2.2.7 Noise

2.2.7.1 Regulatory Setting

NEPA and CEQA provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

A California Environmental Quality Act

CEQA requires a strictly no-build versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are not feasible. The rest of this section will focus on the NEPA-23 CFR 772 noise analysis; please see Chapter 3 for further information on noise analysis under CEQA.

B National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and the Department, as assigned) involvement, the Federal-Aid Highway Act of 1970 and the associated implementing regulations (Title 23 Code of Federal Regulations [CFR] Part 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use being analyzed. For example, the NAC for residences (i.e., 67 A-weighted decibels [dBA]) is lower than the NAC for commercial areas (i.e., 72 dBA). Table 2.2.7-1 lists the NAC.

Table 2.2.7-1
Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA $L_{eq}(h)$	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR Part 772, 2004.

In accordance with the Caltrans' Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans, 1998b), traffic noise impacts occur when one or more of the following occur: (1) a substantial noise increase; and/or (2) predicted noise levels approach or exceed NAC. A noise increase is substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, L_{eq}(h). A traffic noise impact will also occur when predicted noise levels approach within 1 dBA or exceed the NAC with the project (Table 2.2.7-1).

If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This section discusses noise abatement measures that would likely be incorporated in the project.

The Department's Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is feasible and reasonable. Feasibility is defined as an engineering consideration. A minimum 5-dBA noise reduction must be achieved at the impacted receivers for the proposed noise abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is a cost-benefit analysis. Other factors used in determining whether a proposed noise abatement measure is reasonable include residents' acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, and newly constructed development versus development pre-dating 1978. This is compared to determine if the proposed abatement is justified with the cost per benefited residence (or receptor) calculation.

2.2.7.2 Affected Environment

A Traffic Noise Technical Report was prepared as part of the development of this project (Parsons, 2007). The report complies with 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise*, and the Department's noise analysis policy described in *Technical Noise Supplement (TeNS) A Technical Supplement to the Traffic Noise Analysis Protocol* (Caltrans, 1998c). This noise study modeled and evaluated traffic noise levels in noise-sensitive areas within the boundaries of Alternatives 3 and 5. This section summarizes the noise study results.

A Existing Noise Level Measurement

Noise measurements were taken at selected noise-sensitive locations to determine the existing noise environment. All noise measurements were conducted according to the guidelines outlined in FHWA's *Measuring of Highway-Related Noise,* FHWA-PD-96-046. The representative measurement sites are selected to verify or calibrate computer noise models. In addition, locations that are expected to receive the greatest noise impacts, such as the first row of houses from the noise source, are generally chosen. Results of the short-term noise measurements were recorded on field data sheets. Long-term measured data were downloaded to a computer for tabulation. Meteorological conditions at monitoring sites were noted and included in field notes.

The proposed project is considered a Type I project by 23 CFR 772 because of the changes to the horizontal alignments that would occur at the I-5 ramps. This study includes (a) a long-term noise measurement; (b) short-term measurements; (c) roadway traffic noise modeling using FHWA's Traffic Noise Model (TNM) ver. 2.5; and (d) noise abatement recommendations for soundwall replacement. This report complies with 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise*, and the Department's Traffic Noise Analysis Protocol (Caltrans, 2006).

B Existing Noise Environment

The residential areas investigated in this study are located east and west of I-5, north of Ortega Highway. There are three single-family houses on the east side of I-5 along Avenida Los Cerritos. These houses are approximately 36 ft (10.9 m) higher than the freeway. There is also a church just north of these three houses, but it does not have a frequent outdoor use area exposed to the traffic noise. A Best Western hotel is located east of I-5 and south of Ortega Highway. The only outdoor use area at this hotel is the swimming pool area, which is protected from the freeway noise by the hotel building. There is an existing soundwall along the west side of I-5 for the residential area along La Calera Street, baseball fields, and San Juan Elementary School. This soundwall is located along the I-5 freeway shoulder just past the creek, where it continues south along the right-of-way (ROW) line. Mission Inn is located west of I-5, just north of Ortega Highway. The only outdoor use area at this motel is the swimming pool area.

Because of the proposed project, some commercial buildings would be demolished on the east side of I-5 just south of Ortega Highway for both alternatives. Portions of the existing soundwall on the west side of I-5 would also be demolished with Alternative 5. In addition, one of the Mission Inn buildings and several of the school buildings would be demolished with Alternative 5.

A long-term, 24-hour noise measurement was conducted at one of the single-family houses on the east side of I-5 (site R3/LT1) to determine the time of occurrence and level of the peak traffic noise. According to the recorded noise levels at this site, the peak noise hours occurred between 8:00 a.m. and 3:00 p.m. Results of this measurement were also used to adjust the short-term measurements, which were not conducted during the peak noise hour, to reflect the levels during the peak noise hours. The noise monitor was located in the backyard of a first-row, single-family residence on Avenida Los Cerritos.

Noise levels for traffic noise reports are typically reported in terms of dBA. To approximate the frequency response of the human ear, a series of L_p adjustments is usually applied to the sound level at different frequencies. These adjustments are referred to as a weighting network. The A-scale weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. In environmental noise studies, A-weighted L_ps are commonly referred to as noise levels. Figure 2.2.7-1 shows typical A-weighted noise levels.

