

DUDEK

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February 5, 2009

6288-01

Mr. Charles Crail
1187 Coast Village Road Ste. 1-528
Santa Barbara, CA 93108

**SUBJECT: Multifamily Housing Project - 915 E. Anapamu Street
Environmental Noise Study Report**

Dear Mr. Crail:

Dudek has completed an Environmental Noise Study in support of the site planning and design efforts for a proposed multifamily housing development located at 915 E. Anapamu Street in the City of Santa Barbara, California.

The results of the Environmental Noise Study are summarized in this report. The report presents an introduction (*Section 1*), a summary of the city's noise criteria (*Section 2*), a project background discussion (*Section 3*), the existing noise environment (*Section 4*), a future vehicle noise analysis with findings (*Section 5*), and a construction noise impact analysis with findings (*Section 6*).

1.0 INTRODUCTION

This report includes a noise evaluation of existing and future noise levels in private outdoor living areas and an interior noise analysis of the proposed project. This study includes also an evaluation of the potential short-term construction noise impacts upon adjacent land uses.

Data used in our analysis were taken from the project plans prepared by Cearnal Andrulaitis Architects, LPP (Sheets No. A.101, A.102, A.103, A.301, and A.401, dated 2/2/2008). Traffic volumes used in our analysis are based on data provided by the City of Santa Barbara Transportation Division.

A glossary of acoustical terms and definitions used in this report is included in *Attachment A*. All noise levels in this report are in terms of A-weighted decibel, dBA.

Environmental Noise Study

Multifamily Housing Project - 915 E. Anapamu Street

2.0 NOISE CRITERIA

The Land Use Compatibility Standards in the City of Santa Barbara's Noise Element of the General Plan, used to evaluate the noise impacts for the project's residential uses are:

- Interior Living areas: 45 dBA CNEL.
- Outdoor Living areas: 60 dBA CNEL.

The 60 CNEL exterior noise exposure level is considered the maximum allowable exterior noise level for the residential private outdoor living areas, such as the project's patios and balconies.

The City's Noise Ordinance, Chapter 9.16.015 - Construction Work at Night - includes guidelines applicable to the projects construction. The City's Noise Ordinance, Chapter 9.16.015 stipulates:

"It shall be unlawful for any person, between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day to erect, construct, demolish, excavate for, alter or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA at the nearest property line of a property used for residential purposes unless a special permit therefore has been applied for and granted".

3.0 PROJECT BACKGROUND AND SETTING

The project site is located at the north corner of the E Anapamu Street and N Milpas Street transition, with access off Lowena Drive (*Figures 1 and 2*). The project proposes the construction of 14 apartments. The main structure includes 10 two-bedroom apartments located above a subterranean parking structure. The Site/1st floor plan for the proposed project is shown on *Figure 3*.

The principal contributor to the ambient noise environment at the project site would be vehicle noise from N Milpas Street. Potential noise impacts from noise generated during occasional events at the nearby County Bowl are considered special events, permitted and regulated through the City's noise ordinance or other jurisdictions.

Environmental Noise Study

Multifamily Housing Project - 915 E. Anapamu Street

Figure 3 shows Units 5, 6, and 7 nearest to, and potentially most impacted by vehicle noise from N Milpas Street. The outdoor living areas of these units include patio areas on the 1st floor and a balcony off the 2nd master bedroom for Unit 5.

4.0 EXISTING NOISE ENVIRONMENT

The principal contributor to the ambient noise environment at the project site is traffic noise from N Milpas Street. N Milpas Street carries a current traffic volume of approximately 8,980 average daily trips (ADT) adjacent to the site (Source: City of Santa Barbara Transportation Division). Lowena Drive is a local collector and is not anticipated to contribute significantly to the noise environment at the site.

The existing noise environment at the site was monitored on January 16, 2009, between 10:50 a.m. and 11:05 a.m. The noise measurements were taken with a Rion NL 32 integrating sound level meter, with A-weighting and "slow" response settings. This sound level meter meets the current American National Standards Institute standard for a Type 1 precision sound level meter. The sound level meter was calibrated before and after the reading.

The sound level meter was positioned at approximately 45 feet distance from the N Milpas Street centerline (*Figure 4*), 5 feet above pad elevation, and 10 feet above N Milpas Street elevation. The noise level monitored for 15-minutes at this location was 62 dBA, which is considered representative for the hourly equivalent daytime noise level at the monitored location.

During the measurement, the principal contributor to the ambient noise environment at the project site was traffic noise from the N Milpas Street. The N Milpas Street traffic was observed to move smoothly during the measurement, at an average speed of approximately 25 mph. No other significant noise sources were observed during the measurement. The weather conditions during the measurements were temperature 76 F, 20% RH humidity, a clear sky, and less than 2 mph westerly wind.

