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ACOUSTICS TECHNOLOGY VIBRATION

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Email: [redacted]

Subject: **Medway Municipal Complex – Environmental Noise Evaluation**
120 Main Street, Medway, MA
Acentech Project No.: J639560.00, Revision 1

Dear Chip:

The purpose of this letter is to document the environmental (exterior) noise evaluation of the new Medway Municipal Complex to be located at 120 Main Street, Medway, Massachusetts (the Project).

SUMMARY

We have conducted an environmental noise evaluation of the Project which requires two processes. The first is to measure the background sound levels for a period of eight days. We have documented the sound survey, performed in May herein. The State noise limits are relative to background sound levels. However, the State limits would be higher than the Town of Medway noise limits. Therefore, we have determined that the Project-wide daytime noise limit is 47 dBA, and the nighttime noise limit is 42 dBA at residential property lines, and the daytime or nighttime noise limit of 50 dBA at commercial property. The second step is to model the sound emissions from the Project to surrounding properties. We have found that all eleven receivers are compliant with the project noise limits.

PROJECT NOISE REQUIREMENTS

Noise limits applicable to the Project are from the Town of Medway and the Commonwealth of Massachusetts. The sections below describe the applicable noise limits.

COMMONWEALTH OF MASSACHUSETTS

The Commonwealth of Massachusetts has enacted regulations for the control of noise pollution (310 CMR 7.10). To enforce these regulations, the Massachusetts Department of Environmental Protection (MassDEP) has issued guidelines that limit noise levels at property lines[1]. These limitations are: (a) not to increase the residual overall A-weighted background sound level by more than 10 dB and (b) not to produce a pure tone condition, where the sound pressure level (SPL) in one octave band exceeds the levels in the two adjacent octave bands by 3 dB or more.

TOWN OF MEDWAY

The Town of Medway Zoning Bylaw (Section 7.3) defines the maximum allowable noise limits generated by project equipment based on the zoning property. The maximum permissible sound levels at the property line and at the nearest sensitive receptors should not exceed the values found in Table 1.

[1] MassDEP does evaluate at project property line, but for compliance enforcement they will consider sound levels at the receptor structure (e.g., the residence)

TABLE 1: Medway Maximum Permissible Sound Levels by Zoning

Zoning	Daytime (7:00 am – 7:00 pm) @ Property Line	Evening (7:00 pm - 11:00 pm) @ Property Line	Nighttime (11:00 pm - 7:00 am) @ Property Line	Evening & Nighttime (7:00 pm - 7:00 am) @ Sensitive Receptors
	Overall Level (dBA)			
Industrial Zoned Property to Industrial Zoned Property	55	55	55	N/A
Industrial or Commercial Zoned Property to Commercial Zoned Property	50	50	50	N/A
Industrial or Commercial Zoned Property to Residential Zoned Property	47	45	42	32

The Town's zoning bylaw defines a "prominent discrete tone" as concentrated acoustic energy in a one-third-octave band whose sound pressure level exceeds both adjacent band levels and exceeds their arithmetic average by more than the frequency-specific threshold shown in Table 2.

TABLE 2: 1/3 Octave Band Center Frequency Thresholds

1/3 Octave Band Center Frequency (Hz)	Threshold (dB)	1/3 Octave Band Center Frequency (Hz)	Threshold (dB)
100	16	1250	4
125	14	1600	4
160	12	2000	3
200	11	2500	3
250	9	3150	3
315	8	4000	3
400	7	5000	4
500	6	6300	4
630	6	8000	5
800	5	10000	6
1000	4		

BACKGROUND SOUND SURVEY

The background sound survey was conducted in accordance with our test plan dated May 11, 2026. Two logging sound level meters (SLMs) were deployed for the period starting on Monday; May 18, 2026, and ending on Tuesday; May 26, 2026. The SLMs recorded sound levels continuously 24 hours per day, and every day during the 8-day period they were deployed.

INSTRUMENTATION

We used two Type 1 SLMs in accordance with IEC 61672-1. The SLMs were factory-calibrated to National Institute of Standards and Technology (NIST) traceable sources within the previous 12 months; the laboratory calibration certificates are available upon request. The SLMs were also field calibrated before and after the start of the survey. The SLMs were set to slow response, and recorded L_{90}, L_{EQ} and L_{01} unweighted sound pressure levels in one-hour increments in one-third octave-bands with center

frequencies between 12.5 and 20,000 Hz and the overall A-weighted sound levels LA_{90}, LA_{EQ} and LA_{01}. These sound metrics are discussed below.

