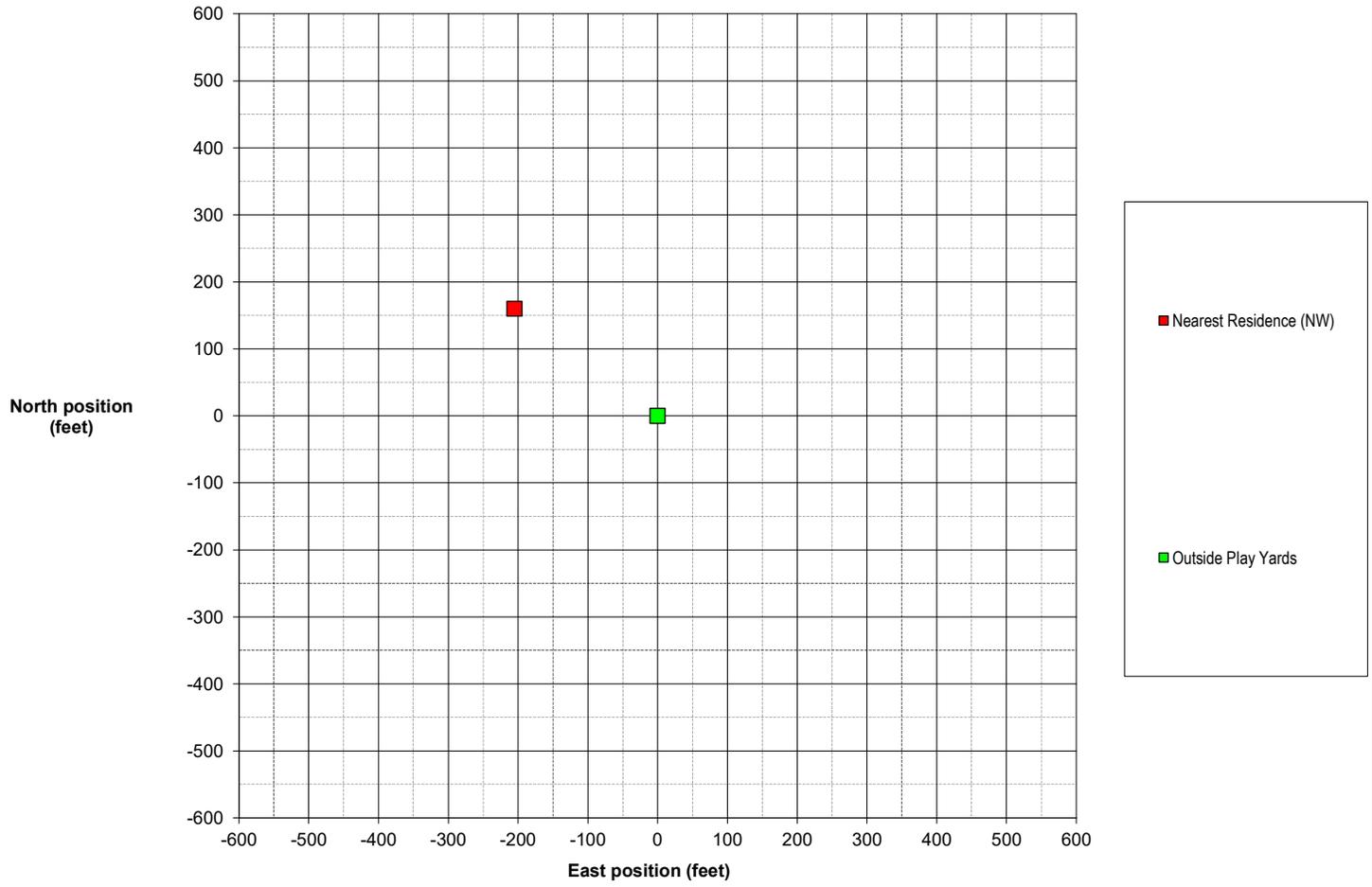
Based on BAC sound data and proposed site plan  
Nearest residence (located to NW) from Inside Building  
Proposed architectural layout with sound control



