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ACOUSTICAL STUDY

ROMBAUER VINEYARDS # P19-00130-MOD
Planning Commission Hearing Date 5 August 2020

RGD ACOUSTICS

Acoustical & Audiovisual Consultants

OUTDOOR MUSIC SOUND STUDY FOR:

Rombauer Vineyards

3522 Silverado Trail
County of Napa, CA
RGD Project #: 19-036

PREPARED FOR:

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DATE:

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1. Introduction

Rombauer Vineyards is located on the west side of Silverado Trail North in unincorporated Napa County. This report assesses outdoor amplified music with respect to the County Noise Ordinance standards. Our work included sound level measurements of an outdoor live music performance and typical operation of outdoor speakers mounted near the tasting room.

2. Environmental Noise Fundamentals

Noise can be defined as unwanted sound. It is commonly measured with an instrument called a sound level meter. The sound level meter captures the sound with a microphone and converts it into a number called a sound level. Sound levels are expressed in units of decibels. To correlate the microphone signal to a level that corresponds to the way humans perceive noise, the A-weighting filter is used. A-weighting de-emphasizes low-frequency and very high-frequency sound in a manner similar to human hearing. The use of A-weighting is required by most local General Plans as well as federal and state noise regulations (e.g. Caltrans, EPA, OSHA and HUD). The abbreviation dBA is sometimes used when the A-weighted sound level is reported.

Because of the time-varying nature of environmental sound, there are many descriptors that are used to quantify the sound level. Although one individual descriptor alone does not fully describe a particular noise environment, taken together, they can more accurately represent the noise environment. The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car passby or airplane flyover. To express the average noise level the L_{eq} (equivalent noise level) is used. The L_{eq} can be measured over any length of time but is typically reported for periods of 15 minutes to 1 hour. The background noise level (or residual noise level) is the sound level during the quietest moments. It is usually generated by steady sources such as distant freeway traffic. It can be quantified with a descriptor called the L_{90} which is the sound level exceeded 90 percent of the time.

In environmental noise, a change in noise level of 3 dB is considered a just noticeable difference. A 5 dB change is clearly noticeable, but not dramatic. A 10 dB change is perceived as a halving or doubling in loudness.

3. Acoustical Criteria

Napa County Code of Ordinances

Chapter 8.16 of Napa County Code of Ordinances contains noise regulations which regulate the noise generation of land uses such as the Rombauer winery by specifying noise limits for potentially affected land uses. These exterior noise limits are excerpted below.

8.16.070 - Exterior noise limits.

A. Maximum Permissible Sound Levels by Receiving Land Use.

1. The noise standards for the various categories of land use identified by the noise control officer, as presented in Tables 8.16.060 and 8.16.070 shall, unless otherwise specifically indicated, apply to all such property within a designated zone.

2. No person shall operate, or cause to be operated, any source of sound at any location within the unincorporated area of the county, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level, when measured on any other property, either incorporated or unincorporated, to exceed:

a) The noise standard for that land use as specified in Table 8.16.070 for a cumulative period of more than thirty minutes in any hour [L_{50}]; or

b) The noise standard plus five dB for a cumulative period of more than fifteen minutes in any hour [L_{25}]; or

c) The noise standard plus ten dB for a cumulative period of more than five minutes in any hour [L_8]; or

d) The noise standard plus fifteen dB for a cumulative period of more than one minute in any hour [L_2];

e) The noise standard plus twenty dB or the maximum measured ambient level, for any period of time [L_{max}].

3. If the measured ambient noise level differs from that permissible within any of the first four noise limit categories above, the allowable noise exposure standard shall be the ambient noise level.

4. If the measurement location is on a boundary between two different zones, the sound level limit applicable to the quieter noise zone shall apply.

5. Wherever possible, the ambient noise level shall be measured at the same location along the property line utilized in subsection (A)(2) with the alleged offending noise source inoperative. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period sufficient to measure the ambient noise level, the ambient noise level may be determined by traveling away from the noise source to a point where a steady-state decibel reading is achieved. If this test is not possible, the noise level measured while the source is in operation shall be compared directly to the noise level standards.

B. Correction for Character of Sound. In the event the alleged offensive noise, as judged by the noise control officer, contains a steady, audible tone such as a whine, screech or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech, the standard limits set forth in Tables 8.16.060 and 8.16.070 shall be reduced by five dB, but not lower than forty-five.