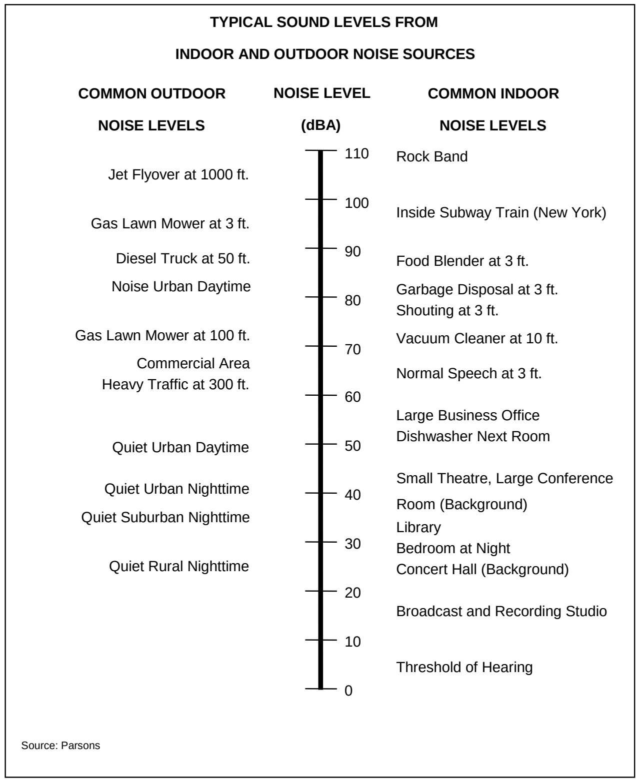

Figure 2.2.7-1
Typical A-Weighted Noise Levels

Short-term, 20-minute noise measurements were taken at three locations – Sites R9/ST1, R4/ST2, and R4/ST4. Measurements were conducted during the afternoon; therefore, the results were adjusted, using results of the long-term noise measurement, to reflect peak-hour noise levels. Measurement results at Site R9/ST1 include noise from kids playing nearby, in addition to the traffic noise. Results of the measurements indicate that existing (i.e., measured or adjusted to reflect peak noise hour) noise levels (L_{eq}(h)) in the area range from 56 to 68 dBA. L_{eq} represents an average of the sound energy occurring over a specified period. L_{eq} is, in effect, the steady-state sound level that, in a stated period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level, L_{eq}(h), is the energy average of the A-weighted sound levels occurring during a 1-hour period, and it is the basis for NAC used by the Department and FHWA.

Traffic noise levels currently approach or exceed the NAC of 67 dBA at some of the measurement sites. Tables 2.2.7-2 and 2.2.7-3 present short-term and long-term measurement results, respectively.

Table 2.2.7-2
Short-Term Noise Measurement Results

Site No.	Street Address, City	Land Use	Meter Location	Measurement Dates	Start Time	Measured L_{eq}, dBA[1]	Adjusted Peak-Hour L_{eq}, dBA[2]	Adjusted to Long-Term Site
ST1	San Juan Elementary School, San Juan Capistrano	School	Baseball Diamond	November 2, 2006	14:20	68	68 [3]	LT1
ST2	Mission Inn 26891 Ortega Highway, San Juan Capistrano	Motel	Unit 21	November 2, 2006	15:20	58	59	LT1
ST3	San Juan Elementary School, San Juan Capistrano	School	Near YMCA	November 2, 2006	16:00	62	63	LT1
ST4	Mission Inn 26891 Ortega Highway, San Juan Capistrano	Motel	Unit 27	November 2, 2006	15:20	55	56	LT1

Notes:
[1] All short-term measured noise levels are a 20-minute L_{eq}.
[2] Measurements conducted during off-peak hours were adjusted to the peak-hour L_{eq} based on a comparison with long-term noise levels that were measured at a nearby measurement site, listed in the last column.
[3] Includes noise from children playing nearby.

Source: Parsons, 2007.

Table 2.2.7-3
Long-Term Noise Measurement Results

Site No.	Street Address, City	Land Use	Meter Location	Measurement Dates	Start Time	Duration, Number of Hours	Peak-Hour Time	Measured Peak Hour L_{eq}, dBA[2]
LT1	31451 Avenida Los Cerritos, San Juan Capistrano, CA	SFR[1]	Back Yard	November 2, 2006 to November 3, 2006	12:00 p.m.	25	9:00 a.m. to 3:00 p.m.	73

Notes:
[1] SFR – single-family residential.
[2] The highest measured hourly noise level recorded during the long-term measurement period.

Source: Parsons, 2007.

C Traffic Noise Modeling

The FHWA highway noise prediction computer model, TNM 2.5, was used for the noise computations. TNM 2.5 input is based on a three-dimensional grid created for the study area to be modeled. All roadway, barrier, and receiver points are defined by their x, y, and z coordinates. Roadways and barriers are coded into TNM 2.5 as line segments defined by their end points. Receivers, defined as single points, are typically located at sensitive receptors such as residences, schools, and churches. Receivers are modeled at a height of 5 ft above ground elevation.

To determine the noise levels generated by traffic, the TNM 2.5 computer program requires inputs of traffic volumes, speeds, and roadway grade adjustments. The program contains three standard vehicle types: cars, medium trucks, and heavy-duty trucks. The propagation path between source and receiver is modeled in TNM 2.5 with shielding factors and propagation constants. These may be coded separately for every roadway and receiver pair. Shielding factors are useful for modeling the shielding effect of rows of houses or building structures, special terrain features, and even barriers. Propagation constants are used to model the varying propagation rates between the source and the receiver. Generally, two basic propagation rates are used in TNM 2.5: hard ground propagation, which produces a 3-dB drop-off per doubling of distance; and soft ground propagation, which produces a 4.5-dB drop-off per doubling of distance.

Hard ground propagation is used when either the source or the receiver is elevated or when the propagation path is over a hard surface such as asphalt. Soft ground propagation is used to model the greater propagation loss over grass or soft earth.

D Traffic Noise Model Calibration

The proposed project would not significantly change the overall geometry of I-5 near the study area; therefore, it is appropriate to calibrate the computer model using field-measured data. Normally, when existing traffic counts and terrain conditions are entered into the noise model, the computer output is then compared with the noise levels recorded at the same time that the traffic count was made, and a calibration (“K”) factor is obtained (Caltrans, 1998). Traffic volumes and speeds in both directions of I-5 were recorded during a 20-minute interval of the long-term measurement. The recorded traffic data were entered into the traffic model, and noise-level results were compared to the noise levels recorded during the 20-minute interval of the long-term measurement. The model results and measured noise levels were within 1.9 dB from each other when compared; therefore, a “K” factor is not necessary for this model. A thick stand of vegetation between the measurement site and I-5 could be contributing to most of the difference between the measured and predicted noise levels. Table 2.2.7-4 presents traffic data that was used for the model calibration.

