NOISE STUDY REPORT
INTERSTATE 5 / STATE ROUTE 56 INTERCHANGE PROJECT

11-SD-5- KP 52.6/56.0 (PM 32.7/34.8)
11-SD-56- KP 0.0/4.1 (PM 0.0/2.5)

EA: 11-177900

Prepared for:

California Department of Transportation

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January 2010

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EXECUTIVE SUMMARY

The purpose of this noise study is to assess the potential noise impacts and identify feasible noise abatement measures for the Interstate 5 / State Route 56 (I-5/SR-56) Interchange Project. Improvements are needed to maintain and improve the existing and future traffic operations along the I-5/SR-56 corridors between Del Mar Heights Road, Carmel Valley Road, and Carmel Country Road, in order to improve the safe and efficient local and regional traffic levels, while minimizing environmental and community impacts for the design year of 2030.

This noise study considers five alternatives; No-Build (Alternative 1), Direct Connector Build (Alternative 2), Auxiliary Lane Build (Alternative 3), the Hybrid Alternative (Alternative 4), and the Hybrid with Flyover Alternative (Alternative 5)

Parsons personnel visited the project site and conducted noise measurements at a total of 25 locations. Noise measurements were performed during March and April of 2004 along I-5 as part of the Interstate 5 North Coast Corridor Widening Project and an additional 15 noise measurements were conducted in November of 2007 for the I-5/SR-56 project. Noise measurements were conducted during the site visits to evaluate existing noise levels in the vicinity of the project area. Monitoring results indicate that the existing traffic noise levels already approach or exceed the Noise Abatement Criteria (NAC) at several outdoor use areas adjacent to the highways.

Existing land uses along the study area are primarily residential, with some schools and churches, and commercial land uses which include hotels, office buildings, and retail stores. Several of the residential land uses along I-5 and SR-56 are protected from highway traffic noise by existing soundwalls, property walls, and earthen berms. As a result, some of the residential land uses protected by the existing walls and berms would either not be impacted or could not meet the feasible abatement requirements by the I-5/SR-56 Interchange Project. A noise impact occurs when the predicted noise level in the design year approaches by 1 dB or exceeds the Noise Abatement Criteria (NAC) and noise reduction is considered feasible if the noise is reduced by at least 5 dB.

Future No-Build and Build Alternatives traffic noise levels were modeled using the Level-of-Service (LOS) C traffic volumes of 1,800 vehicles per hour per lane for mainline traffic and 1,500 vehicles per hour per lane for High Occupancy Vehicle (HOV) traffic to obtain the worst-case noise scenario. The traffic volumes of on- and off-ramps and connectors under the No-Build and Build conditions were capped at 1,000 vehicles per hour per lane.

The Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM) version 2.5, was used for the noise computations of the future "Build" scenarios of both I-5 and SR-56 and the "No-Build" scenario of SR-56. The I-5 portion of the I-5/SR-56 Interchange Project is a re-analysis of the Interstate 5 North Coast Corridor Widening Project. The predicted noise levels for the "No-Build" scenario of I-5 are from the North Coast Corridor Widening Project which were calculated using SOUND2000, Version 3.3.

Since there will only be lane additions to SR-56 without any major changes to the profile of the existing alignment, it is appropriate to calibrate the traffic noise computer model using the measured field data. Model calibration was not performed for I-5 because of the major changes proposed to be made to I-5, model calibration would not be practical. Noise measurements for the calibration of SR-56 were conducted at two of the measurement sites along SR-56 with simultaneous traffic counts using a video camera recorder and a radar gun for traffic speed measurements.

The predicted future peak hour average noise level (L_{eq}) at the representative receptors range from 54 to 83 dBA for Build Alternatives 2 through 5, exceeding the NAC at most locations along I-5 and several locations along SR-56. Soundwall heights from 2.4 m (8 ft) up to 4.9 m (16 ft) were considered to abate the predicted traffic noise impacts at the representative outdoor use areas within the proposed project area. Noise barriers were designed to reduce traffic noise levels by at least the minimum requirement of 5 dB. In addition, the wall heights are designed to block the line-of-sight to heavy truck exhaust stacks. There are a total of 17 soundwalls that would provide feasible abatement for Alternative 2, 14 soundwalls for Alternative 3, and 15 soundwalls for Alternatives 4 and 5. Additionally, there is one optional soundwall design for each alternative along eastbound SR-56. Tables ES-I, ES-II, ES-III, and ES-IV summarizes the feasible barriers, benefited residences, and the reasonable allowance per barrier for Build Alternatives 2 through 5, respectively.

Construction noise exposure to outdoor use areas will be intermittent. The degree of construction noise impacts may vary for different areas of the project site depending on the construction activities. During the construction period, the contractors may be required to comply with the noise ordinances of the local jurisdictions.

TABLE ES-I – SUMMARY OF FEASIBLE BARRIERS FOR ALTERNATIVE 2

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R4A to R10	13 SFR	R/W / Private Property Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 492 m (1,615 ft)	$37,000	$481,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R16 to R21A	35 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 392 m (1,286 ft)	$37,000	$1,295,000
S41	R29 to R30	7 SFR	R/W Westbound SR-56	3.7 m (12 ft) 165 m (541 ft)	$33,000	$231,000
S47	R32 to R36	11 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 339 m (1,112 ft)	$35,000	$385,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 465 m (1,526 ft)	$37,000	$259,000
S34	R46 & R47	2 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 297 m (974 ft)	$51,000	$102,000
S34 (Option)	R46 & R47	2 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 171 m (561 ft)	$49,000	$98,000
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 110 m (361 ft)	$37,000	$37,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S545	R4.5 to R4.12	6 SFR, 17 MFR & 1 REC (1 Frontage Unit)	R/W / Retaining Wall / Private Property Southbound I-5	2.4 m (8 ft) to 4.9 m (16 ft) 500 m (1,640 ft)	$57,000	$1,368,000
S551	R4.12A to R4.21	18 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 842 m (2,763) ft	$45,000	$855,000
S555	R4.21 & R4.22	4 SFR	Private Property Southbound I-5	2.4 m (8 ft) 123 m (404) ft	$55,000	$220,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (718) ft	$45,000	$450,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A to R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.21 to R5.23A	10 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) to 3.7 m (12 ft) 215 (705 ft)	$41,000	$410,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE ES-II – SUMMARY OF FEASIBLE BARRIERS FOR ALTERNATIVE 3

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R6A to R9	11 SFR	R/W Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 362 m (1,188 ft)	$37,000	$407,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R17 to R19	14 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 195 m (640 ft)	$33,000	$462,000
S47	R32 to R36	10 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 340 m (1,115 ft)	$35,000	$350,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 465 m (1,526 ft)	$35,000	$245,000
S34	R46	1 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 258 m (846 ft)	$49,000	$49,000
S34 (Option)	R46	1 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 89 m (292 ft)	$51,000	$51,000
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 110 m (361 ft)	$39,000	$39,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S551	R4.11 to 4.22	20 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,081 m (3,547 ft)	$45,000	$900,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (718 ft)	$43,000	$430,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A & R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.21 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE ES-III – SUMMARY OF FEASIBLE BARRIERS FOR ALTERNATIVE 4

