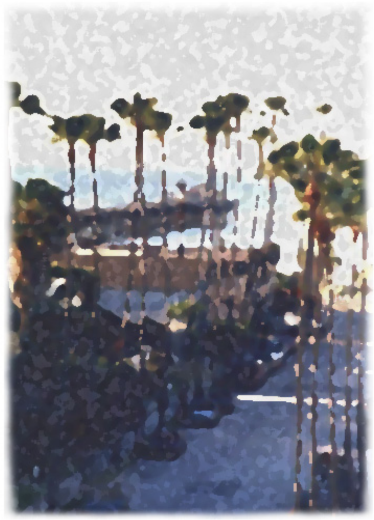
City of Seal Beach



Noise Element

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Introduction

The Noise Element follows the revised state guidelines in the California *Government Code* §653021(g) and §46050.1 of the *Health and Safety Code*. The element quantifies the community noise environment in terms of noise exposure contours for near-term and long-term levels of growth and traffic activity. The information will become a guideline for the development of land use policies to achieve compatible land uses and provide baseline levels and noise source identification for local Noise Ordinance enforcement. The Noise Element is organized as follows:

- 2.0 Noise Environment/Issue Analysis
- 3.0 Goals, Objectives, and Policies
- 4.0 The Plan for Control and Management of Noise
- 5.0 Glossary

Purpose

The Noise Element of a General Plan is a comprehensive program for including noise control in the planning process. It is a tool for local planners to use in achieving and maintaining compatible land use with environmental noise levels. The Noise Element identifies noise sensitive land uses and noise sources, and defines areas of noise impact for the purpose of developing programs to ensure that Seal Beach residents will be protected from excessive noise intrusion.

Authorization

The State of California has mandated that each county and city prepare a Noise Element as part of its General Plan. Section 65302(g) of the California *Government Code* requires specifically:

> (g) A Noise Element shall identify and appraise noise problems in the community. The noise element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify, to the extent practicable, as determined by the

legislative body, current and projected noise levels for all of the following sources:

- Highways and freeways.
- Primary arterials and major local streets.
- Passenger and freight on-line railroad operations and ground rapid transit systems.
- Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.
- Local industrial plants, including, but not limited to, railroad classification yards.
- Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.
- Noise contours shall be shown for all sources and stated in terms of community noise equivalent level (CNEL) or day-night average level (LDN). The noise contours shall be prepared on the basis of noise monitoring or following generally accepted noise modeling techniques for the various sources identified above. The noise contours shall be used as a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise. The Noise Element shall include implementation measures and possible solutions that address existing and foreseeable noise problems, if any. The adopted noise element shall serve as a guideline for compliance with the state's noise insulation standards.

The State Guidelines for Preparation and Content of Noise Elements of the General Plan indicates that the Noise Element should present the noise environment in terms of noise contours. For those areas identified as containing noise sensitive facilities, the noise environment is determined by monitoring.

Definition of Noise

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the

Decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud; and 20 dBA higher four times louder, and so forth. Everyday sounds normally range from 30 dB (very quiet) to 100 dB (very loud). Examples of various sound levels in different environments are shown in Figure N-1.

Noise has been defined as unwanted sound, and it is known to have several adverse effects on people. From these known effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on such known impacts of noise on people as hearing loss, speech interference, sleep interference, physiological responses, and annoyance. Each of these potential noise impacts on people is briefly discussed in the following narratives.

- **HEARING LOSS** is not a concern in community noise problems of this type. The potential for noise-induced hearing loss is more commonly associated with occupational noise exposures in heavy industry or very noisy work environments. Noise levels in neighborhoods, even in very noisy airport environs, are not sufficiently loud to cause hearing loss.
- **SPEECH INTERFERENCE** is one of the primary concerns in environmental noise problems. Normal conversational speech is in the range of 60 to 65 dBA, and any noise in this range or louder may interfere with speech. There are specific methods of describing speech interference as a function of distance between speaker and listener and voice level.

Sound Levels and Loudness of Illustrative Noises in Indoor and Outdoor Environments
(Numbers in Parentheses are the A-Scale Weighted Sound Levels for that Noise Event)

dB(A)	Overall Level - Sound Pressure Level Reference: 0.0002 Microbars	Community (Outdoor)	Home or Industry	Loudness - Human Judgment of Different Sound Levels
130		- Military jet aircraft take-off with after-burner from aircraft carrier @ 50 ft (130)	- Oxygen torch (121)	120 dB(A) 32 times as loud
120 110	Uncomfortably loud	- Turbo-fan aircraft @ take-off power @ 200 ft (110)	- Riveting machine (110) - Rock and roll band (108-114)	110 dB(A) 16 times as loud
100		- Jet flyover @ 1000 ft (103) - Boeing 707, DC-8 @ 6080 ft before landing (106) - Bell J-2A helicopter @ 100 ft (100)		100 dB(A) 8 times as loud
90	Very loud	- Power mower (96) - Boeing 737, DC-9 @ 6080 ft before landing (97) - Motorcycle @ 25 ft (90)	- Newspaper press (97)	90 dB(A) 4 times as loud
		- Car wash @ 20 ft (89) - Prop airplane flyover @ 1000 ft (88) - Diesel truck, 40 mph @ 50 ft (84) - Diesel train, 45 mph @ 100 ft (83)	- Food blender (88) - Milling machine (85) - Garbage disposal(80)	80 dB(A) 2 times as loud
70	Moderately loud	- High urban ambient sound (80) - Passenger car, 65 mph @ 25 ft (77) - Freeway @ 50 ft from pavement edge, 10:00 a.m. (76 ±6)	- Living room music (76) - TV audio, vacuum cleaner	70 dB(A)
60		- Air conditioning unit @ 100 ft (60)	- Cash register @ 10 ft (65-70) - Electric typewriter @ 10 ft (64) - Dishwasher (rinse) @ 10 ft (60) - Conversation (60)	60 dB(A) half as loud
	Quiet	- Large transformers @ 100 ft (50)		50 dB(A) one-quarter as loud
40		- Bird calls (44) - Lower limit urban ambient sound (40)		40 dB(A) one-eighth as loud
20	Just audible	- Desert at night (dB(A) scale interrupted)		
10	Threshold of hearing			

Figure N-1 – Typical A-Weighted Noise Levels

- **SLEEP INTERFERENCE** is a major noise concern because sleep is the most noise sensitive human activity. Sleep disturbance studies have identified interior noise levels that have the potential to cause sleep disturbance. Note that sleep disturbance does not necessarily mean awakening from sleep, but can refer to altering the pattern and stages of sleep.
- **PHYSIOLOGICAL RESPONSES** are those measurable effects of noise on people which are realized as changes in pulse rate, blood pressure, etc. While such effects can be induced and observed, the extent is not known to which these physiological responses cause harm or are signs of harm.
- **ANNOYANCE** is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability.

Background on Standards

Community noise is generally not a steady state and varies with time. Under conditions of non-steady state noise, some type of statistical metric is necessary to quantify noise exposure over a long period of time. Several rating scales have been developed for describing the effects of noise on people. They are designed to account for the above known effects of noise on people.

Based on these effects, the observation has been made that the potential for noise to impact people is dependent on the total acoustical energy content of the noise. A number of noise scales have been developed to account for this observation. These scales are the: Equivalent Noise Level (LEQ), the Day Night Noise Level (LDN), and the Community Noise Equivalent Level (CNEL). These scales are described in the following paragraphs.

- **LEQ** is the sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. LEQ is the "energy" average noise level during the time period of the sample. LEQ can be measured for any time period, but is typically measured for 15 minutes, 1 hour, or 24-hours.
- **LDN** is a 24-hour, time-weighted annual average noise level. Time-weighted refers to the fact that noise that occurs

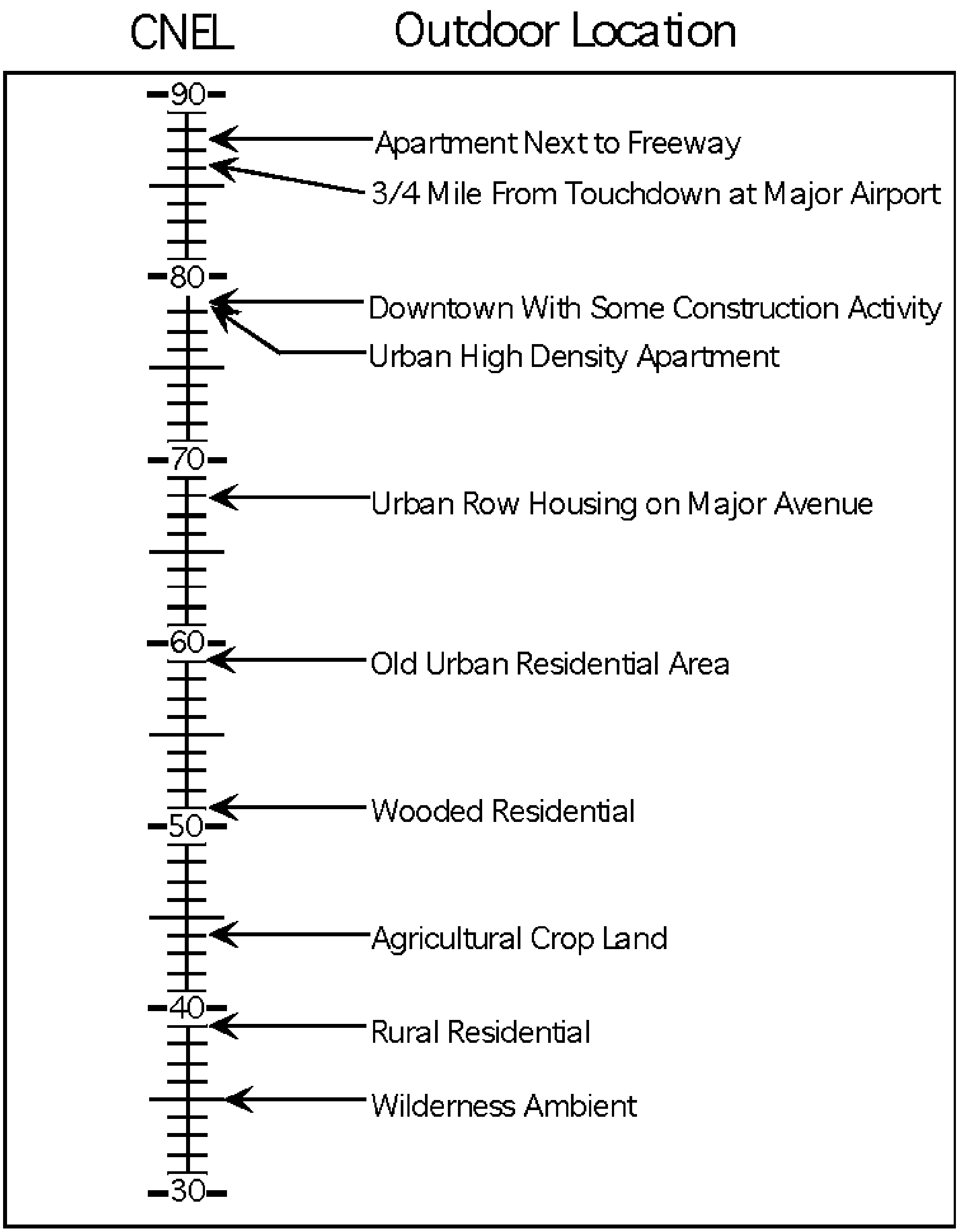
during certain sensitive time periods is penalized for occurring at these times. In the LDN scale, those events that take place during the night (10:00 p.m. to 7:00 a.m.) are penalized by 10 dB. This penalty was selected to attempt to account for increased sensitivity to noise during the quieter period of day where sleep is the most probable activity.