SOUND METRICS

The report provides sound pressure levels using three different metrics as follows:

- **LA_{90}** is the A-weighted sound level exceeded for 90% of the time of each period (1 hour in this case), and is typically considered the background, or residual, sound level for the time at a location. This level is representative of times when short-term intrusive sound sources, such as local traffic pass-by, or aircraft flyovers, are absent and the sound level returns to a lower residual value. This descriptor is approved by the MassDEP as the measure of background sound for compliance with State noise policies.
- **LA_{EQ}** represents the A-weighted sound level of a steady sound, which, when averaged over an individual sampling period (again 1 hour in this case), is equivalent to the energy of the time varying sound over that period. Therefore, the L_{EQ} sound levels include both the steady background sounds and the short-term intrusive sounds.
- **LA_{01}** is the A-weighted sound level exceeded for 1% of the 1-hour interval and represents the near-maximum level at a location. The L_{01} sound levels are representative of relatively short-term events, such as nearby people, local traffic, a loud truck, or an aircraft flyover.

The acoustic exceedance percentiles (L_{01} and L_{90}) represent an inverse to the usual mathematical percentiles, which would put the tenth percentile at the bottom and the ninetieth percentile at the top of all sound levels.

SOUND MONITORING LOCATIONS

The two sound monitoring locations are shown in Figure 1 and summarized in Table 3. The Acentech test plan dated May 11, 2026, includes street view images of each location. Our instruments installed at Locations A and B are shown in Figures 2 and 3, respectively.

TABLE 3: Background Sound Monitoring Location Details

LOCATION	ADDRESS	DETAILS
A	120 Main Street, Medway, MA 02767	Attached to a fence on the southern part of the property, closest to Main Street.
B	120 Main Street, Medway, MA 02767	Located on a fence on the northern part of the property, closest to residences: 5 and 7 Meadow Road.

BACKGROUND SOUND SURVEY RESULTS

We have compiled the data from the two monitoring locations using three different formats:

- Tabulated A-weighted sound pressure levels
- Graphed A-weighted sound pressure level vs. time of day
- Graphed Z-weighted sound pressure level vs octave band (i.e. frequency)

TABULATED A-WEIGHTED SOUND PRESSURE LEVELS

We have tabulated the minimum, average, and maximum LA_{90}, LA_{EQ} and LA_{01} sound levels for each of the two locations. Tables 4 and 5 document the A-weighted sound levels for both Locations A and B.

TABLE 4: Summary of A-Weighted Sound Levels for Location A

	Sound Level, dBA		
	LA_{90}	LA_{EQ}	LA_{01}
Minimum	35	50	63
Average	52	63	71
Maximum	66	72	72

TABLE 5: Summary of A-Weighted Sound Levels for Location B

	Sound Level, dBA		
	LA_{90}	LA_{EQ}	LA_{01}
Minimum	27	31	40
Average	43	47	54
Maximum	50	66	66

GRAPHED A-WEIGHTED SOUND PRESSURE LEVELS

Figure 4 shows the LA_{90}, LA_{EQ} and LA_{01} sound levels versus time for Location A. Figure 5 are the same graph for Location B. Figure 6 shows the LA_{90} sound level vs. time for both Locations A & B. The sound levels at Location A have a higher sound level than at B, due to being much closer to a busy main road. Both locations have diurnal patterns happening every day.

GRAPHED OCTAVE BAND SOUND PRESSURE LEVELS

We have reviewed and graphed the octave band sound pressure levels for the quietest hour at Locations A and B in Figures 7 and 8, respectively. Figure 9 shows the L_{90} octave band sound level for both Locations A and B. This graph shows that the octave bands at Location A are overall higher, which agrees with its position closer to the main road.

NOISE LIMITS

Using the data presented herein we have determined the MassDEP noise limits in accordance with the 1990 MassDEP policy[2]. Given the nature of the facility operation, the controlling noise limit will have to be applicable for nighttime. The guidance from the MassDEP is to use the lowest hourly LA_{90} value to define the background sound levels. We have determined the lowest LA_{90} sound level for daytime (7:00 am to 7:00 pm) and nighttime (7:00 pm to 7:00 am). Table 6 summarizes the lowest LA_{90} value for each of the eight days that we measured sound. We then computed the average of the minimum-daily, LA_{90}(1 hour) sound levels as given in the third to last row of Table 6. The MassDEP limit is +10 dB to the LA_{90} value, as noted in the second to last row of Table 6.

Due to the Town of Medway having more stringent noise limits, these take precedent over the computed MassDEP limits. Therefore, we have determined that, for the residential areas facing the project, the recommended daytime limit is 47 dBA and a nighttime limit of 42 dBA, as noted in the last row of Table 6.