Table 1 [Napa Code of Ordinances Table 8.16.070] Exterior Noise Limits (Levels not to be exceeded more than 30 minutes in any hour)

Land Use Type	Time Period	Noise Level (dBA) By Noise Zone Classification		
		Rural	Suburban	Urban
Single-Family Homes and Duplexes	10 p.m. to 7 a.m.	45	45	50
	7 a.m. to 10 p.m.	50	55	60
Multiple Residential 3 or More Units Per Building (Triplex +)	10 p.m. to 7 a.m.	45	50	55
	7 a.m. to 10 p.m.	50	55	60
Office and Retail	10 p.m. to 7 a.m.	60		
	7 a.m. to 10 p.m.	65		
Industrial and Wineries	Anytime	75		

The lands neighboring the project site are designated by the county as agricultural. The Rural Single-Family noise limits are used at the residences. This is consistent with Napa County's administrative practice of designating as residential the house, and the area around the house used in a residential capacity, when the house occurs on agricultural land[1].

4. Noise Measurement Program

A noise measurement program was conducted at the Rombauer Vineyard site on June 29, 2019. A five-piece band called Off the Record played a 45-minute set of amplified rock and roll music at each of three locations around the winery property (S-1, S-2, and S-3). Band location S-1 is at the parking lot area just west of the Rombauer winery building. Band location S-2 is the parking lot near the wine cave, northwest of the winery building. Band location S-3 is on the east side of the winery building.

The band's PA system consisted of two main loudspeakers, monitor speakers and a subwoofer. The PA was used primarily for the vocals. The guitars and bass each had their own amplifier/speaker. The band was shown the intended audience location and the band set the amplification levels accordingly.

Noise monitors (R-1, R-2, and R-3) were setup at/near the potentially affected residences as identified by Rombauer Winery. The noise monitors quantified the

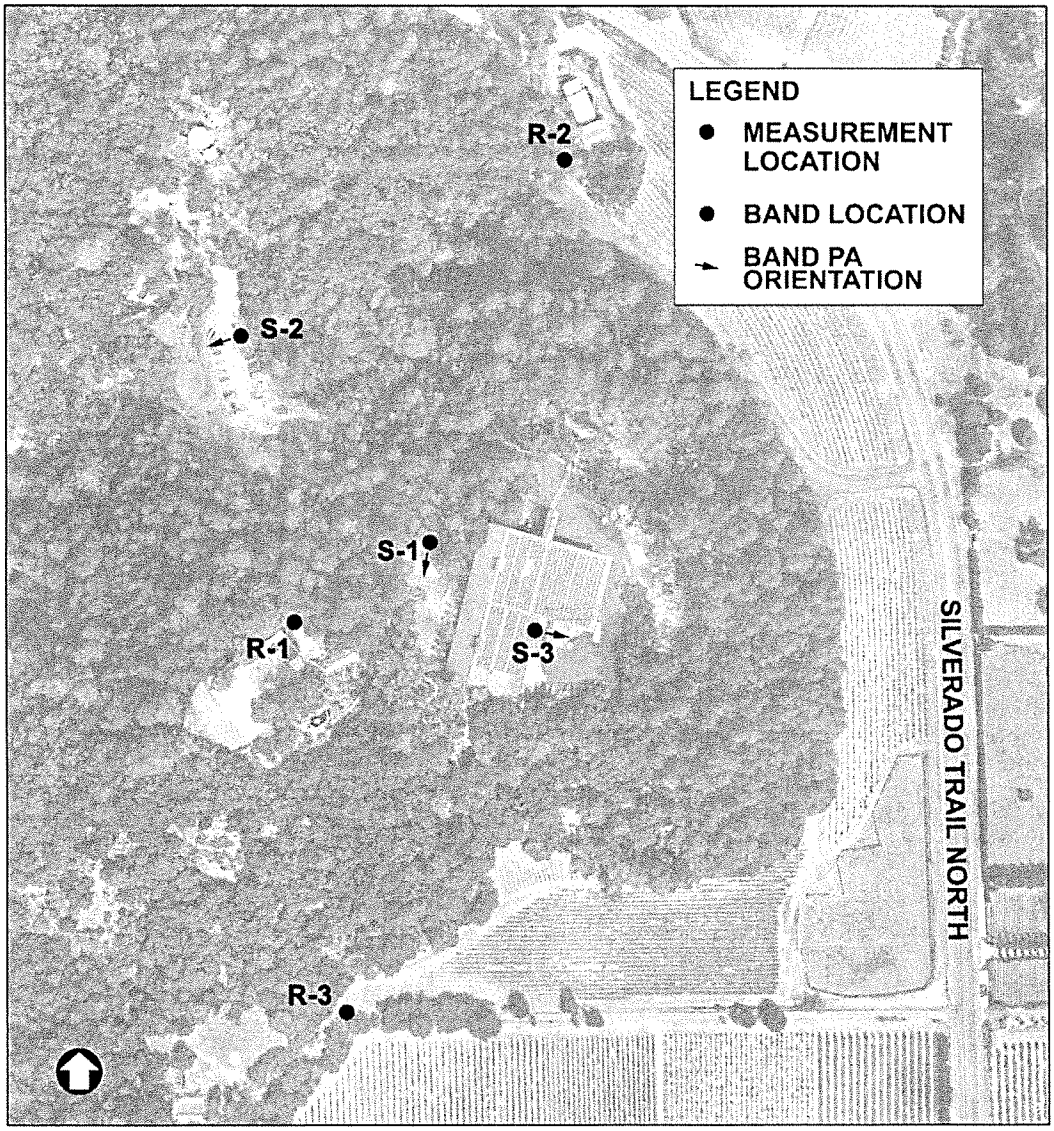
[1] Telephone conversation with John McDowell, Deputy Planning Director, Napa County, 2 Nov. 2015