- **CNEL** is similar to the LDN scale except that it includes an additional 5 dBA penalty for events that occur during the evening (7:00 p.m. to 10:00 p.m.) time period. Either LDN or CNEL may be used to identify community noise impacts within the Noise Element. Examples of CNEL noise levels are presented in Figure N-2.

The public reaction to different noise levels varies from community to community. Extensive research has been conducted on human responses to exposure of different levels of noise. Community noise standards are derived from tradeoffs between community response surveys, such as this, and economic considerations for achieving these levels.

Intermittent or occasional noise such as associated with stationary noise sources is not of sufficient volume to exceed community noise standards that are based on a time averaged scale such as the CNEL scale. To account for intermittent noise, another method to characterize noise is the Percent Noise Level (L%). The Percent Noise Level is the level exceeded X% of the time during the measurement period.

Noise ordinances are typically specified in terms of the percent noise levels. Ordinances are designed to protect people from non-transportation-related noise sources such as music, machinery, and vehicular traffic on private property. Noise Ordinances do not apply to motor vehicle noise on public streets or other transportation-related noise sources that are pre-empted by the state or federal government.



Source: U.S. Environmental Protection Agency, "Impact Characterization of Noise Including Implications of Identifying and Achieving Levels of Cumulative Noise Exposure," EPA Report NTID 73.4, 1973.

Figure N-2 – Typical CNEL Outdoor Noise Levels

Noise/Land Use Compatibility Guidelines

This section presents information regarding the compatibility of various land uses with environmental noise. It is from these guidelines and standards that the City of Seal Beach Noise Criteria and Standards have been developed. noise/land use guidelines have been produced by a number of federal and state agencies, including the Federal Highway Administration, the Environmental Protection Agency, the Department of Housing and Urban Development, the American National Standards Institute, and the State of California. These guidelines, presented in the following paragraphs, are all based upon cumulative noise criteria such as LEQ, LDN, or CNEL.

In March 1974 the Environmental Protection Agency published "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (EPA 550/9-74-004). 55 LDN is described as the requisite level with an adequate margin of safety for areas with outdoor uses, including residences and recreational areas. The EPA "levels document" does not constitute a standard specification or regulation, but identifies safe levels of environmental noise exposure without consideration for economic cost for achieving these levels.

The Federal Highway Administration (FHWA) has adopted and published noise abatement criteria for highway construction projects. The noise abatement criteria specified by the FHWA are in terms of the maximum one hour Noise Equivalent Level (LEQ). The FHWA noise abatement criterion basically establishes an exterior noise goal for residential land uses of 67 LEQ and an interior goal for residences of 52 LEQ. The noise abatement criterion applies to private yard areas and assumes that typical wood frame homes with windows open provide 10 dB noise reduction (outdoor to indoor) and 20 dB noise reduction with windows closed.

The State of California requires each city and county to adopt noise elements of their General Plans. Such noise elements must contain a Noise/Land Use Compatibility matrix. A recommended (but not mandatory) matrix is presented in the "Guidelines for the Preparation and Content of Noise Elements of the General Plan," (Office of Noise Control, California Department of Health, February 1976). Figure N-3 presents this recommended matrix for use in the City of Seal Beach.

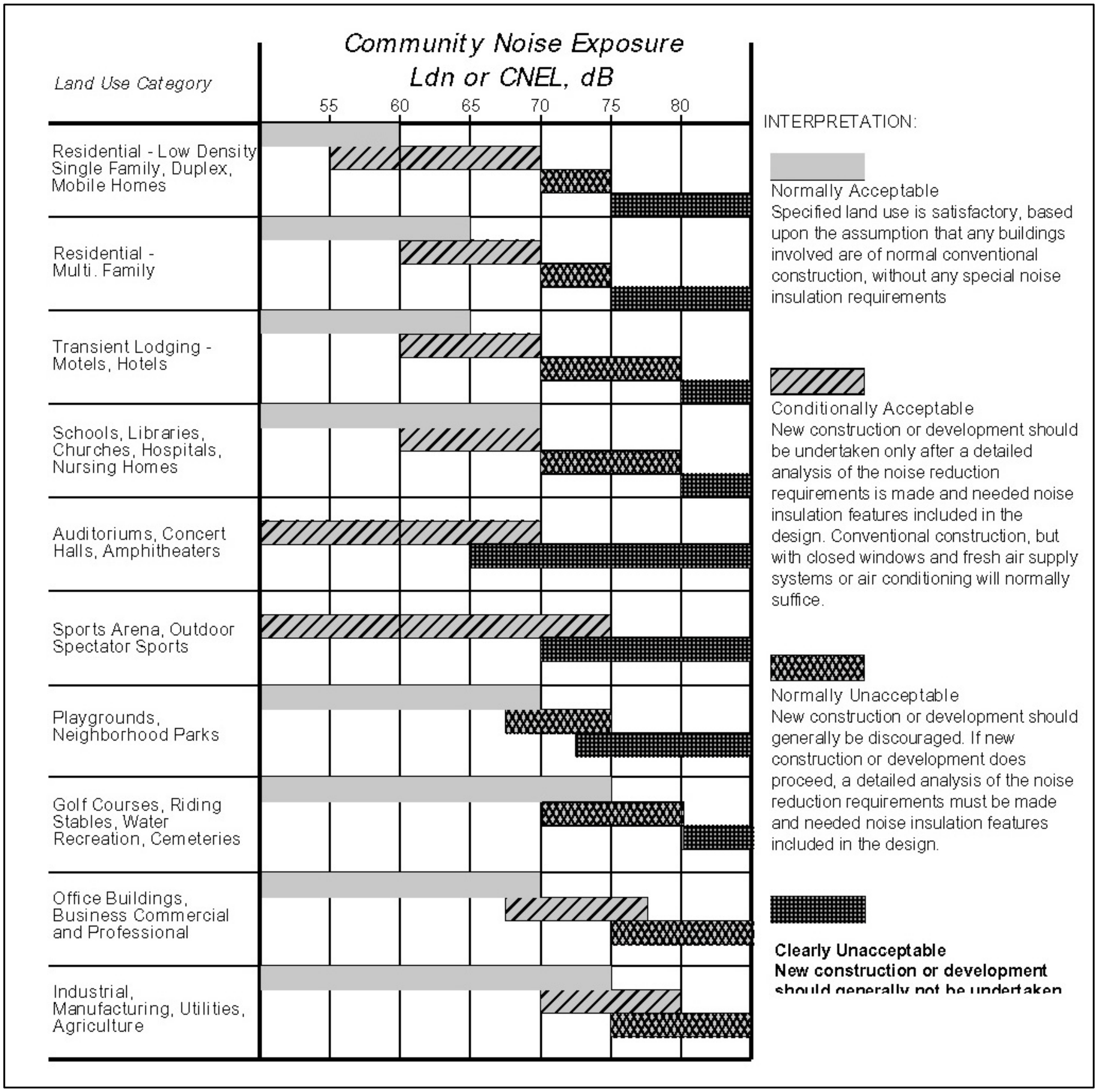


Figure N-3 – Noise/Land Use Compatibility Guidelines

Noise Environment/Issue Analysis

Key Issues

1. **Transportation Noise Control** - Within the City of Seal Beach are a number of transportation related noise sources, including freeways, major arterials, and collector roadways. These sources are the major contributors of noise in Seal Beach. Cost-effective strategies to reduce their influence on the community noise environment are an essential part of the Noise Element.

2. **Community Noise Control for Non-Transportation Noise Sources** - Residential land uses and areas identified as noise sensitive must be protected from excessive noise from non-transportation sources, including commercial and industrial operations. These impacts are most effectively controlled through the adoption and application of a City Noise Ordinance.

3. **Noise and Land Use Planning Integration** - Information relative to the existing and future noise environment within Seal Beach should be integrated into future land use planning decisions. The Element presents the noise environment in order that the City may include noise impact considerations in development programs. Noise/land use compatibility guidelines are presented, as well as guidelines for new developments.

Existing Noise Environment

This section contains a detailed description of the current noise environment within the City. This description of the noise environment is based on an identification of noise sources and noise sensitive land uses, a community noise measurement survey, and noise contour maps.

The predominant noise source in Seal Beach originates from motor vehicles. Several major arterial roadways pass through the City, including the San Diego Freeway (I-405), the San Gabriel River Freeway (I-605), the Garden Grove Freeway (SR 22), Pacific Coast Highway, and arterial roadways. In addition, noise levels within the City are affected by overflights from military aircraft. To completely assess the noise environment in the City, noise sensitive receptors must also be identified. As mandated by the state, noise sensitive receptors include, but are not limited to, residential areas, areas containing schools, hospitals, rest homes, long-term medical or mental care facilities, or any other land use areas deemed noise sensitive by the local jurisdiction.

Noise Measurements

Ten sites were selected for measurement of the noise environment in Seal Beach. The measurement locations are presented in Figure N-4. Discussions with City staff and identification of major noise sources in the community provided the initial base for development of the community noise survey. The measurement locations were selected on the basis of proximity to major noise sources and noise sensitivity of the land use.

The Seal Beach Noise Element measurement survey utilized a Bruel and Kjaer Model 2236 Portable Noise Monitor. This instrument automatically calculates the Equivalent Noise Level (LEQ), maximum noise levels and percentile noise levels for any specific time period. The system was calibrated with a Bruel and Kjaer calibrator with calibration traceable to the National Bureau of Standards. Calibration for the calibrator is certified through the duration of the measurements by Bruel & Kjaer. This system satisfies the ANSI (American National Standards Institute) Standards 1.4 for Type 1 precision noise measurement instrumentation.

