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NOISE IMPACT STUDY OF GILROY RODEO ACTIVITIES AND RECOMMENDATIONS TO MEET COUNTY OF SANTA CLARA COUNTY GENERAL PLAN & ORDINANCE CRITERIA

Prepared for

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1.0 SUMMARY

This report documents the noise impact of activities proposed as part of the Gilroy Rodeo Grounds. The project is to include three (3) large and five (5) medium sized events per year [1]* for cumulative plus project conditions. Only a single large and a single medium sized events for the immediate existing plus project conditions. The project site is a working ranch that will continue with its normal agricultural activities. Special events at the large events will include rodeos and agricultural or equestrian spectator activities. The large events are expected to draw 6,500 spectators per performance or day, with 500 contestants per performance or day, and 300 volunteers per day. The large events will last 3 to 5 days. Medium events will include large jackpot and other specialized activities. These are expected to draw 250 spectators and contestants per day with 100 volunteers. These events will last for three days. Typical events will end at 10:00 p.m., but dances, award presentations and special events are proposed to end at 11:00 p.m.

The main sound sources of sound for existing conditions includes local agricultural activity, road traffic, general aviation flights, commercial flights, domestic animal calls, dogs barking and commercial activity. The introduction of the Gilroy Rodeo activities will create additional sound sources. The existing sources will continue to be a factor, but new sources will be added. This could include more road traffic, people cheering during competitive events, vehicle doors closing, and amplified sound. Audio speakers will be used to provide sound reinforcement to the main audience, the animal hold pen and the dance floor. The sound reinforcement system for the main seating and the system for dance and award area north of the main area are expected to be the main source. Excluding vehicles on the public road, all sources will be non-transportation sources.

Sound generated by the project is evaluated based on requirements in the County's General Plan [2,3,4,5] and Noise Ordinance [6] and the ***California Environmental Quality Act***, CEQA [7]. The Noise Ordinance places limits based on the time of day and the duration of the sound over an hour. For sound lasting at least 30 minutes in an hour, the L_{50} sound level, the limit is 55 dB(A) during the day and 45 dB(A) at night. These limit can be increased of the background exceeds the limit.

Field tests showed background L_{50} sound levels ranging from 41 to 50 dB(A) at Position #1, 41 to 48 dB(A) at Position #2, 44 to 48 dB(A) at Position #3, 44 to 51 dB(A) at Position #4 and 46 to 58 dB(A) at Position #5. All positions were at residences in the backyard of the home. Predictions were made for the sound generated by sound reinforcement systems at the Main Arena and the Dance Floor. The resulting sound at 8 residential including the five sites tested could exceed limits if the system is designed without parameter limited where the speakers are aimed and how loud the sound is. A limit of either 80 or 75 dB(A) for the L_{50} sound level results in insignificant sound impact per the requirements of the County's Noise Ordinance. A bigger safety factor is achieved if the limit is set at 75 dB(A). The same results were found for the Dance Floor sound system based on the assumptions made.

The following sections provide details on the results of field tests and the assumptions made to reduce impact to less than significant. Detailed mitigation measures are provided in the final section of the report.

* - Number(s) in brackets refer to references listed at the end of this report.

2.0 SOUND CRITERIA

CEQA requires all local noise regulations to be used to assess the impact of a project on noise. Existing conditions must be established, and then, conditions with the project must be predicted. This noise impact study has been done per the requirements of the County of Santa Clara. Sounds generated by a project fall under the jurisdiction of two sets of County sound criteria. These two criteria are contained in two documents. The first documents are the County's Noise sections of the ***General Plan*** [2,3,4,5] and they are is applicable to projects prior to receiving permit approval. The County's Noise sections of the ***General Plan*** address mainly transportation sound sources and focus on noise and land use compatibility policies. They are guidelines that must be followed. These guidelines set limits or goals for the annual day-night average, L_{dn}, sound level. This sound descriptor represents the average sound level over 24-hours and is directed mainly at transportation sources. The County's Noise Ordinance [6] contain the second set of noise limits. This document sets specific sound limits that must be met during the operation of the Grilroy Rodeo Grounds events and activities. The impact of non-transportation sound sources is judged against the hourly L_n and maximum, L_{MAX}, sound level in any hour. The "L_n" values represent the "n" percent of the hour not to be exceeded such as 1.67 percent or 1-minute, 8.33 percent or 5-minutes, 25 percent or 15 minutes or 50 percent or 30 minutes. Limits are given based on the time of day, tonal content of the sound and type of sound. The following sections describe these noise limits in more detail

2.1 Noise Element: Transportation Sources

Acoustic criteria contained in the Noise section are based on the day-night average, L_{dn}, sound level and focus on transportation sound sources. The day-night noise descriptor averages measured or predicted sound levels over 24-hours after applying a 10 dB penalty to nighttime sounds. Hourly average sound levels, L_{eq}, are measured or predicted for each hour of the day or for each hour during which a sound source is present. A 10 dB penalty is added to each hourly average sound level measured or predicted from 10:00 p.m. to 7:00 a.m. The penalty is applied because people trying to sleep during these hours are more sensitive to external sounds. If no events happen during the nighttime, no penalty would be applied. Excluding or including only certain sources is possible. When a source or sources of interest is excluded from the analysis, it is called the Background L_{dn} sound level. An acoustical study could be required when noise-sensitive land uses will be subjected to day-night average sound levels, L_{dn}, greater than 55 dB.

For residential use, the exterior L_{dn} sound level is considered "Satisfactory" if it is less than or equal to 55 dB. The land is considered "Cautionary" for residential use if the L_{dn} sound level is between 55 and 65 dB. For this classification, the project is subject to a noise study to demonstrate that the noise can be reduced to acceptable levels with mitigation measures. The project is considered "Critical" when noise levels pose a threat to the land use. This applies to conditions where the L_{dn} sound levels are between 65 and 80 dB. Both exterior and interior sound reduction must be provided as designed by a "Professional" acoustical engineer who is competent in sound reduction.

2.2 Noise Ordinance: Non-transportation Sources

The County's Noise Ordinance applies to non-transportation sound sources and transportation sound sources while on private property. The sound limits are based on the duration of the sound, the time of day of occurrence and the tonal content of the sound. Sources are limited to sound levels given in Table I. A 5 dB penalty is applied to the limits given in Table I when the sound is comprised mainly

of speech or music or if it contains pure tones such as a whine, screech or hum. A pure tone is what you hear when you blow across the mouth of a soda pop bottle half filled with a liquid. Impulsive sounds are typically penalized also. An example of impulsive sound is that generated by a person hammering on metal or a sudden door closing on a vehicle. Where background sound levels exceed the Category 1 through 4 limits in Table I, the limits are raised in 5 dB(A) increments until it encompasses the background sound. When the L_{MAX} limit in Category 5 is exceeded, the field measured background L_{MAX} sound level becomes the new limit. The background sound level is defined as the level measured when the source or sources of interest are absent. In this case, the sources of interest are those related to the Gilroy Rodeo Grounds events, but not the normal ranch agricultural activities. A noise study is required if predicted noise from a project will exceed the limits given in Table I.

Section B11-1156 - Special provisions states that the provisions of the Noise Ordinance do not apply to "occasional gatherings, public dances, shows and sporting and entertaining events". This assumes the event has been permitted by the County. It is unclear whether the proposed 2 to 8 events per year would fall in to this provision, but it appears that it could. If so, the activities would be exempt from the noise limits in Table I

TABLE I. Noise Ordinance Limits for the County of Santa Clara for Single or Double Family Residential Property Affected by Non-Transportation Sources.

		Exterior Sound Level Limits, dB(A)			
		Without Penalty☞		With Penalty☞	
Category	Cumulative Number of Minutes in any 1-hour period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30 (L_{50})	55	45	50	40
2	15 (L_{25})	60	50	55	45
3	5 (L_{08})	65	55	60	50
4	1 (L_{02})	70	60	65	55
5	0 (L_{MAX})	75	65	70	60

☞ - Penalty applies when sound is composed primarily of speech or music, contains pure tones or results from impacts or impulsive sources.

3.0 SITE & PROJECT DESCRIPTION

The project site for the Gilroy Rodeo Grounds is currently a working ranch. The site was formerly used as a rodeo grounds from 1929 through 1956 except during World War II. The site was converted to a school and this use was abandoned. The several community members decided in 2018 that a rodeo and associated events were needed to reconnect with the areas past. Both adult and youth activities were seen as the goal to remember the areas history as a large cattle ranch and the birthplace of horse related clubs and associations.

The first event was a two day rodeo held August 11 & 12, 2018 at the project site. An arena and related facilities were created with a plan to expand the events on th 62.5 acre site zoned for agricultural use.

The ranch will host two types of special events that are broken down into “large” and “medium” events. The large events will include rodeos and agricultural or equestrian spectator events. The even is expected to draw 6,500 spectators per performance or day, 500 contestants per performance per day and 300 volunteers per day. The large events will last from 3 to 5 days each.

The medium events will include large jackpots and shows that will not draw large spectator counts. The combination of spectators and contestants is not expected to exceed 2,500 per day with an additional 100 volunteers per day. These events will last for 3 days.

A single large and a single medium event are planned for 2019. The large event will occur in August with the medium event in November. The goal is to grow interest until a maximum 3 large events and 5 medium events can be held each year and extending from June 1 to December 15.

The project required the construction of a 320 foot by 150 foot Main Arena with a 96 foot by 57 foot ranch pen and a 100 foot by 100 foot Warmup Arena. Figure 1 shows a civil engineering plan [8] vew of the project site with these features included. A dance floor about 48 feet wide and 44 feet long also will be constructed. The stage will be on the west side of the floor facing east. Livestock pens and runways, bucking chutes, roping chutes, water troughs and loading ramps will need to be provided for the activities. An Announcers Booth will be provided above the bucking chutes.

The Ranch will host two types of special events as part of the project. The first is “Large” events that will include rodeos and agricultural or equestrian activities to draw spectators. These special events are expected to draw 6,500 spectators per performance or day, 500 contestants per performance or day and 300 volunteers per day. These special events would last from 3 to 5 days for each occurrence.

The second type of event is a “Medium” sized activity. These events include large jackpots and shows that would not draw large crowds of spectators. A total of 2,500 spectators and contestants and 100 volunteers are expected each day for these events. These events will last 3 days for each occurrence.

The Ranch, will continue its normal operation from 7:00 a.m. to 10:00 p.m. seven days a week except when special events are occurring. The Ranch operates with a staff of 2 to 5 employees to support operations and maintenance. These employees are housed in facilities along Ferguson Road that are on the project area. As such, they are assumed be exempt from sound limits.