Warwick Pet Resort  
Property Line Sound Study  
Proposed Dog Care

### Sound Source - Receiver Location Plot Sound Source Contribution Plot Nearest Residence (NW)

**RMS: 25 dBA**



### BARRIER ATTENUATION CALCULATION

#### Proposed Warwick Pet Resort

Source: Outside play yard area -- Receiver: Nearest property line (to SW)

(\* Indicates values to be input in feet -- baseline elev. 30 ft)

$h_b := 7$  \*Height of barrier                       $d_{sb} := 5$  \*Distance from source to barrier  
 $h_s := 2$  \*Height of source                       $d_{br} := 79$  \*Distance from barrier to receiver  
 $h_r := 5$  \*Height of 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)

$D_{br} := d_{br} \cdot .3048$                        $D_{br} = 24.079$

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

$H_{sb} := (h_b - h_s) \cdot .3048$                        $H_{sb} = 1.524$

$H_{br} := (h_b - h_r) \cdot .3048$                        $H_{br} = 0.61$

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

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$                        $R_{sb} = 2.155$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$                        $R_{br} = 24.087$

Fresnel Number

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

$C := 10$

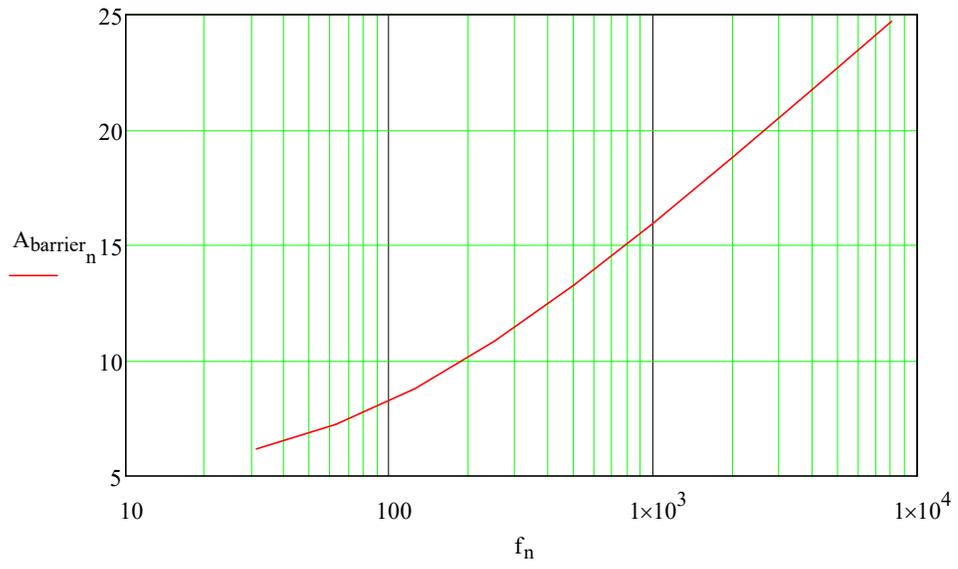
C=10 for receiver over reflecting plane (close to ground)

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

Barrier Attenuation

$A_{\text{barrier}} =$	6.2	31.5
	7.2	63
	8.8	125
	10.8	250
	13.3	500
	16	1000
	18.8	2000
	21.7	4000
	24.7	8000

Note: Practical limit for barrier attenuation is 20 dB



### BARRIER ATTENUATION CALCULATION

#### Proposed Warwick Pet Resort

Source: Outside play yard area -- Receiver: Nearest property line (to NW)

(\* Indicates values to be input in feet -- baseline elev. 30 ft)

$h_b := 7$  \*Height of barrier  $d_{sb} := 5$  \*Distance from source to barrier  
 $h_s := 2$  \*Height of source  $d_{br} := 159$  \*Distance from barrier to receiver  
 $h_r := 5$  \*Height of 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)

$D_{br} := d_{br} \cdot .3048$   $D_{br} = 48.463$

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

$H_{sb} := (h_b - h_s) \cdot .3048$   $H_{sb} = 1.524$

$H_{br} := (h_b - h_r) \cdot .3048$   $H_{br} = 0.61$

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

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$   $R_{sb} = 2.155$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$   $R_{br} = 48.467$