Measurement Results

The noise measurement program was conducted on November 20, 2002 at 10 locations throughout the City. The results of the ambient noise measurements at each site are listed in Table 1. The measurement data also identifies the primary noise source affecting the noise environment. The quantities measured were the Equivalent Noise Level (LEQ).

Table 1
Noise Measurement Results

Site	Lmax	LEQ	Roadway	Location
A	66.9	60.1	1st St.	West of P.C.H
B	65.3	59.8	Marina Dr.	At 4th St.
C	66.9	63.2	Main St.	At Electric Ave.
D	73.4	68.2	P.C.H.	At 12th St.
E	72.6	68.5	P.C.H.	Along Surfside Ave.
F	68.7	62.5	Bolsa Ave.	At Bayside Dr.
G	69.0	65.3	Seal Beach Blvd.	At Balboa Ave.
H	69.3	65.1	Westminster Ave.	West of Seal Beach Blvd.
I	72.8	70.3	Lampson Ave. / I-405	Old Ranch Country Club
J	67.4	66.1	Almond Ave. / I-405	At Aster

The noise measurements results indicate that the sites impacted by Pacific Coast Highway, Seal Beach Boulevard, Westminster Avenue, Lampson Avenue, and Almond (both adjacent to the freeway) experience noise levels of greater than 65 CNEL. It must be noted that these levels account for traffic noise as well as any other ambient noise in the environment. The noise levels measured are typical of urban environments. The LEQ noise levels measured are roughly equivalent to the CNEL noise levels that would occur at these same locations.

At all sites traffic noise was the primary noise source. Sites D, E, G, H, I, and J all experienced noise levels greater than 65 dBA (LEQ). All of these sites are along major roadways including Pacific Coast Highway, Seal Beach Boulevard, Westminster Avenue, and the 405 Freeway. All measurements, except Site I (located at the Old Ranch Country Club), were conducted at the property line of a residence with no intervening noise barriers. If these measurements had been conducted within the property line behind a noise barrier, a 5 dB reduction would result. Sites A, B, C, and F all experienced noise levels of less than 65 dBA (LEQ). All of these sites are along secondary roadways. Secondary roadways generate fewer vehicles at lower speeds than the major roadways impacting Sites D, E, G, H, I, and J.

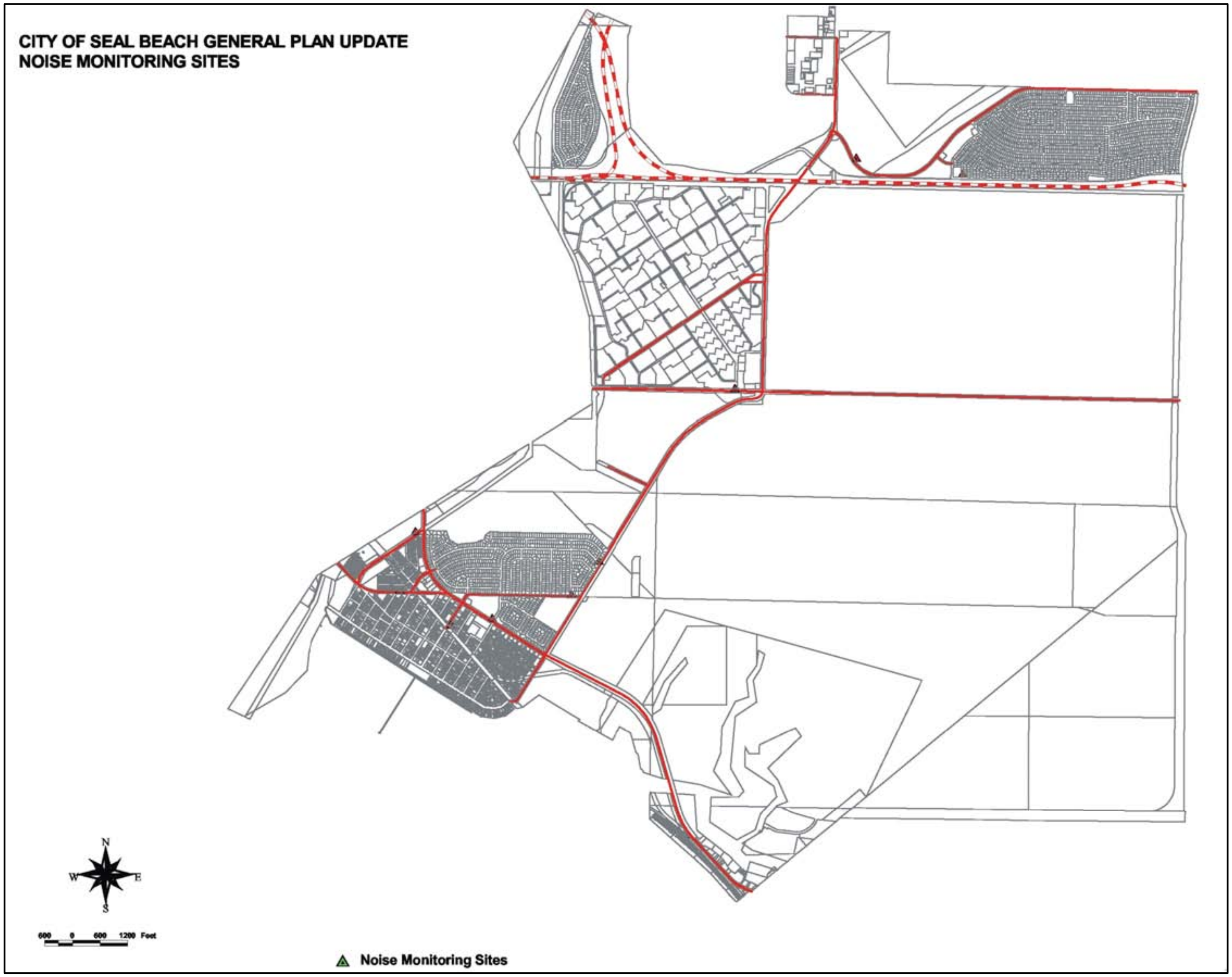


Figure N-4 – Noise Monitoring Sites

Existing Noise Sources and Levels

The noise environment in Seal Beach was determined through the employment of a comprehensive noise measurement survey of existing noise sources and incorporating these results into computer noise models to model the noise environment (it is, of course, impossible to measure future noise levels, so we must rely on computer noise models for future noise estimates).

The noise environment is commonly presented graphically in terms of lines of equal noise levels, or noise contours. The following paragraphs detail the methodology used in the measurement survey and computer modeling of these results into noise contours. The noise environment for Seal Beach can be described using noise contours developed for the major noise sources within the City. The major noise source impacting the City is traffic noise. Existing and future noise contour maps have been developed for the City as part of this noise element. In addition aircraft noise is addressed.

The traffic data used to project these noise levels are derived from the Circulation Element for the City prepared by Kunzman Associates and from Caltrans. The traffic mixes and time distributions for the arterials are presented on the following page in Table 2. The arterial traffic mix data is based on measurement surveys in Southern California and are considered typical for arterials in this area. The freeway traffic mix data was obtained from the "2001 Annual Average Daily Truck Traffic on the California State Highway System" published by Caltrans.

The traffic noise contours for existing conditions are presented in a tabular format in Table 3 and shown in Figure N-5. The 60, 65, and 70 CNEL contour levels are shown on the map. These traffic noise levels were computed using the Highway Noise Model published by the Federal Highway Administration (:FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108, December 1978). The FHWA Model uses traffic volume, vehicle mix, vehicle speed, and roadway geometry to compute the LEQ noise level. A computer code has been written that computes equivalent noise levels for each of the time periods used in CNEL. Weighting these noise levels and summing them results in the CNEL for the traffic projections used.

Table 2
Traffic Distribution per Time of Day (% of ADT)

Vehicle Type	Day	Evening	Night
I-405(a)			
Automobile	66.74	16.92	10.34
Medium Truck	2.57	0.65	0.40
Heavy Truck	1.69	0.43	0.26
I-405(b)			
Automobile	66.88	16.96	10.36
Medium Truck	2.48	0.63	0.38
Heavy Truck	1.63	0.41	0.25
I-405(c)			
Automobile	66.46	16.85	10.30
Medium Truck	2.95	0.75	0.46
Heavy Truck	1.59	0.40	0.25
I-605			
Automobile	68.87	17.46	10.67
Medium Truck	1.07	0.27	0.17
Heavy Truck	1.07	0.27	0.17
SR 22			
Automobile	69.15	17.53	10.71
Medium Truck	1.17	0.30	0.18
Heavy Truck	0.68	0.17	0.11
Arterial Roadway			
Automobile	75.51	12.57	9.34
Medium Truck	1.56	0.09	0.19
Heavy Truck	0.64	0.02	0.08

Table 3
Existing Traffic Noise Contours (Year 2002)

Road Name	Segment	ADT	Speed	70 CNEL	65 CNEL	60 CNEL
1st Street	Marina Drive to Pacific Coast Highway	2400	35	8	16	35
5th Street	Marina Drive to Pacific Coast Highway	5200	35	13	27	59
5th Street	Pacific Coast Highway to Coastline Drive	3100	35	9	19	42
Aldolfo Lopez Drive	West of Seal Beach Boulevard	1400	25	3	7	15
Basswood Street	South of Lampson Avenue	3900	25	6	14	29
Bolsa Avenue	PCH to Seal Beach Boulevard	5900	25	8	18	39
Golden Rain Road	East of Pacific Coast Highway	6600	25	9	19	42
Golden Rain Road	East of Pacific Coast Highway	6600	25	9	19	42
Golden Rain Road	East of Pacific Coast Highway	13200	25	14	31	66
Lampson Avenue	Seal Beach Boulevard to Basswood Street	17500	35	29	62	133
Lampson Avenue	Basswood Street to East City Limits	11000	35	21	45	97
Main Street	Electric Avenue to Pacific Coast Highway	5500	25	8	17	37
Marina Avenue	West City Limits to Pacific Coast Highway	5400	35	13	28	61
Pacific Coast Highway	North City Limits to 1st Street	46500	40	68	146	316
Pacific Coast Highway	1st Street to 5th Street	46000	35	54	117	252
Pacific Coast Highway	5th Street to Marina Drive	45300	35	54	116	250
Pacific Coast Highway	Marina Drive to Bolsa Avenue	44700	35	53	115	248
Pacific Coast Highway	Bolsa Avenue to Seal Beach Boulevard	45400	35	54	116	250
Pacific Coast Highway	South of Seal Beach Boulevard	41900	50	92	199	428
Rossmoor Center Way	West of Seal Beach Boulevard	3800	25	6	13	29
Seal Beach Boulevard	Rossmoor Center Way to St. Cloud Drive	35100	40	56	121	262
Seal Beach Boulevard	St. Cloud Drive to Lampson Avenue	46300	40	68	146	315
Seal Beach Boulevard	Lampson Avenue to I-405 Freeway	45400	40	67	144	311
Seal Beach Boulevard	I-405 Freeway to Golden Rain Road	40000	40	61	132	285
Seal Beach Boulevard	Golden Rain Road to Westminster Avenue	33800	40	55	118	255
Seal Beach Boulevard	Westminster Avenue to Aldolfo Lopez Drive	28000	45	59	127	274
Seal Beach Boulevard	Aldolfo Lopez Drive to Bolsa Avenue	26800	45	57	123	266
Seal Beach Boulevard	Bolsa Avenue to Pacific Coast Highway	21100	45	49	105	227
Seal Beach Boulevard	Pacific Coast Highway to Electric Avenue	7500	35	16	35	75
St. Cloud Drive	West of Seal Beach Boulevard	9300	25	11	24	52
Westminster Avenue	West City Limits to Road A	23100	45	52	112	241
Westminster Avenue	Road A to Seal Beach Boulevard	23200	45	52	112	241
Westminster Avenue	Seal Beach Boulevard to Bolsa Chica St.	24100	50	64	138	296
RTE 22	B - Jct. Rte 405	93000	65	250	539	1162
RTE 605	A – SB off to WB 22	38000	65	141	304	655
RTE 405(a)	A - Jct. Rte 22 east, Garden Grove Freeway	380000	65	706	1520	3276
RTE 405(b)	B - Seal Beach Jct. Rte 605	271000	65	560	1207	2601
RTE 405(c)	A - Seal Beach Jct. Rte 606	248000	65	532	1147	2471

