Environmental Noise Analysis

Serrano Village J5 & J6

El Dorado County, California

BAC Job # 2013-070

Prepared For:

Parker Development Company

Attn: Mr. Tom Howard
4525 Serrano Parkway
El Dorado Hills, CA 95762

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

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EXHIBIT B of ATTACHMENT

Introduction

The Serrano Village J5 & J6 project is located in the western portion of El Dorado County, in the unincorporated community of El Dorado Hills. Land uses in the project vicinity include single-family residential to the northwest and southeast, Bass Lake to the north, and rural residential to the south. Village J6 proposes a 148-lot subdivision while Village J5 would consist of commercial uses.

Traffic noise emanating from Bass Lake Road, as well as noise from the proposed Village J5 commercial uses are considered to be potentially significant noise sources affecting the proposed residential uses of Village J6. As a result, the project developer has retained Bollard Acoustical Consultants, Inc. (BAC) to prepare this analysis. The project area, residential site plan, and commercial site plan are shown in Figures 1, 2, and 3, respectively.

El Dorado County Noise Standards

The Noise Element of the El Dorado County General Plan contains policies to ensure that County residents are not subjected to noise beyond acceptable levels.

Policy 6.5.1.1 of the County Noise Element requires an acoustical analysis for new residential developments located in potentially noise-impacted areas.

Policy 6.5.1.2 states that where proposed non-transportation noise sources are likely to produce noise levels exceeding the performance standards of Table 1 at existing or planned residential uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.

Policy 6.5.1.3 states that where noise mitigation measures are required to achieve the County's exterior noise standards, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project and the noise barriers are not incompatible with the surroundings.

Policy 6.5.1.7 states that noise created by new non-transportation noise sources shall be mitigated so as not to exceed any of the noise level standards of Table 1, as measured immediately within the property line of the receiving property.

Policy 6.5.1.8 establishes 45 and 60 dB L_{dn} as being acceptable interior and exterior noise levels, respectively, for new residential uses affected by traffic noise sources. Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn} or less using a practical application of the best available noise reduction measures, an exterior noise level of up to 65 dB L_{dn} may be allowed provided that available exterior noise reduction measures have been implemented and interior noise levels are in compliance with the 45 dB L_{dn} standard.

Figure 1

Serrano Village J5 & J6 - El Dorado County, California

Project Area and Traffic Noise Measurement Locations

Figure 2

Serrano Village J5 & J6 - El Dorado County, California

Project Site Plan, Recommended Noise Barrier Locations, and 60 dB Ldn Traffic Noise Contour

Legend

- Future (2035) 60 dB Ldn Traffic Noise Contour
- Recommended 6-foot Noise Barrier Location

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Scale (feet)