Fresnel Number

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

$C := 10$

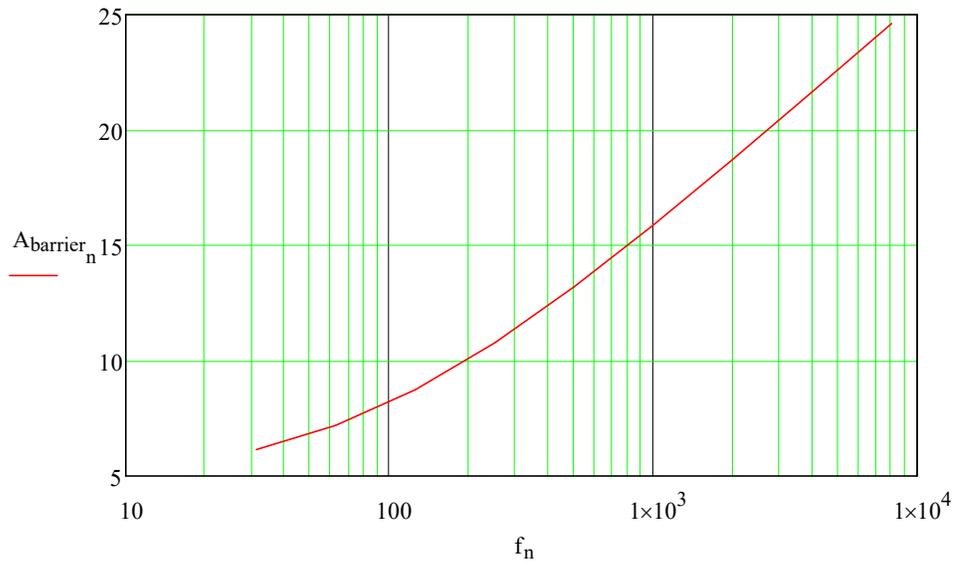
C=10 for receiver over reflecting plane (close to ground)

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

Barrier Attenuation

$A_{\text{barrier}} =$	6.1	31.5
	7.2	63
	8.7	125
	10.8	250
	13.2	500
	15.9	1000
	18.7	2000
	21.6	4000
	24.6	8000

Note: Practical limit for barrier attenuation is 20 dB



### BARRIER ATTENUATION CALCULATION

#### Proposed Warwick Pet Resort

Source: Outside play yard area -- Receiver: Nearest residence (to NW)

(\* Indicates values to be input in feet -- baseline elev. 30 ft)

$h_b := 7$  \*Height of barrier                       $d_{sb} := 5$  \*Distance from source to barrier  
 $h_s := 2$  \*Height of source                       $d_{br} := 255$  \*Distance from barrier to receiver  
 $h_r := 5$  \*Height of 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)

$D_{br} := d_{br} \cdot .3048$                        $D_{br} = 77.724$

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

$H_{sb} := (h_b - h_s) \cdot .3048$                        $H_{sb} = 1.524$

$H_{br} := (h_b - h_r) \cdot .3048$                        $H_{br} = 0.61$

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

$R_{sb} := \sqrt{(D_{sb})^2 + (H_{sb})^2}$                        $R_{sb} = 2.155$