The plan is to have 1 Large and 1 Medium event in August and November, respectively, in 2019. As interest grows, the goal is to increase to 3 Large and 5 Medium events per year. The events would extend from June 1 to November 15 of each year. The events will last from 2:00 p.m to 8:00 p.m. with dancing from 8:00 p.m. to 11:00 p.m. All spectators are to be departed by 11:30 p.m. On nights with no dances, all events will finish by 10:00 p.m.

Amplified sound will be required at the Main Arena, Dance Floor and Ranch Pen. The systems could be temporary, portable or permanent, or some combination of these. The three system will be independent in terms of their operation. The Main Arena and Ranch Pen sound systems will not operate past 10:00 p.m. The sound system at the dance floor could operate until 11:00 p.m.

4.0 TEST EQUIPMENT & PROCEDURES

Standard sound measuring equipment was used during the tests. Field sound measurements were made using a Larson-Davis LD 831 (s/n 2579) Sound Analyzer, two CEL 480 (s/n 129858 and s/n 2/112179) Sound Level Meters, an LD720 sound level meter (s/n 294) and two LD700 sound level meters (s/n 1455 and 984). The LD 831, the two CEL meters and the LD700 (s/n 1455) employ ½ inch random incidence condenser microphones. An LD 200 calibrator was used to calibrate these meters and microphones to 114 dB at 1000 Hz before beginning measurements. These meters conform to the requirements of a Type I meter per American National Standards Institute [9]. The LD 720 and 700 (s/n 984) meters were calibrated using an LD CA150 calibrator at 114 dB(A) at 1,000 Hz at the beginning of the test. These two LD meters are Type II meter per the ANSI standard. A windscreen covered each microphone during all sound measurements. All meters can measure statistical sound levels such as the $L_{8.3}$, L_{25}, L_{50} and L_{90}. These are, respectively, the sound levels exceeded 8.3 percent, 25 percent, 50 percent and 90 percent of the time. The sound level meters also capture the maximum sound level, L_{MAX}, and the average sound level, L_{eq}. These meters used the "slow response" as required. The LD 831 was used to collect representative sound level tones in one-third octave bands at the project site at each test position. The fast response was used with the LD 831 meter to better comply with test standards.

Field sound measurements were made on February 11, 2019 between 1:00 p.m. and 11:30 p.m. at residential sites around and at the project site. The sites were selected to represent the backyard of homes that were closest to the project site and that would be shielded from local traffic. The other statistical descriptors of the sound, labeled L_n, and the maximum sound level, L_{MAX}, were measured also for comparison with the County's Noise Ordinance limits. Here, L_n represents values such as the L_{50}, L_{25}, $L_{8.3}$ and $L_{1.67}$. These sound descriptors also give additional information about how sound varied over the test period. That is, it can tell you whether it was a source that was near the site for only a short time or a source that continued over substantial time. Average sound levels, L_{eq}, were measured to assess transportation sound sources and their influence on the residential properties.

Measurements were made at five positions in and around the project site with microphones mounted on tripods 5.5 to 6 feet above ground level. Sound levels were measured during consecutive five minute intervals to identify sources and variations in sound with time. The average and maximum sound level was also measured in 1-second intervals at two positions and 10-second intervals at one of positions. Continuous measurements were made except where battery problems required battery replacement. Sound tonal measurements were made at each position 1 to 3 times during the monitoring. The meter was set to measure the sound continuously in 1-minute intervals. Tests ran from 5 to 39 minutes in length. The meter measured the L_{eq}, L_{MAX}, $L_{1.67}$, $L_{8.33}$, L_{25}, L_{50}, and L_{90} sound level during each interval with a fast response. The L_{eq} and L_{MAX} sound level was also measured every 50 milliseconds. Two measurement positions were south of the project site, one was at a home on the east side of the project and two were north of Leavensly Road, north of the project site. Figure 1 shows a site plan with the five measurement positions marked. A description of each test position follows assuming Ferguson Road runs north-south:

a. Position #1: 2425 Dunlap Avenue, 6 feet north of backyard fence, 20 feet west of the east face of the garage. Tests done within home parcel but outside backyard fence

b. Position #2: 2545 Dunlap Avenue, in backyard, 6 feet south of backyard fence and 20 feet west of the east face of the garage.

c. Position #3: 2380 Dryden Avenue, in backyard, 23 feet south of south face of home and 21 feet east of west face of home.
d. Position #4: 7955 Ferguson Road, 69 feet south of northwest corner of backyard fence and 8 feet west of backyard fence.
e. Position #5: 8500 New Avenue, 18 feet south of metal building and 132 feet east of the near lane of New Avenue. The property did not have a backyard to the home because of commercial activities.

5.0 SOUND SOURCES

5.1 Existing

Major sound sources at residential property that could be impacted by the proposed project include light near and far road traffic, industrial activity, light agricultural activity, domestic animals calling, chickens crowing, dogs barking, general aviation aircraft overflights and commercial jet flights. Road traffic on Ferguson Road, Leavesly Road, Dunlap Avenue and more distant roadways are the dominant continuous sound source. Other sound sources such as the dogs, chickens, burrows randomly sounded, though the chickens were the most consistent source. General aviation aircraft and commercial jets flew over the sites on a fairly regular basis. They were more noticeable in the evening and night. Significant agricultural activity takes place with commercial greenhouses and processing occurring near the project site. The processing could be heard, particularly a repeated thump. However, because it was winter and the ground was wet, very little agricultural work was observed.

Leavesly and Ferguson Roads are major routes to downtown Gilroy and State Route 152 the central valley. Ferguson Road is a two-lane road that runs north-south from SR 152 to the intersection with Leavesly Road. Leavesly is a 2-lane road near the projects, first running east-west, then south to Ferguson and then again to the East. New Avenue intersects with Leavesly Road directly north of the project site, continuing to the north and residential developments in the area, Dryden is a 2-lane road serving mainly the local area. Dunlap Avenue is a local 2-lane road running along the southern border of the project with a few residential sites, mostly on the north side of the road. Dryden Avenue is a local 2-lane road connecting into Leavesly Road. Traffic counts were obtained from the County of Santa Clara [10]. Field traffic counts were done on New Avenue and Leavesly Road over 20 minutes to gather information about traffic mix and speeds. Informal counts were done on other roads to understand the traffic mix and speeds. A summary of the assumptions used to calculate existing conditions are given in Table II.

TABLE II. Roadway Traffic Volumes and Mixes Assumed to Calculate Existing Sound Levels for Residential Areas near the Gilroy Rodeo Grounds Project in the County of Santa Clara.

Road Name	Distance to Near Lane, Ft	Average Daily Volume	Percent Heavy Trucks	Percent Medium Trucks	Percent Trucks at Night	Percent Autos at Night	Vehicle Speed MPH◊
Leavesly Rd	≥40	9946	1.67%	1.26%	5.5%	11.0%	50/45
New Ave	≥30	4411	1.89%	0.50%	7.60%	11.0%	45/40
Ferguson Rd	≥30	7983	1.67%	1.26%	6.00%	11.0%	50/45
Dunlap Ave	≥30	1120	1.00%	1.50%	7.10%	10.0%	45/40
Dryden Ave	≥30	664	0.75%	0.50%	12.0%	10.0%	35/30

◊-Automobile and truck speed respectively

5.2 Existing + Project

The existing sound sources will remain after the project is permitted. The project will introduce several new sources including road traffic, vehicles driving on private property, vehicle doors closing, animal noise, general activity, patron generated noise and amplified music and speech. The two entrances to the project site are off Dunlap Avenue and Ferguson Road. More parking spaces exist off Dunlap Avenue than off Ferguson Road. For "Large" events, 6,500 spectators are expected. If they arrive near the same time, the speed of the traffic will be low, reducing the road noise and the noise generated on private property. The number of vehicles where doors will be slammed is difficult to estimate and will be random. The same is true of sound generated by patrons and animals. The one source that is expected to dominate is the amplified sound. This can be controlled in the Main Arena by setting limits for the sound level at the back row of seats perpendicular to the speaker pole and the length of the bleachers. This can be done at the back of the Dance Floor and at the north face of the Ranch Pen. The hours of operation will also control the sound level exposure.

5.3 Cumulative + Project

Cumulative plus project conditions will see increased road traffic, but other existing sources will remain the same. CEQA requires projections to be at least 20 years in the future. Because the project is starting part way through 2019, predictions were done for the year 2040. The project sound sources will be the same, but the number of events will increase from two to eight. Road traffic speeds and mixes are expected to remain the same. Table III shows the assumptions used to predicts future sound levels due to road traffic.

TABLE III. Roadway Traffic Volumes and Mixes Assumed to Calculate Existing Sound Levels for Residential Areas near the Gilroy Rodeo Grounds Project in the County of Santa Clara.

Road Name	Distance to Near Lane, Ft	Average Daily Volume	Percent Heavy Trucks	Percent Medium Trucks	Percent Trucks at Night	Percent Autos at Night	Vehicle Speed MPH♢
Leavesly Rd	≥40	15076	1.67%	1.26%	5.0%	11.0%	50/45
New Ave	≥30	6686	1.50%	1.00%	6.00%	11.0%	45/40
Ferguson Rd	≥30	12100	1.67%	1.26%	6.00%	11.0%	50/45
Dunlap Ave	≥30	1697	1.00%	1.50%	7.10%	10.0%	45/40
Dryden Ave	≥30	1006	0.75%	0.75%	13.0%	10.0%	35/30

♢-Automobile and truck speed respectively

6.0 EXTERIOR ACOUSTIC ENVIRONMENT

6.1 Existing

Field sound measurements were used to evaluate the existing background acoustic environment at residential property at and around the project site. Measurements were made at five positions close to residential property as shown in Figure 1. Three of the residential positions were on project property. The houses selected allowed access to the backyard and represent what other such homes are currently

subjected to. Averages of the 5-minute test samples were computed for each hour or part of an hour. These short interval averages of the sound levels and other statistical descriptors are given in Table IV.

TABLE IV. Sound Levels Measured at Five Positions at Residential Property Surrounding the Gilroy Rodeo Grounds at Ferguson Road and Dunlap Avenue on Santa Rosa Count.