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R6A to R9	11 SFR	R/W Westbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 362 m (1,188 ft)	$37,000	$407,000
S31	R14 and R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R17 to R21A	31 SFR	R/W / Private Property Westbound SR-56	2.4 m (8 ft) to 3.7 m (12 ft) 370 m (1,214 ft)	$33,000	$1,023,000
S41	R30A and R30	4 SFR	R/W Westbound SR-56	3.7 m (12 ft) 105 m (345 ft)	$33,000	$132,000
S47	R32 to R35A	10 SFR	R/W Westbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 323 m (1,060 ft)	$35,000	$350,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 519 m (1,703 ft)	$37,000	$259,000
S34	R46	1 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 258 m (846 ft)	$47,000	$47,000
S34 (Option)	R46	1 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 89 m (292 ft)	$49,000	$49,000
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 110 m (361 ft)	$37,000	$35,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S551	R4.12 to 4.21A	23 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,078 m (3,537 ft)	$47,000	$1,081,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (719 ft)	$43,000	$430,000
S561	R5.1 and R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6A	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A and R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.22 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE ES-IV – SUMMARY OF FEASIBLE BARRIERS FOR ALTERNATIVE 5

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R5 to R9A	13 SFR	R/W / Private Property Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 492 m (1,614 ft)	$37,000	$481,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R16 to R21A	36 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 392 m (1,286 ft)	$37,000	$1,332,000
S41	R29 to R30	7 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 164 m (538 ft)	$35,000	$245,000
S47	R32 to R36	11 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 339 m (1,112 ft)	$35,000	$385,000
S20	R42 & R43	1 SCH (4 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 670 m (2,198 ft)	$35,000	$140,000
S34	R46 & R47	2 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 318 m (1,043 ft)	$47,000	$94,000
S34 (Option)	R46 & R47	2 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 171 m (561 ft)	$49,000	$98,000
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 42 m (138 ft)	$37,000	$37,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.7 m (12 ft), & 183 m (600 ft)	$45,000	$225,000
S551	R4.11A to 4.21A	21 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,078 m (3,537 ft)	$47,000	$987,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (719 ft)	$43,000	$430,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A & R5.6A	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A & R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft), 3.7 (12 ft), and 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.22 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school.
2 - Based on the base reasonable allowance of $31,000 per residence.

1.0 INTRODUCTION

The purpose of this noise study is to assess the potential noise impacts and identify feasible noise abatement measures for the Interstate 5 / State Route 56 Interchange Project. Improvements are needed to maintain and improve the existing and future traffic operations along the Interstate 5 and State Route 56 (I-5/SR-56) corridors between Del Mar Heights Road, Carmel Valley Road, and Carmel Country Road, in order to improve the safe and efficient local and regional traffic levels, while minimizing environmental and community impacts for the design year of 2030. The project addresses the following issues:

- Maintain or improve future traffic levels of service in 2030 over the existing and forecasted level of service.
- Maintain or reduce off peak and peak hour delay for SR-56 traffic moving to and from the north on I-5.
- Maintain or reduce peak hour congestion at the El Camino Real/SR-56 ramp termini.
- Maintain or reduce freeway related traffic bypassing the congestion by traveling through local communities during the peak hour.
- Maintain or reduce congestion on I-5 and SR-56 mainlines during the peak hour.
- Provide a facility that is compatible with future transit and other modal options.
- Follow the Regional Transportation Plan where feasible and be in compliance with Federal and State regulations (SANDAG, 2003).
- Maintain the facility as an effective link in the intra-regional and inter-regional movement of people and goods.
- Avoid and minimize impacts to human and natural environment.

This project is defined as Type 1 by 23 CFR 772; therefore, a full noise assessment is required. The study includes (a) long-term noise measurements; (b) short-term measurements; (c) roadway traffic noise modeling using the Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM) version 2.5 and SOUND2000; and (d) noise abatement measures for soundwall placement.

2.0 PROJECT DESCRIPTION

This project involves multiple improvements within the project limits while accommodating the I-5 North Coast Widening Project. Improvements proposed in the I-5 North Coast Widening Project include the addition of one managed/High Occupancy Vehicle (HOV) lane in each direction of travel within the median of I-5 and one general-purpose lane along northbound I-5 and improvements to the Del Mar Heights Road interchange. The project will also accommodate the future construction of one HOV lane in each direction of travel located within the median of SR-56.

This noise analysis study considers five alternatives; No-Build (Alternative 1), Direct Connector (Alternative 2), Auxiliary Lane (Alternative 3), Hybrid Alternative (Alternative 4), and the Hybrid with Flyover Alternative (Alternative 5). The following are descriptions of each alternative

No-Build Alternative (Alternative 1)

The No-Build Alternative assumes the existing configuration for the I-5/SR-56 interchange with the improvements proposed as part of the I-5 North Coast Widening Project, which are independent of the I-5/SR-56 Interchange Project.

This alternative would not include the construction of direct freeway - to - freeway connectors in the westbound SR-56 to northbound I-5 and southbound I-5 to eastbound SR-56 directions or improvements to local streets in the Carmel Valley area.

Direct Connector Alternative (Alternative 2)

The Direct Connector Alternative proposes the construction of direct freeway - to - freeway structures in the westbound to northbound and southbound to eastbound directions.

The connector ramps will have two general purpose lanes. This alternative includes the extension of the local bypass in both the northbound and southbound directions to the Del Mar Heights Road Interchange. Travelers who want to use the southbound local bypass must access the bypass just south of the Del Mar Heights Road interchange. A concrete barrier will separate the freeway mainline traffic from the local bypass and connector ramps in the northbound and southbound directions. A barrier separated collector/distributor system along westbound SR-56 will separate the westbound to southbound traffic from the westbound to northbound traffic just east of the Carmel Creek interchange. To eliminate the weave movement between the drivers traveling on the eastbound connectors and drivers wishing to access Carmel Creek Road a barrier will be constructed along SR-56 between El Camino Real and Carmel Creek Road. Drivers traveling in those directions will need to use local street alternatives to access Carmel Creek Road.

An auxiliary lane will be constructed along eastbound SR-56 between Carmel Creek Road and Carmel Country Road, and along northbound and southbound I-5 between the connector ramps and Del Mar Heights Road. Several local street interchanges will be modified in order to accommodate for the new configurations on and along I-5 and SR-56. Improvements are proposed for the northbound on-ramp and southbound off

ramp at Carmel Valley Road and the eastbound and westbound Carmel Creek Road on- and off-ramps. The Del Mar Heights interchange will be reconstructed; the overcrossing will be replaced and the northbound and southbound on- and off-ramps will be reconfigured. The bridge at El Camino Real will be widened to accommodate the westbound to northbound connector ramp. The northbound and southbound bypass lanes will be realigned north of Carmel Valley Road to improve operations and to accommodate the connector ramps. Seventeen retaining walls will be constructed for this alternative. Portofino Circle will be realigned and reconstructed as well.

Auxiliary Lane Alternative (Alternative 3)

The Auxiliary Lane Alternative proposes the construction of an auxiliary lane along southbound I-5, improvements to the southbound off-ramp and northbound on-ramp at Carmel Valley Road, and improvements to the eastbound El Camino Real on-ramp. Carmel Valley Road will be widened to four lanes east of I-5. Improvements will be made to the intersection of El Camino Real and Carmel Valley Road south of SR-56; the intersection will be widened to accommodate higher traffic volumes.

SR- 56 westbound will be widened to the north to accommodate an additional general purpose lane and the future construction of HOV lanes within the median. Due to this addition, the westbound Carmel Creek Road loop on-ramp and off-ramp and the Carmel Country Road loop on-ramp will be realigned. Additional auxiliary lanes, reconstruction of the Del Mar Heights Road overcrossing and associated operational improvements are also proposed with this alternative.