$R_{br} := \sqrt{D_{br}^2 + H_{br}^2}$                        $R_{br} = 77.726$

Fresnel Number

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

$C := 10$

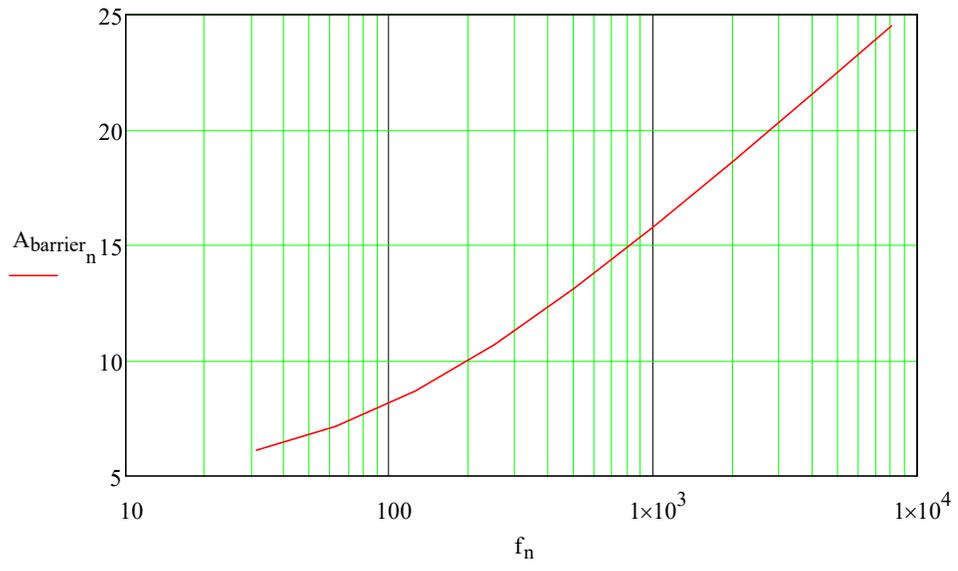
C=10 for receiver over reflecting plane (close to ground)

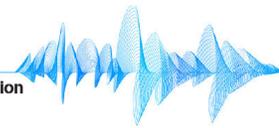
$$A_{\text{barrier}_n} := 10 \cdot \log \left[ 3 + C \cdot N_n \cdot \exp \left[ -\frac{1}{2000} \cdot \sqrt{\frac{R_{sb} \cdot R_{br} \cdot (D_{sb} + D_{br})}{2 \cdot [(R_{sb} + R_{br}) - (D_{sb} + D_{br})]}} \right] \right]$$

Barrier Attenuation

$A_{\text{barrier}} =$	6.1	31.5
	7.1	63
	8.7	125
	10.7	250
	13.1	500
	15.8	1000
	18.6	2000
	21.6	4000
	24.5	8000

Note: Practical limit for barrier attenuation is 20 dB





Margin of error is generally within STC ±3 dB

Job Name: Warwick Pet Resort

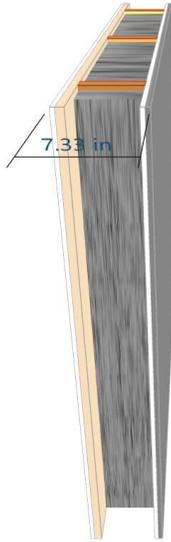
Job No.: PJ2022-1395

Date: 10/6/2022

File Name:

Initials: BMB

Notes: Exterior wall assembly - with tile on interior



**STC 56**  
OITC 37

Mass-air-mass resonant frequency = 34 Hz

Panel Size = 8.9 ft x 13.1 ft

Partition surface mass = 14.1 lb/ft<sup>2</sup>

## System description

Panel 1 : 1 x 0.374 in Compressed Fibre Cement

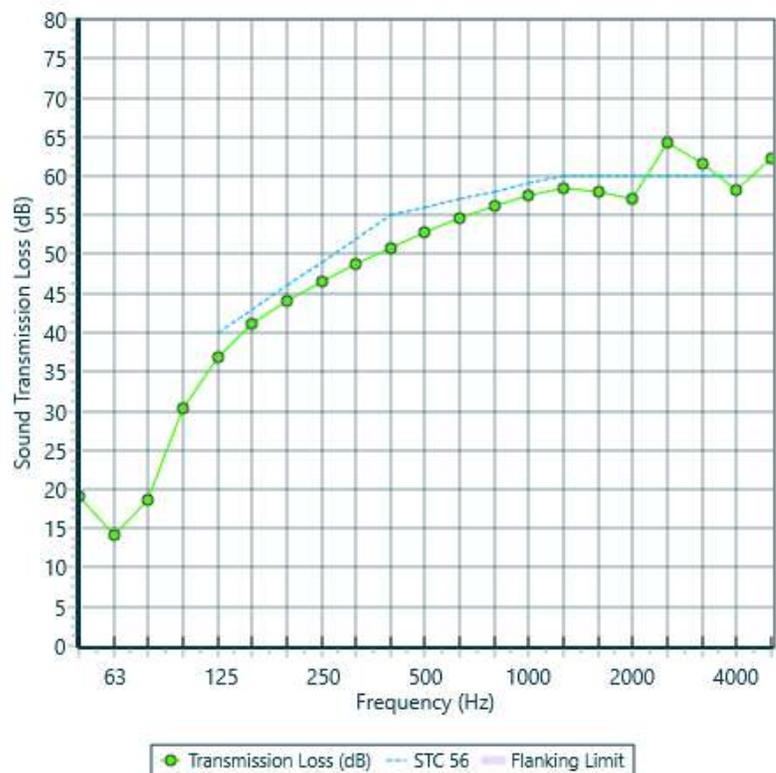
+ 1 x 0.689 in Plywood

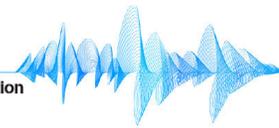
Frame: Timber stud (5.5 in x 1.6 in ), Stud spacing 24 in ; Cavity Width 5.5 in , 1 x fiberglass (1.4 lb/ft<sup>3</sup>) Thickness 6.0 in

Panel 2 : 1 x 0.374 in Compressed Fibre Cement

+ 1 x 0.3941 in Sand/Cement render (plaster)

freq.(Hz)	TL(dB)	TL(dB)
50	19	
63	14	17
80	19	
100	30	
125	37	34
160	41	
200	44	
250	47	46
315	49	
400	51	
500	53	52
630	55	
800	56	
1000	58	57
1250	59	
1600	58	
2000	57	59
2500	64	
3150	62	
4000	58	60
5000	62	

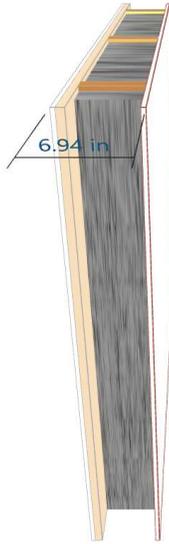




Margin of error is generally within STC ±3 dB

Job Name: Warwick Pet Resort  
 Job No.: PJ2022-1395 Initials: BMB  
 Date: 10/6/2022  
 File Name: Kennel Bldg exterior no tile Insul.ixl

Notes: Exterior wall assembly - no tile on interior  
 Hardiplank exterior (compressed fiber cement)



**STC 52**  
**OITC 33**

Mass-air-mass resonant frequency = -39 Hz

Panel Size = 8.9 ft x 13.1 ft

Partition surface mass = 10.8 lb/ft<sup>2</sup>

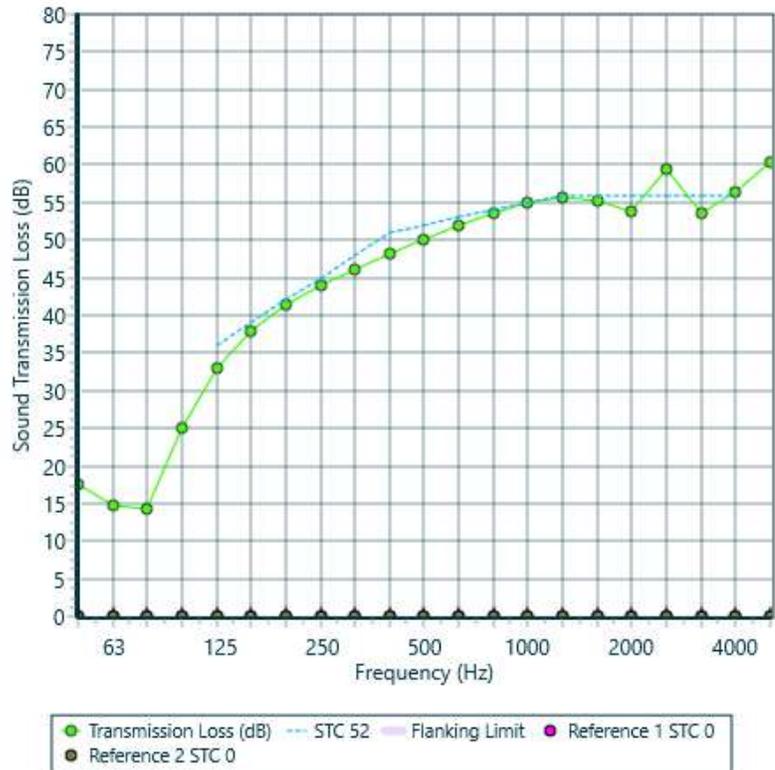
## System description

Panel 1 : 1 x 0.374 in Compressed Fibre Cement + 1 x 0.689 in Plywood

Frame: Timber stud (5.5 in x 1.6 in ), Stud spacing 24 in ; Cavity Width 5.5 in , 1 x fiberglass (1.4 lb/ft<sup>3</sup>) Thickness 5.5 in