Test Positions	Test Interval	Measured Sound Level, dB(A)						
		L_{eq}	L_{MAX}	$L_{1.7}$	$L_{8.3}$	L_{25}	L_{50}	L_{90}
#1	13:45-14:00	58	83	68	54	48	45	40
	14:00-15:00	46	66	53	49	44	40	35
	15:00-16:00	47	67	56	50	45	42	37
	16:00-17:00	48	71	53	48	45	42	38
	17:00-18:00	52	76	56	53	52	49	44
	18:00-19:00	50	59	55	53	51	50	45
	19:00-20:00	47	65	54	51	48	46	42
	20:00-21:00	46	57	53	50	47	45	40
	21:00-22:00	46	59	54	50	47	44	40
	22:00-23:00	43	55	50	46	43	41	36
Total Time	*13:45-23:00*	*49*	*83*	*55*	*52*	*48*	*44*	*38*
#2	14:10-15:00	46	60		52	45	41	37
	15:00-16:00	48	67		55	47	42	38
	16:00-17:00	46	63		52	47	42	38
	17:00-18:00	49	62		53	50	47	43
	18:00-19:00	49	61		53	50	47	42
	19:00-20:00	46	66		50	47	43	38
	20:00-21:00	44	60		49	44	41	37
	21:00-21:20	43	57		47	44	41	37
Total Time	*14:10-21:20*	*47*	*67*		*52*	*47*	*43*	*37*
#3	14:35-15:00	59	84	67	60	52	48	44
	15:00-16:00	54	81	60	55	49	46	42
	16:00-17:00	57	83	66	53	48	45	41
	17:00-18:00	49	67	58	52	49	47	44
	18:00-19:00	47	61	53	49	47	46	42
	19:00-20:00				Batteries Died			
	20:00-21:00	46	63	52	49	47	45	40
	21:00-22:00	46	61	52	49	47	45	41
	22:00-22:34	46	58	51	50	47	44	38
Total Time	*14:35-22:35*	*53*	*84*	*59*	*52*	*48*	*46*	*41*

Test Positions	Test Interval	Measured Sound Level, dB(A)						
		L_{eq}	L_{MAX}	$L_{1.7}$	$L_{8.3}$	L_{25}	L_{50}	L_{90}
4	15:10-16:00	52	65		57	53	50	42
	16:00-17:00	52	64		55	53	51	43
	17:00-18:00	53	63		56	54	51	45
	18:00-19:00	53	63		57	55	51	45
	19:00-20:00	51	63		55	53	49	44
	20:00-21:00	51	61		55	53	49	43
	21:00-22:00	49	63		54	51	46	41
	22:00-22:25	47	65		52	48	44	39
Total Time	15:10-22:25	51	65		56	53	49	42
5	15:42-15:59	58	74	65	62	59	57	47
	16:00-16:59	58	78	64	62	59	57	48
	17:00-17:59	59	79	65	62	60	58	51
	18:00-18:59	58	77	64	61	59	57	50
	19:00-19:59	57	74	63	61	58	56	50
	20:00-20:59	56	76	63	60	57	53	48
	21:00-21:59	55	74	63	59	56	53	46
	22:00-22:59	53	68	60	57	54	49	41
	23:00-23:11	49	65	57	51	49	46	42
Total Time	*15:42-23:11*	*57*	*79*	*64*	*61*	*58*	*55*	*47*

Table IV includes many transient sources of sound. The L_{50} sound level at Position #1 ranged from 40 to 50 dB(A). The daytime L_{50} sound level limit is 55 dB(A), or 50 dB(A) with music or speech. During the hour 6:00 to 7:00 p.m., the limit would be raised to 55 dB(A) because the back-ground L_{50} sound level was the same as the limit. Therefore, the limit would be raised 5 dB(A). Figure 2 compare the L_n sound levels shown in Table I for each 5-minute interval of the test. This figure shows many peaks in the L_{MAX} sound level from 1420 to 17:40. No one was home but the dogs wee outdoors and the tester was not at the site during this time. During the time of many peaks in the sound, the L_{eq} sound levels follows closely the L_{25} sound level. This implies transient sources were most important. After 5:30 p.m, the L_{eq}, L_{50} and L_{25} sound levels were all very close. This implies the sources were more continuous. The variation in the sound measured in 1-second intervals is displayed in Figure 3. This figure shows the peaks in the sound were very short lived. The 70 dB(A) daytime limit for project activities were exceeded, and this would caus the limit to be raised to the measured value. The average and L_{50} 1/3-octave bands sound pressure levels are presented in Figures 4 and 5. The influence of road traffic and insects and frogs can be seen in these figures.

Figure 6 compares the L_n values measured in 5-minute intervals at Position #2. The sound at this position was more constant but appears to increase around 6:00 p..m. The L_{eq} sound level follows the

L_{25} sound level closer than the L_{50} sound level. This means that transient events were more important than more continuous sound sources. This could be due to traffic that was not continuous on Dunlap Avenue. The L_{50} sound level was highest between 5:00 and 7:00 p.m., just as occurred at Position #1. Thus, the same source influenced both sites. Most of the time, the L_{50} sound level at Position #2 was less than the 45 dB(A) nighttime limit without penalties. A comparison of the sound tones measured at Position #2 for existing conditions is given in Figure 7.

Positions #3 was in the backyard of a home almost 3/4 of mile north of the Main Arena poles where speakers will be mounted. Since the speakers will be pointed north, establishing the existing background sound was considered important. Two large dogs were a part of this home as they are outside until the owners retire at night. A comparison of the L_n sound levels are shown in Figure 8 for this position. Difficulty with the instrument batteries resulting in some data being lost. This figure shows that the measurements were fairly constant after 5:30 p.m. The peaks in the L_{MAX}, sound level from 2:45 pm to 4:55 p.m. were due to the dogs barking. Table IV shows that the L_{50} sound level was consistently between 44 to 47 dB(A) with the loudest time between 5:00 p.m. and 7:00 p.m. Results obtained at the Positions in 1 second intervals is shown in Figure 9. This figure shows the short duration of the impulsive barks and the consistency in the sound from 6:40 p.m. to 8:20 p.m.

Position #4 was near the backyard of the home occupied by an employee of the Ranch. This test location was shielded from Ferguson Road by the home and other structures. This site was selected because another home with similar shielding could not found east of the road. Figure 10 compares the statistical sound levels, L_n, measured at this site. Traffic was the dominant source at this position. Background L_{50} sound level ranged from 49 to 51 dB(A) from 3:10 p.m. to 9:00 p.m. As traffic volumes decreased, the L_{50} sound level dropped to 46 dB(A) and then to 44 dB(A) between 10:00 and 11:00 p.m. The higher background sound levels would result in an increase of the sound limits during some hours.

A comparison of the L_n sound levels measured at Position #5 is displayed in Figure 11. This site was south of a home that is part of the main home at 8500 New Avenue in Gilroy. This site had no backyard because of commercial activities, but the site selected was shielded from the commercial activity and from road traffic north of New Avenue by a metal building. The highest L_{50} sound levels were measured at this site. As with most sites, the highest L_{50} sound levels were measured from 5:00 to 7;00 p.m. The background L_{50} sound level did not drop below 50 dB(A) until between 10:00 and 11:00 p.m. The L_{50} sound level most closely followed the L_{25} sound levels, showing that transient vehicle traffic was the dominant source. Figure 12 compares the L_{eq} and L_{MAX} sound levels measured at this position over the duration of the test.

For the purpose of this study, the background L_{eq} sound level at Position #1 was assumed to be 52 dB(A). This means that the City of Vacaville limit is 55 dB(A) during the day. The sound generated by the operation of the high pressure washer at the facility north of PG&E are assumed to not be part of the background, but are assumed to exceed the City's noise limits. The background L_{eq} sound level at Position #2 is estimated to be as low as 44 dB(A) when dogs are not barking and no general aviation aircraft flights are occurring and to be 52 dB(A) when dogs are barking or aircraft flights are passing over the sites. The sound generated by the high pressure washer north of the PG&E facility are as-

sumed not to be a part of the background, but the sound exceeds the City's limit when background L_{eq} sound levels at Position #2 are less than 50 dB(A). The background L_{eq} sound levels at Position #3 west of the proposed project site were assumed to be 47 dB(A) when dogs are not barking and general aviation aircraft are not flying and 53 dB(A) when these are not true. When the background L_{eq} sound level reaches 50 dB(A) and above, the City's noise limit shall be 3 dB(A) greater than hourly L_{eq} sound level. These are the values used in the evaluation of the new sources to be a part of the new GCC building.

The L_{dn} sound level used for evaluating transportation sound sources is not applicable to occasional events that only last part of day. For this reason, predictions of the existing L_{dn} sound levels were not completed.

6.2 Existing + Project

Sound generated by the sound reinforcement system is expected to be the dominant source during events whether "Large" or "Medium". Other event sources could be significant, but they are very difficult to quantify. For example, a door closing sound is a short lived event where you need a typical sound sample created near other vehicles and you need to know how many times it occurs per hour and the location of the source relative to the receiver. This is a random process with potentially an infinite number of possibilities across any given hour. Approximately 1640 parking spots exist next to Position #1 at Dunlap Avenue. If all of these spots were filled in a single hour and each closed their doors in a way that produced a maximum sound level of 75 dB(A) at 23 feet, the sound generated 250 feet from Position #1 would result in a level of 54 dB(A) over a duration of 13 minutes and 40 seconds. Since the duration is less than 15 minutes, the L_{25} sound limit wold be 60 dB(A) during the day time. The parking spots range in distance from Position #1 from 115 feet to 675 feet. The 250 foot distance is 37 percent of the farthest distance and a little more than twice the closest distance. This prediction does not account for shielding provided by the vehicles to sound propagating from the source to the receiver.

Similar problems occur when predicting the sound from individual patrons because the source is directive, i.e., much less sound is produced to the rear of the head, the distances are large and quite varied and the voice effort is quite large. Outbursts of sound can be expected from the Main Arena grand stands, but these will be of short duration. The noise limits increase as the duration of the event over an hour decrease as seen in Table I.

Amplified sound is potentially a bigger problem and three systems will exist. Two of those systems, the Main Arena and the Ranch Pen, will use speakers that point north. As noted earlier, directions in this study assume Ferguson Road runs north-south and Dunlap Avenue runs east-west. The Dance Floor speakers will be installed on poles along the west side of the floor and stage and will point east. The speakers used for the 2018 Gilroy Rodeo were used as a basis for design and analysis of the sound generated. The speakers have a horn discharge and 15 inch bass speaker. The horn is designated at a 60° by 40° horn. This means that the horn will cover 60° horizontally and 40° vertically. The highest sound will come along the centerline of the speaker. At 30° off center horizontally, the sound will be 6 dB lower than at the center for the specified frequency. The same is true at 20° verti-

cally either above or below the centerline. With this information, the predicted sound at any position can be made, if you account for how far off axis the receiver will be. Table V gives the results for the Main Arena system assuming two speaker poles are used and that a not to exceed L_{50} sound level is set for the last row of bleachers 4 feet above seat height directly perpendicular to the speaker. For a person that is 180° from the direction the speakers are aimed, the sound is at least 15 dB(A) below that at the centerline. The source sound levels shown include the influence of being off axis. Receiver Positions sites #6, #7 and #8 represent additional home sites that were included in the analysis. Position #6 is the closest home directly north or the Arena and south of Leavesly Road. Position #7 is the nearest home east of Ferguson Road and in line with the Arena. Finally, Position #8 is the backyard of the home along Dunlap Avenue closest to the parking area and closest to the entrance to the Gilroy Rodeo Grounds.