Hybrid Alternative (Alternative 4)

The Hybrid Alternative is a combination of the Direct Connector Alternative and the Auxiliary Lane Alternative. In this alternative, the proposed westbound to northbound connector featured in the Direct Connector Alternative would be combined with the proposed southbound to eastbound improvements featured in the Auxiliary Lane Alternative. As part of the I-5/SR 56 Interchange Project, HOV lanes are proposed for the on-ramps located at the Del Mar Heights Road interchange.

Hybrid with Flyover Alternative (Alternative 5)

The Hybrid with Flyover alternative is a variation of the Hybrid Alternative. The Hybrid with Flyover Alternative includes a proposed flyover structure that would connect eastbound Carmel Valley Road to the eastbound SR-56 fast lane, in addition to the west SR-56 to north I-5 connector featured as part of the Direct Connector Alternative. The Hybrid with Flyover Alternative would require use of non-standard lane and shoulder widths along Carmel Valley Road and would require tunneling behind the Carmel Valley Road undercrossing abutments to provide pedestrian/bicycle access.

Figures 2-1 and 2-2 present the project location and vicinity maps, respectively.

FIGURE 2-1 – PROJECT LOCATION MAP

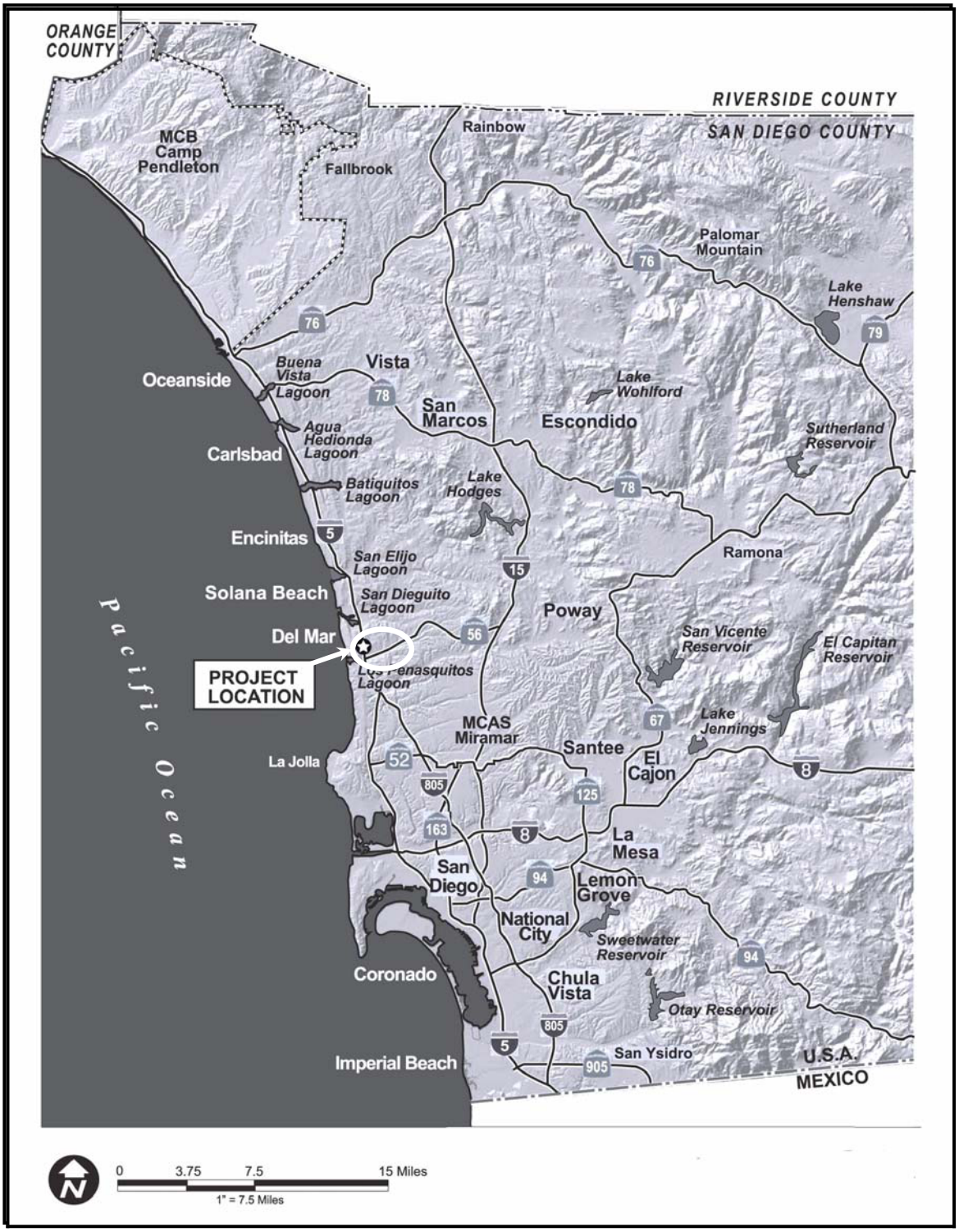
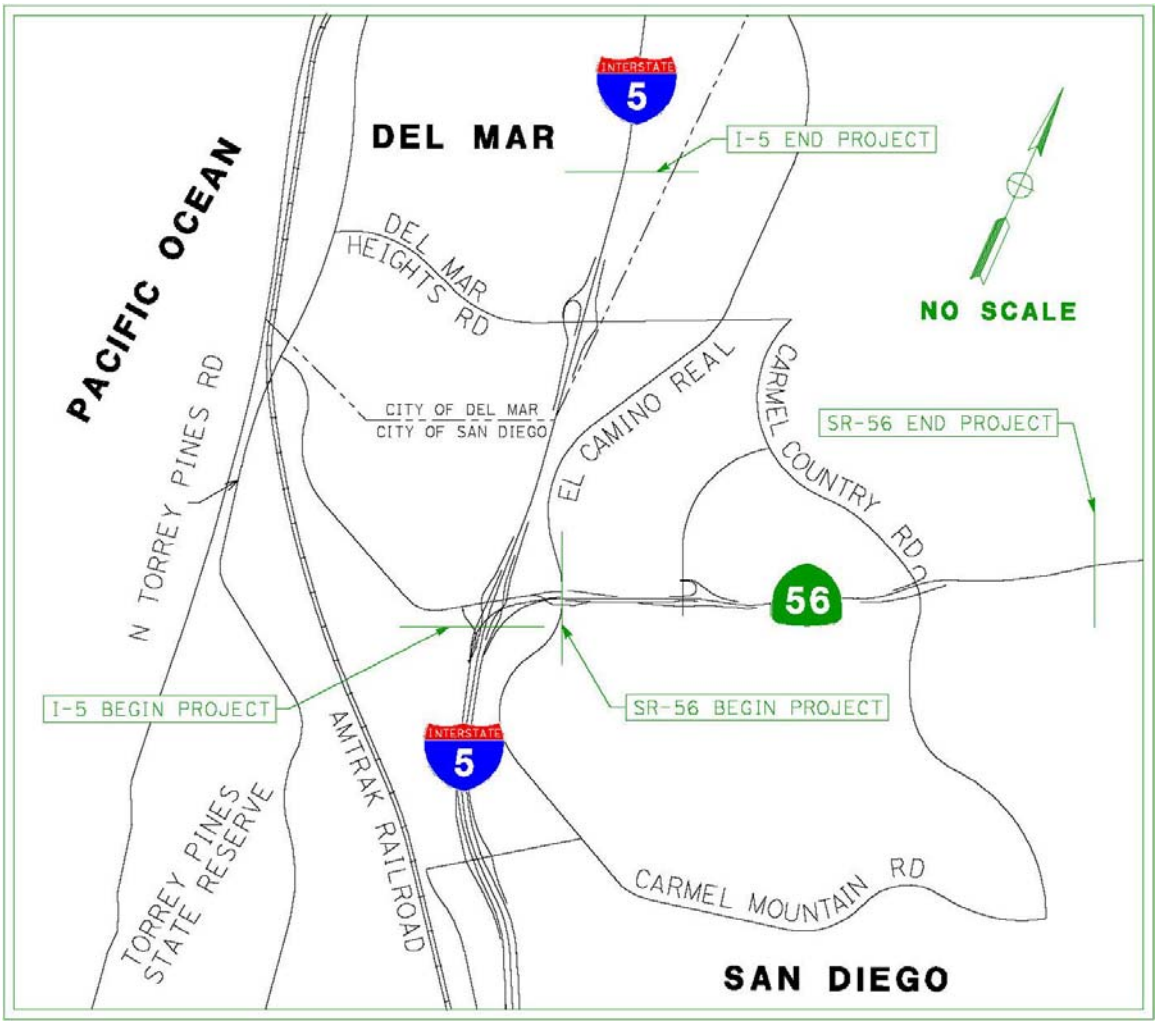