Panel 2 : 1 x 0.374 in Compressed Fibre Cement

freq.(Hz)	TL(dB)	TL(dB)
50	18	
63	15	15
80	14	
100	25	
125	33	29
160	38	
200	41	
250	44	43
315	46	
400	48	
500	50	50
630	52	
800	54	
1000	55	55
1250	56	
1600	55	
2000	54	56
2500	59	
3150	54	
4000	56	56
5000	60	



Margin of error is generally within STC  $\pm 3$  dB

Job Name: Warwick Pet Resort

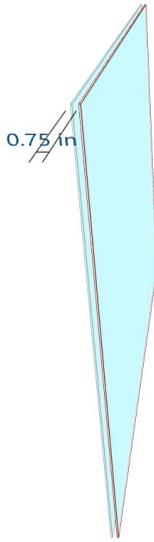
Job No.: PJ2022-1395

Initials: BMB

Date: 10/6/2022

File Name: Kennel Bldg exterior window .ixl

Notes: Superseal window - insulated double glass



**STC 32**  
**OITC 26**

Mass-air-mass resonant frequency = 267 Hz

Panel Size = 8.9 ft x 13.1 ft

Partition surface mass = 3.79 lb/ft<sup>2</sup>

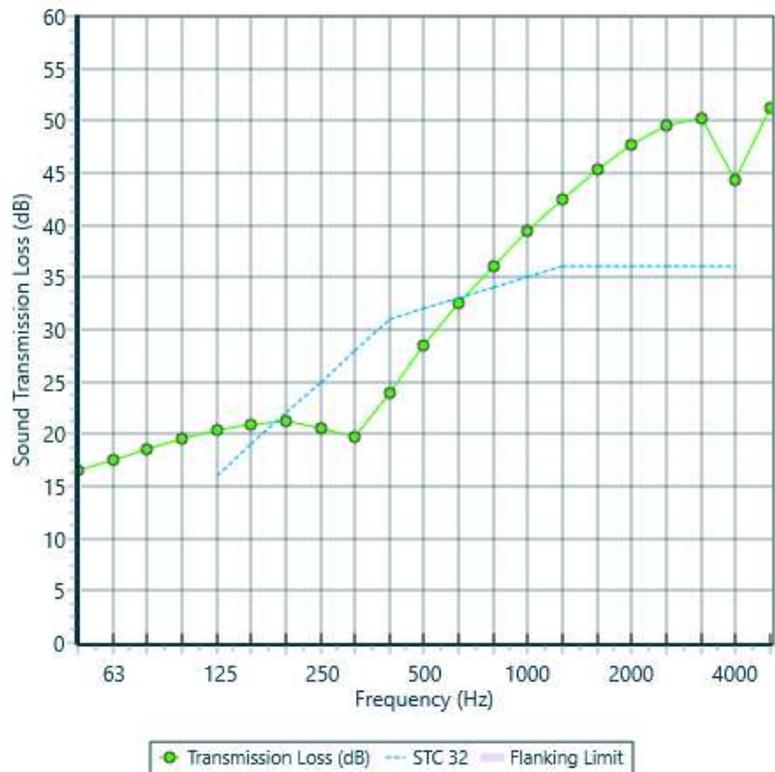
## System description

Panel 1 : 1 x 0.125 in Glass

Frame: None (no connections) (5.5 in x 1.8 in), Stud spacing 24 in; Cavity Width 0.5 in