TABLE V. Predicted Receiver Sound Levels Due to Main Arena Sound Reinforcement System for Either L_{50} Sound Level of 80 or 75 at Rear Seat for Gilroy Rodeo Grounds.

Description		Source	Receiver	L_{50} Snd Level, dB(A)		Background L_{50} Snd Lvl, dB(A)			
Source	Receiver	D_1, ft.	D_2, ft.	Source	Receiver	2-5 pm	5--8 pm	8-10 pm	10-11 pm
E-Pole	Bk Ro,90d	192	3.28	115	80				
E-Pole	Bk Ro,90d	192	3.28	110	75				
E-Pole	S#1	192	697	65	54	<45	<50	<45	<45
E-Pole	S#2	192	938	65	51	<45	<50	<45	<45
E-Pole	S#3	192	3980	80	54	<50	<50	<50	<45
E-Pole	S#4	192	1315	74	57	<55	<55	<50	<50
E-Pole	S#5	192	3386	80	55	<60	<60	<55	<50
E-Pole	S#6	192	2016	80	60	<60	<60	<55	<50
E-Pole	S#7	192	1846	74	54	<55	<55	<50	<50
W-Pole	S#8	192	746	65	53	<45	<50	<45	<45
E-Pole	S#1	192	697	60	49	<45	<50	<45	<45
E-Pole	S#2	192	938	60	46	<45	<50	<45	<45
E-Pole	S#3	192	3980	75	49	<50	<50	<50	<45
E-Pole	S#4	192	1315	69	52	<55	<55	<50	<50
E-Pole	S#5	192	3386	75	50	<60	<60	<55	<50
E-Pole	S#6	192	2016	75	55	<60	<60	<55	<50
E-Pole	S#7	192	1846	69	49	<55	<55	<50	<50
W-Pole	S#8	192	746	60	48	<45	<50	<45	<45

This table also shows the L50 background sound levels by time period and from this the County's sound limits can be determined. Table V shows that even at an L_{50} sound level of 80 dB(A), the predicted sound level meets the noise limits. These predictions are very conservative, because the design the speakers are higher than the receiver at the back row of the grand stands, so that the centerline of the speaker would strike the ground before leaving the property. Thus, the vertical sound is off axis

and could be lower than assumed by the source by 5 to 10 dB(A). The portable system used for the Ranch Pen will be designed in a similar manner but with much lower levels since the receiver will be in or around the pen.

The Dance Floor sound system was assumed to use equipment similar to that employed for the Main Arena. The speakers will be mounted on a structure to allow them to be well above the receiver ear height and the centerline of the horn speaker will be aimed 5.5 feet above floor height. This again will result in sound off axis propagating to the receiver. The Dance Floor should be designed to be rectangular in shape, i.e., longer than it is wide. This makes it easier to cover the area without increasing the number of speakers required to have even sound levels over the entire floor area.

TABLE VI. Predicted Receiver Sound Levels Due to Dance Floor Sound Reinforcement System for Either L_{50} Sound Level of 80 or 75 at Rear of Floor for Gilroy Rodeo Grounds.

Description		Source	Receiver	L_{50} Snd Level, dB(A)		Background L_{50} Snd Lvl, dB(A)			
Source	Receiver	D_1, ft.	D_2, ft.	Source	Receiver	2-5 pm	5--8 pm	8-10 pm	10-11 pm
Stage	Flr Rear	60	3.28	105	80				
Stage	Flr Rear	60	3.28	100	75				
Stage	S#1	60	1090	74	49	<45	<50	<45	<45
Stage	S#2	60	1325	75	48	<45	<50	<45	<45
Stage	S#3	60	3615	74	38	<50	<50	<50	<45
Stage	S#4	60	1440	80	52	<55	<55	<50	<50
Stage	S#5	60	3000	75	41	<60	<60	<55	<50
Stage	S#6	60	1620	75	46	<60	<60	<55	<50
Stage	S#7	60	2135	80	49	<55	<55	<50	<50
W-Pole	S#8	60	1120	73	48	<45	<50	<45	<45
Stage	S#1	60	1090	69	44	<45	<50	<45	<45
Stage	S#2	60	1325	70	43	<45	<50	<45	<45
Stage	S#3	60	3615	70	34	<50	<50	<50	<45
Stage	S#4	60	1440	75	47	<55	<55	<50	<50
Stage	S#5	60	3000	70	36	<60	<60	<55	<50
Stage	S#6	60	1620	69	40	<60	<60	<55	<50
Stage	S#7	60	2135	75	44	<55	<55	<50	<50
Stage	S#8	60	1120	68	43	<45	<50	<45	<45

Table VI again shows that for L_{50} sound level of 80 or 75 dB(A) at ear height at the rear of the Dance Floor, sound levels are acceptable everywhere but the employee house which is exempt. The results are very conservative because of the influence of the elevated speakers pointing down to the listener at the rear (east side) of the dance floor.

6.3 Cumulative + Project

Background sound levels will increase over time as additional development occurs in areas surrounding the project site. This will raise or increase the noise limits. The cumulative plus project condition will result in a greater number of event, but a change in the sound for each event. Therefore, the predictions for existing plus project conditions remain the same.

7.0 NOISE IMPACTS

The impact of sound generated by events at the project site at the Gilroy Rodeo Grounds facility could be significant for residents surrounding the site without mitigation. The impacts can be reduced to less than significant by requiring monitoring of the sound and ensuring that L_{50} and other L_n

levels at the rear of the Arena & Dance Floor. This conclusion assumes that requirements for the sound reinforcement systems and their installation are make a part of the project. The mitigation measures are provided in the following section.

8.0 MITIGATION MEASURES

Impacts are predicted to be insignificant if the requirements for the sound reinforcement system and general requirements are implemented and monitored. All requirements are given in the outline sections that follow.

I. General Requirements

A. Signage

1. Signs shall be installed near all entrances and parking area to remind patrons, contestants and volunteers that homes surround the site,
2. The signs should encourage all to be aware of the sound generated when closing vehicle doors and that being “gentle” in the closing helps.
3. Be aware that not everyone is participating in the event and having fun but playing friendly will ensure the continuance of the event.

II. Sound Reinforcement System

A. Main Arena

1. A firm specializing the design of outdoor sound reinforcement system for speech and music shall be hired to design or review a design for system to meet the requirements given here.
2. Speakers shall be selected with a horn coverage of 60° by 40° degrees. A maximum 15" bass element shall be provided with the system.
3. A total of 4 speakers is expected to provide coverage for the Main Arena as shown in Sheet C2 of civil engineering drawings. The design shall be made to prevent excess sound from striking areas outside the grandstands.
4. The speakers shall be installed a minimum 30 feet above the ground level.

5. The speakers will be tilted so the centerline of the horn speaker is 4 feet above the last row of seats. A laser system shall be used to ensure that the centerline of the speaker hits that position,
6. The speaker poles are expected to be about 115 feet apart, with exact positions found to meet coverage requirements of ±2 dB(A) at all seats.
7. The system shall be capable of providing continuous sound level of 80 dB(A) at the referenced laser location at the back row of seats at ear heigh, assumed to be 4 feet above seat height.
8. Amplifiers and speakers shall be selected that will provide the 80 dB(A) requirement at the specified last row perpendicular tot he face of the speaker. This distance is estimated to be 192 feet between the face of the speaker and the ear of the receiver.
9. Final tests shall done to confirm the sound coverage and the ability to provide continuous pink noise sound at the last row of seats at 80 dB(A). Both sound versus time and frequency content in 1/3-octave band shall be provided as part of the final report for the installation.

B. Dance Floor

1. A firm specializing the design of outdoor sound reinforcement system for speech and music shall be hired to design or review a design for system to meet the requirements given here.
2. Speakers shall be selected with a horn coverage of 60° by 40° degrees. A maximum 15" bass element shall be provided with the system.
3. A total of 2 speakers is expected to provide coverage for the Dance Floor. The floor should be assumed to be 40 feet wide and 50 to 60 feet long. The design shall be made to prevent excess sound from striking areas outside the Dance Floor.
4. The speakers shall be installed a minimum 20 feet above the Dance Floor.
5. The speakers will be tilted so the centerline of the horn speaker is 5.5 feet above floor for a person standing 3 feet from the rear edge of the floor. A laser system shall be used to ensure that the centerline of the speaker hits that position,
6. The speaker locations shall be selected to meet coverage requirements of ±2 dB(A) at all places on the floor, measured 5.5 feet above floor height.
7. The system shall be capable of providing continuous sound level of 80 dB(A) at the referenced laser location 3 feet west of east edge of the floor and 5.5 feet above floor height.
8. Amplifiers and speakers shall be selected that will provide the 80 dB(A) requirement at the specified last row perpendicular tot he face of the speaker. This distance is estimated to be about 60 feet between the face of the speaker and the ear of the receiver.
9. The speakers shall be at least 3 feet in front of any microphones used on stage.
10. Final tests shall done to confirm the sound coverage and the ability to provide continuous pink noise sound at the last row of seats at 80 dB(A). Both sound versus time and frequency content in 1/3-octave band shall be provided as part of the final report for the installation.

C. Ranch Pen

1. A portable speaker system shall be used in the Ranch pen with the speaker on the south side of the pen and the speakers facing north across the pen.

2. The system shall be capable of providing 80 dB(A) of sound at all locations on the north side of the pen.

9.0 REFERENCES

1. Anon., "7955 Ferguson Rd. – Gilroy Rodeo Grounds Use Permit Project Description", for Santa Clara County Planning Department by Gilroy Rodeo Grounds Group,

2. Anon., ***Santa Clara County General Plan; Book A: Charting a Course for Santa Clara Count's Future: 1995-2010***, by county of Santa Clara, Planning Office, San Jose, CA, adopted December 20 1994.

3. Anon., ***Santa Clara County General Plan; Book B: Charting a Course for Santa Clara Count's Future: 1995-2010***, by County of Santa Clara, Planning Office, San Jose, CA, adopted December 20 1994.

4. Anon., ***Update to 1994 General Plan, Book A***, County of Santa Clara, Planning Office, San Jose, CA, adoption November 19, 2015.

5. Anon., ***Update to 1994 General Plan, Book B***, County of Santa Clara, Planning Office, San Jose, CA, adoption November 19, 2015.

6. Anon., "Chapter VIII. Control of Noise and Vibration," from ***County of Santa Clara, Code of Ordinances***, Title B, Regulations, Division B11 Environmental Health, 2018.

7. Title 14. California Code of Regulations, Chapter 3. Guidelines for Implementation of the California Environmental Quality Act, Article 9. Contents of Environmental Impact Reports, Sections 15120 to 15132.

8. W.J. McClintock, "Improvement Plans for GilroyRodeo," by MH Engineering, Morgan Hill, for Gilroy Rodeo Grounds, PO Box 1148, Gilroy, Job No. 218058, January 24, 2019.