Based on current traffic levels, the only areas of the City that experience noise levels in excess of 65 CNEL are along Pacific Coast Highway, Seal Beach Boulevard, Westminster Avenue, and all freeways. The remaining portions of the City experience noise levels generally of 60 CNEL or less. Much of the land uses along these roadways are commercial or business uses that are generally considered insensitive to noise. However, single-family and multi-family residential uses along these roadways are considered noise sensitive. In particular, the residential noise sensitive area can be defined as a "rear yard area" for the exterior environment and a "habitable room" for the interior environment.

The majority of the residential areas are protected from traffic noise by existing noise barriers. These existing noise barriers along major arterials consist of masonry block walls varying in height from approximately 5.0 to 8.0 feet. Existing noise barriers along freeways are significantly taller.

The residential area experiencing traffic noise levels greater than 65 CNEL but not protected by a noise barrier is along Pacific Coast Highway at the Surfside community north of Anderson Street. These residences consist of "side yards" or "patio areas" (a lesser defined residential exterior living area).

Aircraft flyovers occur over the City several times throughout the week. The aircraft are military flight operations generated from the Los Alamitos Joint Forces Training Base and the Long Beach Airport.

The Los Alamitos Joint Forces Training Base aircraft flights occur over residential and other noise sensitive land uses within the City. The CNEL noise contours were obtained from the 1994 Air Insulation Compatible Use Zone (AICUZ) Study (see Figure N-5 and Figure N-6). The AICUZ document was prepared by the California National Guard. Residential noise-sensitive areas north of the 405 Freeway experience aircraft-generated noise levels greater than 65 CNEL.

The 65 CNEL noise contour for Long Beach Airport is located approximately 3 miles outside the City of Seal Beach boundary. Therefore, aircraft noise generated from the Long Beach Airport will not have a significant impact on residential and other noise sensitive land uses within the City. These contours were obtained from the Long Beach Airport year 2000 quarterly report.

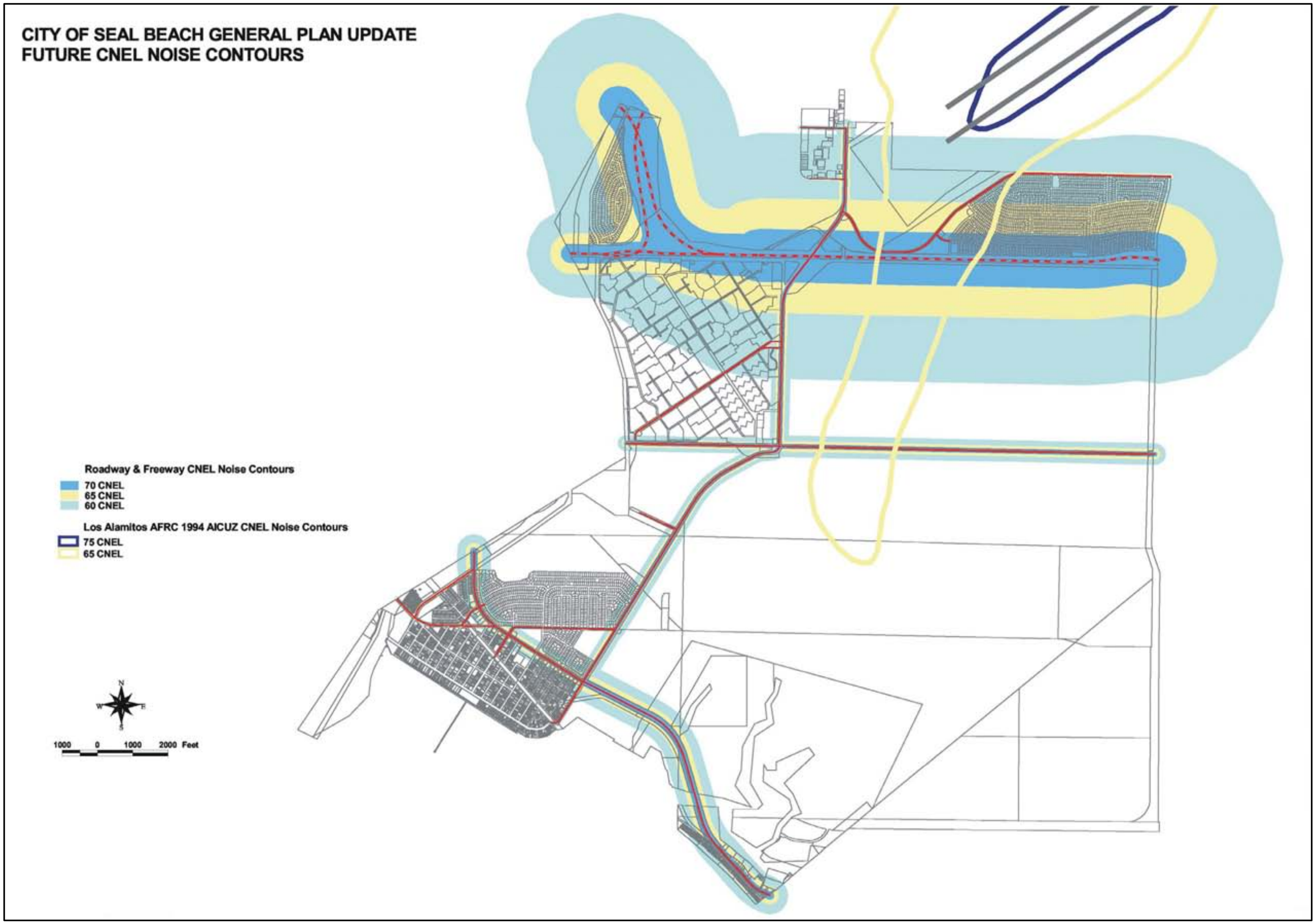


Figure N-5 – Existing CNEL Noise Contours

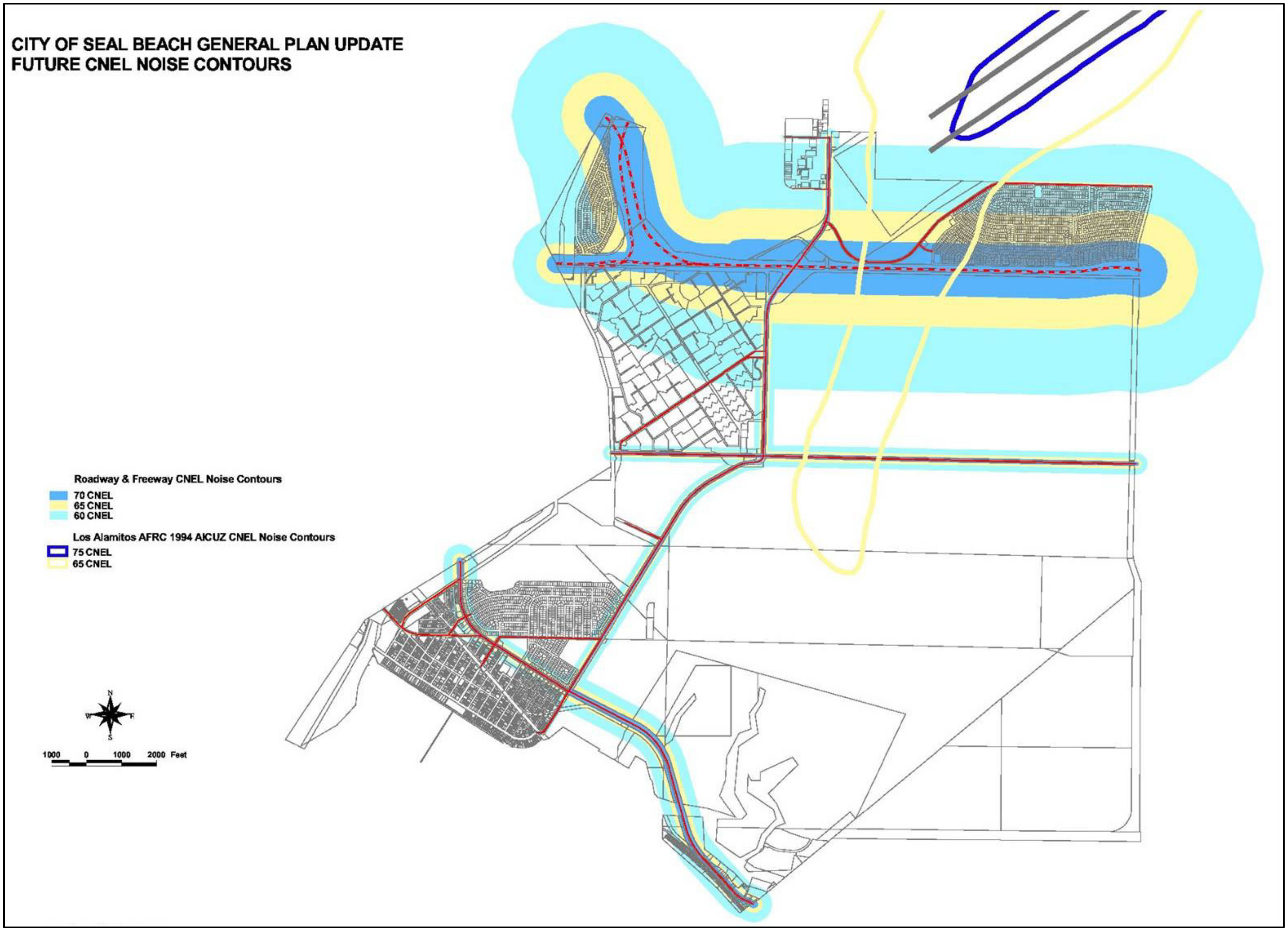


Figure N-6 – Future CNEL Noise Contours

Noise Sensitive Land Uses

The most noise sensitive land use in Seal Beach is residential development. It is considered especially noise sensitive because (1) considerable time is spent by individuals at home, (2) significant activities occur outdoors, and (3) sleep disturbance is most likely to occur in a residential area. Additionally, the City of Seal Beach has a number of public and private educational facilities that are considered noise sensitive. The location of residential areas, schools, and parks are shown on the General Plan. The distribution of these facilities varies from quiet residential areas to major arterial roadways. The majority of schools and parks experience noise levels below 65 CNEL. J.H. McGaugh Elementary School is impacted by Seal Beach Boulevard traffic noise of greater than 65 CNEL. Likewise, a portion of Edison Park is impacted by freeway traffic noise levels of greater 65 CNEL.