0 250 500

Figure 3

Serrano Village J5 & J6 - El Dorado County, California

Serrano J5 Commercial Center Site Plan

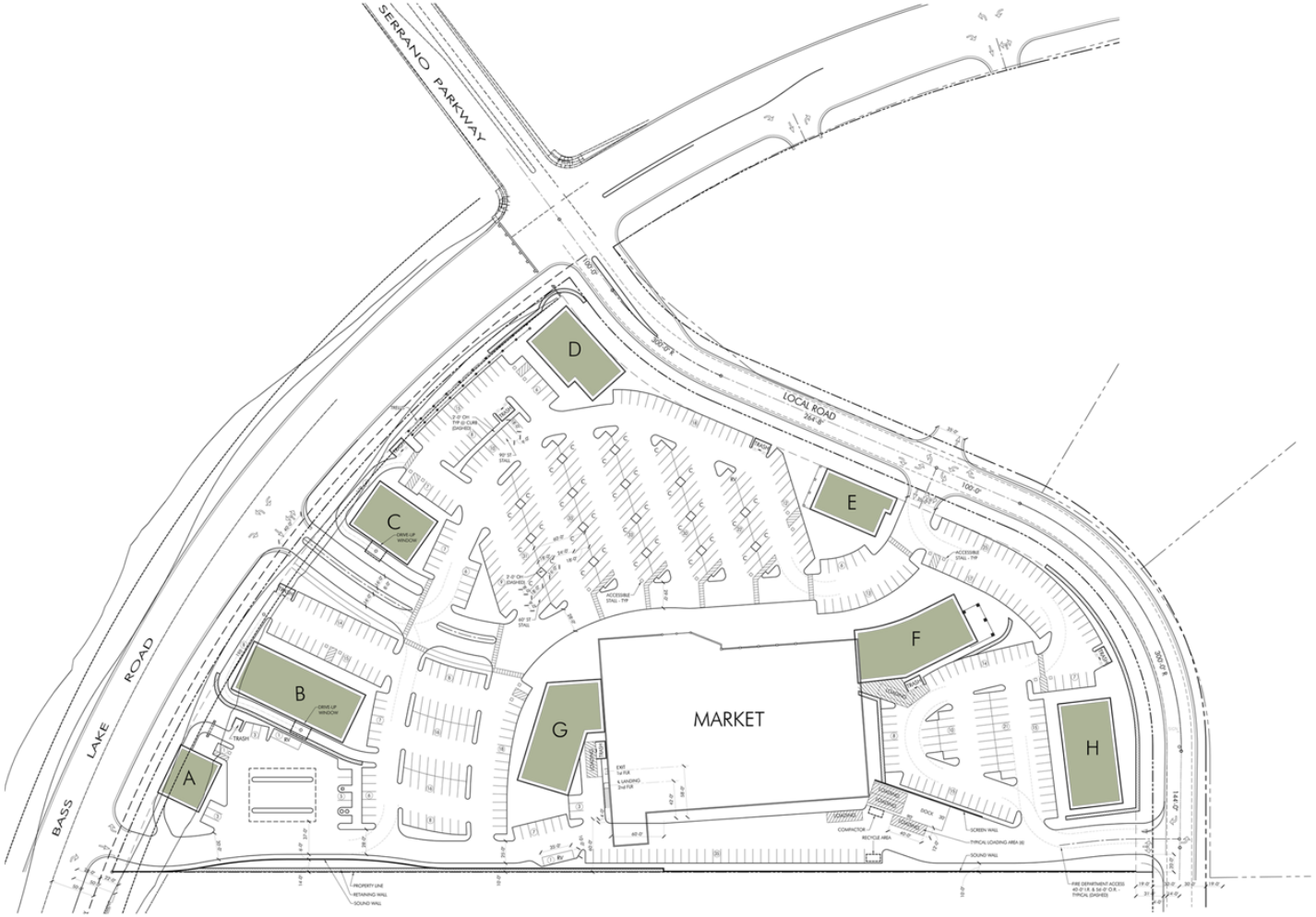

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Table 1
Performance Standards for Non-Transportation Noise Sources
El Dorado County Noise Element – Community Areas

Noise Level Descriptor	Daytime (7 a.m. - 7 p.m.)	Evening (7 p.m. - 10 p.m.)	Nighttime (10 p.m. - 7 a.m.)
Hourly L_{eq}, dB	55 dB	50 dB	45 dB
Maximum Level, dB	70 dB	60 dB	55 dB

Note: Each of the noise levels specified above should be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

Please refer to Appendix A for definitions of acoustical terminology.

Existing Ambient Noise Environment

The noise environment in the project vicinity is primarily defined by traffic noise emanating from Bass Lake Road. To quantify existing ambient noise levels in the project area, BAC conducted long-term and short-term noise surveys at the locations shown on Figure 1 on August 7-9, 2013. Larson-Davis Laboratories (LDL) 820 precision integrating sound level meters were used to complete the noise level measurement survey. The meters were calibrated before use with a LDL Model CAL200 calibrator to ensure the accuracy of the measurements.

The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4). The noise level measurement results are summarized below in Table 2. The detailed long-term monitoring results conducted at Site A are provided in Appendices B and C.

Table 2
Summary of Ambient Noise Level Measurements
Serrano Village J5 & J6 Residential Development – August 7-9, 2013

			Daytime			Nighttime		
Site	Date	L_{dn}	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
1[1]	August 7, 2013 – 2:55 PM	--	59	--	71	--	--	--
2[1]	August 7, 2013 – 2:30 PM	--	63	--	82	--	--	--
A[2]	August 7-8, 2013	63	59	55	69-82	56	40	65-75
	August 8-9, 2013	63	58	55	68-77	56	41	64-73

Notes:
1 Short-term noise level measurement location, 15 minute duration.
2 Long-term noise level measurement location, 48 hour duration.
Source: Bollard Acoustical Consultants, Inc.

Evaluation of Future Bass Lake Road Traffic Noise Levels

Traffic Noise Prediction Methodology

The Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) with the Calveno vehicle noise emission curves was used to predict traffic noise levels at the project site.

Traffic Noise Prediction Model Calibration

The FHWA Model provides reasonably accurate traffic noise predictions under "ideal" roadway conditions. Ideal conditions are generally considered to be long straight roadway segments with uniform vehicle speeds, a flat roadway surface, good pavement conditions, a statistically large volume of traffic, and an unimpeded view of the roadway from the receiver location. Such conditions did not appear to be in effect at this project site. As a result, Bollard Acoustical Consultants, Inc. conducted a careful calibration of the FHWA Model through site-specific traffic noise level measurements and concurrent traffic counts.