9. American National Standards Institute, ANSI, ***Standard Specification For Sound Level Meters, S1.4-1983 (Precision)***

10. Anon., ***Official County Road Book 2018***, Prepared by Traffic Engineering & Operations, Revised July 2018l.

Figure 1. Aerial Image of Project Site and Surrounding Commercial and Residential Property and Showing Sound Measurement Positions.

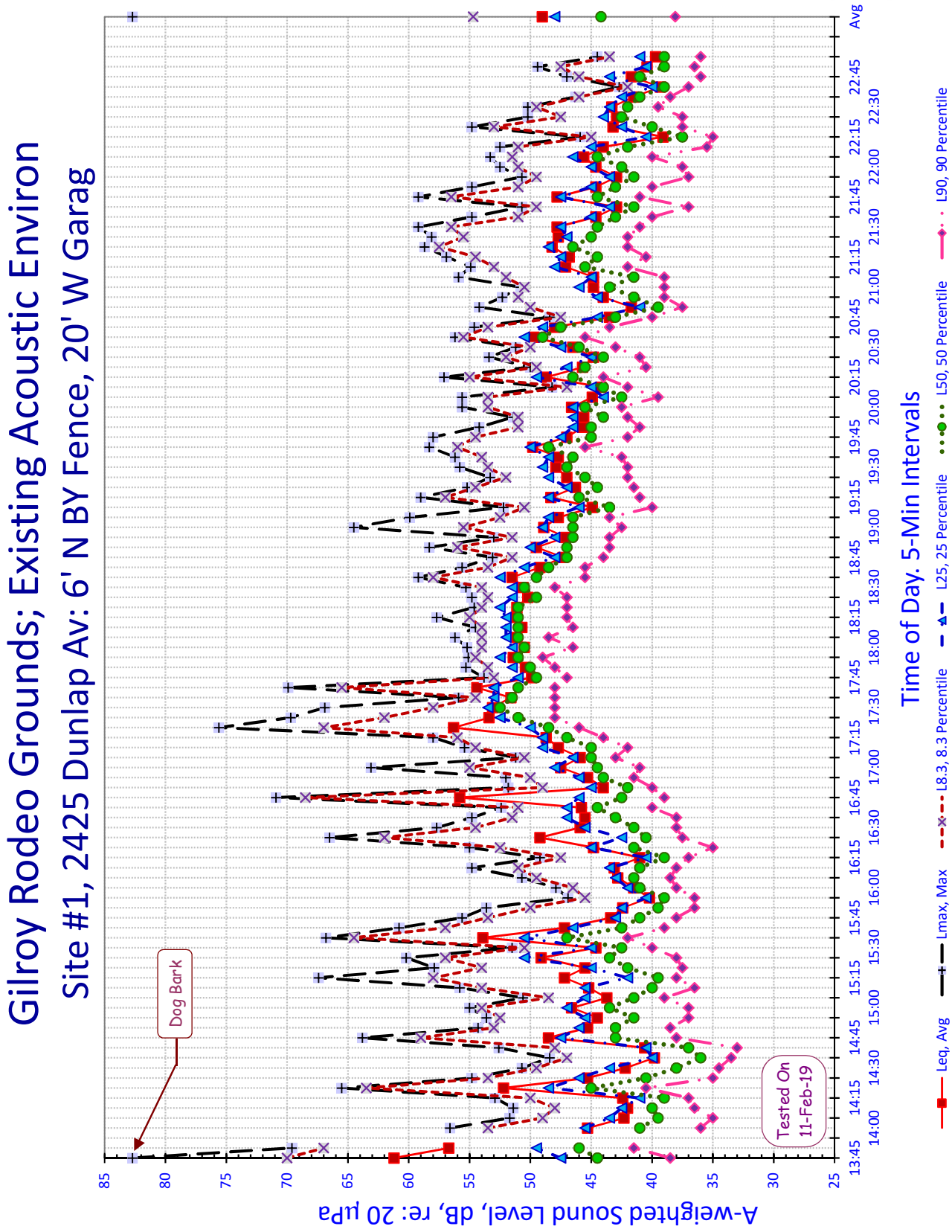

Figure 2. Variation in Sound Measured in 5-minute Intervals at Position #1 6 ft. North of Backyard Fence

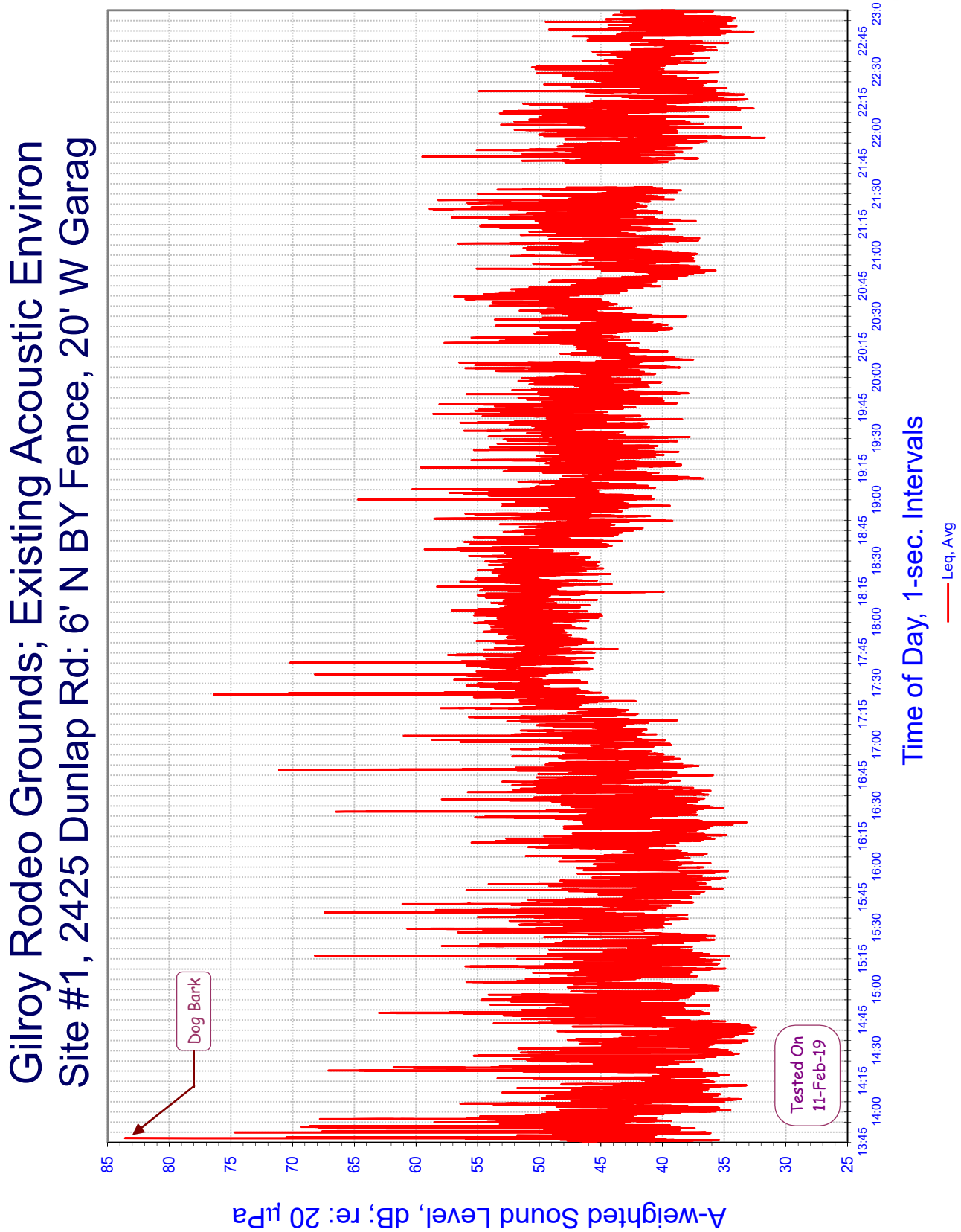

Figure 3. Sound Levels Measured in 1-second Intervals at Position #1 for Existing Conditions6' 6' South of Fence.

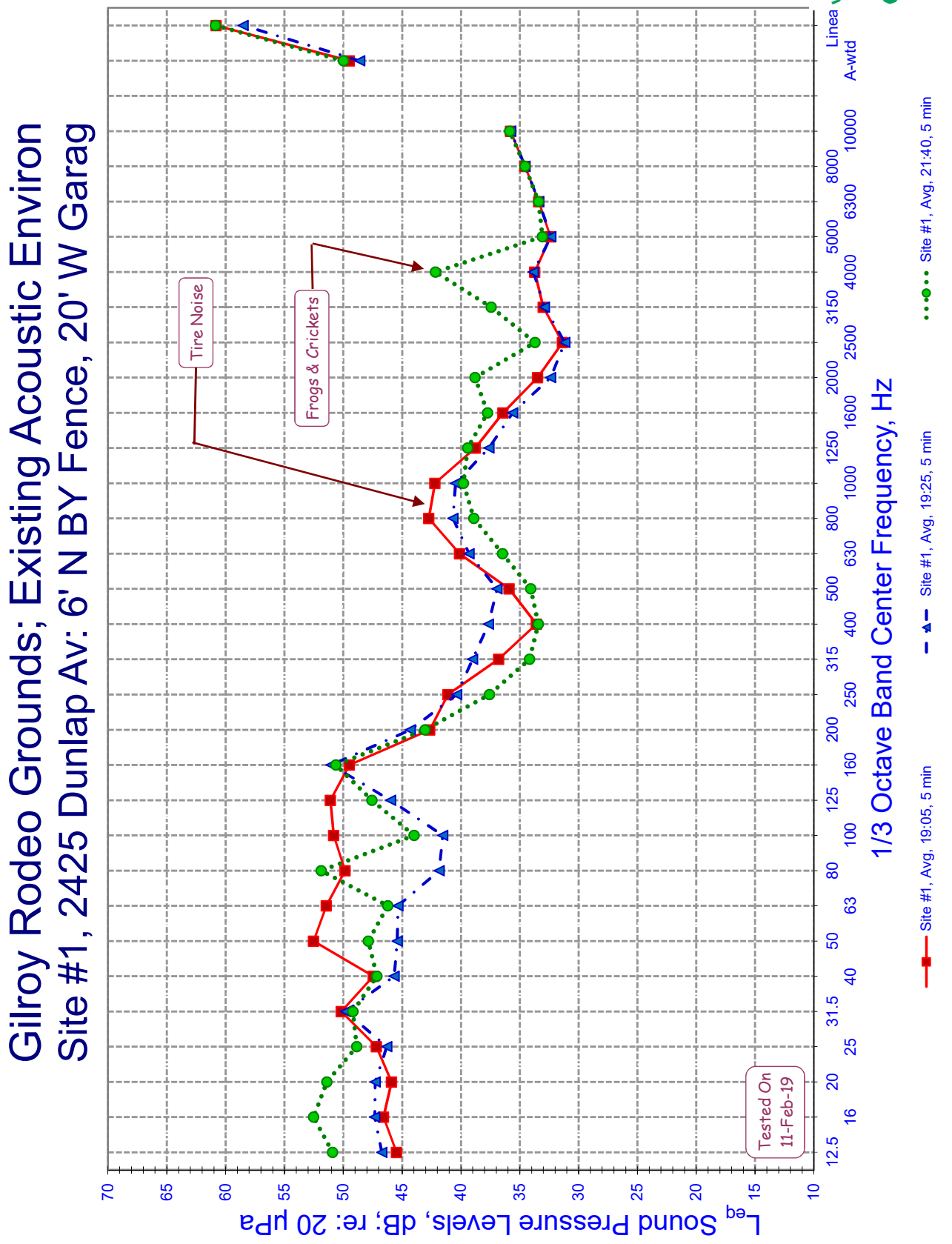

Figure 4. Comparison of Background Sound Tones Measured at Position #l 6' South of Fence for Existing Conditions.