Table 2.2.7-4
Traffic Data Used For Calibration

I-5 Roadway Segment and Lane Type	Number of Lanes	Speed, mph Volume	Total Hourly Volume	Car (%)	Medium Trucks (%)	Heavy Trucks (%)
Off-ramp from I-5 northbound	1	45-25	1,000	845 (84.5)	11 (1.0)	15 (1.7)
On-ramp to I-5 northbound	1	25-65	1,122	1,080 (96.3)	18 (1.6)	24 (2.2)
Off-ramp from I-5 southbound	1	5	1,818	1779 (97.9)	27 (1.5)	12 (1.0)
On-ramp to I-5 southbound	1	65-25	681	658 (96.6)	10 (1.5)	13 (1.9)
I-5 southbound outside lanes	2	67	3,154	2,960 (93.8)	50 (1.6)	144 (4.6)
I-5 southbound inside lanes	2	67	3,009	2,960 (98.3)	49 (1.6)	–
I-5 southbound high-occupancy vehicle lane	1	67	1,480	1,480 (100)	–	–
I-5 northbound high-occupancy vehicle lane	1	67	1,118	1,1118 (100)	–	–
I-5 northbound inside lanes	2	67	2,332	2,236 (95.9)	96 (4.1)	–
I-5 northbound outside lanes	2	65	2,497	2,236 (89.5)	96 (3.8)	165 (6.6)

Source: Parsons, 2007.

E Traffic Data Results

The highest traffic noise occurs when traffic is heavy but remains free flowing. Traffic engineers refer to this condition as Level of Service (LOS) C. Traffic volumes of LOS C are used to obtain the worst-case scenario for potential noise impacts. It is assumed that the LOS C for I-5 general mixed-flow lanes is 1,800 vehicles per lane per hour at 65 miles per hour (mph). One high-occupancy vehicle (HOV) lane in each direction of travel was modeled with 1,500 vehicles per lane per hour at 65 mph.

Although the same mainline traffic volumes are used for the no build and build alternatives, some ramp volumes differ. On the northbound side of I-5, an additional loop on-ramp would be constructed. This ramp would carry an additional 1,000 vehicles during the peak hour. On the southbound side of I-5, the off-ramp to Ortega Highway would be expanded from one lane to two lanes, and it would carry approximately 2,000 vehicles during the peak noise hour compared to 1,000 vehicles with the No Build Alternative.

Traffic on the existing on-ramp from Ortega Highway to I-5 southbound would increase from 681 vehicles with the No Build Alternative to 780 vehicles with Alternative 3. With Alternative 5, the number of vehicles on this ramp would be reduced to 251 vehicles during the peak hour. With Alternative 5, a loop ramp from Ortega Highway to I-5 southbound would be constructed, and it would carry 530 vehicles during the peak hour

(Austin-Foust, 2007a). Tables 2.2.7-5 through 2.2.7-7 present vehicle volumes and speeds on I-5 and the ramps. Traffic on local surface streets was not modeled because the dominant noise source in the study area is the freeway traffic.

Table 2.2.7-5
TNM Traffic Inputs – No Build Alternative

I-5 Roadway Segment and Lane Type	Number of Lanes	Speed, mph Volume	Total Hourly Volume	Car (%)	Medium Trucks (%)	Heavy Trucks (%)
Off-ramp from I-5 northbound	1	65-25	1,000	845 (84.5)	10 (1.0)	15 (1.7)
On-ramp to I-5 northbound	1	25-65	1,000	971 (97)	12 (1.2)	17 (1.7)
Off-ramp from I-5 southbound	1	65-25	1,000	967 (96.7)	14 (1.4)	19 (1.9)
On-ramp to I-5 southbound	1	65-25	681	658 (96.6)	10 (2.8)	13 (1.9)
I-5 southbound outside lanes	2	65	3,601	3,309 (91.9)	83 (2.3)	209 (5.8)
I-5 southbound inside lanes	2	65	3,600	3,517 (97.7)	83 (2.3)	–
I-5 southbound high-occupancy vehicle lane	1	65	1,500	1,500 (100)	–	–
I-5 northbound high-occupancy vehicle lane	1	65	1,500	1,500 100	–	–
I-5 northbound inside lanes	2	65	3,600	3,526 (97.9)	74 (2.1)	–
I-5 northbound outside lanes	2	65	3,600	3,335 (92.6)	74 (2.1)	191 (5.3)

Source: Parsons, 2007.

Table 2.2.7-6
TNM Traffic Inputs – Alternative 3

I-5 Roadway Segment and Lane Type	Number of Lanes	Speed, mph Volume	Total Hourly Volume	Car (%)	Medium Trucks (%)	Heavy Trucks (%)
Off-ramp from I-5 northbound	1	25-65	1,000	971 (97)	12 (1.2)	17 (1.7)
Loop on-ramp to I-5 northbound	1	35	870	845 (97.1)	10 (1.1)	15 (1.7)
On-ramp to I-5 northbound	1	25-65	1,000	971 (97)	12 (1.2)	17 (1.7)
I-5 southbound outside lanes	2	65	3,601	3,309 (91.9)	83 (2.3)	209 (5.8)
I-5 southbound middle lanes	2	65	3,600	3,517 (97.7)	83 (2.3)	–
I-5 southbound high-occupancy vehicle lane	1	65	1,500	1,500 (100)	–	–
I-5 northbound high-occupancy vehicle lane	1	65	1,500	1,500 (100)	–	–

Table 2.2.7-6
TNM Traffic Inputs – Alternative 3

I-5 Roadway Segment and Lane Type	Number of Lanes	Speed, mph Volume	Total Hourly Volume	Car (%)	Medium Trucks (%)	Heavy Trucks (%)
Off-ramp from I-5 southbound	1	25-65	2,000	1,934 (96.7)	28 (1.4)	38 (1.9)
On-ramp to I-5 southbound	1	25-65	780	754 (96.7)	11 (1.4)	15 (1.9)
I-5 northbound middle lanes	2	65	3,600	3,526 (97.9)	74 (2.1)	–
I-5 northbound outside lanes	2	65	3,600	3,335 (92.6)	74 (2.1)	191 (5.3)

Source: Parsons, 2007.