ambient and music sound levels. A noise monitor was also setup in front of the band at a distance of 15- to 25-feet to quantify the sound level at the audience area. All noise monitors were set at a height of five feet above ground.

The outdoor band locations and the residential noise measurement locations are shown in Figure 1.

The sound measurements were made with Larson-Davis Model 820 and Larson-Davis Model 824 sound level meters meeting Type 1 specifications (ANSI S1.4). The sound level meter calibration was checked with an acoustical calibrator (Larson-Davis Model Cal200).

Figure 1: Noise Monitor and Band Locations



4.1. Ambient Noise Environment

The existing ambient noise level is generally dominated by vehicular traffic, primarily those on Silverado Trail North. Other noise sources included occasional wind in the trees, birds, and aircraft flyovers. A summary of the ambient sound levels is shown in Table 2. The sound level descriptors used in the County noise standards (L_{max}, L_2, L_8, L_{25} and L_{50}) are used. The ambient sound levels were quantified at various times of day when the band was not playing.

Appendix A shows sample time-history charts of representative ambient noise levels during periods when there was no band activity.

Table 2: Measured Ambient Sound Levels Summary

Receiver	Ambient Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
R-1	57	47	44	42	41
R-2	70	63	60	58	55
R-3	56	48	45	42	39

4.2. Outdoor Music Sounds

During the band performance at each band location, we listened for music sounds at each of the noise monitor locations. In general, band music was clearly audible at location R-1. At location R-2, noise from traffic dominated the measurements and band music sound was audible but tended to be drowned out by traffic noise. At location R-3, noise from traffic also dominated the measurements and the band music was just barely inaudible when the band was at S-1 and S-3, and inaudible when the band was at S-2.

Table 3 shows the music source sound level at the audience area. The sound level descriptors in the County noise standard are used. The L_{50} sound levels at Location S-3 were higher than the other band locations because the noise monitor was closer to the band.

The music sound levels at the residential receivers are presented in Tables 7 to 9. Since the noise measurements at locations R-2 and R-3 were dominated by traffic, we calculated the contribution of music sounds at the receivers based on the measured offset between the audience area sound levels and the residential sound levels during lulls in the ambient traffic noise. Appendix A shows time-history charts of the sound levels during the band performances.