FIGURE 2-2 – PROJECT VICINITY MAP



3.0 FUNDAM ENTALS OF TRAFFIC NOISE

A brief discussion of fundamental traffic noise concepts is provided in this section.

Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a human ear. For traffic sound, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or undesired.

Frequency and Hertz

A continuous sound can be described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). The extreme range of frequencies that can be heard by the healthiest human ears spans from 16–20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of a sound increases and decreases with increasing and decreasing amplitude. Sound pressure amplitude is measured in units of micro-Newton per square meter ($\mu N/m^2$), also called micro-Pascal (µPa). One µPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. S*ound pressure level* (L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB.

Addition of Decibels

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. When two sounds of equal L_p are combined, they will produce a combined L_p, which is 3 dB greater than the original individual L_p. In other words, sound energy must be doubled to produce a 3-dB increase. If two sound levels differ by 10 dB or more, the combined L_p is equal to the higher L_p; in other words, the lower sound level does not increase the higher sound level.

A-Weighted Decibels

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. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound of higher or lower frequency with the same magnitude. A series of L_p adjustments is usually applied to the sound level at different frequencies to approximate the frequency response of the human ear. 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. Noise levels for traffic noise reports

are typically reported in terms of A-weighted decibels (dBA). In environmental noise studies, A-weighted L_ps are commonly referred to as noise levels. Figure 3-1 shows typical A-weighted noise levels.

FIGURE 3-1 – TYPICAL A-WEIGHTED NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans 2009.

Human Response to Changes in Noise Levels

It is widely accepted that the average healthy ear can barely perceive noise level changes of 3 dB. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as being twice or half as loud. As discussed previously, doubling of sound energy results in a 3 dB increase in the sound level, which means that doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels fluctuate rapidly, others slowly. Some noise levels vary widely, others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in traffic noise analysis:

- **Equivalent Sound Level ($L_{eq(h)}$)** - $L_{eq(h)}$ represents an average of the sound energy occurring over a specified period. $L_{eq(h)}$ 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 is the basis for Noise Abatement Criteria (NAC) used by the Department and the FHWA.

- **Maximum Sound Level (L_{max})** - L_{max} is the highest instantaneous sound level measured during a specified period.
- **Insertion Loss (I.L.)** – I.L. is the actual noise level reduction at a specific receiver due to the construction of a noise barrier between the noise source (traffic) and the receiver. Generally, it is the net effect of the soundwall attenuation and the loss due to ground effects.

Sound Propagation

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

- ***Geometric spreading*** - Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dB for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is 3 dB per doubling of distance.
- ***Ground absorption*** - Most often, the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.
- ***Atmospheric effects*** - Research by The Department and others has shown that atmospheric conditions can have a significant effect on noise levels when noise receptors are located more than 60 m (200 ft) from a highway. Wind has been shown to be the most important meteorological factor within approximately 150 m (500 ft) of the source, whereas vertical air temperature gradients are more important for greater distances. Other factors such as air temperature, humidity, and turbulence also have significant effects.

4.0 FEDERAL REGULATIONS AND STATE POLICIES

This report focuses on the requirements of 23 CFR 772, as discussed in this section.

1.1. Federal Regulations

1.1.1. 23 CFR 772

23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type I or Type II projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment.

Type I projects include those that create a completely new noise source, as well as those that increase the volume or speed of traffic or move the traffic closer to a receiver. Type I projects include the addition of an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening an existing ramp by a full lane width for its entire length. Projects unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type I projects.

Under 23 CFR 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23 CFR 772 requires that the project sponsor “consider” noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR 772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (a “substantial” noise increase). 23 CFR 772 does not specifically define the terms “substantial increase” or “approach”; these criteria are defined in the Caltrans Traffic Noise Analysis Protocol (Caltrans, 2006), as described below.

Table 4-1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

In identifying noise impacts, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category E) is used as the basis for determining a noise impact.

Table 4-1 - Activity Categories and 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, 2009

1.2. State Regulations and Policies

1.2.1. Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Caltrans Protocol (Caltrans, 2006) specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The NAC specified in the Protocol are the same as those specified in 23 CFR 772. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The Technical Noise Supplement - A Technical Noise Supplement (TeNS) (Caltrans, 2009) to the Protocol provides detailed technical guidance for the evaluation of highway traffic noise. This includes field measurement methods, noise modeling methods, and report preparation guidance.

1.2.2. Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools. Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels ($L_{eq(h)}$) exceed 52 dBA in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or spaces. This requirement does not replace the “approach or exceed” NAC criterion for FHWA Activity Category E for classroom interiors, but it is a requirement that must be addressed in addition to the requirements of 23 CFR 772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level that is at or below $L_{eq(h)}$ of 52 dBA. If the noise levels generated from freeway and non-freeway sources exceed $L_{eq(h)}$ of 52 dBA prior to the construction of the proposed freeway project, then noise abatement must be provided to reduce the noise to the level that existed prior to construction of the project.

5.0 STUDY METHOD AND PROCEDURES

This section describes the methods and procedures followed for the noise study, including the selection of representative receptor sites, noise measurement procedures, and traffic noise modeling required to conduct the analysis.

Selection of Receptor Sites

Noise measurement sites are locations where noise measurements are taken in order to determine existing noise levels and to verify or calibrate computer noise models. These sites are chosen as being representative of similar outdoor use areas along the project. Locations that are expected to receive the greatest noise impacts, such as the first row of houses from the noise source, are generally chosen. Noise measurements were conducted in frequent outdoor human-use. All measurement sites were selected so that there would be no unusual noises from sources such as dogs, pool pumps, or children that could affect the measured levels. It is also desirable to choose sites that are free of major obstructions or contamination.