[2] Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Department of Environmental Quality Engineering, Division of Air Quality Policy, DAQC Policy 90-001, dated February 1, 1990.

TABLE 6: Summary of Minimum Day and Night LA_{90}(1-hour), MassDEP limit, and Town limit

Day	Date	LA90(1-hour) Sound Level, dBA			
		Daytime		Nighttime	
		Loc A	Loc B	Loc A	Loc B
Monday	5/18/2026	57	48	42	39
Tuesday	5/19/2026	55	45	39	41
Wednesday	5/20/2026	57	45	41	39
Thursday	5/21/2026	57	45	35	37
Friday	5/22/2026	55	40	35	40
Saturday	5/23/2026	53	43	35	33
Sunday	5/24/2026	49	43	37	37
Monday	5/25/2026	48	42	42	35
Tuesday	5/26/2026	59	45	-	35
Average		55	44	38	37
MassDEP Limits		***65***	***54***	***48***	***47***
Medway Limits		***47***	***47***	***42***	***42***
Project Limits		**47**	**47**	**42**	**42**

PROJECT SOUND GOALS

Based on our familiarity with the applicable noise limits, we will use the more stringent Town of Medway noise limits. At the residential property lines abutting the project, we will use a daytime noise limit of 47 dBA, and a nighttime noise limit of 42 dBA. For all commercial property lines, we will be using an overall daytime or nighttime noise limit of 50 dBA.

NOISE EVALUATION

Acentech developed an acoustic model of the Medway Municipal Complex. The model has the ability to compute the sound levels transmitted from the Project's sound-producing equipment to the adjacent properties.

MODEL DESCRIPTION

The acoustic model was developed using a widely accepted computer program, Cadna/A, to estimate the contributions of various noise sources to the environmental sound levels. Cadna/A complies with international standard ISO 9613-2-2024 "Attenuation of sound during propagation outdoors -- Part 2: General method of calculation". Abutting buildings were placed in the model to provide reflections and shielding. A ground absorption factor of 0.5 was used, which represents a mixture of hard reflective ground conditions indicative of the numerous paved parking lots and roadways, and soft absorptive ground conditions representing the grassy areas surrounding the Project.

SOUND MODELING

We have defined eleven receivers where we computed sound levels. These locations are shown in Figure 10 and summarized in Table 7. Receivers R01 to R03 have commercial use and were evaluated at a height of 23 ft, 7 ft, and 7 ft, respectively. All other receivers have residential use and were evaluated at a height of 13 feet above the ground representing the single story of a single-family home.

TABLE 7: List of Receiver Locations, R01 to R11

ID	Receiver Address (Zoning)	Receiver Height (ft)
R01	116 Main St (Commercial)	23
R02	117 Main St (Commercial)	7

R03	126 Main St (Commercial)	7
R04	1A Drybridge Rd (Residential)	13
R05	9 Pond St (Residential)	13
R06	1 Meadow Rd (Residential)	13
R07	3 Meadow Rd (Residential)	13
R08	5 Meadow Rd (Residential)	13
R09	7 Meadow Rd (Residential)	13
R10	9 Meadow Rd (Residential)	13
R11	11 Meadow Rd (Residential)	13

SOUND PRODUCING EQUIPMENT

Table 8 provides the overall A-weighted sound power levels (L_W) of the proposed mechanical equipment. The associated sound levels in octave bands have been provided by the equipment vendors and input into the acoustic model to predict the sound pressure levels at various locations. The octave band sound power data can be provided upon request. All of the equipment in Table 8 were modeled as acoustic point sources (or vertical area sources if louvered) with their locations indicated by the red "+" in Figure 10.

TABLE 8: List of Proposed Equipment with Overall A-weighted "Source" Sound Power Levels

Equipment Name	Tag	Overall A-Weighted Sound Power[3] (dBA)
AHU 1 (Supply Fan)	AHU1_SF	88
AHU 1 (Exhaust Fan)	AHU1_EF	88
AHU 3 (Supply Fan)	AHU3_SF	82
AHU 3 (Exhaust Fan)	AHU3_EF	82
AHU 4 (Supply Fan)	AHU4_SF	88
AHU 4 (Exhaust Fan)	AHU4_EF	88
AHU 5 (Supply Fan)	AHU5_SF	85
AHU 5 (Exhaust Fan)	AHU5_EF	81
ERV -1	ERV1_SF	73
Greenheck GB-360-VG	EF-1	72
Greenheck SQ-95-VG	EF-3	70

DAY VS. NIGHT CONDITIONS

For this report, the sound levels for both daytime and nighttime conditions are the same. During the day, we assumed that all equipment would be operating. During the night, we assumed that all rooftop equipment would normally operate without any setback.