Table 3: Band Music Sound Levels at Audience Area

Band Location	Distance	A-weighted Sound Level, dBA				
		L_{max}	L_2	L_8	L_{25}	L_{50}
S-1	At audience area 25 ft from band	98	92	89	87	84
S-2	At audience area 25 ft from band	103	99	95	88	83
S-3	At audience area 15 ft from band	99	96	95	93	91

5. Analysis

The County of Napa Code of Ordinances identifies maximum permissible sound levels in terms of five statistical sound level descriptors to account for the time varying characteristic of noise sources. The standards allow for higher noise levels for shorter duration noises in 5 dBA increments and an upward adjustment for higher ambient levels. The permissible sound level standards are reduced by 5 dBA (but not lower than 45 dBA) for speech and music sounds. Table 4 to 6 summarize the calculations of the noise standards at the residences.

Table 4: Maximum Permissible Music Sound Level Calculations – R-1

Residential Receiver R-1	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Measured Ambient	57	47	44	42	41
Baseline Daytime Noise Standard (L_{50} dBA)	50	50	50	50	50
Corrections to Noise Standard					
1. Duration (8.16.070.2)	+20	+15	+10	+5	+0
Subtotal	70	65	60	55	50
2. Correction for Ambient (if ambient exceeds standard, allowable noise exposure equals ambient) (8.16.070.3)	70	65	60	55	50
3. Correction for Music and Speech (8.16.070.B)	-5	-5	-5	-5	-5
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	50	45

Table 5: Maximum Permissible Music Sound Level Calculations – R-2

Residential Receiver R-2	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Measured Ambient	70	63	60	58	55
Baseline Daytime Noise Standard (L_{50} dBA)	50	50	50	50	50
Corrections to Noise Standard					
1. Duration (8.16.070.2)	+20	+15	+10	+5	+0
Subtotal	70	65	60	55	50
2. Correction for Ambient (if ambient exceeds standard, allowable noise exposure equals ambient) (8.16.070.3)	70	65	60	58	55
3. Correction for Music and Speech (8.16.070.B)	-5	-5	-5	-5	-5
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	53	50

Table 6: Maximum Permissible Music Sound Level Calculations – R-3

Residential Receiver R-3	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Measured Ambient	56	48	45	42	39
Baseline Daytime Noise Standard (L_{50} dBA)	50	50	50	50	50
Corrections to Noise Standard					
4. Duration (8.16.070.2)	+20	+15	+10	+5	+0
Subtotal	70	65	60	55	50
5. Correction for Ambient (if ambient exceeds standard, allowable noise exposure equals ambient) (8.16.070.3)	70	65	60	55	50
6. Correction for Music and Speech (8.16.070.B)	-5	-5	-5	-5	-5
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	50	45

Tables 7 to 9 show the music sound levels at each of the three residential locations. Numbers in Bold identify music sound levels which exceed the noise ordinance criteria.

Table 7: Comparison of Music Sound to Noise Ordinance – R-1

Receiver R-1	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	50	45
Music Levels with Band at Location S-1	62	58	***57***	***55***	***53***
Music Levels with Band at Location S-2	53	52	51	49	***47***
Music Levels with Band at Location S-3	55	47	44	43	42

Table 8: Comparison of Music Sound to Noise Ordinance – R-2

Receiver R-2	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	53	50
Music Levels with Band at Location S-1	55	49	47	44	42
Music Levels with Band at Location S-2	60	56	52	45	40
Music Levels with Band at Location S-3	52	49	47	45	43

Table 9: Comparison of Music Sound to Noise Ordinance – R-3

Receiver R-3	A-weighted Sound Level, dBA				
	L_{max}	L_2	L_8	L_{25}	L_{50}
Noise Ordinance Criteria - Daytime Residential receiver, source containing speech	65	60	55	50	45
Music Levels with Band at Location S-1	45	39	37	34	32
Music Levels with Band at Location S-2	43	39	35	29	23
Music Levels with Band at Location S-3	43	40	39	36	35

Based on the analysis, music sounds exceeded the noise ordinance limits at residential location R-1 by up to 8 dBA when the band was playing at location S-1 and by 2 dBA when the band was playing at location S-2. Music sound levels did not exceed the noise ordinance limits at residential locations R-2 and R-3.

Tasting Room Outdoor Speakers

During our site visit, the outdoor tasting room speakers were in operation. However, sounds from the tasting room speakers were not audible and not measurable at any of the residential measurement locations. In other words, sounds from the tasting room speakers were well below the existing ambient noise levels and meet the noise ordinance limits.