This calibration process was performed at two locations on the project site on August 7th, 2013. The traffic noise measurement locations, Sites 1 and 2, are shown in Figure 1. The detailed results of this procedure are provided in Appendix D. The FHWA Model was found to reasonably predict traffic noise levels at the measurement site. As a result, no calibration adjustment was applied to the FHWA Model for the prediction of future traffic noise levels at the project site.

Predicted Future Exterior Traffic Noise Levels at Outdoor Activity Areas

The FHWA Model was used with future traffic data to predict future traffic noise levels at the proposed outdoor activity areas of the project residences which are located adjacent to Bass Lake Road. Future traffic volume forecasts for Bass Lake Road were obtained from El Dorado County Traffic Model. The FHWA Model inputs and predicted future traffic noise levels at the project site are shown in Appendix E. The predicted future traffic noise levels are summarized below in Table 3.

Table 3
Predicted Future Traffic Noise Levels at Lots Nearest to Bass Lake Road
Serrano Village J5 & J6 – El Dorado County, California

	Predicted L_{dn} (dB) at Proposed Outdoor Activity Areas					
Roadway	**Lot 15**	**Lot 23**	**Lot 28**	**Lot 77**	**Lot 96**	**Lot 101**
Bass Lake Road	64	65	65	62	64	58

Note: A complete listing of FHWA Model inputs and results are provided in Appendix E.

The Table 2 data indicate that future traffic noise levels within the backyards of the nearest to Bass Lake Road will be exposed to the future traffic noise levels in the County's conditionally acceptable range of 60-65 dB L_{dn}. Because the predicted exterior levels along Bass Lake Road are within this conditionally acceptable range, a more specific analysis of potential noise impacts at the residences located adjacent to Bass Lake Road was prepared.

Traffic Noise Barrier Analysis

An analysis of noise barrier effectiveness was performed for this project and is summarized below in Table 4 for representative backyard areas. Proposed grading plans were reviewed to ensure that proposed site topography was included in the barrier analysis. The detailed results of the noise barrier effectiveness are provided as Appendix F.

Table 4
Barrier Analysis Results
Serrano Village J5 & J6 - El Dorado County, California

	Predicted L_{dn} (dB) at Proposed Outdoor Activity Areas				
Barrier Height (feet)	**Lot 15**	**Lot 23**	**Lot 28**	**Lot 77**	**Lot 96**
No barrier	64	65	65	62	64
5	56	57	56	53	59
6	55	56	55	52	58
7	54	55	54	51	57
8	53	54	53	50	56

Note: A complete listing of FHWA Model Noise Barrier Effectiveness inputs and results are provided in Appendix F.

As shown above in Table 4, the barrier analysis results indicate that a 5-foot wall constructed at the locations shown in Figure 2 would be adequate to achieve compliance with the County's exterior noise standard (60 dB L_{dn}).

The model result indicates that a 5-foot tall barrier would be adequate is based on the typical assumption that the receiver is located in the middle of the backyard area. If the receiver is located closer to the house (further from the road), the barrier would be more effective. However, at backyard receiver locations closer to the wall, the wall would be less effective as a standing individual could potentially see the roadway over the top of the barrier. To provide adequate noise attenuation, a solid barrier height of at least 6 feet is recommended.

Interior Noise Levels within Residences Located Adjacent to Bass Lake Road

With construction of the required Bass Lake Road noise barrier, future traffic noise levels are not predicted to exceed 60 dB L_{dn} at the exterior first-floor facades of residences constructed along Bass Lake Road. Due to reduced ground absorption at elevated positions, and lack of shielding by barriers at upper floor areas, second-floor facade exterior noise levels are predicted

to be approximately 67 dB L_{dn}. Based on this level, a building facade noise reduction of 22 dB or less would be required to achieve an interior noise level of 45 dB L_{dn} within second-floor rooms, and 15 dB of noise reduction would be required for first-floor facades.

Standard residential construction (wood siding, STC-26 windows, door weather-stripping, exterior wall insulation, composition plywood roof), results in an exterior to interior noise reduction of 25 dB with windows closed and approximately 15 dB with windows open. Therefore, standard construction would be acceptable for this project at all residences of this development. Nonetheless, mechanical ventilation should be provided to allow occupants to close doors and windows as desired for acoustical isolation.

Evaluation of Serrano Village J5 Commercial Center Noise Generation

Noise Sources Evaluated

The major noise-producing components of the Serrano Village J5 Commercial Center identified as potentially significant consist of parking lot activity, rooftop mechanical equipment, and loading dock activities. Each of these noise sources are evaluated separately below.