RESULTS

We have computed the overall A-weighted sound levels to compare to the Project nighttime noise limit of 42 dBA at residences and an overall noise limit of 50 dBA at commercial use buildings. We have also computed the octave band sound pressure levels to check if a pure tone condition is expected according to the MassDEP requirements with details given below.

[3] Sound Power Level in dB re 1 pico-watt

OVERALL A-WEIGHTED SOUND LEVELS

Table 9 presents the computed A-weighted overall sound levels at the eleven receiver locations for the daytime and nighttime conditions, as no equipment night setbacks were used. As noted above, all receiver locations were assumed to be at the highest point of each residence. We found this location to be more conservative (i.e. louder) than at ground level at the property line.

Daytime and nighttime include all equipment turned on. The predicted sound levels for the commercial receivers R01 to R03 are below the overall town limit of 50 dBA. The predicted sound levels for residential receivers R04 to R11 are below the Town of Medway noise limit.

TABLE 9: Predicted Project Sound Levels vs. Town limit

Receiver Location	Predicted Project Level (dBA)	Recommended Nighttime/Daytime Limit (dBA)
R01	48	50
R02	44	50
R03	49	50
R04	33	42/47
R05	32	42/47
R06	30	42/47
R07	31	42/47
R08	26	42/47
R09	27	42/47
R10	35	42/47
R11	35	42/47

PURE TONES/OCTAVE BAND SOUND PRESSURE LEVELS

We have also performed a check of “Pure Tone” conditions according to the MassDEP definition. No pure tone conditions were identified, as shown in Figure 12. We did not evaluate the Town of Medway pure tone conditions because the equipment manufacturers do not provide the necessary one-third octave band sound pressure level data.

MITIGATION

No sound mitigation features were assumed in this evaluation.

(Continued)

Please contact me directly if you have any questions or comments regarding our study or this report at [redacted]