Noise contours represent lines of equal noise exposure, just as the contour lines on a topographic map are lines of equal elevation. The contours shown on the maps are the 70, 65, and 60 CNEL noise level for traffic noise contours. The noise contours presented should be used as a guide for land use planning. The 60 CNEL contour defines the Noise Referral Zone. This is the noise level for which noise considerations should be included when making land use policy decisions. The 65 CNEL contour describes the areas for which new noise sensitive developments will be permitted only if appropriate mitigation measures are included such that the standards contained in this Element are achieved.

The contours presented in this report are a graphic representation of the noise environment. Topography and intervening buildings or barriers have a very complex effect on the propagation of noise. This topographic effect is not included in these contours.

Future Noise Environment

Noise Sources and Levels

Future traffic noise levels have been computed using the FHWA Highway Traffic Noise Prediction Model. Projected traffic volumes for arterial roadways were obtained from the Circulation Element for the City prepared by Kunzman Associates. Projected traffic volumes for freeways were calculated at a 10% increase in volume. Table 4 and Figure N-6 on page 21 show the projected traffic noise contours to occur following buildout of the proposed general plan.

Based on future traffic levels the only areas of the City that experience noise levels in excess of 65 CNEL are along Pacific Coast Highway, Seal Beach Boulevard, Westminster Avenue, and all freeways. As mentioned previously, the remaining portions of the City experience noise levels generally of 60 CNEL or less with the exception of the areas discussed in the Existing Noise Sources and Levels Section of this element.

A 3-dBA increase in noise levels is often noticeable to residents. An increase of twice the existing traffic volume (ADT) results to an increase in traffic noise levels of 3 dBA. A roadway that has 3,000 ADT and goes up to 6,000 ADT will experience a CNEL increase of 3 dBA, as well as a roadway that goes from 20,000 ADT to 40,000 ADT. Obviously, the roadway with 40,000 ADT will be much louder than a 6,000 ADT roadway, but residents along either roadway will perceive the noise as increasing significantly.

Two areas experience an increase in noise of near or greater than 3 dB. The first area is at 1st Street between Marina Drive and Pacific Coast Highway. This area consists of single- and multi-family residences. There are sound walls at the single-family residences. These areas will experience future traffic noise levels of less than 65 CNEL. The second area is at Pacific Coast Highway at the north City limit to 1st Street. This area consists of commercial land use. These areas will experience future traffic noise levels of greater than 65 CNEL.

Table 4
Future Traffic Noise Contours (Year 2025)

Road Name	Segment	ADT	SPEED	70 CNEL	65 CNEL	60 CNEL	dB Increase
1st Street	Marina Drive to Pacific Coast Highway	7200	35	16	34	73	4.8
5th Street	Marina Drive to Pacific Coast Highway	5700	35	14	29	63	0.4
5th Street	Pacific Coast Highway to Coastline Drive	3400	35	10	21	44	0.4
Aldolfo Lopez Drive	West of Seal Beach Boulevard	1500	25	3	7	15	0.3
Basswood Street	South of Lampson Avenue	4300	25	7	14	31	0.4
Bolsa Avenue	PCH to Seal Beach Boulevard	8600	25	11	23	50	1.6
Golden Rain Road	East of Pacific Coast Highway	7250	25	10	21	44	0.4
Golden Rain Road	East of Pacific Coast Highway	7250	25	10	21	44	0.4
Golden Rain Road	East of Pacific Coast Highway	14500	25	15	33	70	0.4
Lampson Avenue	Seal Beach Boulevard to Basswood Street	20000	35	31	67	145	0.6
Lampson Avenue	Basswood Street to East City Limits	13500	35	24	52	111	0.9
Main Street	Electric Avenue to Pacific Coast Highway	6100	25	8	18	39	0.4
Marina Avenue	West City Limits to Pacific Coast Highway	5900	35	14	30	64	0.4
Pacific Coast Highway	North City Limits to 1st Street	85700	40	102	220	474	2.7
Pacific Coast Highway	1st Street to 5th Street	66600	35	70	150	323	1.6
Pacific Coast Highway	5th Street to Marina Drive	65900	35	69	149	321	1.6
Pacific Coast Highway	Marina Drive to Bolsa Avenue	65300	35	69	148	319	1.6
Pacific Coast Highway	Bolsa Avenue to Seal Beach Boulevard	60300	35	65	140	302	1.2
Pacific Coast Highway	South of Seal Beach Boulevard	54200	50	110	236	509	1.1
Rossmoor Center Way	West of Seal Beach Boulevard	4200	25	7	14	31	0.4
Seal Beach Boulevard	Rossmoor Center Way to St. Cloud Drive	36000	40	57	124	266	0.1
Seal Beach Boulevard	St. Cloud Drive to Lampson Avenue	47200	40	69	148	319	0.1
Seal Beach Boulevard	Lampson Avenue to I-405 Freeway	49500	40	71	153	329	0.4
Seal Beach Boulevard	I-405 Freeway to Golden Rain Road	42300	40	64	138	296	0.2
Seal Beach Boulevard	Golden Rain Road to Westminster Avenue	36100	40	57	124	267	0.3
Seal Beach Boulevard	Westminster Avenue to Aldolfo Lopez Drive	29100	45	61	130	281	0.2
Seal Beach Boulevard	Aldolfo Lopez Drive to Bolsa Avenue	27900	45	59	127	273	0.2
Seal Beach Boulevard	Bolsa Avenue to Pacific Coast Highway	21900	45	50	108	232	0.2
Seal Beach Boulevard	Pacific Coast Highway to Electric Avenue	8300	35	17	37	81	0.4
St. Cloud Drive	West of Seal Beach Boulevard	10200	25	12	26	56	0.4
Westminster Avenue	West City Limits to Road A	27100	45	58	124	268	0.7
Westminster Avenue	Road A to Seal Beach Boulevard	27200	45	58	125	269	0.7
Westminster Avenue	Seal Beach Boulevard to Bolsa Chica Street	25700	50	67	a144	309	0.3
RTE 22	B - Jct. Rte 405	102300	65	267	575	1238	0.4
RTE 605	A – SB off to WB 22	41800	65	150	324	698	0.4
RTE 405(a)	A - Jct. Rte 22 east, Garden Grove Freeway	418000	65	752	1620	3490	0.4
RTE 405(b)	B - Seal Beach Jct. Rte 605	298100	65	597	1286	2771	0.4
RTE 405(c)	A - Seal Beach Jct. Rte 606	272800	65	567	1222	2633	0.4

As previously discussed, the sources of noise in Seal Beach can be divided into two basic categories: transportation sources (primarily traffic) and non-transportation sources. A local government has little direct control of transportation noise at the source. State and federal agencies have the responsibility to control the noise from the source, such as vehicle noise emission levels. The most effective method the City has to mitigate transportation noise is through reducing the impact of the noise onto the community (e.g., noise barriers and site design review). Mitigation through the design and construction of a noise barrier (wall, berm, or combination wall/berm) is the most common way of alleviating traffic noise impacts.

The effect of a noise barrier is critically dependent on the geometry between the noise source and the receiver. A noise barrier effect occurs when the "line of sight" between the source and receiver is penetrated by the barrier. The greater the penetration, the greater the noise reduction.

Noise/Land Use Compatibility

Noise concerns should be incorporated into land use planning to reduce future noise and land use incompatibilities. This is achieved by establishing standards and criteria that specify acceptable limits of noise for various land uses throughout the City. These criteria are designed to integrate noise considerations into land use planning to prevent noise/land use conflicts and used to assess the compatibility of proposed land uses with the noise environment (Figure N-3) on page 9.

The most effective method to control community noise impacts from non-transportation noise sources is through application of the Community Noise Ordinance. The City of Seal Beach currently has a noise ordinance. Continued enforcement of the ordinance will provide noise control for noise-sensitive land uses.

Goals and Objectives

Goals

A beach town should be a quiet place where one can hear the surf and the wind. Reduce the level of noise, so that it causes less human stress or health damage, is not as likely to interfere with human activities such as sleep, work, play, or thought, and allow the peaceful existence of wildlife and pets.

Objectives

The identification in quantitative, numerical terms of existing and projected noise levels, noise sources, and noise-sensitive land uses in the City of Seal Beach.

Establishment of appropriate criteria and guidelines for desirable sound levels and the identification of means available to achieve those sound levels in the City of Seal Beach.

Direction for an implementation program that may be used to achieve and maintain a minimal noise environment.

Maintain the relatively quiet areas of Seal Beach by regulating existing and potential noise sources, especially in public open space and the designated Wildlife Refuge areas.

Inform the citizenry of Seal Beach of real and potential noise hazards, both physical and psychological.

The city shall encourage a long-term development pattern that minimizes noise conflicts through planning and zoning.

The city shall require the construction of barriers to mitigate sound emissions where necessary and feasible to protect outdoor noise sensitive land uses.

The city shall require the inclusion of noise mitigation measures in the design of new roadway projects in Seal Beach.

The city shall minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures.

The city shall ensure the effective enforcement of city, state and federal noise level standards by all appropriate city divisions. The city shall provide quick response to complaints and rapid abatement of noise nuisances within the scope of the city's police powers.