Parking Lot Noise

As a means of determining potential noise exposure due to project parking lot activities, Bollard Acoustical Consultants, Inc. utilized noise level data collected for previous parking lot noise studies. A typical sound exposure level (SEL) due to automobile arrivals/departures, including car doors slamming and people conversing, is approximately 70 dB at a distance of 50 feet. The approximate distance between the center of the nearest proposed parking lot area, located just north of Building F, and the closest residential areas to the northeast, Lots 7 and 8, is 150 feet.

Based on the capacity of the nearest parking lot, it was assumed that 42 cars could enter or leave the parking lot within a worst-case hour. Parking lot noise exposure was determined using the following equation.

$$\text{Peak Hour } L_{eq} = 70+10*\log (N) - 35.6$$

Where 70 is the SEL for a single automobile parking operation, N is the number of parking lot operations in a peak hour, and 35.6 is 10 times the logarithm of the number of seconds in an hour.

Using the equation and operations data described above, the proposed parking lot could be expected to produce a noise exposure of approximately 41 dB Peak Hour L_{eq} at the closest residential property lines. Therefore, noise exposure is expected to comply with the County's noise exposure standards and is not expected to be a significant impact on the closest residents and no mitigation measures are required.

Mechanical Equipment Noise

Heating, ventilating, and air conditioning (HVAC) requirements for this store will likely be met using rooftop mounted systems located atop the building. The units would be shielded from view of neighboring residential uses by intervening building parapets.

BAC reference file data for packaged HVAC systems indicate that a 12.5-ton packaged unit can be expected to generate an A-weighted sound power level of 85 dB. When projected to the nearest residential property lines 175 feet from the equipment location, the resulting levels compute to approximately 35 dB L_{eq}, including 5 dB of shielding provided by the building parapets.

Because the predicted HVAC equipment noise level of 35 dB L_{eq} is below measured existing ambient noise levels in the project vicinity and below County noise standards, no noise impacts are identified for this aspect of the project, and no additional consideration of noise mitigation measures would be warranted.

Truck Delivery and Unloading Noise

According to the commercial site plans shown on Figure 3, the commercial area would have only one truck loading dock, as the smaller stores would load through the front entrance with smaller trucks. The loading dock associated with the Market is approximately 750 feet from the residential project site and would be completely shielded from view of those proposed residences by the intervening market building. Given this distance and shielding, truck unloading operations at the commercial market are predicted to be inaudible at the proposed residential locations, and well below El Dorado County noise standards. As a result, no noise impacts are identified for this aspect of the project, and no additional consideration of noise mitigation measures is warranted.

Conclusions

The residential portion of Serrano Village J5 & J6 project site will be exposed to future Bass Lake Road traffic noise levels in excess of El Dorado County 60 dB L_{dn} exterior noise level standard for new residential developments. The following specific noise mitigation measures are recommended to achieve compliance with the County's noise standards:

- A 6-foot tall barrier would be required to reduce future traffic noise levels to approximately 60 dB L_{dn} in the backyards located adjacent to Bass Lake Road. Figure 2 shows the recommended locations of the noise barrier.

- Suitable materials for the traffic noise barriers include masonry and precast concrete panels. Other materials may be acceptable but should be reviewed by an acoustical consultant prior to use.

- Mechanical ventilation (air conditioning) should be provided for all residences in this development to allow the occupants to close doors and windows as desired to achieve compliance with the applicable interior noise level criteria.

These conclusions are based on the Bass Lake Road traffic assumptions cited in Appendix E and on noise reduction data for standard residential dwellings. Deviations from the Appendix E data, or the project site plan shown in Figure 2, could cause future traffic noise levels to differ from those predicted in this analysis. In addition, Bollard Acoustical Consultants, Inc. is not responsible for degradation in acoustic performance of the residential construction due to poor construction practices, failure to comply with applicable building code requirements, or for failure to adhere to the minimum building practices cited in this report.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

Appendix B-1

Serrano Village J5 & J6

24hr Continuous Noise Monitoring at Site A

August 7-8, 2013

Hour	Leq	Lmax	L50	L90
15:00	57	69	55	43
16:00	58	70	57	45
17:00	60	75	58	51
18:00	60	70	58	48
19:00	59	76	57	46
20:00	58	69	57	46
21:00	57	72	55	40
22:00	56	73	48	34
23:00	53	68	41	31
0:00	52	67	35	29
1:00	49	67	31	27
2:00	45	65	28	25
3:00	49	66	30	26
4:00	53	69	34	28
5:00	59	75	54	37
6:00	62	75	60	47
7:00	62	75	61	52
8:00	61	73	58	48
9:00	58	76	53	43
10:00	57	81	51	41
11:00	57	76	53	42
12:00	56	69	51	40
13:00	57	78	52	42
14:00	56	72	51	41