Sincerely,



Andrea Mejia
Consultant

Cc: Michael Bahtiarian; Acentech

FIGURE 1: Background Noise Monitoring Locations – Aerial View



FIGURE 2: Instrumentation as installed at Location A



FIGURE 3: Instrumentation as installed at Location B



FIGURE 4: A-weighted Measured Sound Levels vs Time of Day – Location A

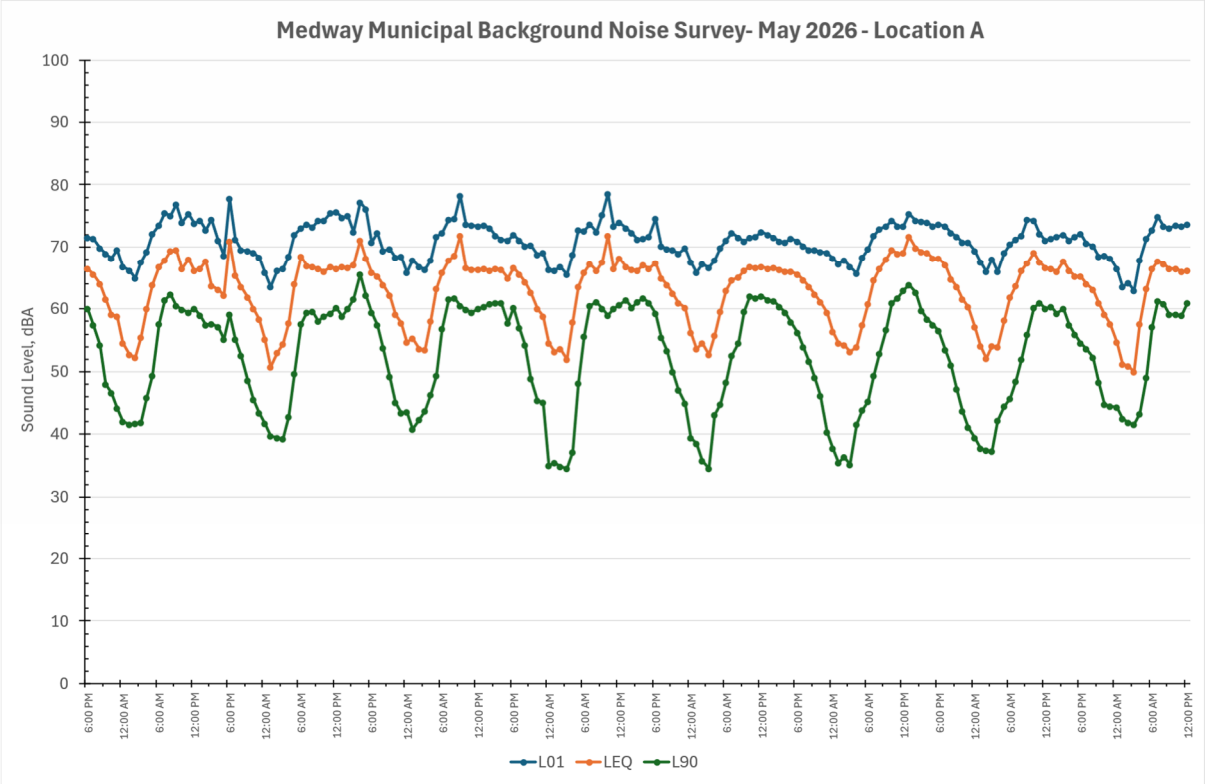


FIGURE 5: A-weighted Measured Sound Levels vs Time of Day – Location B

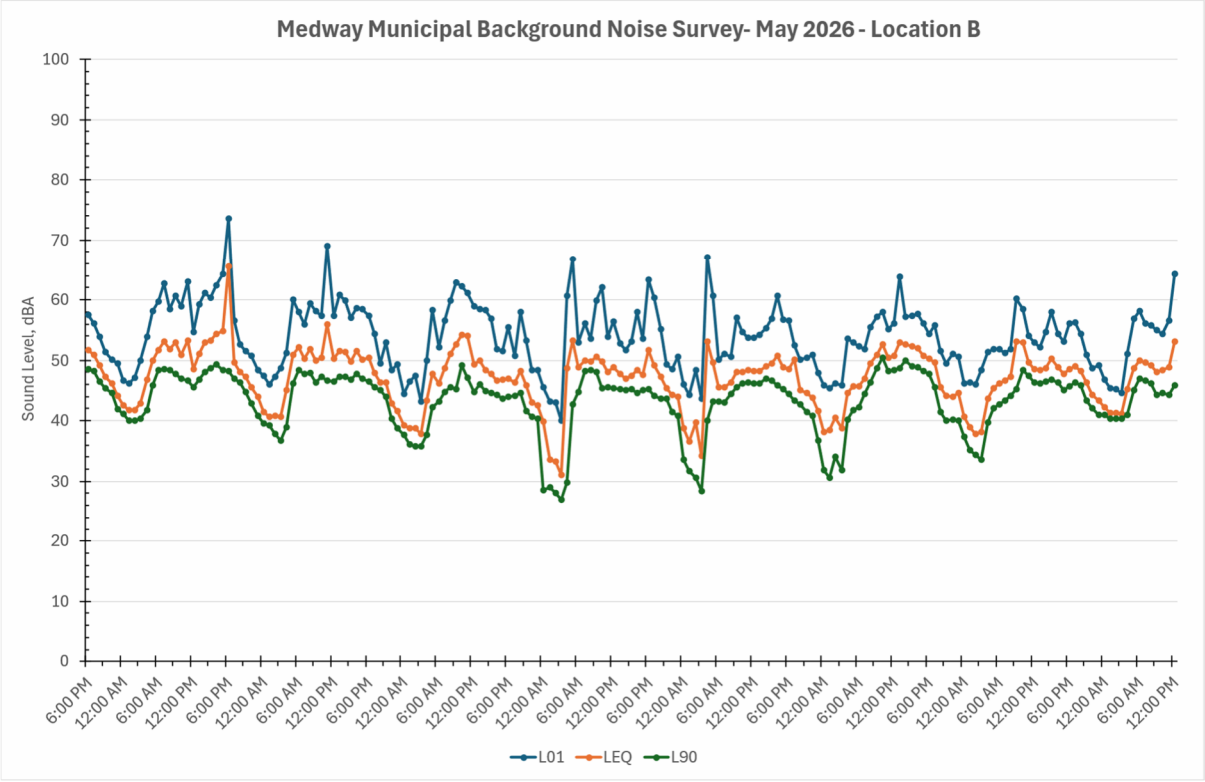


FIGURE 6: A-weighted (LA_{90}) Measured Sound Levels vs Time of Day – All Locations