Noise Measurement Procedures

Noise measurements were taken at selected locations to evaluate the existing noise environment. Noise measurements were conducted in conformance with the Caltrans' Technical Noise Supplement (Caltrans, 2009) and the guidelines outlined in the FHWA's "Measuring of Highway Related Noise," FHWA-DP-96-046. The following are brief descriptions of the measurement procedures used for this project:

- Microphones were primarily placed approximately 1.5 m (5 ft) above the ground or in some instances on top of walls and were positioned at least 3 m (10 ft), when placed on the ground, from any wall or building to prevent reflections or unrepresentative shielding of the noise.
- Sound level meters were calibrated before and after each set of measurements.
- Following the calibration of equipment, a wind screen was placed over the microphone.
- Frequency weighting was set on "A", and the slow detector response was used.
- Results of the short-term noise measurements were recorded on data sheets in the field. Long-term measured data were downloaded to the computer for tabulation.
- During the short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, etc. were noted.
- Traffic was recorded for model calibration measurements using a video camera. Vehicle types were separated into three vehicle groups: heavy trucks, medium trucks, and autos. Average traffic speeds were measured using a radar gun and driving on the freeway.

- Wind speed, temperature, humidity, and sky conditions were observed and documented during the short-term noise measurements.

The instruments used for the noise measurements included the following:

- Integrating Sound Level Meters – Larson Davis models 812 (ANSI Type 1), 820 (ANSI Type 1), and 870 (ANSI Type 1), Sound level Meters.
- Microphone Systems – LD 812 and 820 Systems – Larson Davis model PRM 828 microphone preamps; Larson Davis model 2560, ½-inch pressure microphone. LD 870 System - Larson Davis model 900B microphone preamps; Larson Davis model 2559, ½-inch pressure microphone.
- Acoustic Field Calibrator – Larson Davis model CA250 constant pressure microphone calibrator.
- Wind Monitor/Temperature and Humidity Gauge – Kestrel 3000 Pocket Weather Meter.

Traffic Noise Modeling

The FHWA Traffic Noise Model (TNM) version 2.5, was used for the noise computations of the future "Build" scenarios of both I-5 and SR-56 and the "No-Build" scenario of SR-56 (FHWA, 2004). TNM 2.5 input is based on a three-dimensional grid created for the study area to be modeled. All roadway, barrier, terrain lines, and receiver points are defined by their x, y, and z coordinates. Roadways, terrain lines, 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 outdoor use area of the receptors such as residences, schools, and recreational areas. Receivers are modeled at a height of 1.5 m (5 ft) above ground elevation.

In order to determine the noise levels generated by traffic, TNM 2.5 computer program requires inputs of traffic volumes, speeds, and vehicle types. Three vehicle types were input into the model: cars, medium trucks, and heavy trucks. The propagation path between source and receiver is modeled in TNM 2.5 by specifying special terrain features, rows of houses or building structures, and existing walls. Propagation of noise can be further specified by selecting ground types such as hard soil, loose soil, pavement, lawn, and field grass. The lawn option was chosen as the overall ground type for this study. All other natural obstructions, such as cuts and fills that could affect the predicted noise levels were also included in the input file.

The I-5 portion of the I-5/SR-56 Interchange Project is a re-analysis of the Interstate 5 North Coast Corridor Widening Project (Parsons, 2007). The predicted noise levels for the "No-Build" scenario of I-5 are from the North Coast Corridor Widening Project which were calculated using SOUND2000, Version 3.3 (Caltrans, 2004).

SOUND2000 is based on the highway traffic noise prediction method specified in FHWA-RD-77-108 (FHWA, 1978). The SOUND2000 input requirements and basic computational procedures are outlined in this section.

SOUND2000 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 SOUND2000 as line segments defined by their end points. Receivers, defined as single points, are typically located at receptors such as residences, schools, and churches. Receivers are modeled at a height of 1.5 m (5 ft) above ground elevation.

The SOUND2000 computer program requires inputs of traffic volumes, speeds, and roadway grade adjustments to determine traffic noise levels. The highest traffic noise levels are generated by conditions where traffic volumes are heavy, but still free flowing. Traffic volumes of LOS C are used to obtain the worst case for potential noise impacts. SOUND2000 also allows for the input of percentages for three standard vehicle types: cars, medium trucks and heavy trucks, each corresponding to different noise emission levels.

The propagation path between source and receiver is modeled in SOUND2000 through the use of 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 SOUND2000: hard ground and soft ground. 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, and it produces a 3-dB drop-off per doubling of distance. Soft ground propagation is used to model the greater propagation loss over grass or soft earth, and it produces a 4.5 dB drop-off per doubling of distance.

6.0 EXISTING NOISE ENVIRONMENT

Noise measurements were taken at outdoor locations within the project limits to establish the baseline conditions and calibrate the future traffic noise model. Parsons personnel conducted site surveys and noise measurements in 2004 and 2007. Noise measurements conducted in 2007 were for this study and the measurements conducted in 2004 were for the I-5 North Coast Corridor Widening Project.

Measurements were taken at a total of 25 locations (15 locations in 2007 and 10 locations in 2004) for purposes of evaluating the existing noise environment and calibrating the noise model. Short-term measurements were conducted at seven sites in 2004 and 10 sites in 2007 for 20-minutes each, and long-term noise measurements were conducted at five sites in 2007 and three sites in 2004 for a minimum of 24 hours each. The results for the short-term and long-term measurements are presented in Tables 6-1 and 6-2, respectively. Two additional measurements corresponding to two of the 15 locations were conducted in 2007 for the specific purpose of model calibration only.

Appendix A includes noise measurement data sheets recorded in the field, as well as the hourly L_{eq} graphs for the long-term measurement. Appendix B presents photographs taken at each of the measurement sites. Locations of the measurement sites are shown in both layouts and aerials on Sheets 1 through 10 in Appendix C.

Existing Noise Level

Some of the short-term measurements were conducted during time intervals outside of the peak noise hour. These measurements have been adjusted to reflect peak hourly noise levels using the results of the nearby long-term noise measurements. The peak noise hour was determined by a long-term measurement taken on the same day as each short-term measurement. Short-term measurements not conducted during peak traffic hours, when traffic is observed to be free flowing, were adjusted to the peak hour by the long-term measurement.

Model Calibration

Since there will only be lane additions to SR-56 without any major changes to the profile of the existing alignment, it is appropriate to calibrate the traffic noise computer model using the measured field data. Model calibration was not performed for I-5 because of the major changes proposed to be made to I-5, model calibration would not be practical. Noise measurements for the calibration of SR-56 were conducted at one of the long-term and one of the short-term measurement sites along SR-56 with simultaneous traffic counts using a video camera recorder and a radar gun for traffic speed measurements. For each of these measurements, the noise meter microphone was re-positioned on top of the existing walls. The video recordings of freeway traffic were reviewed and tabulated according to three vehicle types, including automobiles, medium trucks (2-axle with 6-wheels but not including dually pick-up trucks), and heavy trucks (3 or more axle vehicles). The field observations and measured data were used to calibrate the traffic noise model.