6. Conclusion

Based on our measurements and analysis, the proposed outdoor music events at Rombauer Vineyards would meet the Napa County noise ordinance limits at residential locations R-2 and R-3 for all three band locations and at R-1 for band location S-3.

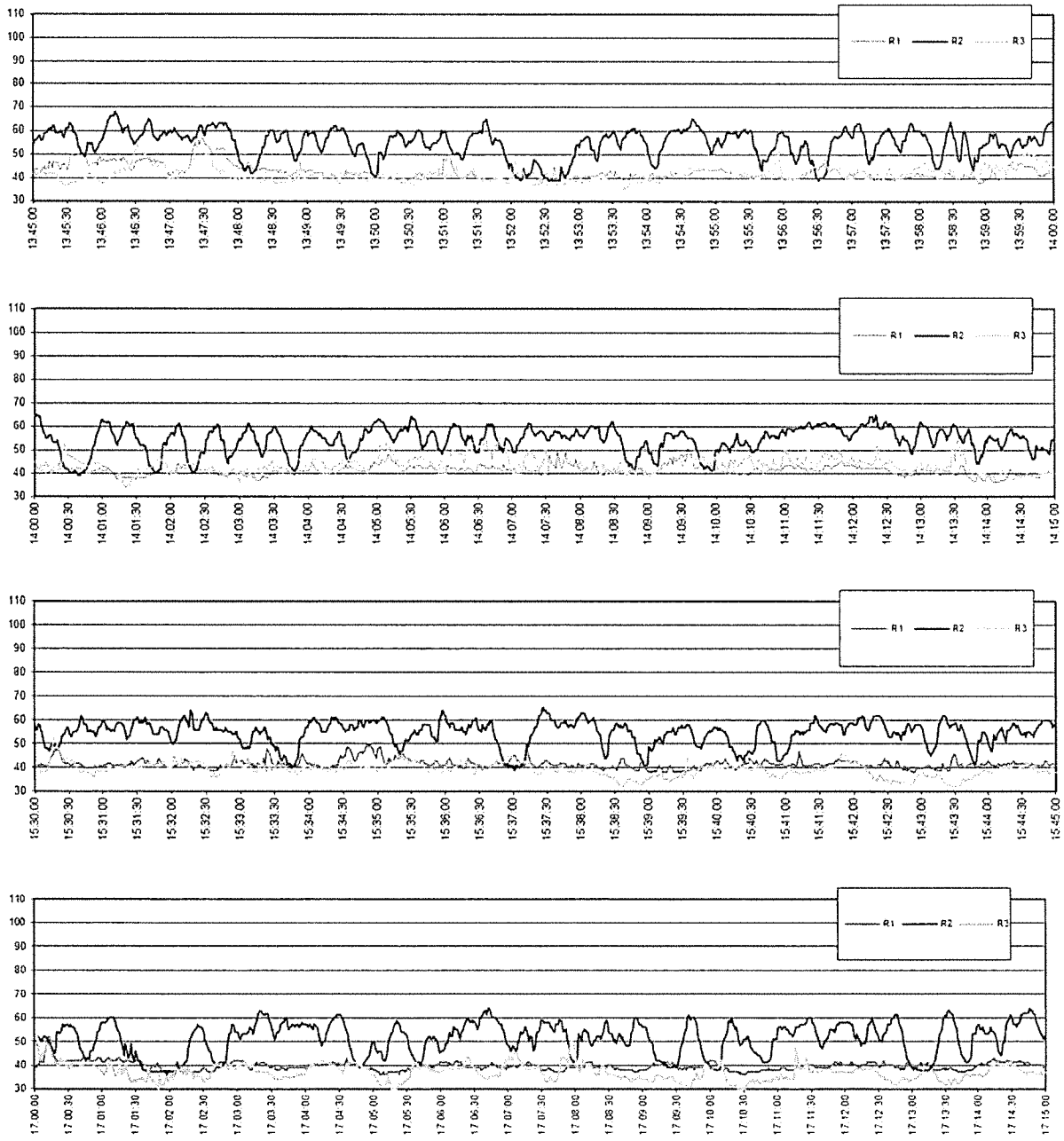
Since Rombauer winery desires to have a band play at any of the three locations, in order to also meet the noise limits at location R-1, the volume of the music should be reduced when the band is at either location S-1 or S-2. This can be accomplished by using a sound level meter at a distance of 25 feet from the band to monitor the sound levels and adjusting the music volume so that the sound levels do not exceed the following thresholds:

- L_{50} of 76 dBA if the band is located at S-1
- L_{50} of 81 dBA if the band is located at S-2

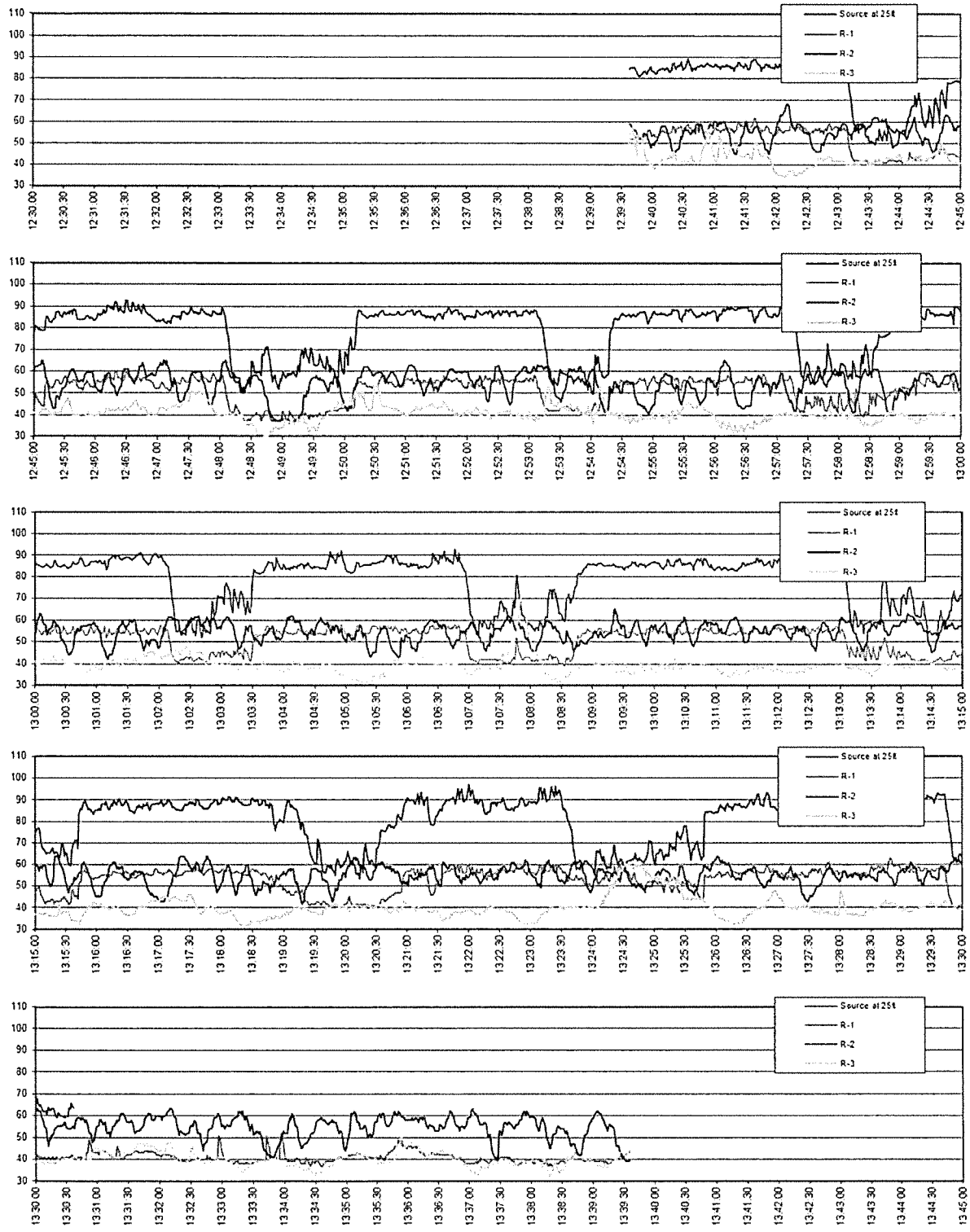
* * *

Appendix A-1 to A-4 show time-history charts of the measured sound levels. Measurements at location R-1 are shown in pink, measurements at location R-2 are shown in black, and measurements at location R-3 are shown in yellow. When the band was performing, the noise measurement in the audience area is shown in blue.