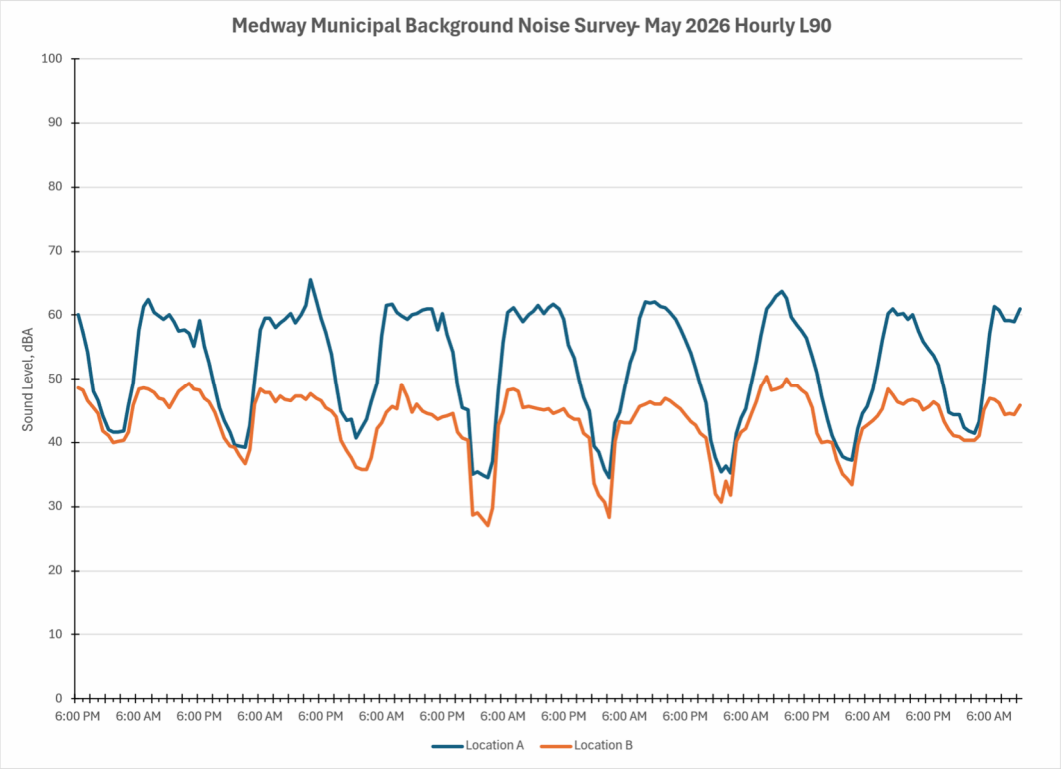


FIGURE 7: Quietest Hour Measured Octave Band Sound Pressure Levels – Location A

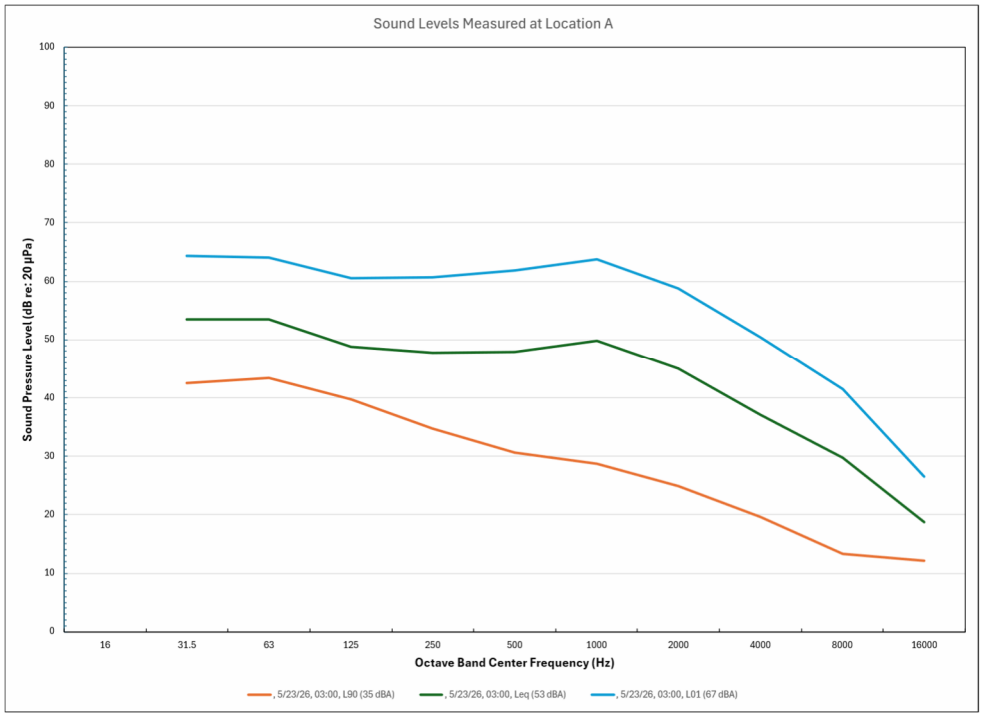