The monitored noise levels and concurrently counted traffic volumes are summarized in *Table 1*.

Environmental Noise Study Multifamily Housing Project - 915 E. Anapamu Street

**Table I
Measured Average Sound Level**

Monitor Location	Date/Time	L _{eq} ¹	Cars	MT ²	HT ³
45 feet to center line of N Milpas Street 10 feet above N Milpas Street elevation	1/16/2009 10:50 a.m. to 11:05 a.m.	62 dBA	157	0	3

- Notes:
- ¹ Equivalent Continuous Sound Level (Time-Average Sound Level)
 - ² Medium Trucks
 - ³ Heavy Trucks/Buses

As shown in Table 1, the measured average noise level (daytime Leq) at the monitor location was 62 dBA.

5.0 FUTURE VEHICLE NOISE ANALYSIS

N Milpas Street is expected to remain the primary noise source at the project site in the future. Future vehicle noise levels at the site were calculated using a Federal Highway Administration (FHWA) vehicle noise prediction model. This vehicle noise prediction model was calibrated using the monitored 62 dBA daytime Leq noise level (*Table 1*). The difference between the monitored and calibrated Leq daytime noise level is 0.5 dBA, which is well within the accuracy of the noise monitoring and modeling programs.

The following existing and future average daily traffic volumes (ADT) for N Milpas Street are used in this analysis:

N Milpas Street:

- Existing ADT: 8,980
- Year 2025 ADT: 9,700

Based upon our observations and vehicle count along N Milpas Street, the vehicle mix on N Milpas Street is assumed 98% automobiles, 0.1% medium trucks, and 2% heavy trucks/buses. The input into the computer model includes the above existing and future traffic volumes and vehicle mix, with an average vehicle speed of 25 mph along the N Milpas Street.

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Units 5, 6, and 7 (*Figure 3*) are nearest to, and potentially most impacted by vehicle noise from, N Milpas Street. The outdoor living areas of these units include patio areas on the 1st floor and a balcony off the 2nd master bedroom for Unit 5.

Future (year 2015) N Milpas Street traffic noise levels in these units' private outdoor living areas and at there façades facing N Milpas Street were analyzed. The results of the future exterior noise analysis are summarized in *Table 2*. A copy of the vehicle noise prediction model calculation sheets is included in *Attachment B*.

Unit	Outdoor Area	Façade - 1 st Floor	Façade - 2 nd Floor
5	50 CNEL ¹	50 CNEL	53 CNEL
5	53 CNEL ²	50 CNEL	53 CNEL
6	51 CNEL ¹	50 CNEL	53 CNEL
7	50 CNEL ¹	49 CNEL	52 CNEL

Notes: ¹ 1st Floor Patio
² 2nd Floor Balcony

5.1 FINDINGS - FUTURE VEHICLE NOISE ANALYSIS

5.1.1 Private Outdoor Living Areas Noise Levels

The year 2025 exterior noise analysis indicates the highest noise levels in the private outdoor living areas facing N Milpas Street to range between 50 dBA CNEL and 53 dBA CNEL. These worse case analyzed noise levels meet the City of Santa Barbara 60 dBA CNEL exterior noise level compatibility criteria for residential land uses without any mitigation.

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5.1.2 Interior Noise Levels

The data shown in *Table 2* indicate Year 2025 traffic noise levels at the 2nd floor façades of units facing N Milpas Street to range between 52 and 53 dBA CNEL.

Standard construction materials and techniques used for new developments in Southern California would result in a minimum exterior to interior noise attenuation of 12 dBA with windows open, and minimum 20 dBA with windows closed. Therefore, the worse case interior noise levels are expected to range between 40 and 41 dBA CNEL with windows open, and between 32 and 33 dBA CNEL with windows closed. Consequently, the interior noise levels in all units are anticipated to meet the City of Santa Barbara 45 dB CNEL interior noise level requirement with windows open or closed, without any mitigation.

6.0 CONSTRUCTION NOISE IMPACT ANALYSIS

Construction noise is a temporary phenomenon. Construction noise levels will vary from hour-to-hour and day-to-day, depending on the equipment in use, the operations being performed, and the distance between the source and receptor. The project's construction potentially impacting the existing noise environment at the site include:

- *Demolition of existing structures.* Sources include dozers, excavators, front loaders, and trucks.
- *Site preparation.* Sources include trucks, backhoes, front-end loaders, and pavers.
- *Construction of foundations.* Sources include concrete trucks and mixers.
- *Facade and interior construction.* Sources include hammering, drilling, generators, compressors, and light truck traffic.
- *Mechanical Equipment systems installation.* Sources include hammering, drilling, generators, compressors, and light truck traffic.