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62.3	55.5	58.6	61.7	45.4	55.8
Lmax (Maximum)	81.5	68.7	73.4	75.1	65.2	69.4
L50 (Median)	61.2	50.9	55.2	60.4	27.8	40.2
L90 (Background)	51.9	40.0	44.6	47.1	25.3	31.6

Computed Ldn, dB	62.7
% Daytime Energy	76%
% Nighttime Energy	24%

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Appendix B-2

Serrano Village J5 & J6
24hr Continuous Noise Monitoring at Site A
August 8-9, 2013

Hour	Leq	Lmax	L50	L90
15:00	56	71	53	43
16:00	57	77	55	45
17:00	58	70	56	47
18:00	58	69	56	45
19:00	58	72	56	45
20:00	57	68	56	44
21:00	58	69	56	47
22:00	54	68	48	33
23:00	53	67	42	32
0:00	51	68	39	31
1:00	51	70	34	27
2:00	47	64	28	25
3:00	45	66	29	26
4:00	53	73	35	30
5:00	58	73	51	39
6:00	62	73	61	47
7:00	63	74	62	53
8:00	61	75	59	49
9:00	58	71	54	43
10:00	57	72	52	41
11:00	57	76	51	39
12:00	57	72	52	38
13:00	57	76	52	40
14:00	57	72	54	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63.0	56.2	58.3	62.2	45.1	55.7
Lmax (Maximum)	76.5	68.3	72.3	73.4	64.1	69.0
L50 (Median)	62.1	51.1	55.0	60.5	28.4	40.7
L90 (Background)	52.6	38.5	44.1	46.8	25.2	32.0

Computed Ldn, dB	62.6
% Daytime Energy	75%
% Nighttime Energy	25%

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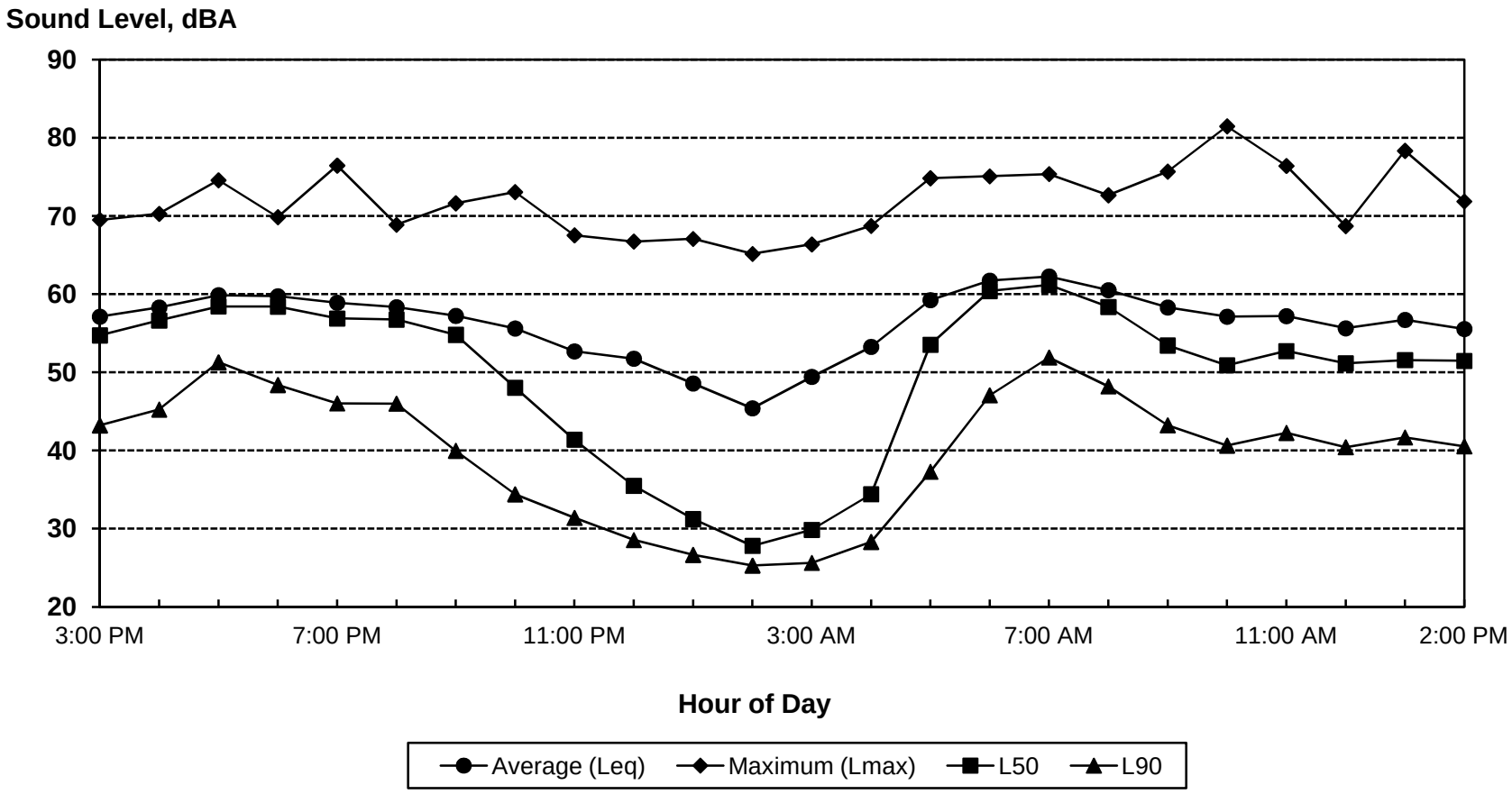
Appendix C-1
Serrano Village J5 & J6
24hr Continuous Noise Monitoring at Site A
August 7-8, 2013