FIGURE 8: Quietest Hour Measured Octave Band Sound Pressure Levels – Location B

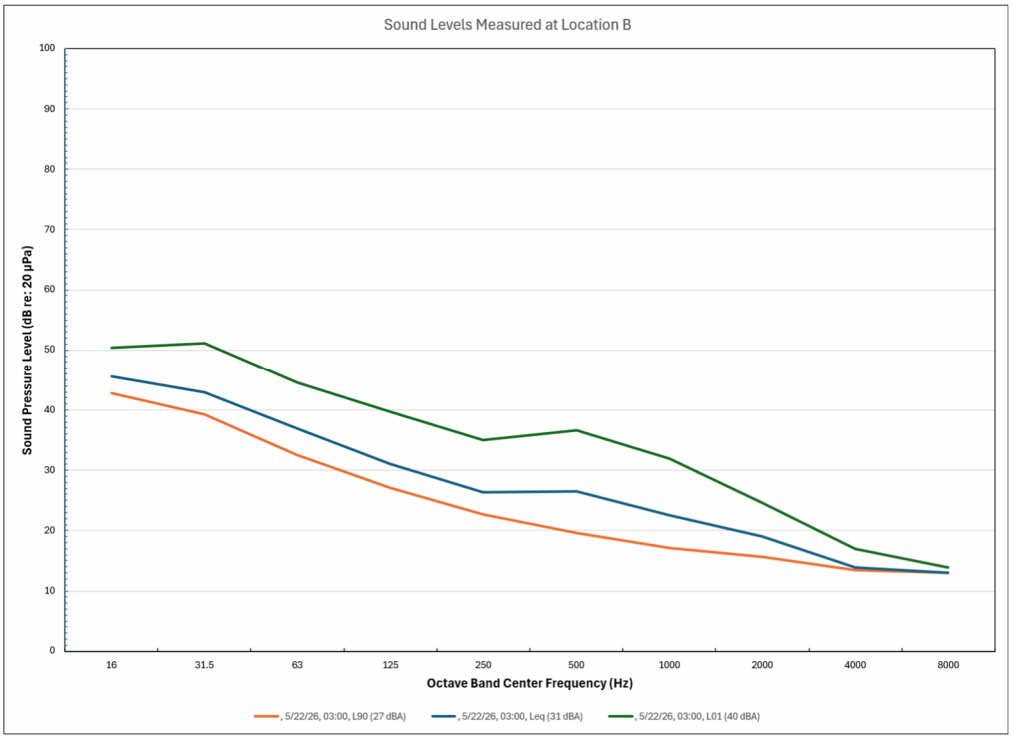


FIGURE 9: Quietest Hour Measured Octave Band L90 Sound Pressure Levels – All Locations