The Environmental Protection Agency (EPA) has compiled data regarding the noise-generating characteristics of specific types of construction equipment. The typical maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in *Table 3*.

Environmental Noise Study Multifamily Housing Project - 915 E. Anapamu Street

**Table 3
Construction Equipment Noise Levels¹**

Equipment Type	"Typical" Equipment dBA at 50 ft	"Quiet" ² Equipment dBA at 50 ft
Backhoe	85	80
Truck, Crane	88	80
Dozer	87	83
Loader	84	80
Pavers	88	80
Pneumatic Tools	85	75
Shovel	82	80
Trucks	88	83
¹ Source: Environmental Protection Agency (EPA)		
² Quieted Equipment: with enclosures, mufflers, or other noise-reducing features.		

Note that the equipment noise levels presented in *Table 3* are *maximum* noise levels. The equipment operates in alternating cycles at various power levels, thus, producing variable noise levels, lower than the maximum equipment noise levels. The average sound level of the construction activity also depends upon the amount of time that the equipment operates, and the intensity of the construction during the time.

The maximum equipment noise levels at 50 feet distance shown in *Table 3* decrease with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. The nearest sensitive receptors could be as close as 50 feet distance from the project's nearest construction activities, potentially resulting in maximum noise levels ranging between 82 to 88 dBA for "typical" equipment and between 75 to 83 dBA for "quiet" equipment at these locations.

**Environmental Noise Study
Multifamily Housing Project - 915 E. Anapamu Street**

6.1 FINDINGS - CONSTRUCTION NOISE IMPACT ANALYSIS

Although it can be expected that construction of the project could create short-term noise disturbances for residences, and people near the project site, these potential disturbances can be minimized by compliance with the City's Noise Ordinance time limitations for construction, i.e., no construction should take place between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day.

* * * * *

This completes our Environmental Noise Study for the proposed a proposed condominium housing development located at 915 E. Anapamu Street in the City of Santa Barbara, California.

Respectfully submitted,

DUDEK



CORNELIS OVERWEG, P.E., LEED AP, INCE
Senior Acoustical Engineer



Enclosures: *Attachments A, B*

Cc: Mr. Adam Cunningham, Cearnal Andrulaitis LLP

Environmental Noise Study Multifamily Housing Project - 915 E. Anapamu Street

REFERENCES

California Department of Transportation (Caltrans).

California Vehicle Noise Emission Levels, (FHWA/CA/TL-87/03).

City of Santa Barbara, August 1979.

City of Santa Barbara General Plan Noise Element.

City of Santa Barbara, rev. 12/31/97.

City of Santa Barbara Noise Ordinance

City of Santa Barbara - Transportation Division.

N Milpas Street - Traffic data.