Table 2.2.7-7
TNM Traffic Inputs – Alternative 5

I-5 Roadway Segment and Lane Type	Number of Lanes	Speed, mph Volume	Total Hourly Volume	Car (%)	Medium Trucks (%)	Heavy Trucks (%)
Off-ramp from I-5 northbound	1	25-65	1,000	971 (97)	12 (1.2)	17 (1.7)
Loop on-ramp to I-5 northbound	1	35	870	845 (97.1)	10 (1.1)	15 (1.7)
On-ramp to I-5 northbound	1	25-65	1,000	971 (97)	12 (1.2)	17 (1.7)
I-5 southbound outside lanes	2	65	3,601	3,309 (91.9)	83 (2.3)	209 (5.8)
I-5 southbound middle lanes	2	65	3,600	3,517 (97.7)	83 (2.3)	–
I-5 southbound high-occupancy vehicle lane	1	65	1,500	1,500 100	–	–
I-5 northbound high-occupancy vehicle lane	1	65	1,500	1,500 100	–	–
Off-ramp from I-5 southbound	1	25-65	2,000	1,934 (96.7)	28 (1.4)	38 (1.9)
On-ramp to I-5 southbound	1	25-65	251	242 (96.4)	4 (1.6)	5 (2.0)
On loop ramp to I-5 southbound	1	25-65	530	513 (96.7)	7 (1.3)	10 (1.9)
I-5 northbound middle lanes	2	65	3,600	3,526 (97.9)	74 (2.1)	–
I-5 northbound outside lanes	2	65	3,600	3,335 (92.6)	74 (2.1)	191 (5.3)

Source: Parsons, 2007.

F Noise Impacts and Barrier Analysis

The worst-case scenario traffic peak noise hour levels for the two build alternatives were predicted using TNM 2.5, and the results are presented in Tables 2.2.7-9 and 2.2.7-10.

2.2.7.3 Environmental Consequences

This section discusses traffic data used in the analysis and predicts worst-case traffic noise impacts for the two build alternatives (Alternatives 3 and 5) and the No Build Alternative.

A Temporary Impacts

Alternatives 3 and 5. Temporary noise impacts would be related to construction activities. Noise at the construction sites would be intermittent with varying intensity. The degree of construction noise would also vary depending on the location and type of construction activities. Long-term noise exposure descriptors would be difficult to quantify because of the intermittent nature of construction noise. Highway construction would be accomplished in several different phases. Table 2.2.7-8 lists the calculated noise levels for typical construction activity that would be expected in the project area.

During the construction period, some of the sensitive receptors that are close to the highway may be exposed to high noise levels; therefore, a detailed construction noise level calculation is often conducted during the design phase to predict construction noise levels and provide appropriate abatement measures.

Temporary adverse effects related to construction noise are not anticipated and measures MM N1 and MM N2 are proposed to minimize construction noise.

Table 2.2.7-8
Typical Construction Noise Levels

Type of Equipment	Maximum Noise Level, dBA at 50 feet (15 meters)
Excavator	83
Backhoe	75
Front End Loader	74
Dozer	85
Grader	75
Concrete Pump	81
Vibratory Roller	78
Compactor	76
Crane	85
Asphalt Paver	79
Asphalt Roller	78
Heavy-Duty Dump Trucks	77

Source: Parsons, 2007.

B Permanent Impacts

Alternative 3. With Alternative 3, three sensitive noise receptors representing single-family residences, a church, and a baseball field at San Juan Elementary School would be subjected to noise levels that approach or exceed the NAC. On the east side of I-5, two modeled receptors (R2, R3), depicted on Figure 2.2.7-2, represent three residences and a church located adjacent to the I-5 northbound on-ramp from Ortega Highway. On the west side of I-5, the receptor exceeding the NAC represents a baseball field (receptor R11) at San Juan Elementary School.

Table 2.2.7-9 provides noise analysis results for Alternative 3, including the noise barrier analysis. A noise barrier was considered along the shoulder of the on-ramp starting near Ortega Highway and then the barrier was transitioned to the ROW line where it became higher than the shoulder of the ramp. As shown in Table 2.2.7-9, barrier heights of up to 16 ft (4.8 m) were investigated, but they would not achieve the Department-required 5-dB reduction; therefore, a barrier at this location would not be justified or feasible.

An existing 16-ft soundwall located along the I-5 southbound off-ramp adjacent to San Juan Elementary School currently protects portions of the school, as well as the associated playground and baseball field. This existing barrier location and length are illustrated in Figure 2.2.7-2. This soundwall was originally constructed as part of the San Joaquin Hills Transportation Corridor project and would remain in place if Alternative 3 is constructed. This wall is at the maximum height allowed under Department policy; therefore, it cannot be raised.

A potential second soundwall adjacent to the shoulder of the I-5 southbound exit ramp to Ortega Highway was also analyzed. Soundwall heights of up to 16 ft were modeled, but the minimum 5-dB reduction was not achieved at R11; therefore, a new soundwall at this location is not justified or feasible.