The Plan for Control and Management of Noise

In order to achieve the goals and objectives of the Noise Element, an effective implementation program developed within the constraints of the City's financial and staffing capabilities is necessary. The underlying purpose is to reduce the number of people exposed to excessive noise and to minimize the future effect of noise in the City. The following are the actions that the City should consider implementing to control the impacts of noise in Seal Beach.

- ***Issue 1 - Transportation Noise Control***. The most efficient and effective means of controlling noise from transportation systems is reducing noise at the source. However, since the City has little direct control over source noise levels because of state and federal preemption (e.g., State Motor Vehicle Noise Standards), policies should be focused on reducing the impact of the noise on the community. Cooperative efforts with state and federal offices are essential.

  Encourage the use of walls and berms in the design of residential or other noise sensitive land uses that are adjacent to major roads, commercial, or industrial areas.

  Provide for continued evaluation of truck movements and routes in the City to provide effective separation from residential or other noise sensitive land uses.

  Encourage the enforcement of State Motor Vehicle noise standards for cars, trucks, and motorcycles through coordination with the California Highway Patrol and Seal Beach Police Department.

  Aircraft noise standards shall be enforced by the local Airport Environ Land Use Plan (AELUP), which is regulated by the local Airport Land Use Commission (ALUC) and the Federal Aviation Administration (FAA).

- ***Issue 2 - Noise and Land Use Planning Integration.*** Community noise considerations are to be incorporated into land use planning. These measures are intended to prevent future noise and land-use incompatibilities.

  The criteria shown previously in Figure N-3 are used to assess the compatibility of proposed land uses with the noise environment. These criteria are the basis for review of projects to ensure compatibility between land-use and noise environment. These guidelines are the primary tool that will allow the City to ensure noise integrated planning for compatibility between land uses and outdoors.

Incorporate noise reduction features during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses. The noise referral zones (areas exposed to noise levels greater than 60 CNEL) can be used to identify locations of potential conflict. New developments will be permitted only if appropriate mitigation measures are included such that the standards contained in this Element or the ordinance is met.

Enforce the State of California Uniform Building Code that specifies that the indoor noise levels for residential living spaces not exceed 45 dB LDN/CNEL due to the combined effect of all noise sources. The state requires implementation of this standard when the outdoor noise levels exceed 60 dB LDN/CNEL. The Noise Referral Zones (60 CNEL) can be used to determine when this standard needs to be addressed. The Uniform Building Code (specifically, the California *Administrative Code*, Title 24, Part 6, Division T25, Chapter 1, Subchapter 1, Article 4, Sections T25-28) requires that "Interior community noise levels (CNEL/LDN) with windows closed, attributable to exterior sources shall not exceed an annual CNEL or LDN of 45 dB in any habitable room." The code requires that this standard be applied to all new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. The City can and is encouraged to reduce the noise standard from 45 CNEL to 40 CNEL. Additionally, the standard should be applied to single-family homes.

- ***Issue 3 - Community Noise Control for Non-Transportation Noise Sources.*** The focus of control of noise from non-transportation sources is the Community Noise Ordinance. The ordinance can be used to protect people from noise generated on adjacent properties.

The purpose of the ordinance is to protect people from non-transportation-related noise sources such as music, machinery and pumps, air conditioners, landscaping and gardening activities, and truck traffic on private property. The Noise Ordinance does not apply to motor vehicle noise on public streets, but it does apply to vehicles on private property. The Noise Ordinance is designed to protect quiet residential areas from stationary noise sources. The noise levels encouraged by the ordinance are typical of a quiet residential area.

Continue to enforce the community Noise Ordinance. The most effective method to control community noise impacts from non-transportation noise sources is through application of the community noise ordinance.

Require that new commercial projects proposed for development near existing residential land use demonstrate compliance with the City Noise Ordinance prior to approval of the project.

All new residential projects to be constructed near existing non-transportation noise sources (including but not limited to commercial facilities, public parks with sports activities) must demonstrate via an acoustical study conducted by a Registered Engineer that the indoor noise levels will be consistent with the limits contained in the noise ordinance.

Require construction activity to comply with limits established in the City Noise Ordinance.

Designate one agency in the City to act as the noise control coordinator. This will ensure the continued operation of noise enforcement efforts of the City.

Additional Noise Assessment

An acoustical study on traffic noise in the Surfside Colony community was conducted by Wieland Associates, Inc. on July 18, 2002. The additional analysis is hereby incorporated into this Noise Element as an addendum to this section.

Glossary

A-WEIGHTED SOUND LEVEL. 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 response of the human ear. A numerical method of rating human judgments of loudness.

AMBIENT NOISE LEVEL. The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL). The average equivalent A-Weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of ten (10) decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

DAY-NIGHT AVERAGE LEVEL (LDN). The average equivalent A-Weighted sound level during a 24-hour day, obtained after addition of ten (10) decibels to sound levels in the night before 7 a.m. and after 10 p.m.

DECIBEL (dB). A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A). A-weighted sound level (see definition above)

EQUIVALENT SOUND LEVEL (LEQ). The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

FREQUENCY. The number of times per second that a sound pressure signal oscillates about the prevailing atmosphere pressure. The unit of frequency is the hertz. The abbreviation is Hz.

INTRUSIVE NOISE. That noise that intrudes over and above the ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

L10. The A-Weighted sound level exceeded 10 percent of the sample time. Similarly L50, L90, L99, etc.

NOISE. Any unwanted sound or sound that is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "excessive undesirable sound".

NOISE ATTENUATION. The ability of a material, substance, or medium to reduce the noise level from one place to another or between one room and another (specified in decibels).

NOISE EXPOSURE CONTOURS. Lines drawn around a noise source indicating constant or equal level of noise exposure. CNEL and LDN are typical metrics used.

NOISE REFERRAL ZONES. Such zones are defined as the area within the contour defining a CNEL level of 55 decibels. It is the level at which state or federal laws and standards related to land use become important and, in some cases, pre-empt local laws and regulations. Any proposed noise sensitive development which may be impacted by a total noise environment of 55 dB CNEL or more should be evaluated on a project specific basis.

NOISE SENSITIVE LAND USE. Those specific land uses that have associated indoor and/or outdoor human activities that may be subject to stress and/or significant interference from noise produced by community sound sources. Such human activity typically occurs daily for continuous periods of 24 hours or is of such a nature that noise is significantly disruptive to activities that occur for short periods. Specifically, noise sensitive land uses include: residences of all types, hospitals, places of worship and schools.

SOUND LEVEL (NOISE LEVEL). The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

SOUND LEVEL METER. An instrument, including a microphone, an amplifier, output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Addendum to Noise Element

Acoustical Study of Traffic and Noise

by

Wieland Associates, Inc.

dated July 18, 2002

ACOUSTICAL STUDY
OF TRAFFIC NOISE
IN THE
SURFSIDE COMMUNITY

Project File 335-02
July 18, 2002

Prepared for:

W. G. Zimmerman Engineering
1500 Pacific Coast Highway, Suite D
Seal Beach, CA 90740

Prepared by:

David L. Wieland
Principal Consultant

Jonathan L. Higginson
Associate Consultant

Wieland Associates, Inc.
23276 South Pointe Drive, Suite 114
Laguna Hills, CA 92653
Tel: 949/829-6722 Fax: 949/829-6670
www.wielandassoc.com

Wieland Associates, Inc.

Table of Contents

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Introduction

The purpose of this study is to identify the noise environment currently being experienced within the Surfside community as a result of traffic on Pacific Coast Highway, and to identify measures that can be taken to reduce the traffic noise. For this project, the study area is the homes adjacent to Surfside Avenue between Phillips Street and Anderson Street. Figure 1 (page 2) identifies the location of the study area. It should be noted that the proposed future realignment of Pacific Coast Highway has not been considered in this study.

Noise Descriptors

The following sections briefly identify the noise descriptors that will be used throughout this study.

Decibels

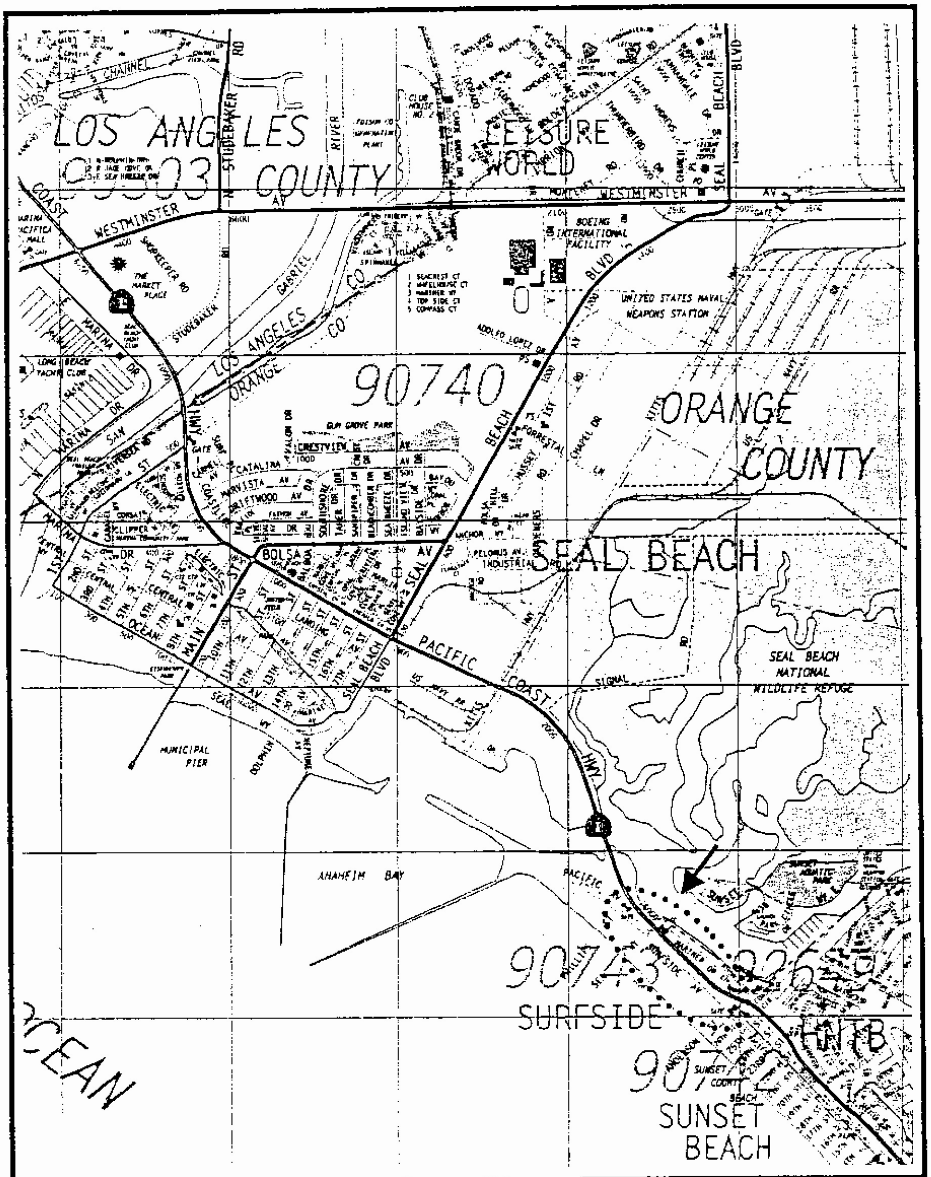
Sound pressures can be measured in units called microPascals. However, expressing sound levels in terms of microPascals would be very cumbersome since it would require a wide range of very large numbers. For this reason, sound pressure levels are described in logarithmic units of ratios of actual sound pressures to a reference pressure squared. These units are called bels. In order to provide a finer resolution, a bel is subdivided into 10 decibels, abbreviated dB.