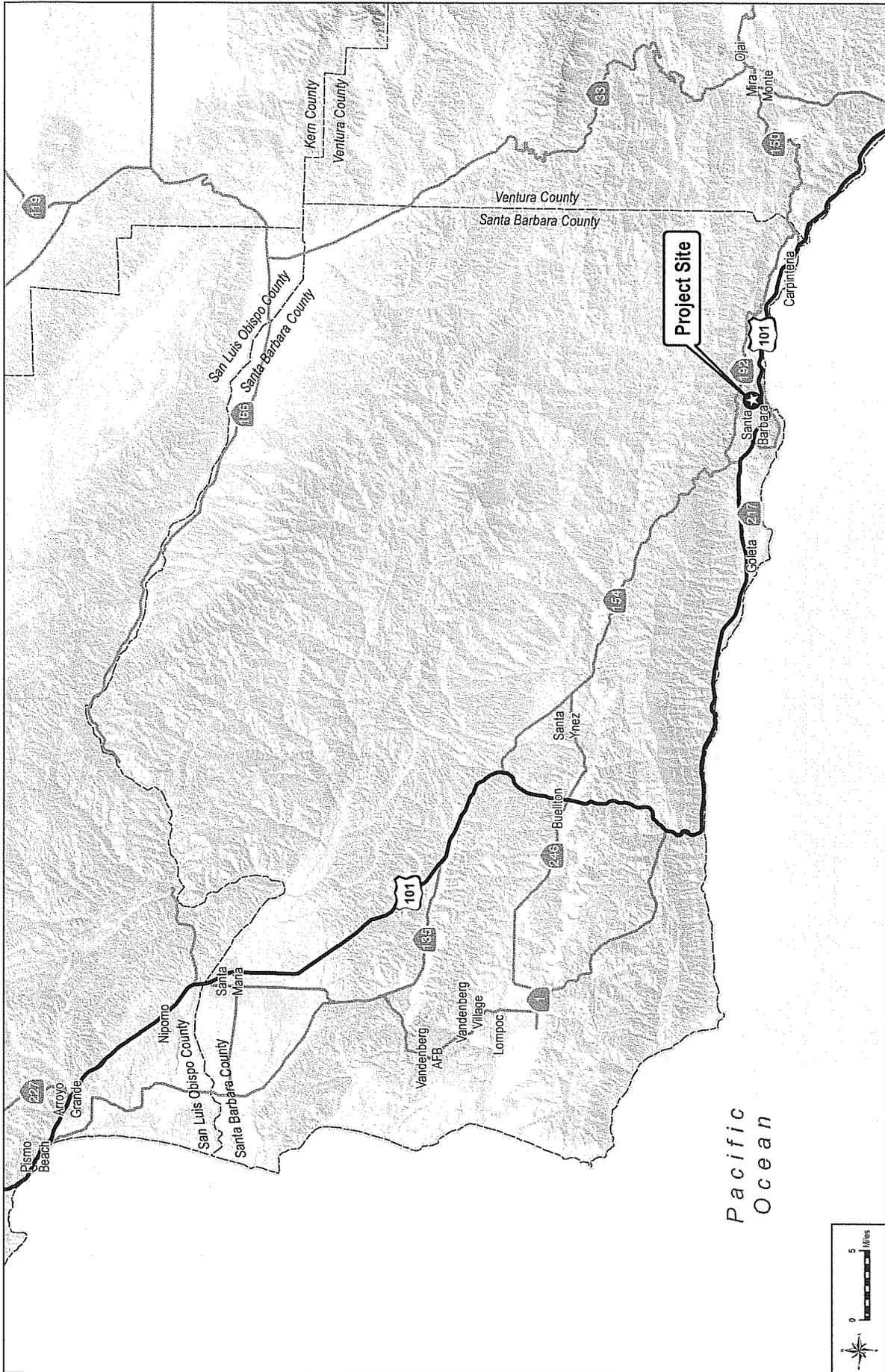
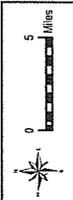