Table 2.2.7-9
Summary of Noise Analysis Results – Alternative 3

REC. NO.	LAND USE [2]	EXISTING PEAK HOUR NOISE LEVELS Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS [1]														BARRIER NO.
			FUTURE NO-BUILD Leq (h), dBA	FUTURE BUILD Leq (h), dBA	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE S, A/E, or (NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							8 ft		10 ft		12 ft		14 ft		16 ft		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
East of I-5/South of Ortega Highway																	
R 1	Motel	63 [E]	63	64	B (67)	NONE	--		--		--		--		--		N/A
East of I-5/North of Ortega Highway																	
R 2	SFR	73 [E]	73	73	B (67)	A/E	73	0	72	1	71	2	70	3	69	4	N/A
R 3	SFR	73 [M-LT1]	73	73	B (67)	A/E	72	1	72	1	71	2	70	3	69	4	
West of I-5/North of Ortega Highway																	
R 4*	Motel	56 [M-ST4]	61	61	B (67)	NONE	--		--		--		--		--		N/A
R 5*	School	62 [E]	62	62	B (67)	NONE	--		--		--		--		--		
R 7*	School	61 [E]	61	62	B (67)	NONE	--		--		--		--		--		
R 5A*	School	63 [M-ST3]	63	63	B (67)	NONE	--		--		--		--		--		
Baseball Field Area North of Ortega/West of I-5																	
R 5B*	REC	64 [E]	64	64	B (67)	NONE	62	2	61	3	60	4	60	4	61	3	Results are with existing soundwall and a new soundwall on the shoulder
R 6*	REC	64 [E]	64	64	B (67)	NONE	63	1	62	2	60	4	60	4	61	3	
R 8*	REC	65 [E]	62	62	B (67)	NONE	62	0	61	1	60	2	60	2	60	2	
R 9*	REC	68 [M-ST1]	65	65	B (67)	NONE	64	1	63	2	61	4	60	5	61	4	
R 11*	REC	69 [E]	66	66	B (67)	A/E	65	1	64	2	62	4	62	4	62	4	
Single Family Residences North of Ortega/West of I-5																	
R 10*	SFR	67 [E]	63	63	B (67)	NONE	--		**--**		--		--		--		N/A
R 12*	SFR	68 [E]	64	64	B (67)	NONE	--		**--**		--		--		--		

Notes:

1 - Traffic noise from freeway only; other local noise sources are not included.
2 - Land Use: SFR - single-family residence.
REC - Recreational (playground, pool, or tennis court).
3 - S = Substantial Increase (12 dB or more); A/E = Approach or Exceed NAC.
- Noise level in bold-face indicate the minimum height required for 5-dB reduction.

*No-Build and Build scenario includes existing 12-ft and 16-ft barriers.

R - Recommended height based on requirements of Caltrans Noise Analysis Protocol.
E - Estimated noise level based on measurements at a similar location.
M - Measured peak hour noise level. Short-term measurements have been adjusted to
I.L. - Insertion Loss

T - Height required to cut the line-of-sight to heavy truck stacks.

Source: Parsons, 2007.