Since decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces a sound pressure level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB. In fact, they would combine to produce 73 dB. This same principle can be applied to other traffic quantities as well. In other words, doubling the traffic volume on a street or the speed of the traffic will increase the traffic noise level by 3 dB. Conversely, halving the traffic volume or speed will reduce the traffic noise level by 3 dB.

A-Weighting

Sound pressure level alone is not a reliable indicator of loudness. The frequency or pitch of a sound also has a substantial effect on how humans will respond. While the intensity of the sound is a purely physical quantity, the loudness or human response depends on the characteristics of the human ear.

Human hearing is limited not only to the range of audible frequencies, but also in the way it perceives the sound pressure level in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and perceives both higher and lower frequency sounds of the same magnitude with less intensity. In order to approximate the frequency response of the human ear, a series of sound pressure level



WIELAND ASSOCIATES, INC.	Location of the Project Site	1

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adjustments is usually applied to the sound measured by a sound level meter. The adjustments, or weighting network, are frequency dependent.

The A-scale approximates the frequency response of the average young ear when listening to most ordinary everyday sounds. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. A range of noise levels associated with common in- and outdoor activities is shown in Figure 2 (page 4).

The A-weighted sound level of traffic and other long-term noise-producing activities within and around a community varies considerably with time. Measurements of this varying noise level are accomplished by recording values of the A-weighted level during representative periods within a specified portion of the day. The value recorded for this study is the energy equivalent (or average) sound level, denoted as Leq. Readings of this value are recorded to provide representative samples of the noise during the time period being examined (i.e., peak traffic period, morning, afternoon, and night, etc.).

Community Noise Equivalent Level (CNEL)

It is recognized that a given level of noise may be more or less tolerable depending on the duration of exposure experienced by an individual. There are numerous measures of noise exposure that consider not only the A-level variation of noise but also the duration of the disturbance. The State Department of Aeronautics and the California Commission on Housing and Community Development have adopted the community noise equivalent level (CNEL). This measure weights the average noise levels for the evening hours (7:00 p.m. to 10:00 p.m.), increasing them by 5 dB, and weights the late evening and early morning hour noise levels (10:00 p.m. to 7:00 a.m.) by 10 dB. The daytime noise levels are combined with these weighted levels and are averaged to obtain a CNEL value. Figure 3 (page 5) indicates the outdoor CNEL at typical locations.

Noise Design Goal

Since there are no standards for this privately-funded project, it is recommended that the following noise design goals be considered:

1. The CNEL should not exceed 65 dB at the second floor decks of units adjacent to Surfside Avenue.[1] This is consistent with the Orange County standards for new residential construction.
2. Noise barriers, if constructed as a result of this study, should reduce the exterior noise level by at least 5 dB at the second floor decks of units adjacent to Surfside Avenue. This is consistent with the Caltrans noise abatement criteria for new soundwall

[1] Mitigating to 65 dB at second floor decks will ensure an even lower noise exposure at ground floor locations. It is not practical to provide mitigation for levels above the second floor.

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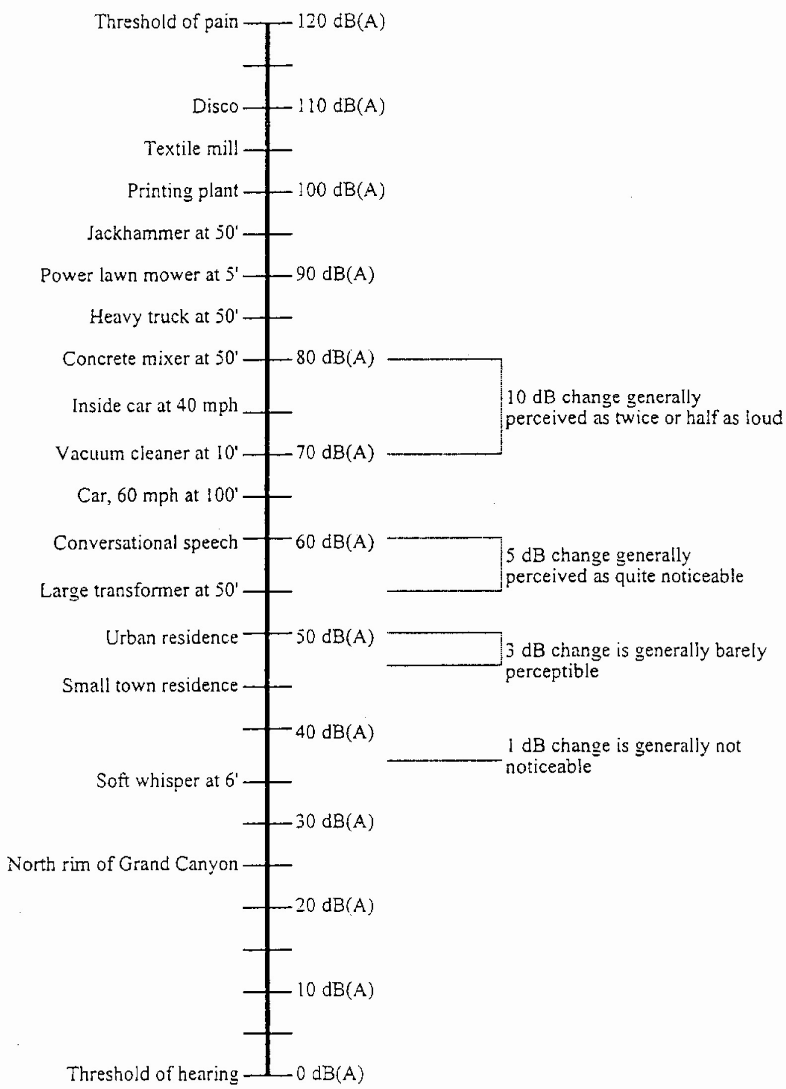

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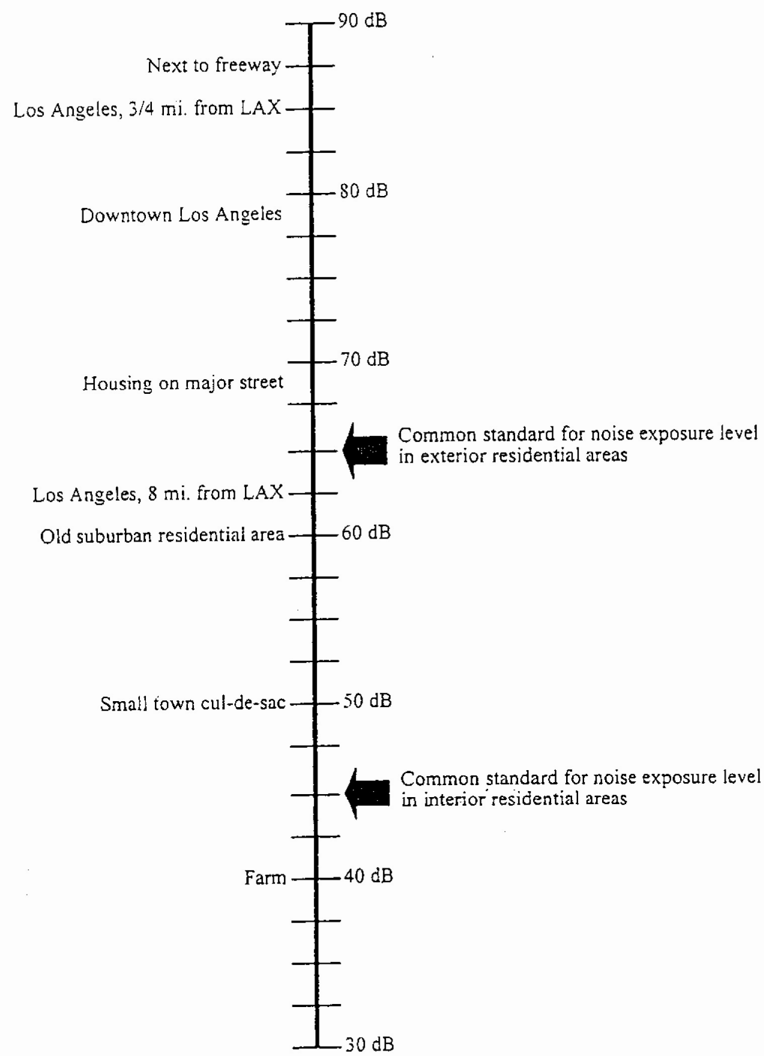

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designs. The purpose of this design goal is to ensure that the barrier provides a noticeable reduction in traffic noise.

3. Noise barriers, if constructed as a result of this study, should break the line-of-sight between a truck exhaust stack in the nearest travel lane and a resident at a second floor deck of a unit adjacent to Surfside Avenue. Again, this is consistent with the Caltrans noise abatement criteria for new soundwall designs. The purpose of this design goal is to minimize annoyance. Traffic noise is generally perceived as a "hum", which is primarily a result of tire interactions on the pavement, air turbulence, engines, and exhausts. If a noise barrier is not constructed high enough, it will effectively block much of this background "hum" without providing any reduction in noise from the truck exhaust stacks that are typically 11½' above ground level. Therefore, the noise from these exhaust stacks will stand out from the rest of the traffic noise and create annoyance.

Study Methods and Procedures

In order to document the existing noise environment, measurements were obtained at five locations within the study area. (Refer to Figure 4 on page 7.) The ambient noise level measurements were obtained by positioning the sound level meter on the property at an appropriate setback from Pacific Coast Highway. The microphone was positioned at a height of 5' and the instrument was calibrated prior to obtaining the measurement. At two of the locations, measurements were obtained over a continuous 24-hour period. At the remaining three locations, the measurements were obtained for a period of at least 20 minutes until the Leq level stabilized at a constant value. During these short-term measurements, extraneous noise sources (such as sirens and helicopters) were excluded from the data by placing the sound level meter on "standby" until the noise event was concluded. Refer to Appendix I for a complete listing of the measurement data.