FIGURE 1
Regional Map

FINAL

915 E. Anapamu Street Environmental Noise Study Report



DUDEK

628801
JANUARY 2009

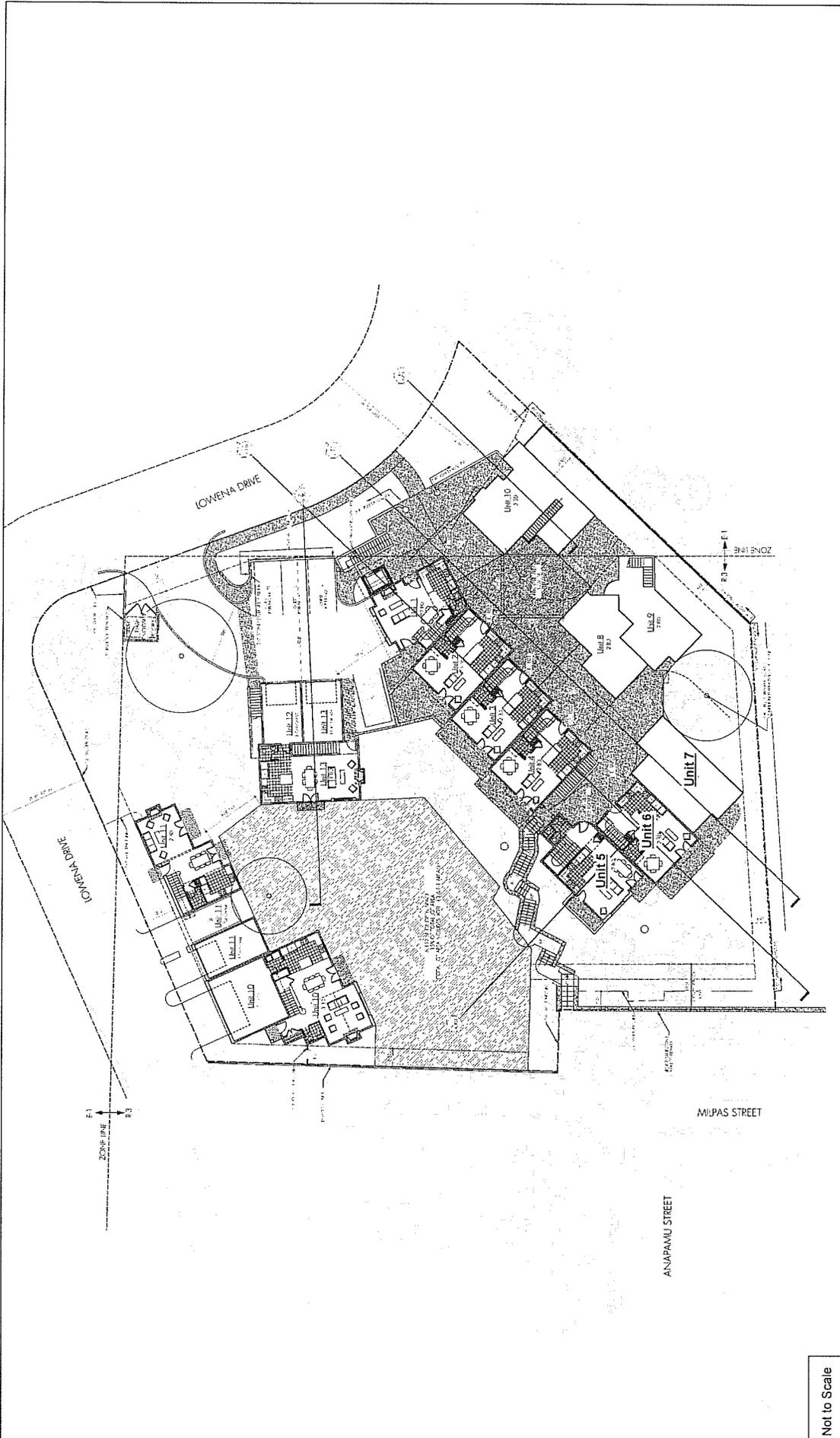


FIGURE 3
Site Plan / 1st Floor Plan
 FINAL

Not to Scale

DUDEK

020801
 JANUARY 2004

SOURCE: Cornell University Architecture, Interior Design

B15 E Anapau Street Environmental Noise Study Report

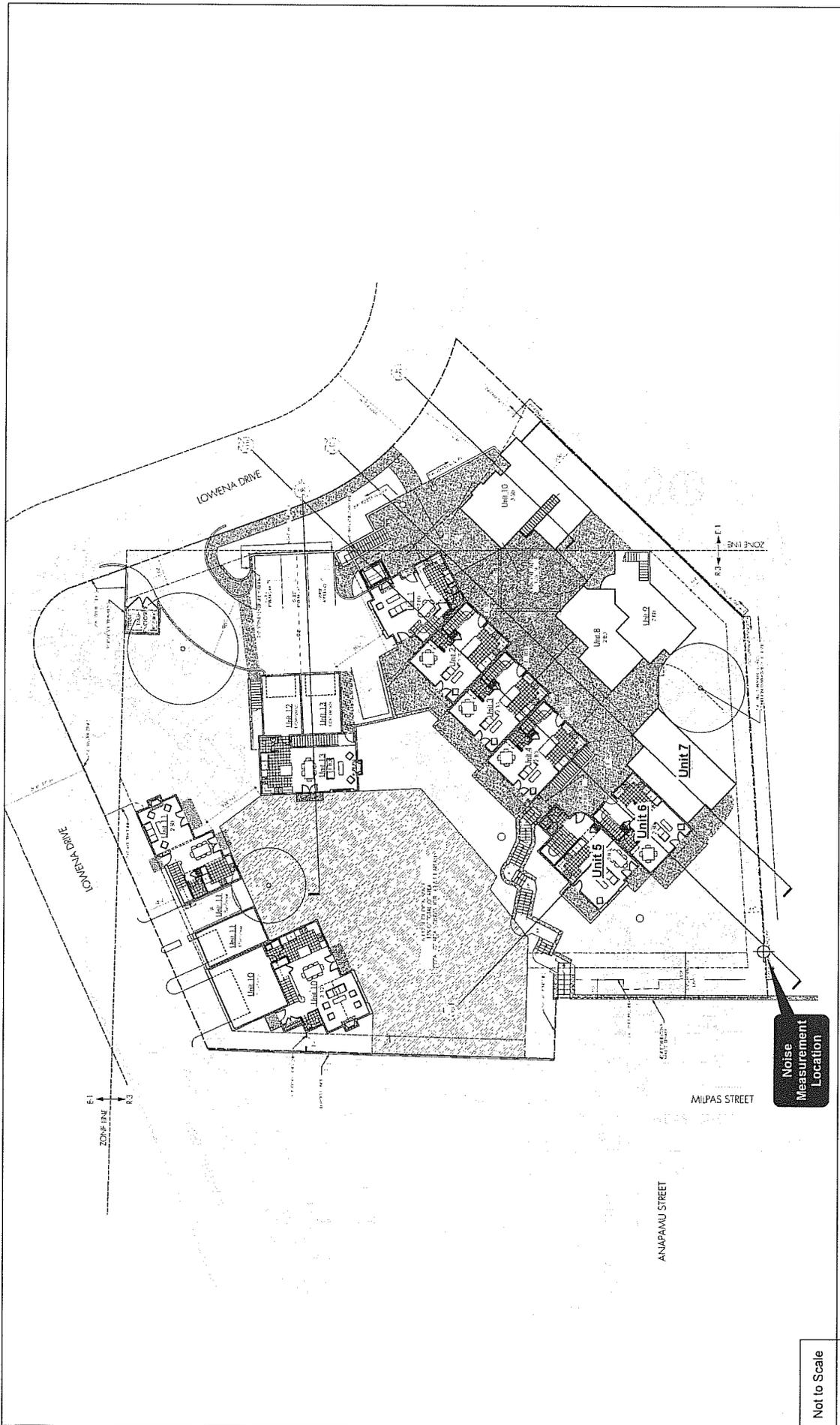


FIGURE 4
Noise Level Measurement Location
 FINAL

Not to Scale

DUDEN

AZ0001
 JANUARY 2008

SOURCE: DUDEN CONSULTANTS ARCHITECTURE ENGINEERING

P15 E Anapamu Street Environmental Noise Study Report

ATTACHMENT "A"

ACOUSTICAL TERMS AND DEFINITIONS

<u>Term</u>	<u>Definition</u>
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level	<u>dBA</u> is the sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Community Noise Equivalent Level	<u>CNEL</u> is the A-weighted equivalent continuous sound exposure (CNEL) level for a 24-hour period with a ten dB adjustment added to sound levels occurring during nighttime hours (10 pm to 7 am) and a five dB adjustment added to the sound levels occurring during the evening hours (7 pm to 10 pm).
Day / Night Noise Equivalent Level	<u>Ldn</u> is the A-weighted equivalent continuous sound exposure level for a 24-hour period with a ten dB adjustment added to sound levels occurring during nighttime hours (10 pm to 7 am).
Decibel	<u>dB</u> is the unit for measuring sound pressure level, equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micro-Pascal.