Ldn: 63 dB

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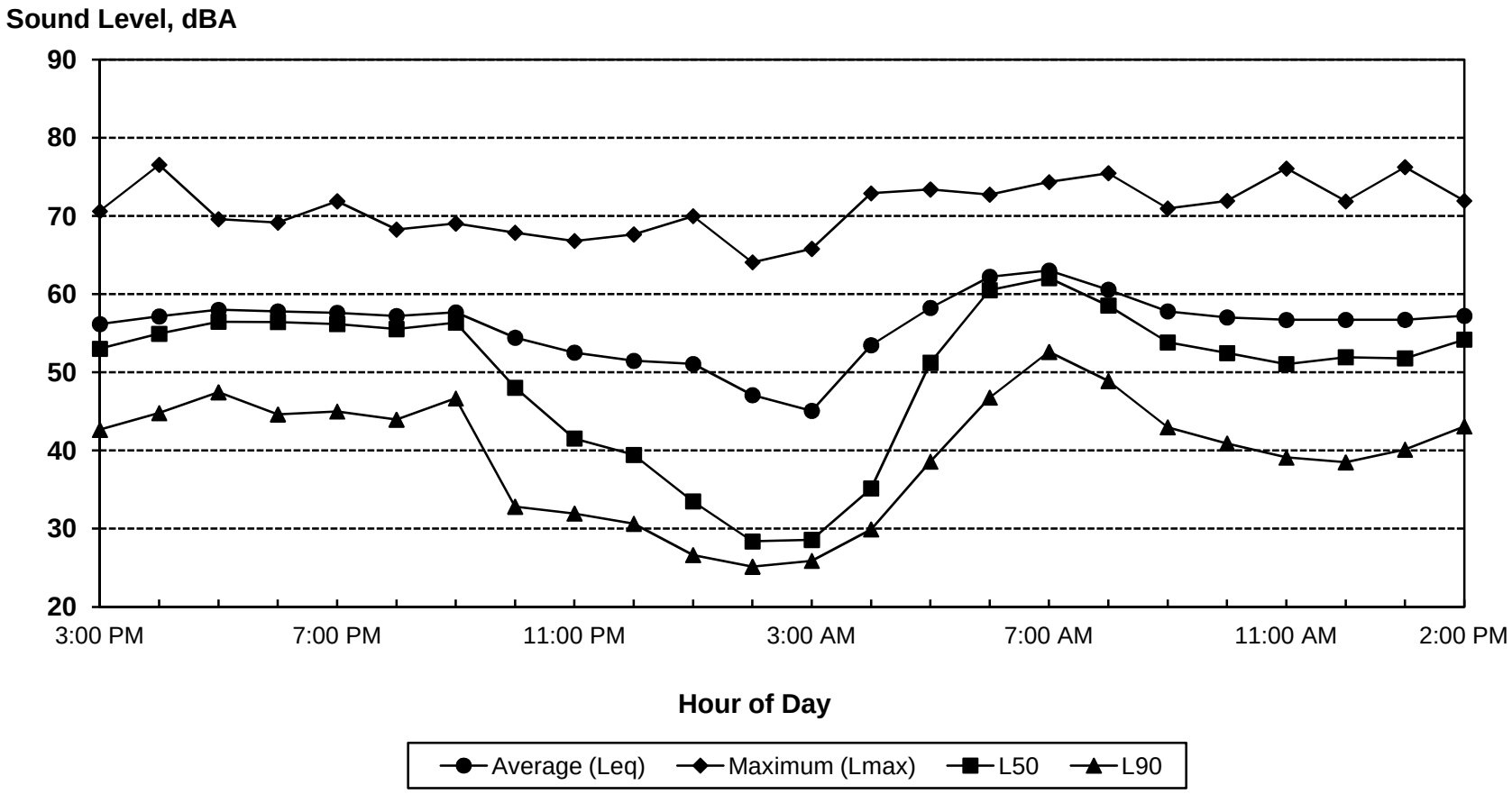
Appendix C-2
Serrano Village J5 & J6
24hr Continuous Noise Monitoring at Site A
August 8-9, 2013