The instrumentation used to obtain the noise measurements consisted of integrating sound level meters (Models 712 and 820), and an acoustic calibrator (Model CAL200) manufactured by Larson Davis Laboratories. The accuracy of the calibrator is maintained through a program established by the manufacturer, and is traceable to the National Bureau of Standards. All instrumentation meets the requirements of the American National Standards Institute (ANSI) S1.4-1971.

The Sound32 traffic noise prediction model developed by Caltrans was used to model existing traffic noise levels and to predict future year (2025) traffic noise levels. This model predicts noise levels based on traffic volumes, speeds, truck mix, site conditions, and distance from the roadway to the receptor. The California reference energy mean emission (Calveno) levels developed by Caltrans were used in the prediction model.

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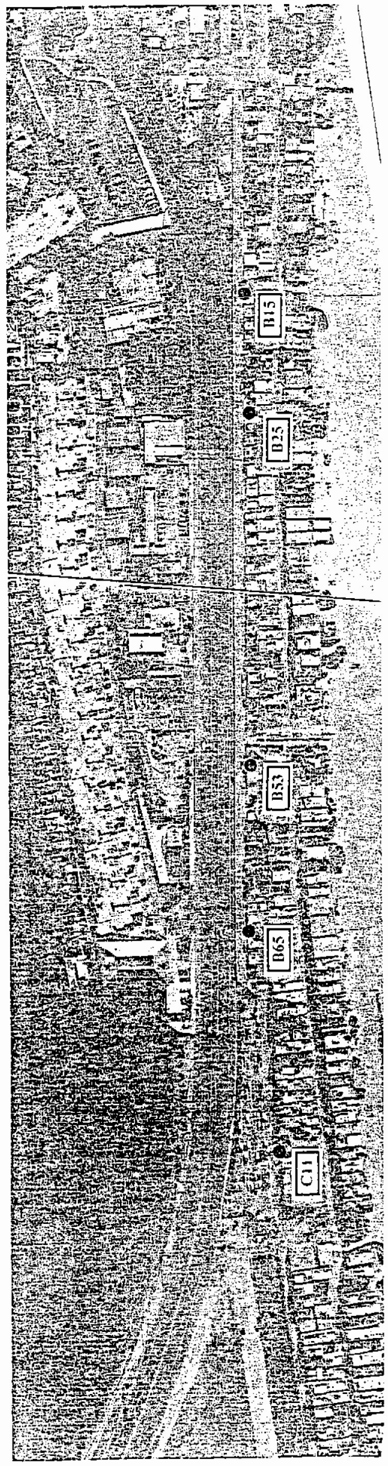

Figure 4. Location of the Noise Measurement Positions

Existing Noise Environment

As indicated in the previous section, five measurement locations were used in this study to characterize the existing noise environment. These locations were selected as being representative of other residences in their vicinity. To calibrate the traffic noise model to existing conditions, traffic counts were conducted concurrently with the limited noise measurements. These counts were obtained by videotaping traffic on Pacific Coast Highway in the vicinity of the sound level meters, and then reviewing the tape to identify the number and type of vehicles in each lane. Vehicles were classified as autos, medium (i.e., 2-axle) trucks and heavy (i.e., 3+-axle) trucks as required for input into the traffic noise model.

Using the measurement data provided in Appendix I and the traffic count data obtained at the site, the Sound32 traffic noise prediction model developed by Caltrans was calibrated to reflect the existing noise levels at the measurement locations. With the calibrated traffic model, an analysis was conducted to estimate the CNEL at each of the measurement locations in the study area. The results of our analysis are summarized as follows:

Location	Estimated Existing CNEL at 2nd Floor Level
Unit C11	66 dB
Unit B65	71 dB
Unit B53	71 dB
Unit B25	72 dB
Unit B15	70 dB

Future Noise Environment

Caltrans has indicated that the average daily traffic volume (ADT) on Pacific Coast Highway is expected to increase from its present level of 38,000 to a total of 48,000 vehicles per day by the year 2025. Using this traffic data, as well as the calibrated model developed for this project, an analysis was conducted to estimate the future traffic noise environment that will occur in the study area. The results of our analysis for year 2025 conditions are summarized as follows:

Location	Estimated Future CNEL at 2nd Floor Level
Unit C11	67 dB
Unit B65	72 dB
Unit B53	72 dB
Unit B25	73 dB
Unit B15	71 dB

These levels are 1 dB higher than existing traffic noise levels.

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Recommendations

As indicated in the previous section, the existing traffic noise environment exceeds the recommended design goal of 65 dB by 1 to 7 dB. By the year 2025, this exceedance is expected to increase by another 1 dB. To mitigate the traffic noise, and to comply with the noise design goals established for this project, the following mitigation measures are recommended:

1. A noise barrier should be constructed along the property line of the Surfside community as shown in Figure 5 (page 10). It consists of approximately 1,704 linear feet of 14'-high barrier followed by approximately 622 linear feet of 16'-high barrier. The barrier heights indicated in the figure are relative to the "PLTR" and "FNC" elevations surveyed by Jones, Cahl & Associates (Reference 1).
2. The noise barrier should be constructed of a material that provides a minimum surface density of 4 pounds per square foot. To minimize the aesthetic impact of the noise barrier, the overall recommended height shown in Figure 5 (page 10) can be achieved with a combination of materials (e.g., concrete block and glass panels), as long as each material complies with the recommended surface density requirement.
3. The noise barrier should be a continuous structure without gaps (including drainage holes) or gates.
4. To minimize the buildup of noise in the Surfside community due to reverberation, the barrier should be constructed with a sound-absorptive material facing the homes. This can be achieved by constructing the barrier out of a sound-absorptive material, or by attaching a sound-absorptive material to the face of the barrier. Refer to Enclosure 1 for product literature.

Consideration should also be given to the potential impact that traffic noise reflections off the recommended noise barrier will have on the properties across Pacific Coast Highway, and across Surfside Avenue near Anderson Street. Any potential impact can be minimized by constructing the barrier with a sound-absorptive material (as described in Item 4 above) facing Pacific Coast Highway.

Alternatives to the Recommended Noise Barrier

The noise barrier recommended in the previous section will achieve all three design goals established for this project. This will result in a noticeable reduction in traffic noise and an exterior noise environment that is generally considered to be acceptable. Recognizing that a 14'- to 16'-high noise barrier may have unacceptable economic and aesthetic impacts, the following sections briefly discuss the noise barriers needed to achieve each of the individual design goals.

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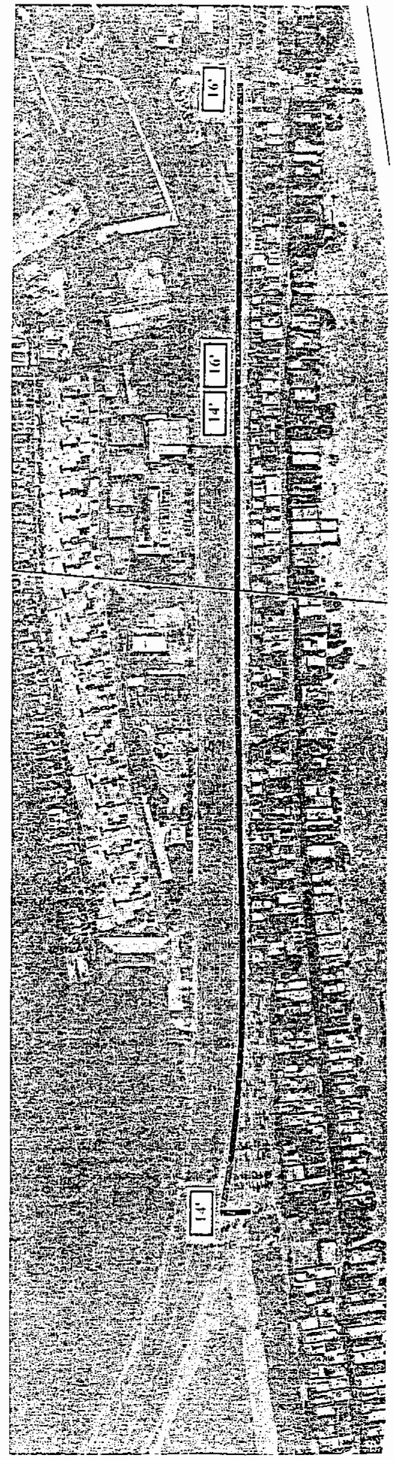

Figure 5. Location of Recommended Noise Barriers

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CNEL of 65 dB or Less

Referring to Figure 5 (page 10) and starting from the north end and working towards the south, a CNEL of 65 dB or less can be achieved with a noise barrier consisting of 301 linear feet of 10'-high barrier, followed by 1,300 linear feet of 12'-high barrier, and then 725 linear feet of 14'-high barrier. This barrier will also provide 5 dB or more of noise reduction, but will not break the line-of-sight to the truck exhaust stacks at homes towards the north and south ends of the study area.

Minimum 5 dB of Noise Reduction

Referring to Figure 5 (page 10) and starting from the north end and working towards the south, 5 dB or more of noise reduction can be achieved with a noise barrier consisting of 1,804 linear feet of 10'-high barrier, followed by 522 linear feet of 12'-high barrier. This barrier will reduce the CNEL to 65 dB or less at only a few homes near the north end of the study area. The line-of-sight to the truck exhaust stacks will not be broken at any residence in the study area.

Break Line-of-Sight to Truck Exhaust Stacks

This is the recommended noise barrier, as shown in Figure 5 (page 10).

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Conclusion

Measurements obtained at the site indicated that the existing traffic noise exposure within the Surfside community exceeds the recommended design goal of 65 dB by about 1 to 7 dB. This impact can be mitigated by constructing a 14'- to 16'-high barrier along the property line. Such a barrier will reduce both the existing and future traffic noise exposures to 65 dB or less at second floor locations, will provide 5 dB or more of noise reduction, and will break the line-of-sight to truck exhaust stacks in the nearest traffic lane. It is noted, however, that such a high wall has the potential for creating a reverberant environment within the Surfside community, and for increasing traffic noise exposures at properties on the northeast side of the barrier. This potential impact can be minimized by either constructing the barrier of sound-absorptive materials, or by attaching such materials to either or both sides of the barrier.

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References

1. Surfside Colony Topography prepared by Jones, Cahl & Associates; June 18, 2002.
2. Preliminary Plans, Seal Beach Regional Trail, Pacific Coast Highway from Seal Beach Boulevard to Anderson Street, prepared by W. G. Zimmerman Engineering, Inc; no date.