Time-Average Sound Level	<u>TAV</u> is the sound level corresponding to a steady state sound level and containing the same total energy as a time varying signal over a given sample period. TAV is designed to average all of the loud and quiet sound levels occurring over a specific time period.

ATTACHMENT "B"

VEHICLE NOISE CALCULATIONS

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT: **915 E Anapamu Street** JN: 6288
 ROADWAY: **N Milpas Street** DATE: 02-Feb-09
 LOCATION: Monitor Location BY: C.OVERWEG

ADT 8,980 EXISTING PK HR VOL 898
 SPEED 25
 PK HR % 10
 DIST CTL 45
 DIST N/F 36 (M=76,P=52,S=36,C=12) AUTO SLE DISTANCE 42.4
 DIST WALL 30 MED TRUCK SLE DIST 42.0
 DIST W/OB 15 HVY TRUCK SLE DIST 41.3
 HTH WALL 0.0 *****
 HTH OBS 5.0
 AMBIENT 0
 ROADWAY VIEW:
 LF ANGLE -90
 RT ANGLE 90
 DF ANGLE 180

SITE CONDITIONS: ((HARD SITE=10, SOFT SITE=15)

AUTOM 15.0
 MED TR 15.0
 HVY TR 15.0
 BARRIER 0 (0=WALL,1=BERM)

ELEVATIONS:

PAD 80.0 AUTOMOBILES = 75.00
 ROAD 75.0 MEDIUM TRUCKS 77.30
 HEAVY TRUCKS = 83.01
 GRADE: 0.0 % GRADE ADJUSTM 0.0 (TO HEAVY TRUCKS)

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9800
MEDIUM TRUCKS	0.848	0.049	0.103	0.0000
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	58.7	56.8	55.0	48.9	58.2
MEDIUM TRUCKS	10.9	9.4	3.0	1.5	10.2
HEAVY TRUCKS	61.2	59.8	50.7	52.0	60.4
VEHICULAR NOISE	63.1	61.5	56.4	53.7	62.5

NOISE IMPACTS WITH TOPO AND BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
VEHICULAR NOISE	62.2	60.7	55.5	52.9	61.6