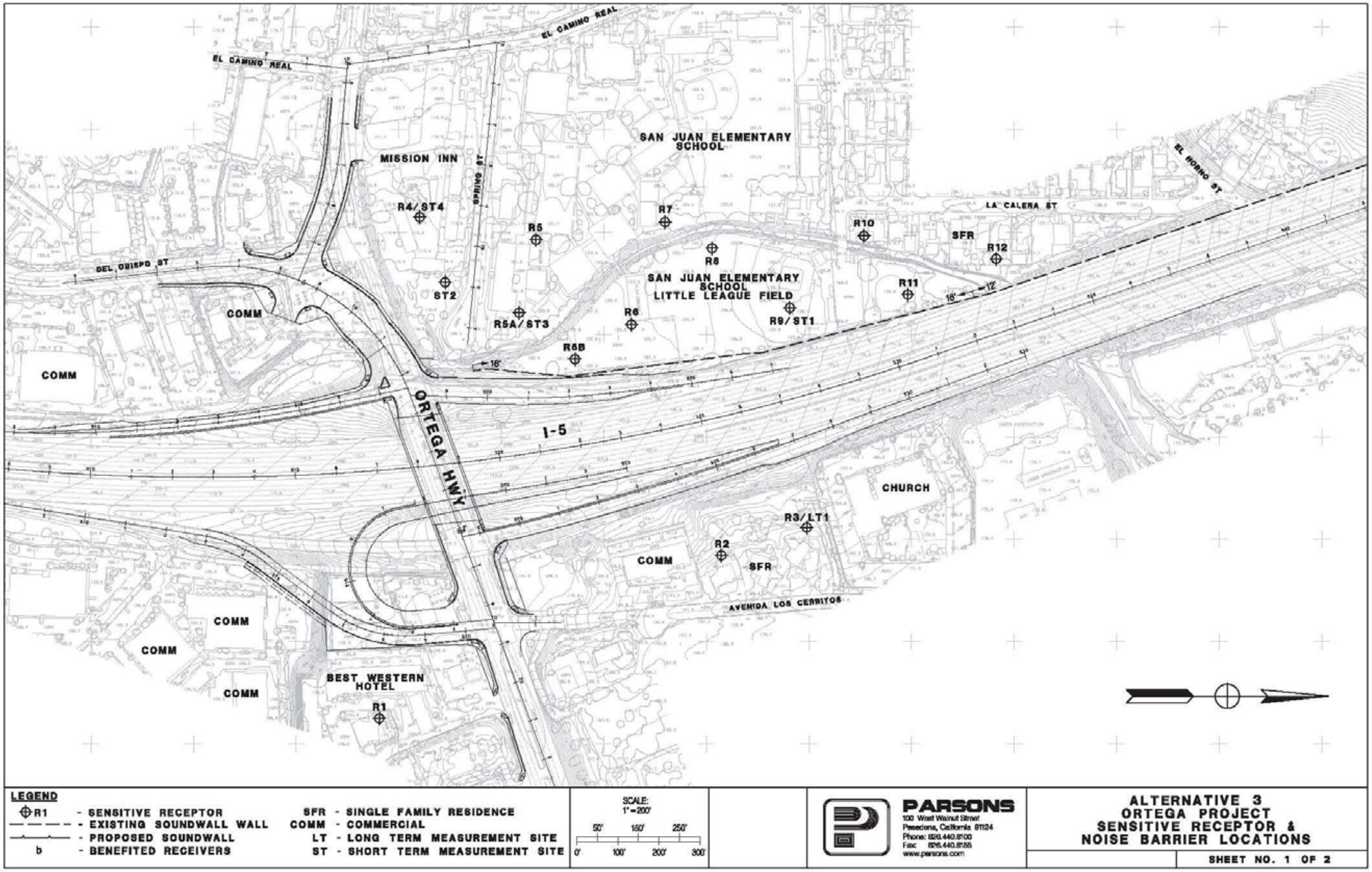

Figure 2.2.7-2
Sensitive Receptor and Noise Barrier Locations – Alternative 3

Alternative 5. With this alternative, seven modeled sensitive noise receptors, depicted on Figure 2.2.7-3, had noise levels that approach or exceed the NAC. As previously mentioned, on the east side of I-5, receptors R2 and R3 represent three residences and a church located adjacent to an on-ramp from Ortega Highway to I-5 northbound. Receptors R5, R6, R9 and R11 are located on the west side of I-5 and represent the San Juan Elementary School and associated recreation/sports fields. Receptor R12 is a Single Family Residence located on the west side of I-5, adjacent to San Juan Elementary School.

The Alternative 5 existing soundwall configuration and considered location and length for proposed Soundwall S523 are illustrated in Figure 2.2.7-3. With Alternative 5, a portion of the existing 16-ft soundwall that currently protects portions of the San Juan Elementary School buildings, playground, and baseball fields would remain in place, but a portion of the barrier must be removed and replaced to accommodate the new I-5 southbound ramp configuration. South of the remaining portion of the existing soundwall, a new 10-ft soundwall (Soundwall S523) is proposed to be constructed along the ramp shoulder to Ortega Highway. To be effective, the new soundwall would be designed to connect to, or overlap, the existing soundwall at this location.

The proposed new Soundwall S523 was originally planned to be placed at the shoulder of the I-5 off-ramp because the off-ramp is elevated in comparison to the school and play fields. However, the City and Capistrano Unified School District (CUSD) requested that the new soundwall be moved to the ROW line to minimize “dead space” between the future soundwall and the school property line. It was subsequently determined that, due to the topography of the area, the soundwall placement at the ROW line would not be as effective in abating noise as a wall placed along the shoulder of the off-ramp would be. The proposed placement along the ramp shoulder for Soundwall S523 would be more effective to minimize noise and also shield the line of sight from heavy-duty truck exhaust stacks. To be effective, the new Soundwall S523 would be designed to connect to, or overlap, the existing soundwall at this location. It has been confirmed that the proposed soundwall placement along the ramp shoulder can be designed to meet Caltrans’ mandatory geometric design standard for minimum Stopping Sight Distance.

If Alternative 5 is selected for implementation and it is determined during the future final design phase that noise conditions have substantially changed, noise abatement may not be necessary under NEPA guidelines. Typically, the final decision regarding noise abatement is made after completion of the project design and the public involvement processes. However, CEQA impact significance thresholds would be exceeded at the San Juan Elementary School and associated play fields, so the construction of Soundwall S523 has been incorporated into the project as a mitigation measure required under CEQA guidelines. Refer to Section 3.2.11 (CEQA Evaluation, Noise) for more information.

Table 2.2.7-10
Summary of Noise Analysis Results – Alternative 5

REC. NO.	MEAS. SITE NO.	LAND USE [2]	EXISTING PEAK HOUR NOISE LEVELS Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS [1]: FUTURE NO-BUILD Leq (h), dBA	FUTURE BUILD Leq (h), dBA	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE S, A/E, or (NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.): 8ft Leq(h)	8ft I.L.	10 ft Leq(h)	10 ft I.L.	12 ft Leq(h)	12 ft I.L.	14 ft Leq(h)	14 ft I.L.	16 ft Leq(h)	16 ft I.L.	BARRIER NO.
East of I-5/South of Ortega Highway																		
R 1	LT1	Motel	63 [E]	63	64	B (67)	NONE	--		--		--		--		--		N/A
East of I-5/North of Ortega Highway																		
R 2	LT1	SFR	73 [E]	73	73	B (67)	A/E	--		72	1	72	1	70	3	69	4	N/A
R 3	LT1	SFR	73 [M-LT1]	73	73	B (67)	A/E	--		72	1	71	2	70	3	69	4	
West of I-5/North of Ortega Highway																		
R 4*	ST3	Motel	56 [M-ST4]	61	61	B (67)	NONE	--		--		--		--		--		--
R 5*	ST2	School	61 [E]	62	68	B (67)	A/E	**62**	6	60 [R, T]	8	60	8	59	9	59	9	S523
R 7*	ST3	School	61 [E]	61	65	B (67)	NONE	62	3	61	4	61	4	**60**	5	60	5	
Baseball Field Area North of Ortega/West of I-5																		
R 6*	ST1	REC	64 [E]	64	71	B (67)	A/E	**65**	6	64 [R, T]	7	63	8	62	9	62	9	S523
R 8*	ST1	REC	65 [E]	62	65	B (67)	NONE	62	3	62	3	62	3	61	4	61	4	
R 9*	ST1	REC	68 [M-ST1]	65	71	B (67)	A/E	67	4	**66** [R, T]	5	65	6	65	6	64	7	
R 11*	ST1	REC	69 [E]	66	67	B (67)	A/E	66	1	66	1	66	1	66	1	66	1	--
Single Family Residences North of Ortega/West of I-5																		
R 10*	ST1	SFR	67 [E]	63	65	B (67)	NONE	--		--		--		63	2	63	2	N/A
R 12**	ST1	SFR	68 [E]	64	66	B (67)	A/E	--		--		--		65	1	65	1	

Notes:

1 - Traffic noise from freeway only; other local noise sources are not included.
2 - Land Use: SFR - single-family residence.
REC - Recreational (playground, pool, or tennis court).
3 - S = Substantial Increase (12 dB or more); A/E = Approach or Exceed NAC.
- Noise level in bold-face indicate the minimum height required for 5-dB reduction.