TABLE 6-1 – SHORT-TERM NOISE MEASUREMENT RESULTS

Site No.	Street Address, City	Land Use[1]	Meter Location	Measurement Dates	Start Time	Measured Leq, dBA[2]	Adjusted Peak-Hour Leq, dBA[3]	Adjusted to Long-Term Site
ST1	12565 Carmel Canyon Road, San Diego	SFR	Front Yard*	11/14/07	12:03 PM	56.6	58	LT1
ST1A	4835 Ruette de Mar, San Diego	SFR	Cul-de-sac*	11/15/07	12:18 PM	54.7	56	LT1
ST2	4595 Da Vinci Street, San Diego	SFR	Backyard	11/14/07	12:41 PM	63.4	64	LT1
ST3	Notre Dame Academy 4345 Del Mar Trails Road, San Diego	SCH	Playground	11/15/07	11:00 AM	62.8	64	LT1
ST4	3920 San Gregorio Way, San Diego	SFR	Cul-de-sac*	11/15/07	1:37 PM	62.1	63	LT1
ST5	San Diego Jewish Academy 11860 Carmel Creek Road, San Diego	SCH	Baseball Field	11/15/07	9:51 AM	62.4	63	LT1
ST6	Del Mar Villas Portofino Circle, Del Mar	REC	Pool Area	11/06/07	2:07 PM	65.4	66	LT3
ST7	Del Mar Village 13691 Ruette le Parc, Unit B, Del Mar	MFR	Backyard	11/06/07	11:20 AM	75.4	77	LT3
ST8	Bella Del Mar Apartments 14047 Mango Drive, Del Mar	MFR	Backyard	11/07/07	9:36 AM	71.7	75	LT5
ST9	Del Mar Hills Elementary School 14085 Mango Drive, Del Mar	SCH	Playground	11/06/07	3:09 PM	58.9	63	LT5

Notes:

1 - Land Use: SFR - single-family residence; MFR - multi-family residence; REC – recreational area; SCH – school.

2 - All short-term measured noise levels were measured for a 20-minute period.

3 - Measurements conducted during off-peak hours were adjusted to the peak-hour $L_{eq}(h)$ based on a comparison with long-term noise levels measured at a nearby measurement site, listed in the last column.

* - Measurement sites are representative of adjacent outdoor use areas.

TABLE 6-1 – SHORT-TERM NOISE MEASUREMENT RESULTS (CONT'D.)

Site No.	Street Address, City	Land Use[1]	Meter Location	Measurement Dates	Start Time	Measured Leq, dBA[2]	Adjusted Peak-Hour Leq, dBA[3]	Adjusted to Long-Term Site
ST4.1	2784 Camino San Marino, Del Mar	MFR	Side Yard*	3/31/04	9:05 AM	68.6	69	LT4.1
ST4.2	13080 Camino Cristobal, Del Mar	MFR	Front Yard*	3/31/04	8:35 AM	68.3	68	LT4.1
ST4.3	13231 Portofino Drive, Del Mar	SFR	Backyard	3/31/04	2:13 PM	68.0	69	LT4.1
ST4.4	Del Mar Village 13681 Ruette le Parc, Del Mar	MFR	Backyard	3/31/04	2:11 PM	76.5	77	LT4.1
ST5.1	East Bluff Community, 3528 Voyager Circle, Del Mar	MFR	Backyard	4/01/04	10:42 AM	66.5	68	LT5.1
ST5.2	Bella Del Mar Apartment Homes 14065 Mango Drive, Del Mar	MFR	Backyard	4/01/04	11:25 AM	69.5	71	LT5.1
ST5.4	13204 Overpark Road, San Diego	SFR	Backyard	4/01/04	10:45 AM	64.7	66	LT5.1

Notes:

1 - Land Use: SFR - single-family residence; MFR - multi-family residence; REC – recreational area; SCH – school.

2 - All short-term measured noise levels were measured for a 20-minute period.

3 - Measurements conducted during off-peak hours were adjusted to the peak-hour $L_{eq}(h)$ based on a comparison with long-term noise levels measured at a nearby measurement site, listed in the last column.

. * - Measurement sites are representative of adjacent outdoor use areas.

TABLE 6-2 – LONG-TERM NOISE MEASUREMENT RESULTS

Site No.	Street Address, City	Land Use[1]	Meter Location	Measurement Dates	Start Time	Duration, No. of Hours	Peak-Hour Time	Measured Peak Hour Leq, dBA[2]
LT1	3920 Saint Augustine, San Diego	SFR	Backyard	11/14/07-11/15/07	10:58 AM	28	6:00 AM	62
LT2	12949 Pointe Del Mar Way, Del Mar	SFR	Backyard	11/6/07-11/7/07	9:25 AM	28	9:00AM	65 / 71[F]
LT3	13357 Portofino Drive, Del Mar	SFR	Backyard	11/5/07-11/7/07	12:04 PM	45	8:00 AM	66
LT4	3404 Lady Mill Road, San Diego	SFR	Backyard	11/7/07-11/9/07	3:40 PM	43	10:00 AM	60
LT5	14261 Minorca Cove, Del Mar	SFR	Backyard	11/5/07-11/7/07	2:21 PM	44	7:00 AM	60
LT4.1	13505 Portofino Drive, Del Mar	SFR	Backyard	3/30/04 – 3/31/04	4:20 PM	25	6:00 AM	68
LT5.1	3285 Lower Ridge Road, Del Mar	SFR	Backyard	3/30/04 – 4/01/04	3:07 PM	43*	12:00 PM	64
LT5.2	14175 Minorca Cove, Del Mar	SFR	Backyard	3/29/04 – 3/31/04	1:00 PM	50	6:00 AM	72

Notes:

1 - SFR = Single-family residential; MFR = Multi-family residential.

2 - The highest measured hourly noise level recorded during the long-term measurement period.

* - There was a break in the measurement intervals due to power failure.

F - Measured level of 65 dBA was adjusted to 71 dBA to compensate for wooden fence that was not modeled. This is based on the fence providing over 6 dB noise reduction when fence was modeled as a barrier. Furthermore, fence was not modeled because it most likely will have a life expectancy of less than 20 years.

Table 6-3 presents the traffic counts taken during each of the calibration measurements and Table 6-4 shows the results of the model calibration. According to the Caltrans' Technical Noise Supplement, given the inherent uncertainties in the measurements and calibration procedures, model calibration should definitely not be attempted when calculated and measured noise levels agree within ±1 dB. However, if the modeled and measured values are between 1 and 2 dB and there is great confidence in the accuracy and results of the measurements, calibration may be attempted (Caltrans, 2009).

The differences between the measured and modeled values were found to be no more than ±1.1 dB for this project; therefore, no calibration or "K" factor has been applied.

TABLE 6-3 – NOISE MODEL CALIBRATION TRAFFIC COUNTS

Traffic Volumes for Calibration of Measurement Site				**LT1**					
Traffic Lane/s between Carmel Creek Rd and Carmel Country Rd	20 Min Count (2:40-3:00 pm)			1 Hour Volume			Speed, km/h (mph)		
	Car	MT	HT	Car	MT	HT	In Lane	Out Lane	HT
EB Mainline Total	974	29	14	2922	87	42	113 (70)	105 (65)	89 (55)
EB On Ramp to Carmel Creek Rd	74	4	1	222	12	3	--	--	--
WB Mainline Total	687	12	11	2061	36	33	113 (70)	105 (65)	89 (55)
WB Off Ramp to Carmel Creek Rd	109	2	1	327	6	3	--	--	--
Traffic Volumes for Calibration of Measurement Site				**ST2**					
Traffic Lane/s between Carmel Creek Rd and Carmel Country Rd	20 Min Count (1:40-2:00 pm)			1 Hour Volume			Speed, km/h (mph)		
	Car	MT	HT	Car	MT	HT	In Lane	Out Lane	HT
EB Mainline Total	764	16	14	2292	48	42	113 (70)	105 (65)	89 (55)
WB Mainline Total	571	16	12	1713	48	36	113 (70)	105 (65)	89 (55)

TABLE 6-4 – NOISE MODEL CALIBRATION RESULTS

Measurement Site	**Date**	**Start Time**	**Stop Time**	**Noise Levels, $L_{eq(h)}$, dBA**		**Deviation, dB**	**Adjustment Applied, dB**
				Measured	**Modeled**		
LT1	11/15/07	2:40 PM	15:00	72.0	73.1	-1.1	0
ST2	11/14/07	1:40 PM	14:00	72.7	72.9	-0.2	0

7.0 FUTURE NOISE ENVIRONMENT, IMPACTS, AND ABATEMENT MEASURES

This noise study was conducted to determine future noise impacts at outdoor use areas within the boundaries of this project. The future/worst case scenario traffic noise levels were modeled to determine the appropriate feasible abatement measures. This section discusses the future noise environment and considers possible abatement measures for impacted locations.