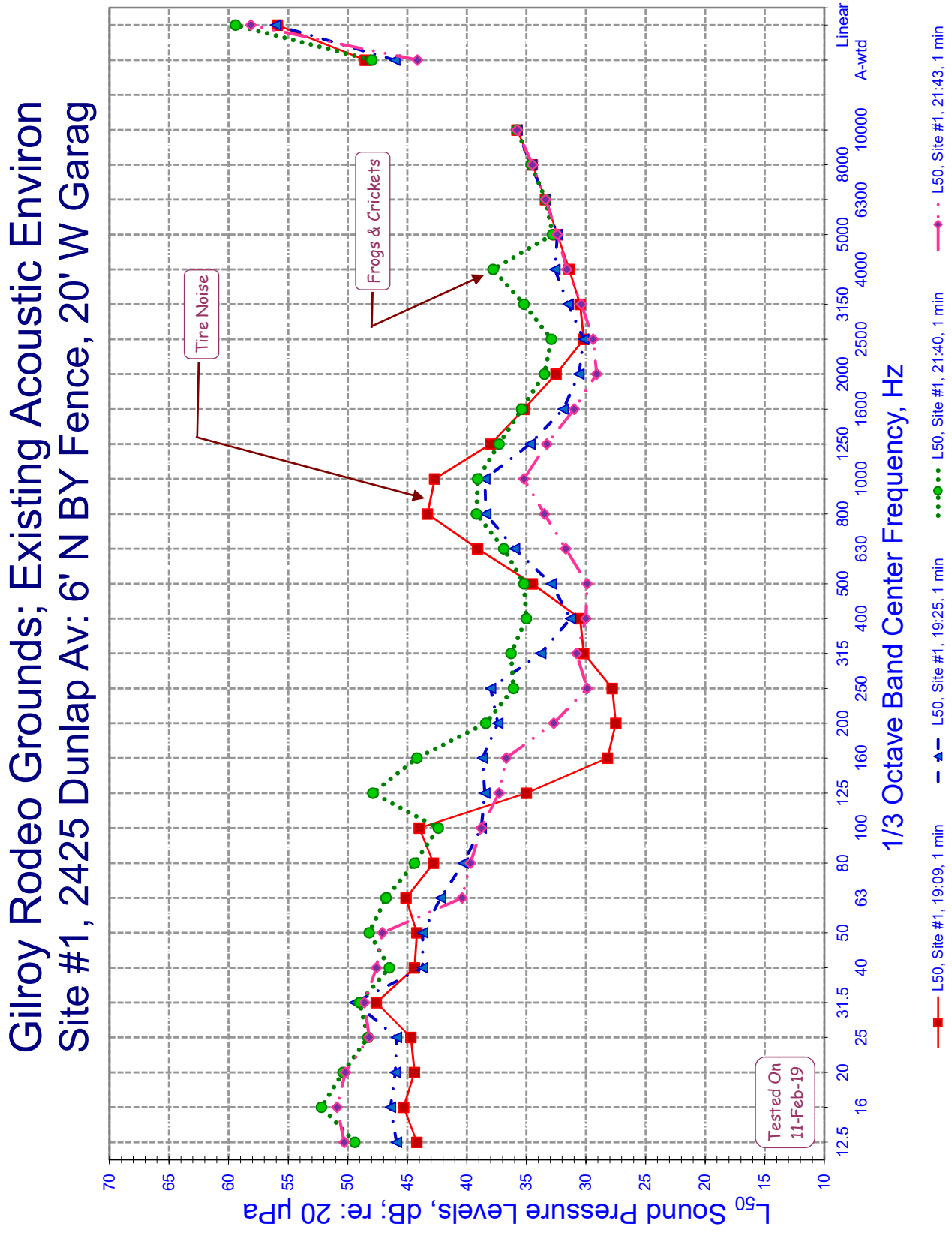

Figure 5. Background L_{50} Sound Tones Measured at Position #l 6' South of Fence for Existing Conditions.

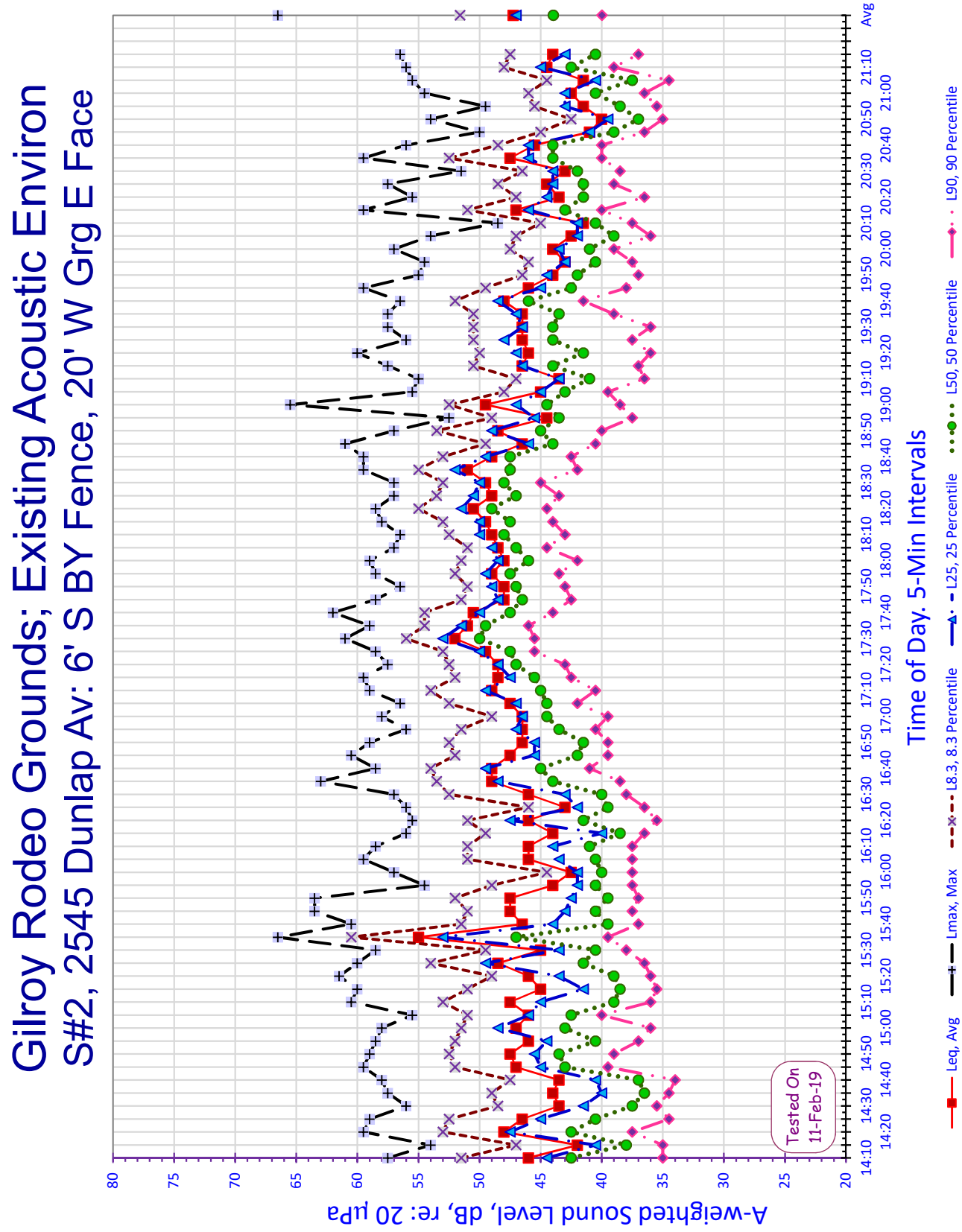

Figure 6. Variation in Sound Measured in 5-minute Intervals at Position #2 for existing Conditions, 6' south of Fence.