Ldn: 63 dB

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Appendix D-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2013-070
	Project Name:	Serrano Villages J5 & J6
	Roadway Tested:	Bass Lake Road
	Test Location:	Site 1
	Test Date:	August 7, 2013
Weather Conditions:	Temperature (Fahrenheit):	85
	Relative Humidity:	Moderate
	Wind Speed and Direction:	Calm
	Cloud Cover:	Clear
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On project site
	Distance to Centerline (feet):	80
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	5
Roadway Condition:	Pavement Type	Asphalt
	Pavement Condition:	Good
	Number of Lanes:	2
	Posted Maximum Speed (mph):	50
Test Parameters:	Test Time:	2:55 PM
	Test Duration (minutes):	15
	Observed Number Automobiles:	138
	Observed Number Medium Trucks:	2
	Observed Number Heavy Trucks:	0
	Observed Average Speed (mph):	40
Model Calibration:	Measured Average Level (L_{eq}):	59.1
	Level Predicted by FHWA Model:	59.6
	Difference:	***0.5 dB***

Conclusions:

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Appendix D-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2013-070
	Project Name:	Serrano Villages J5 & J6
	Roadway Tested:	Bass Lake Road
	Test Location:	Site 2
	Test Date:	August 7, 2013
Weather Conditions:	Temperature (Fahrenheit):	85
	Relative Humidity:	Moderate
	Wind Speed and Direction:	Calm
	Cloud Cover:	Clear
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On project site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	5
Roadway Condition:	Pavement Type	Asphalt
	Pavement Condition:	Good
	Number of Lanes:	2
	Posted Maximum Speed (mph):	50
Test Parameters:	Test Time:	2:30 PM
	Test Duration (minutes):	15
	Observed Number Automobiles:	74
	Observed Number Medium Trucks:	2
	Observed Number Heavy Trucks:	0
	Observed Average Speed (mph):	50
Model Calibration:	Measured Average Level (L_{eq}):	62.9
	Level Predicted by FHWA Model:	63.0
	Difference:	***0.1 dB***

Conclusions:

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Appendix E

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road

Traffic Data:

Year:	2035
Average Daily Traffic Volume:	7,900
Percent Daytime Traffic:	76
Percent Nighttime Traffic:	24
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	1
Assumed Vehicle Speed (mph):	50
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				----------L_{dn}, dB----------			
Location:	**Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	Lot 15	95	0	63	54	55	64
2	Lot 23	90	0	64	55	56	65
3	Lot 28	90	0	64	55	56	65
4	Lot 77	140	0	61	52	53	62
5	Lot 96	95	0	63	54	55	64
6	Lot 101	245	0	57	48	49	58

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	19
70	41
65	87
60	188

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Appendix F-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road
Location(s): Lot 15

Noise Level Data:

Year: 2035
Auto L_{dn}, dB: 63
Medium Truck L_{dn}, dB: 54
Heavy Truck L_{dn}, dB: 55

Site Geometry:

Receiver Description: Lot 15
Centerline to Barrier Distance (C_1): 80
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 1216
Medium Truck Elevation: 1218
Heavy Truck Elevation: 1224
Pad/Ground Elevation at Receiver: 1234
Receiver Elevation[1]: 1239
Base of Barrier Elevation: 1234
Starting Barrier Height 5

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
1239	5	55	46	49	**56**	Yes	Yes	Yes
1240	6	54	45	47	**55**	Yes	Yes	Yes
1241	7	53	44	46	**54**	Yes	Yes	Yes
1242	8	52	43	45	**53**	Yes	Yes	Yes
1243	9	51	42	44	**52**	Yes	Yes	Yes
1244	10	50	41	43	**51**	Yes	Yes	Yes
1245	11	49	40	42	**51**	Yes	Yes	Yes
1246	12	49	40	42	**50**	Yes	Yes	Yes
1247	13	49	40	41	**50**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road
Location(s): Lot 23

Noise Level Data:

Year: 2035
Auto L_{dn}, dB: 64
Medium Truck L_{dn}, dB: 55
Heavy Truck L_{dn}, dB: 56

Site Geometry:

Receiver Description: Lot 23
Centerline to Barrier Distance (C_1): 75
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 1237
Medium Truck Elevation: 1239
Heavy Truck Elevation: 1245
Pad/Ground Elevation at Receiver: 1251
Receiver Elevation[1]: 1256
Base of Barrier Elevation: 1251
Starting Barrier Height 5

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB: Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
1256	5	56	47	50	**57**	Yes	Yes	Yes
1257	6	55	46	48	**56**	Yes	Yes	Yes
1258	7	53	45	47	**55**	Yes	Yes	Yes
1259	8	53	44	46	**54**	Yes	Yes	Yes
1260	9	52	43	45	**53**	Yes	Yes	Yes
1261	10	51	42	44	**52**	Yes	Yes	Yes
1262	11	50	41	43	**51**	Yes	Yes	Yes
1263	12	49	40	42	**51**	Yes	Yes	Yes
1264	13	49	40	42	**50**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-3

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road
Location(s): Lot 28

Noise Level Data:

Year: 2035
Auto L_{dn}, dB: 64
Medium Truck L_{dn}, dB: 55
Heavy Truck L_{dn}, dB: 56

Site Geometry:

Receiver Description: Lot 28
Centerline to Barrier Distance (C_1): 75
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 1250
Medium Truck Elevation: 1252
Heavy Truck Elevation: 1258
Pad/Ground Elevation at Receiver: 1268
Receiver Elevation[1]: 1273
Base of Barrier Elevation: 1268
Starting Barrier Height 5

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
1273	5	55	46	49	**56**	Yes	Yes	Yes
1274	6	54	45	47	**55**	Yes	Yes	Yes
1275	7	53	44	46	**54**	Yes	Yes	Yes
1276	8	52	43	45	**53**	Yes	Yes	Yes
1277	9	51	42	44	**52**	Yes	Yes	Yes
1278	10	50	41	43	**51**	Yes	Yes	Yes
1279	11	50	41	42	**51**	Yes	Yes	Yes
1280	12	49	40	42	**50**	Yes	Yes	Yes
1281	13	48	40	41	**50**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-4

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road
Location(s): Lot 77

Noise Level Data:

Year: 2035
Auto L_{dn}, dB: 61
Medium Truck L_{dn}, dB: 52
Heavy Truck L_{dn}, dB: 53

Site Geometry:

Receiver Description: Lot 77
Centerline to Barrier Distance (C_1): 125
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 1251
Medium Truck Elevation: 1253
Heavy Truck Elevation: 1259
Pad/Ground Elevation at Receiver: 1285
Receiver Elevation[1]: 1290
Base of Barrier Elevation: 1285
Starting Barrier Height 5

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
1290	5	52	43	45	**53**	Yes	Yes	Yes
1291	6	51	42	44	**52**	Yes	Yes	Yes
1292	7	50	41	43	**51**	Yes	Yes	Yes
1293	8	49	40	42	**50**	Yes	Yes	Yes
1294	9	48	39	41	**49**	Yes	Yes	Yes
1295	10	47	38	40	**49**	Yes	Yes	Yes
1296	11	47	38	39	**48**	Yes	Yes	Yes
1297	12	46	37	39	**47**	Yes	Yes	Yes
1298	13	46	37	38	**47**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-5

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2013-070
Project Name: Serrano Villages J5 & J6
Roadway Name: Bass Lake Road
Location(s): Lot 96

Noise Level Data:

Year: 2035
Auto L_{dn}, dB: 63
Medium Truck L_{dn}, dB: 54
Heavy Truck L_{dn}, dB: 55

Site Geometry:

Receiver Description: Lot 96
Centerline to Barrier Distance (C_1): 80
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 1240
Medium Truck Elevation: 1242
Heavy Truck Elevation: 1248
Pad/Ground Elevation at Receiver: 1243
Receiver Elevation[1]: 1248
Base of Barrier Elevation: 1243
Starting Barrier Height 5

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
1248	5	58	49	50	**59**	Yes	Yes	No
1249	6	57	48	50	**58**	Yes	Yes	Yes
1250	7	55	47	49	**57**	Yes	Yes	Yes
1251	8	54	45	48	**56**	Yes	Yes	Yes
1252	9	53	44	46	**54**	Yes	Yes	Yes
1253	10	52	43	45	**54**	Yes	Yes	Yes
1254	11	51	42	44	**53**	Yes	Yes	Yes
1255	12	50	41	43	**52**	Yes	Yes	Yes
1256	13	50	41	43	**51**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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