7.1 TRAFFIC DATA

The highest traffic noise levels occur when traffic is heavy but remains free-flowing. Level-of-Service (LOS) C volumes were modeled to ensure the absolute worst-case scenario traffic noise for the future year. Table 7-1 presents the future traffic volumes and traffic distributions used for the noise analysis per direction of travel for the "No-Build" – Alternative 1 scenario and Tables 7-2, 7-3, 7-4, and 7-5 presents the future traffic volumes and traffic distributions for the "Build" scenarios of Alternatives 2 through 5, respectively. The future traffic volumes and traffic distribution for the "No-Build" case of I-5 can be found in the Interstate 5 North Coast Corridor Widening Project (Parsons, 2007).

The traffic distribution for the projected year 2030 has been applied to the LOS C volume limit of 1,800 and 1,500 vehicles per hour (vph) per lane for mainline lanes and HOV lanes, respectively. Speeds of 105 kilometers per hour (km/h) (65 miles per hour [mph]) are assumed for all vehicle types for mainline and HOV traffic.

The ramp and connector traffic data provided by Caltrans was examined and has been capped at a maximum of 1,000 vph/lane for LOS C conditions for all alternatives. The number of lanes in the traffic noise model for a ramp is governed by the lowest number of lanes in the ramp. If an off ramp begins at one lane on the freeway and then at its end point becomes three lanes, only one lane's worth of traffic, capped at 1,000 vph/lane is modeled. The number of lanes in the traffic noise model for a connector is governed by the total number of lanes in the connector. The AM peak ramp and connector traffic volumes have been used for all southbound I-5 and westbound SR-56 and the PM peak ramp and connector traffic volumes have been used for all northbound I-5 and eastbound SR-56 in the model to ensure worst-case noise levels. Speeds of 89 km/h (55 mph) were modeled for the connector ramps, while speeds of 40 km/h (25 mph) to 105 km/h (65 mph) were used for all "on" and "off" ramps. Slower speeds of 40 km/h (25 mph) were used to model traffic on the loop portion of loop ramps.

It was assumed that heavy truck traffic percentages on and off ramps at the study area would be less than the percentages for mainline traffic. Heavy truck percentages were reduced by 0.8% and 1.0% for ramps along I-5 and SR-56, respectively.

Since the freeway traffic would be the dominant noise source at a majority of the receptors located adjacent to the project corridor, no local surface street traffic was modeled. There is a hotel located at the corner of Carmel Valley Road and El Camino Real with a receptor located at the pool area of the hotel. Directly in front of the receptor, the SR-56 off-ramp traffic to El Camino Real was modeled. The receptor's noise level is predicted to be well below the noise abatement criteria with both the

highway and off-ramp traffic volumes in the model. Therefore, modeling local street traffic for this receptor was not deemed necessary.

TABLE 7-1 – TRAFFIC VOLUMES - FUTURE NO-BUILD

Description of Traffic Lane	Number of Lanes	Total Traffic Volumes [1,2]	Travel Speeds, km/h (mph)	Volumes by Vehicle Type					
				Cars	% Cars	Medium Trucks	% MT	Heavy Trucks	% HT[3]
State Route 56 Interstate 5 to El Camino Real									
EB Connector from NB I-5	2	2,000	89 (55)	1,884	94.2	48	2.4	68	3.4
WB Connector to SB I-5	2	2,000	89 (55)	1,922	96.1	46	2.3	32	1.6
State Route 56 El Camino Real to Carmel Creek Road									
EB Inside Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
EB Outside/By-Pass Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
Subtotal		7,200		6,918	96.1	166	2.3	115	1.6
EB Exit to By-Pass Lane	1	1,420	105 (65)	1,364	96.1	33	2.3	23	1.6
EB On-Ramp from El Camino Real	2	2,000	40-105 (25-65)	1,942	97.1	46	2.3	12	0.6
EB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.1	35	2.3	9	0.6
EB Off-Ramp to Carmel Creek Rd	2	1,525	105-40 (65-25)	1,481	97.1	35	2.3	9	0.6
WB Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
Subtotal		3,600		3,459	96.1	83	2.3	58	1.6
WB On-Ramp from Carmel Creek Rd	1	960	40-105 (25-65)	932	97.1	22	2.3	6	0.6
WB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.067	35	2.3	9	0.6
WB Off-Ramp El Camino Real	2	2,000	105-40 (65-25)	1,942	97.1	46	2.3	12	0.6
State Route 56 Carmel Creek Road to Carmel Country Road									
EB Inside Lanes	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
EB Outside Lanes	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
EB On-Ramp from Carmel Creek Rd	1	740	40-105 (25-65)	719	97.2	17	2.3	4	0.6
EB Off-Ramp to Carmel Country Rd	1	1,000	105-40 (65-25)	971	97.1	23	2.3	6	0.6
WB Inside Lanes	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
WB Outside Lanes	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
WB On-Ramp from Carmel Country Rd	1	1,000	40-105 (25-65)	971	97.1	23	2.3	6	0.6
WB Off-Ramp to Carmel Creek Rd	1	900	105-40 (65-25)	874	97.1	21	2.3	5	0.6
State Route 56 Carmel Country Road to Carmel Valley Road									
EB Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
EB On-Ramp from Carmel Country Rd	1	585	40-105 (25-65)	568	97.1	13	2.3	4	0.6
EB Off-Ramp to Carmel Valley Rd	2	1,015	105-40 (65-25)	986	97.1	23	2.3	6	0.6
WB Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
WB On-Ramp from Carmel Valley Rd	1	840	40-105 (25-65)	816	97.1	19	2.3	5	0.6
WB Off-Ramp to Carmel Country Rd	1	505	105-40 (65-25)	490	97.0	12	2.3	3	0.6

Notes:

1 - Total volume based on LOS C volumes of 1,800 vehicles per hour per lane for main lanes and 1,500 vehicles per hour per lane for HOV and auxiliary lanes.

2 - Ramp and connector volume based on 2030 peak hour traffic volumes or capped at 1,000 vehicles per hour per lane.

3 - Heavy truck percentages were reduced by 0.8% and 1.0% for ramp traffic volumes along SR-56.