R - Recommended height based on requirements of Caltrans Noise Analysis Protocol.
E - Estimated noise level based on measurements at a similar location.
M - Measured peak hour noise level. Short-term measurements have been adjusted to peak hour levels using the long-term measurements.
I.L. - Insertion Loss
T - Height required to cut the line-of-sight to heavy truck stacks.

*No Build scenario includes an existing 16-ft barriers for R4 to R11.
**No-Build and Build scenarios include existing 12-ft and 16-ft barriers for R12.

Source: Parsons, 2007.

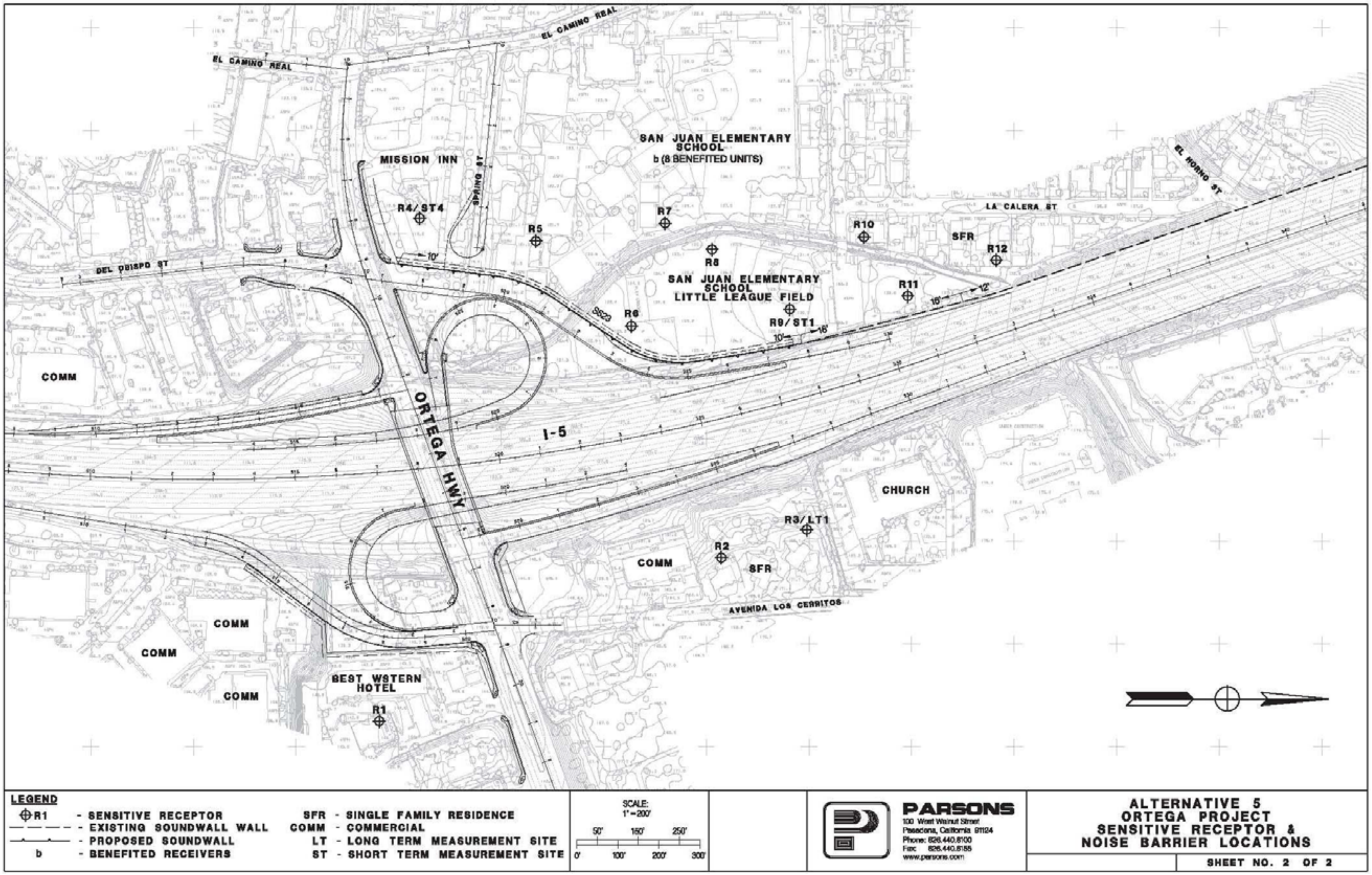

Figure 2.2.7-3
Sensitive Receptor and Noise Barrier Locations – Alternative 5

C Year 2035 Traffic Sensitivity Analysis – Noise Impact Conclusions

Alternatives 3 and 5. A supplemental traffic study sensitivity analysis was completed to evaluate the potential impacts of extending the traffic study planning horizon year from 2030 to 2035. Refer to Section 2.1.4.3C [Environmental Consequences, Permanent Impacts (Year 2035 Supplemental Traffic Sensitivity Analysis)] for a discussion of the year 2035 traffic analysis results. The purpose of the year 2035 traffic sensitivity analysis was to evaluate the implications of extending the traffic study planning horizon year from 2030 to 2035 and determine whether the longer time frame would change the future year traffic performance of Alternatives 3 or 5 in any significant manner.