Panel 2 : 1 x 0.125 in Glass

freq.(Hz)	TL(dB)	TL(dB)
50	17	
63	18	17
80	19	
100	20	
125	20	20
160	21	
200	21	20
250	21	20
315	20	
400	24	
500	28	27
630	32	
800	36	
1000	39	39
1250	42	
1600	45	
2000	48	47
2500	50	
3150	50	
4000	44	47
5000	51	



Margin of error is generally within STC  $\pm 3$  dB

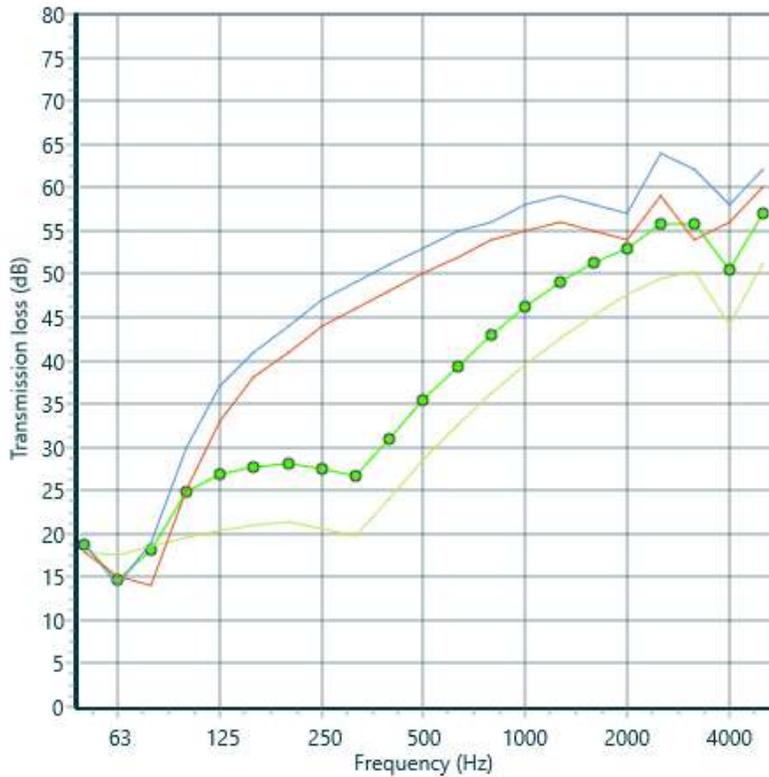
Job Name: Warwick Pet Resort

Job No.: PJ2022-1395

Initials: BMB

Date: 10/6/2022

File Name:



STC 39  
OITC 32

Element	Area	Octave band centre frequency (Hz)																				STC	OITC	
		63		125		250		500		1k		2k		4k										
Windows	90	18	18	19	20	20	21	21	21	20	24	28	32	36	39	42	45	48	50	50	44	51	32	26
Wall with tile	315	19	14	19	30	37	41	44	47	49	51	53	55	56	58	59	58	57	64	62	58	62	56	38
Wall no tile	45	18	15	14	25	33	38	41	44	46	48	50	52	54	55	56	55	54	59	54	56	60	52	33
Total	450	19	15	18	25	27	28	28	28	27	31	35	39	43	46	49	51	53	56	56	51	57	39	32

Margin of error is generally within STC  $\pm 3$  dB

Job Name: Warwick Pet Resort

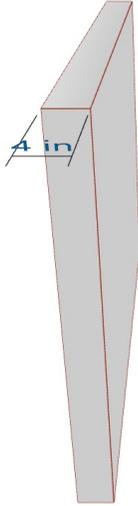
Job No.: PJ2022-1395

Date: 10/6/2022

File Name:

Initials: BMB

Notes: Precast concrete walls (4 inch) around dog play areas.



**STC 49**  
**OITC 45**

Panel Size = 8.9 ft x 13.1 ft

Partition surface mass = 48.7 lb/ft<sup>2</sup>

## System description

Panel 1 : 1 x 4 in Concrete

freq.(Hz)	TL(dB)	TL(dB)
50	38	
63	39	39
80	40	
100	41	
125	42	42
160	43	
200	43	
250	40	40
315	38	
400	41	
500	44	43
630	46	
800	49	
1000	51	51
1250	54	
1600	57	
2000	59	58
2500	60	
3150	62	
4000	64	63
5000	65	