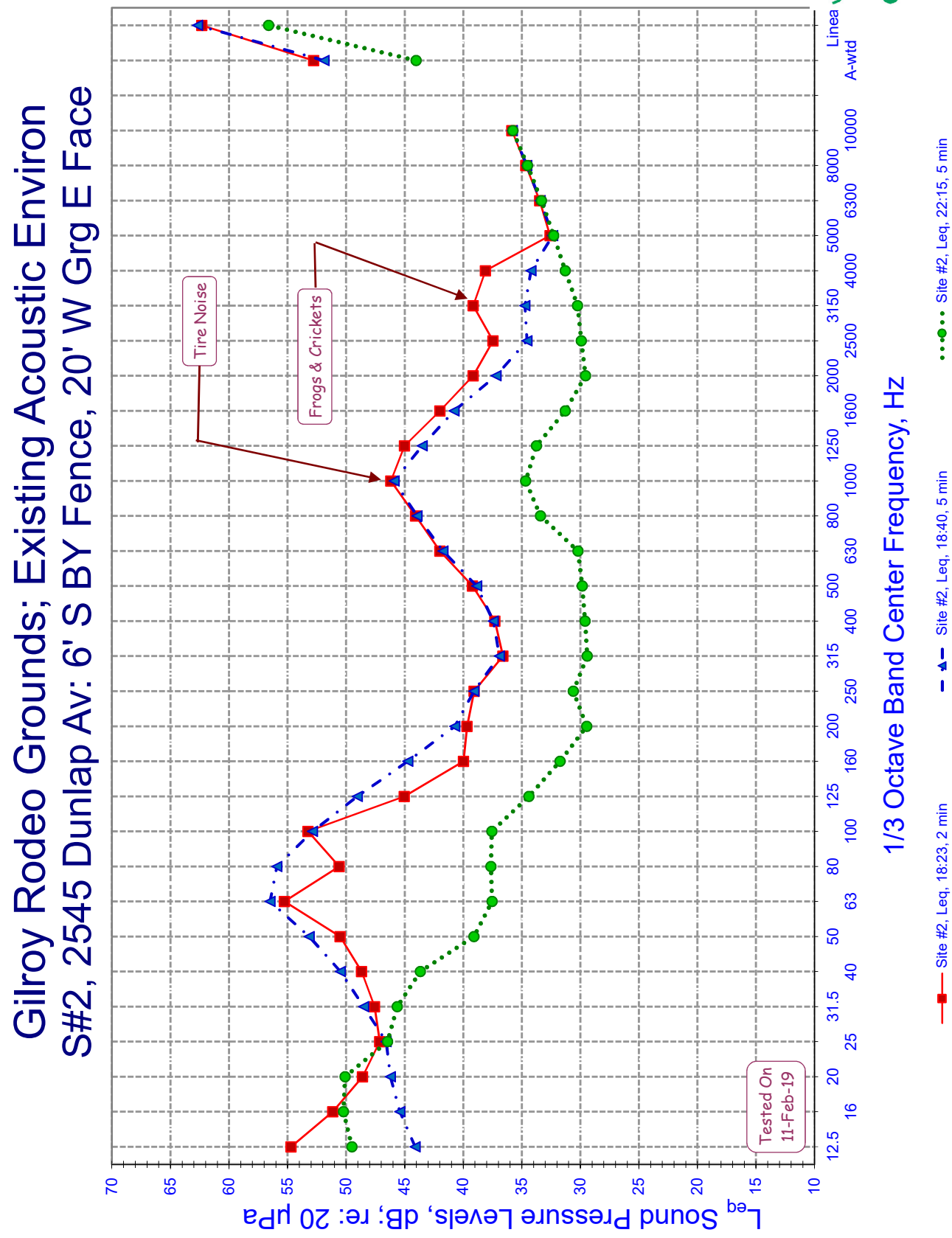

Figure 7. Comparison of Background Sound Tones Measured at Position #2 for Existing Conditions 6' South of Fence.

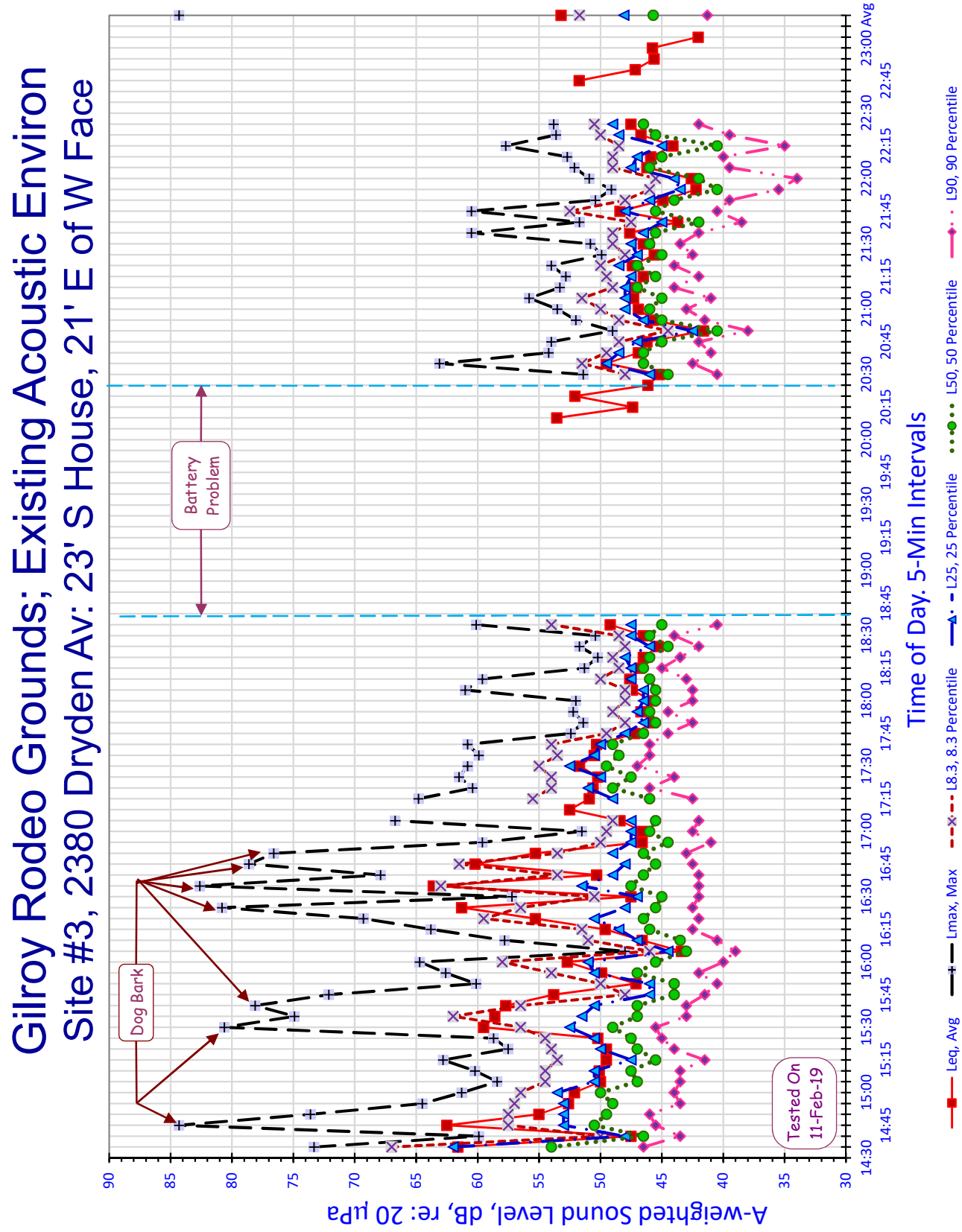

Figure 8. Variation in Background Sound Measured at Position #3 in 5-minute intervals for Existing Conditions.

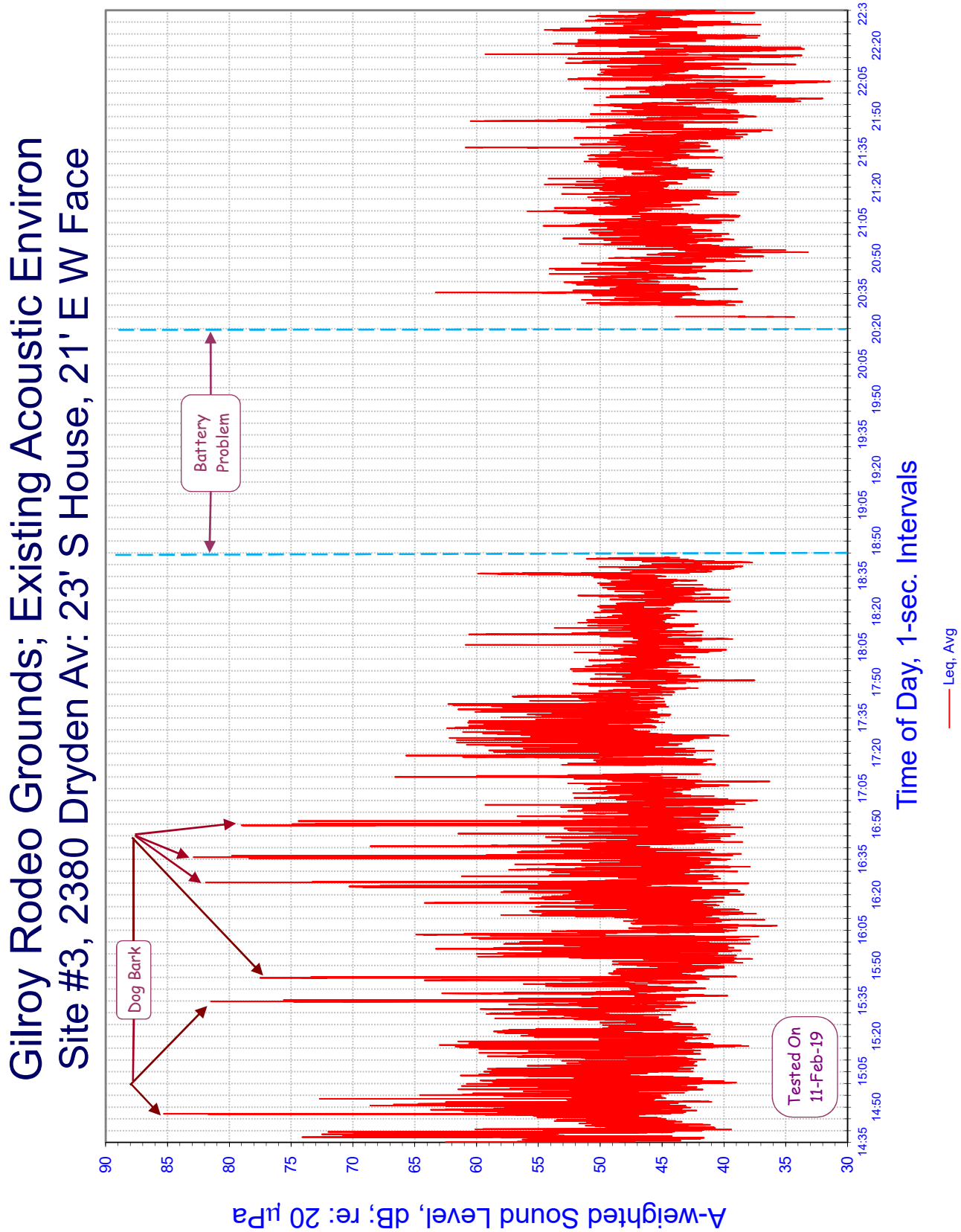

Figure 9. Existing Background Sound Level Measured at Position #3 in 1-second Intervals near Hot Tube and Pool.