The year 2035 traffic volumes are somewhat higher than the official year 2030 traffic forecasts provided in the project's Traffic Impact Study (Austin-Foust, 2007a). The higher volumes for year 2035 compared to year 2030 result in some differences in the intersection delay values and ramp volume to capacity (V/C) ratios for Alternatives 3 and 5; however, these differences are relatively minor in magnitude. The overall conclusion is that both build Alternatives 3 and 5 achieve the required traffic performance criteria and will operate satisfactorily with the projected year 2035 traffic volumes.

Anticipated higher traffic volumes for year 2035 compared to year 2030 would potentially result in lower peak-noise-hour traffic speeds, thereby decreasing peak-hour noise levels. The differences in noise levels would be relatively minor and commensurate with the minor differences in the year 2030 versus 2035 traffic volumes. Extending the traffic study planning horizon from 2030 to 2035 is not anticipated to result in a measurable difference in noise levels within the project area. Therefore, Alternatives 3 and 5 would not result in adverse noise effects to sensitive receptors within the project area under year 2035 traffic conditions.

2.2.7.4 Avoidance, Minimization and/or Mitigation Measures

A Temporary Measures

MM N-1 To minimize noise impacts during the construction period, the contractors shall be required to comply with the noise ordinance of the City of San Juan Capistrano. Specifically, Section 9-3.531 of the San Juan Capistrano Municipal Code limits construction periods between 7:00 a.m. – 6:00 p.m. Monday through Friday and from 8:30 a.m. to 4:30 p.m. on Saturdays (Section 9-3.531, 2000).

MM N-2 Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall operate without a muffler.

B Permanent Measures

Alternative 5: Proposed Soundwall S523 (Stations 527+20 to 149+50)

Based on the studies completed to date, if Alternative 5 is selected for implementation, the Department intends to incorporate noise abatement in the form of a new 10-ft barrier (Soundwall S523) to be located along the shoulder of the I-5 southbound off-ramp to

Ortega Highway, extending south to Ortega Highway. The Alternative 5 existing soundwall configuration and considered location and length for proposed Soundwall S523 are illustrated in Figure 2.2.7-3. The new Soundwall S523 would protect the San Juan Elementary School, as well as the associated playground and recreation/sports fields. It has been confirmed that the proposed soundwall placement along the ramp shoulder can be designed to meet Caltrans' mandatory geometric design standard for minimum Stopping Sight Distance.

If Alternative 5 is selected for implementation and it is determined during the future final design phase that noise conditions have substantially changed, noise abatement may not be necessary under NEPA guidelines. Typically, the final decision regarding noise abatement is made after completion of the project design and the public involvement processes. However, CEQA impact significance thresholds would be exceeded at the San Juan Elementary School and associated play fields, so the construction of Soundwall S523 has been incorporated into the project as a mitigation measure required under CEQA guidelines. Refer to Section 3.2.11 (CEQA Evaluation, Noise) for more information.

As reflected in Table 2.2.7-10, the proposed new Soundwall S523 with a 10-ft height would provide a 5- to 8-dB noise reduction for the impacted receptors on the school property. While the 10-ft soundwall would not provide a 5-dB reduction for other receivers in this area, it would reduce noise by 4 dB for R7 (school) and 3 dB for R8 (baseball field), and it would adequately abate noise for R5 (school), R6 (playground), and R9 (baseball field). To be effective, Soundwall S523 must connect to, or overlap, the existing soundwall at this location. Table 2.2.7-11 presents top-of-wall elevations considered for Soundwall S523.

The Department's noise protocol equates 100 ft of school or recreational land fronting a proposed barrier location with one residential unit to determine barrier reasonableness. For Alternative 5, the calculated reasonable allowance per frontage unit and reasonable allowance per noise barrier according to the Department's Protocol Worksheets A and B are $50,000 and $400,000, respectively. Table 2.2.7-12 presents an assessment of Soundwall S523 reasonableness with different soundwall heights.

Table 2.2.7-11
Soundwall S523 - Considered Top-of-Wall Elevations

Barrier Number	Benefited Receptor Number	Number and Type of Benefited Receptor	Highway Side	Barrier Location	Approximate I-5 Barrier Station	Barrier Height (ft)	Top-of-Wall Elevation (ft) [1]
S523	R5 and R6	Playground (6 frontage units)	West side of I-5	I-5 Southbound Off-ramp Shoulder	527+25	10	145.0
					527+00	10	145.0
					526+00	10	145.0
					525+00	10	139.0
					524+00	10	136.0
					523+00	10	137.6
					522+00	10	136.3
					521+00	10	137.6
					520+00	10	137.7
					519+00	10	137.9
					518+00	10	137.7
					517+00	10	137.7

Source: Parsons, 2007.

Table 2.2.7-12
Soundwall S523 - Data for Reasonableness Determination

SOUNDWALL I.D.: S523					
Critical Receiver: R6					
Predicted, without soundwall					
Absolute noise level, L_{eq}(h) dBA	71.1				
Build versus No Build, dBA	+7.4				
Predicted, with soundwall	H= 8 ft	H=10 ft	H= 12 ft	H= 14 ft	H=16 ft
Loss (noise reduction), dBA	6	7	8	9	9
Number of benefited frontage units*	6	8	8	8	8
Reasonable allowance per benefited frontage unit	$50,000	$50,000	$50,000	$50,000	$50,000
Total cost of soundwall should not exceed	$300,000	$400,000	$400,000	$400,000	$400,000
Number of benefited second-row residences	--	--	--	--	--
Additional allowance for second-row residences	--	--	--	--	--
Total cost of soundwall with second-row should not exceed	$300,000	$300,000	$300,000	$300,000	$300,000
* Soundwall S523 is proposed for noise reduction for a school and recreational facility. This cost analysis is consistent with the Department's Traffic Noise Protocol, August 2006, which equates a 100-ft frontage unit to one residential unit.					

Source: Parsons, 2007.

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