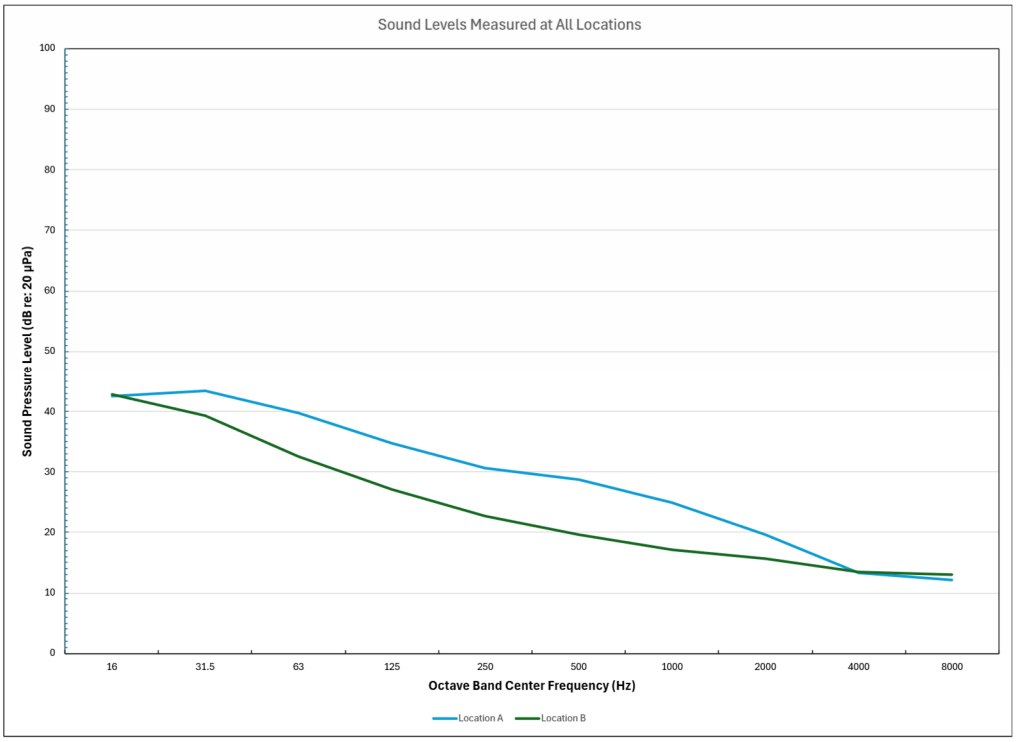


FIGURE 10: Residential Receivers – Aerial View



FIGURE 11: Residential Receivers – Aerial View with Contours

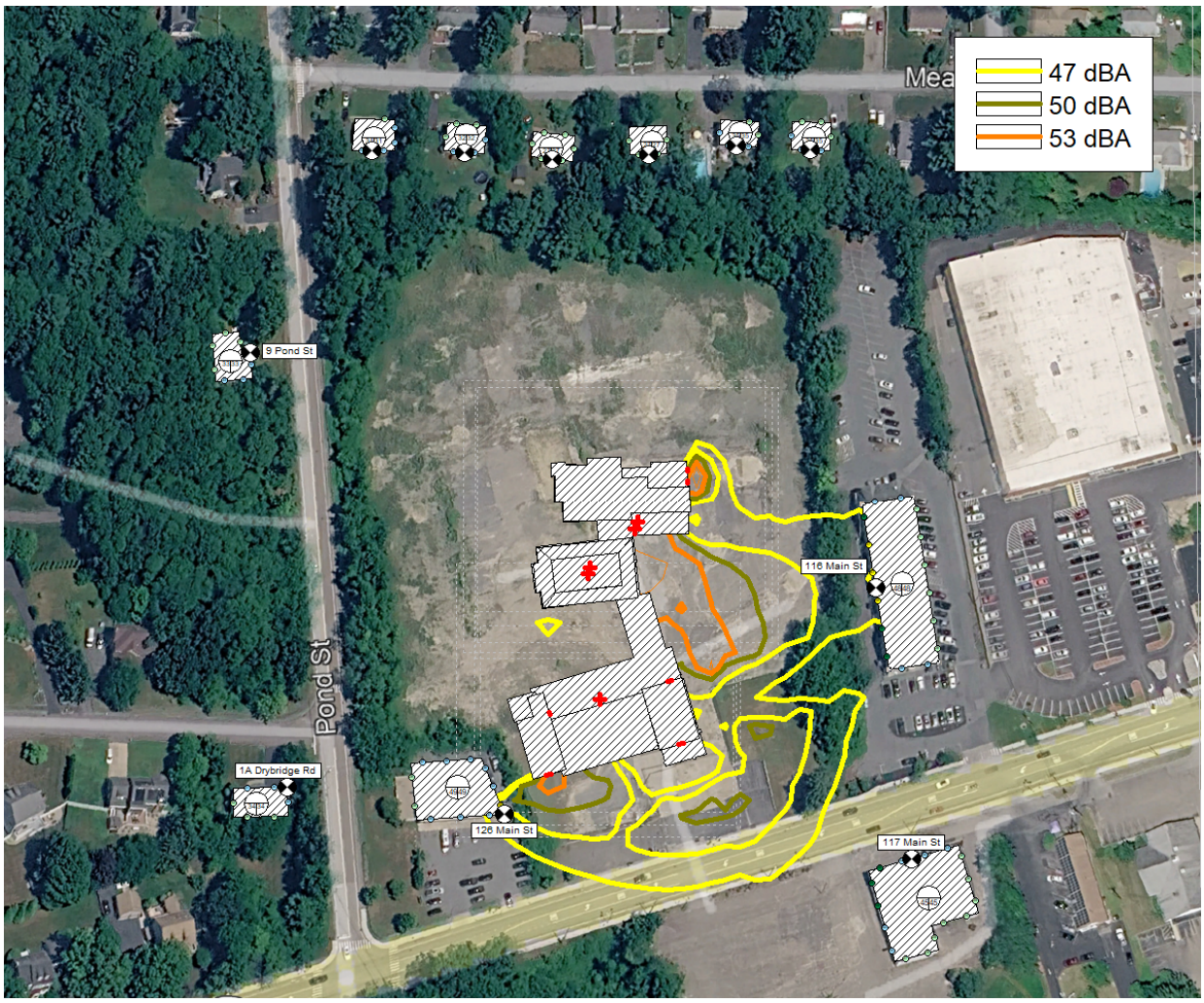


FIGURE 12: Receiver Octave Band Sound Pressure Levels