AMBIENT:

	W/O AMBIENT	W/ AMBIENT
LEQ PK HR WITHOUT TOPO OR BARRIER	63.1	63.1
LEQ PK HR WITH TOPO OR BARRIER	62.3	62.3
CNEL WITHOUT TOPO AND BARRIER	62.5	62.5
CNEL WITH TOPO AND BARRIER	61.6	61.6

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT: **915 E Anapamu Street**
 ROADWAY: **N Milpas Street**
 LOCATION: Patio Unit 5

JN: 6288
 DATE: 02-Feb-09
 BY: C.OVERWEG

ADT	9,700	Year 2015	PK HR VOL	970
SPEED	25			
PK HR %	10			
DIST CTL	90			
DIST N/F	36	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	88.5
DIST WALL	30		MED TRUCK SLE DIST	87.4
DIST W/OB	60		HVY TRUCK SLE DIST	85.2
HTH WALL	0.0	*****		
HTH OBS	5.0			
AMBIENT	0			
ROADWAY VIEW:				
LF ANGLE	-90			
RT ANGLE	90			
DF ANGLE	180			

SITE CONDITIONS: ((HARD SITE=10, SOFT SITE=15)

AUTOM	15.0	
MED TR	15.0	
HVY TR	15.0	
BARRIER	0	(0=WALL,1=BERM)

ELEVATIONS:

PAD	90.0	AUTOMOBILES =	75.00
ROAD	75.0	MEDIUM TRUCKS	77.30
		HEAVY TRUCKS =	83.01
GRADE:	0.0 %	GRADE ADJUSTM	0.0 (TO HEAVY TRUCKS)

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9800
MEDIUM TRUCKS	0.848	0.049	0.103	0.0000
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	54.2	52.3	50.5	44.5	53.7
MEDIUM TRUCKS	6.4	4.9	-1.4	-3.0	5.7
HEAVY TRUCKS	56.8	55.4	46.3	47.6	56.1
VEHICULAR NOISE	58.7	57.1	51.9	49.3	58.1

NOISE IMPACTS WITH TOPO AND BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
VEHICULAR NOISE	50.6	49.0	43.9	41.2	50.0

AMBIENT:

	W/O AMBIENT	W/ AMBIENT
LEQ PK HR WITHOUT TOPO OR BARRIER	58.7	58.7
LEQ PK HR WITH TOPO OR BARRIER	50.7	50.7
CNEL WITHOUT TOPO AND BARRIER	58.1	58.1
CNEL WITH TOPO AND BARRIER	50.0	50.0

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT: **915 E Anapamu Street**
 ROADWAY: **N Milpas Street**
 LOCATION: **Balcony Unit 5**

JN: 6288
 DATE: 02-Feb-09
 BY: C.OVERWEG

ADT	9,700	Year 2015	PK HR VOL	970
SPEED	25			
PK HR %	10			
DIST CTL	85			
DIST N/F	36	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	85.7
DIST WALL	30		MED TRUCK SLE DIST	84.4
DIST W/OB	55		HVY TRUCK SLE DIST	81.9
HTH WALL	0.0	*****		
HTH OBS	12.0			
AMBIENT	0			
ROADWAY VIEW:				
LF ANGLE	-90			
RT ANGLE	90			
DF ANGLE	180			

SITE CONDITIONS: ((HARD SITE=10, SOFT SITE=15)

AUTOM	15.0	
MED TR	15.0	
HVY TR	15.0	
BARRIER	0	(0=WALL,1=BERM)

ELEVATIONS:

PAD	92.0	AUTOMOBILES =	75.00
ROAD	75.0	MEDIUM TRUCKS	77.30
		HEAVY TRUCKS =	83.01
GRADE:	0.0 %	GRADE ADJUSTM	0.0 (TO HEAVY TRUCKS)

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9800
MEDIUM TRUCKS	0.848	0.049	0.103	0.0000
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	54.4	52.5	50.8	44.7	53.9
MEDIUM TRUCKS	6.7	5.2	-1.2	-2.8	5.9
HEAVY TRUCKS	57.0	55.6	46.6	47.8	56.3
VEHICULAR NOISE	58.9	57.4	52.2	49.6	58.3

NOISE IMPACTS WITH TOPO AND BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
VEHICULAR NOISE	53.7	52.2	47.0	44.4	53.1

AMBIENT:

	W/O AMBIENT	W/ AMBIENT
LEQ PK HR WITHOUT TOPO OR BARRIER	58.9	58.9
LEQ PK HR WITH TOPO OR BARRIER	53.8	53.8
CNEL WITHOUT TOPO AND BARRIER	58.3	58.3
CNEL WITH TOPO AND BARRIER	53.1	53.1