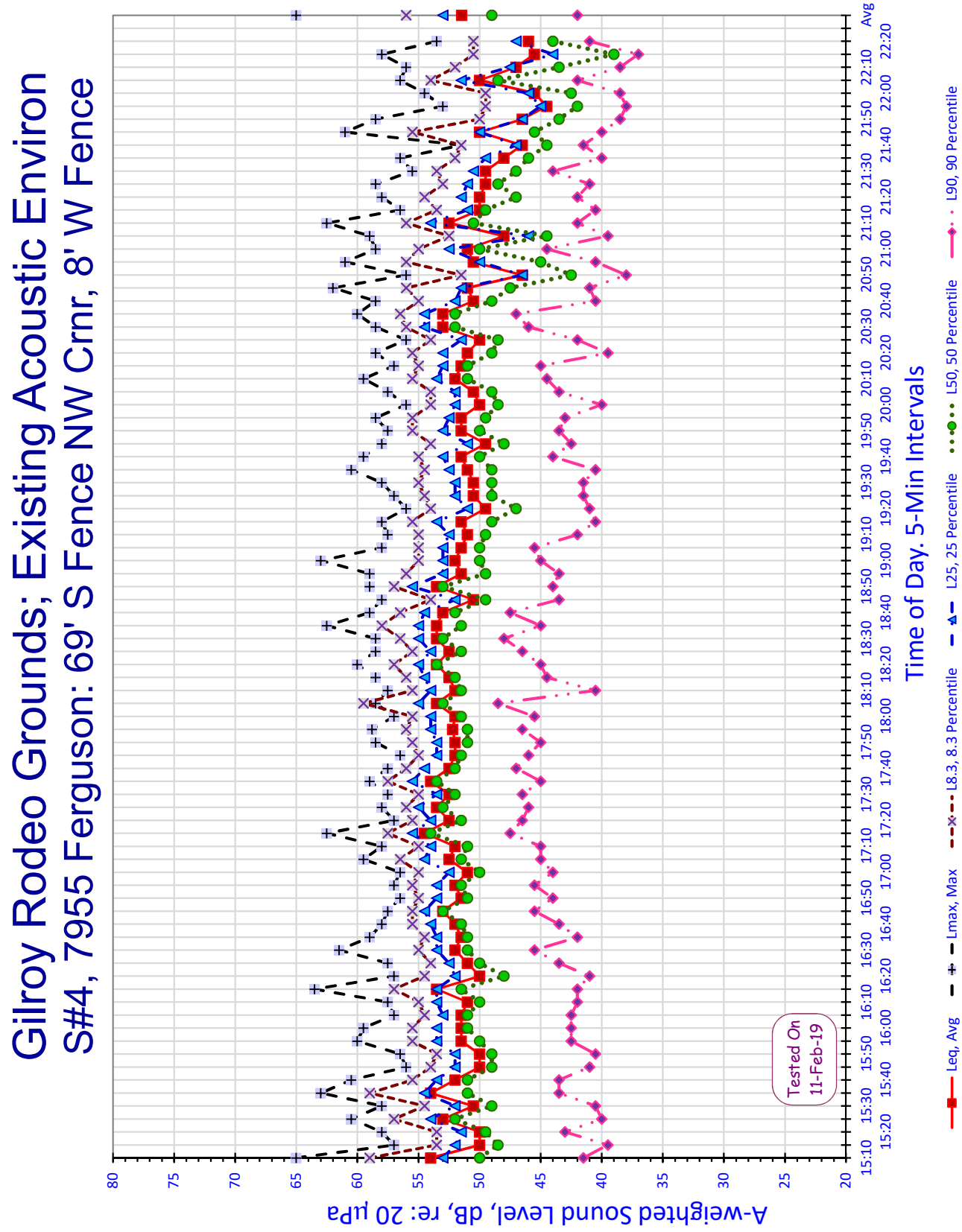

Figure 10. Variation in Background Sound Levels in 5-minute Intervals for Existing Conditions 8' West of the Fence.

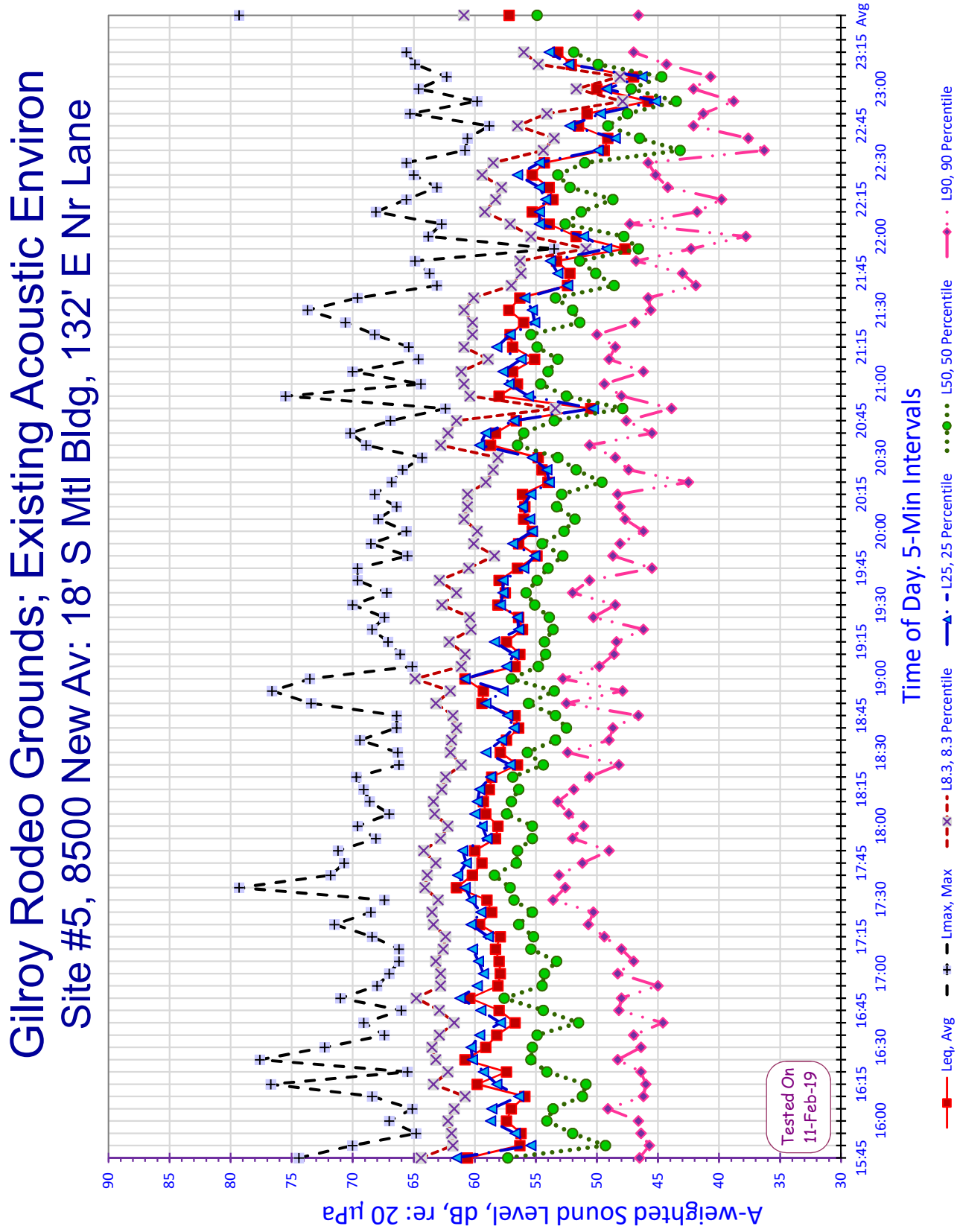

Figure 11. Background Sound Level Variations at Position #5 Measured in 5-minute Intervals for Existing Conditions.

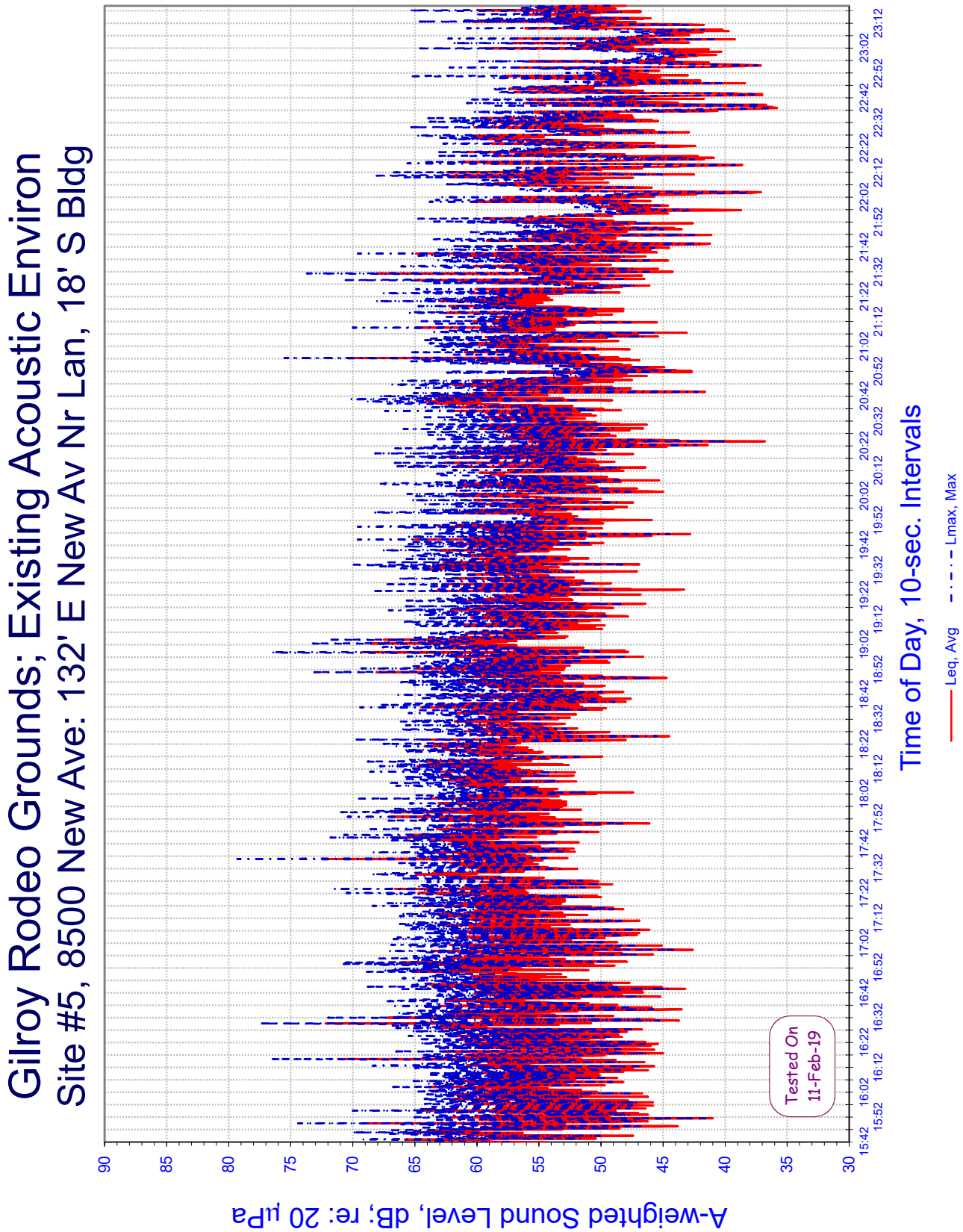

Figure 12. Variation in L_{eq} and L_{MAX} Sound Levels Measured 10-second Intervals for Existing Conditions at Position #5.