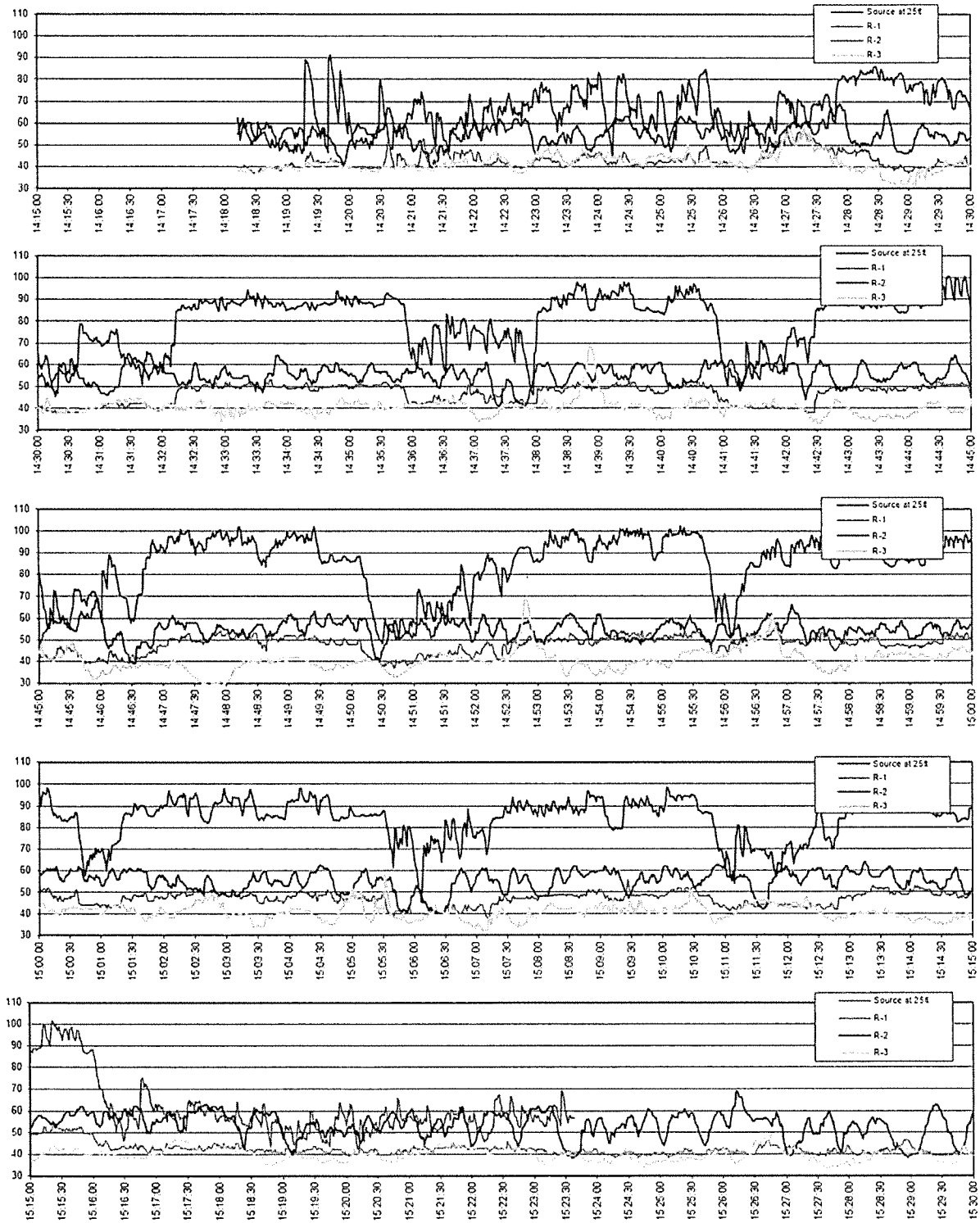
Appendix A-1: Example of Measured Ambient Noise Levels (without Band Activity)



Appendix A-2: Measured Noise Levels with Band at Location S-1



Appendix A-3: Measured Noise Levels with Band at Location S-2



Appendix A-4: Measured Noise Levels with Band at Location S-3