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL
(modified for CNEL)

DUDEK

PROJECT: **915 E Anapamu Street** JN: 6288
 ROADWAY: **N Milpas Street** DATE: 02-Feb-09
 LOCATION: **Patio Unit 6** BY: C.OVERWEG

ADT 9,700 Year 2015 PK HR VOL 970
 SPEED 25
 PK HR % 10
 DIST CTL 85
 DIST N/F 36 (M=76,P=52,S=36,C=12) AUTO SLE DISTANCE 83.5
 DIST WALL 30 MED TRUCK SLE DIST 82.4
 DIST W/OB 55 HVY TRUCK SLE DIST 80.2
 HTH WALL 0.0 *****
 HTH OBS 5.0
 AMBIENT 0
 ROADWAY VIEW:
 LF ANGLE -90
 RT ANGLE 90
 DF ANGLE 180

SITE CONDITIONS: ((HARD SITE=10, SOFT SITE=15)

AUTOM 15.0
 MED TR 15.0
 HVY TR 15.0
 BARRIER 0 (0=WALL,1=BERM)

ELEVATIONS:

PAD 90.0 AUTOMOBILES = 75.00
 ROAD 75.0 MEDIUM TRUCKS 77.30
 GRADE: 0.0 % HEAVY TRUCKS = 83.01
 GRADE ADJUSTM 0.0 (TO HEAVY TRUCKS)

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9800
MEDIUM TRUCKS	0.848	0.049	0.103	0.0000
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	54.6	52.7	50.9	44.9	54.1
MEDIUM TRUCKS	6.8	5.3	-1.0	-2.6	6.1
HEAVY TRUCKS	57.2	55.8	46.7	48.0	56.5
VEHICULAR NOISE	59.1	57.5	52.3	49.7	58.4

NOISE IMPACTS WITH TOPO AND BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
VEHICULAR NOISE	51.3	49.7	44.5	41.9	50.7

AMBIENT:	W/O AMBIENT	W/ AMBIENT
LEQ PK HR WITHOUT TOPO OR BARRIER	59.1	59.1
LEQ PK HR WITH TOPO OR BARRIER	51.3	51.3
CNEL WITHOUT TOPO AND BARRIER	58.4	58.4
CNEL WITH TOPO AND BARRIER	50.7	50.7

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT: **915 E Anapamu Street** JN: 6288
 ROADWAY: **N Milpas Street** DATE: 02-Feb-09
 LOCATION: **Patio Unit 7** BY: C.OVERWEG

ADT 9,700 Year 2015 PK HR VOL 970
 SPEED 25
 PK HR % 10
 DIST CTL 95
 DIST N/F 36 (M=76,P=52,S=36,C=12) AUTO SLE DISTANCE 93.5
 DIST WALL 30 MED TRUCK SLE DIST 92.3
 DIST W/OB 65 HVY TRUCK SLE DIST 90.2
 HTH WALL 0.0 *****
 HTH OBS 5.0
 AMBIENT 0
 ROADWAY VIEW:
 LF ANGLE -90
 RT ANGLE 90
 DF ANGLE 180

SITE CONDITIONS: ((HARD SITE=10, SOFT SITE=15)

AUTOM 15.0
 MED TR 15.0
 HVY TR 15.0
 BARRIER 0 (0=WALL,1=BERM)

ELEVATIONS:

PAD 90.0 AUTOMOBILES = 75.00
 ROAD 75.0 MEDIUM TRUCKS 77.30
 HEAVY TRUCKS = 83.01
 GRADE: 0.0 % GRADE ADJUSTM 0.0 (TO HEAVY TRUCKS)

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9800
MEDIUM TRUCKS	0.848	0.049	0.103	0.0000
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	53.8	52.0	50.2	44.1	53.4
MEDIUM TRUCKS	6.1	4.6	-1.8	-3.3	5.4
HEAVY TRUCKS	56.4	55.0	46.0	47.2	55.7
VEHICULAR NOISE	58.3	56.7	51.6	48.9	57.7

NOISE IMPACTS WITH TOPO AND BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
VEHICULAR NOISE	50.1	48.6	43.4	40.8	49.5

AMBIENT:	W/O AMBIENT	W/ AMBIENT
LEQ PK HR WITHOUT TOPO OR BARRIER	58.3	58.3
LEQ PK HR WITH TOPO OR BARRIER	50.2	50.2
CNEL WITHOUT TOPO AND BARRIER	57.7	57.7
CNEL WITH TOPO AND BARRIER	49.5	49.5