TABLE 7-2 – TRAFFIC VOLUMES - FUTURE BUILD ALTERNATIVE 2

Description of Traffic Lane	Number of Lanes	Total Traffic Volumes [1,2]	Travel Speeds, km/h (mph)	Volumes by Vehicle Type					
				Cars	% Cars	Medium Trucks	% MT	Heavy Trucks	% HT[3]
State Route 56 Interstate 5 to El Camino Real									
EB Connector from NB I-5	2	2,000	89 (55)	1,884	94.2	48	2.4	68	3.4
EB Connector from SB I-5	2	1,470	89 (55)	1,385	94.2	35	2.4	50	3.4
WB Connector to SB I-5	2	2,000	89 (55)	1,922	96.1	46	2.3	32	1.6
WB Connector to NB I-5	2	1,730	89 (55)	1,662	96.1	40	2.3	28	1.6
State Route 56 El Camino Real to Carmel Creek Road									
EB Inside Lanes	2	3,600	105 (65)	3,517	97.7	83	2.3	0	0
EB Outside Lanes	2	3,600	105 (65)	3,402	94.5	83	2.3	115	1.6
Subtotal		7,200		6,919	96.1	166	2.3	115	1.6
EB On-Ramp from El Camino Real	2	2,000	40-105 (25-65)	1,942	97.1	46	2.3	12	0.6
EB Auxiliary Lanes	2	3,000	105 (65)	2,883	96.1	69	2.3	48	1.6
EB Off-Ramp to Carmel Creek Rd	1	1,000	105-40 (65-25)	971	97.1	23	2.3	6	0.6
WB Inside Lanes to WS Connector	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
WB Outside Lanes to WN Connector	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
Subtotal		7,200		6,918	96.1	166	2.3	115	1.6
WB On-Ramp from Carmel Creek Rd	1	820	40-105 (25-65)	796	97.1	19	2.3	5	0.6
WB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.1	35	2.3	9	0.6
WB Off-Ramp El Camino Real	2	2,000	105-40 (65-25)	1,942	97.1	46	2.3	12	0.6
State Route 56 Carmel Creek Road to Carmel Country Road									
EB Inside Lanes	2	3,600	105 (65)	3,517	97.7	83	2.3	0	0
EB Outside Lanes	2	3,600	105 (65)	3,402	94.5	83	2.3	115	--
Subtotal		7,200		6,919	96.1	166	2.3	115	1.6
EB On-Ramp from Carmel Creek Rd	1	740	40-105 (25-65)	719	97.2	17	2.3	4	0.6
EB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.1	35	2.3	9	0.6
EB Off-Ramp to Carmel Country Rd	2	2,000	105-40 (65-25)	1,942	97.1	46	2.3	12	0.6
WB Inside Lanes	2	3,600	105 (65)	3,517	97.7	83	2.3	0	0
WB Outside Lanes	2	3,600	105 (65)	3,402	94.5	83	2.3	115	--
Subtotal		7,200		6,919	96.1	166	2.3	115	1.6
WB On-Ramp from Carmel Country Rd	1	1,000	40-105 (25-65)	971	97.1	23	2.3	6	0.6
WB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.1	35	2.3	9	0.6
WB Off-Ramp to Carmel Creek Rd	2	1,060	105-40 (65-25)	1,030	97.2	24	2.3	6	0.6
State Route 56 Carmel Country Road to Carmel Valley Road									
EB Inside Lanes to Sta 48+40	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
EB Outside Lanes to Sta 48+40	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
EB Lanes after Sta 48+40	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
EB On-Ramp from Carmel Country Rd	1	410	40-105 (25-65)	399	97.3	9	2.3	2	0.6
EB Off-Ramp to Carmel Valley Rd	2	1,050	105-40 (65-25)	1,020	97.1	24	2.3	6	0.6
WB Inside Lanes to Sta 45+00	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
WB Outside Lanes to Sta 45+00	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
WB Lanes after Sta 45+00	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
WB On-Ramp from Carmel Valley Rd	1	880	40-105 (25-65)	855	97.2	20	2.3	5	0.6
WB Off-Ramp to Carmel Country Rd	1	400	105-40 (65-25)	389	97.3	9	2.3	2	0.6

Notes:

1 - Total volume based on LOS C volumes of 1,800 vehicles per hour per lane for main lanes and 1,500 vehicles per hour per lane for HOV and auxiliary lanes.

2 - Ramp and connector volume based on 2030 peak hour traffic volumes or capped at 1,000 vehicles per hour per lane.

3 - Heavy truck percentages were reduced by 0.8% and 1.0% for ramp traffic volumes along SR-56.

TABLE 7-2 – TRAFFIC VOLUMES - FUTURE BUILD ALTERNATIVE 2 (CONT'D.)

Description of Traffic Lane	Number of Lanes	Total Traffic Volumes [1,2]	Travel Speeds, km/h (mph)	Volumes by Vehicle Type					
				Cars	% Cars	Medium Trucks	% MT	Heavy Trucks	% HT[3]
Interstate 5 State Route 56 to Del Mar Heights Road									
NB HOV Lanes	2	3,000	105 (65)	3,000	100.0	0	0	0	0
NB Inside Lanes	2	3,600	105 (65)	3,478	96.6	122	2.4	0	0
NB Outside Lanes	2	3,600	105 (65)	3,130	86.9	123	2.4	347	--
Subtotal		10,200		9,608	94.2	245	2.4	347	3.4
NB Connector to EB SR-56	2	2,000	89 (55)	1,884	94.2	48	2.4	68	3.4
WB SR-56 Connector to NB I-5	2	1,730	89 (55)	1,662	96.1	40	2.3	28	1.6
NB By-Pass Lanes to Sta 548+00	2	3,000	105 (65)	2,826	94.2	72	2.4	102	3.4
NB By-Pass Lanes after Sta 548+00	3	4,500	105 (65)	4,239	94.2	108	2.4	153	3.4
NB Auxiliary/Exit Lane	1	1,500	105 (65)	1,425	95.0	36	2.4	39	2.6
NB Off-Ramp to Del Mar Heights Rd	2	1,600	105-40 (65-25)	1,520	95.0	38	2.4	42	2.6
SB HOV Lanes	2	3,000	105 (65)	3,000	100.0	0	0	0	0
SB Inside Lanes	2	3,600	105 (65)	3,478	96.6	122	2.4	0	0
SB Outside Lanes	2	3,600	105 (65)	3,130	86.9	123	2.4	347	--
Subtotal		10,200		9,608	94.2	245	2.4	347	3.4
SB Auxiliary/Exit Lane to SE Connector	1	1,500	105 (65)	1,413	94.2	36	2.4	51	3.4
SB Connector to EB SR-56	2	1,470	89 (55)	1,385	94.2	35	2.4	50	3.4
SB By-Pass Lanes	2	3,000	105 (65)	2,826	94.2	72	2.4	102	3.4
SB On-Ramp from Del Mar Heights Rd	1	790	40-105 (25-65)	750	94.9	19	2.4	21	2.6
SB Loop On-Ramp from Del Mar Heights Rd	1	1,000	40-105 (25-65)	950	95.0	24	2.4	26	2.6
SB Auxiliary/Exit Lane	1	1,500	105 (65)	1,425	95.0	36	2.4	39	2.6
SB Off-Ramp to Carmel Valley Rd	1	530	105-40 (65-25)	503	94.9	13	2.4	14	2.6
SB Connector from EB SR-56	2	2,000	89 (55)	1,922	96.1	46	2.3	32	1.6
Interstate 5 Del Mar Heights Road to Via de la Valle									
NB HOV Lanes	2	3,000	105 (65)	3,000	100.0	0	0	0	0
NB Inside Lanes	2	3,600	105 (65)	3,478	96.6	122	2.4	0	0
NB Outside Lanes	2	3,600	105 (65)	3,130	86.9	123	2.4	347	--
Subtotal		10,200		9,608	94.2	245	2.4	347	3.4
NB Auxiliary Lanes to Sta 569+00	3	4,500	105 (65)	4,239	94.2	108	2.4	153	3.4
NB Auxiliary Lanes after Sta 569+00	2	3,000	105 (65)	2,826	94.2	72	2.4	102	3.4
NB On-Ramp from Del Mar Heights Rd	1	1,000	40-105 (25-65)	950	95.0	24	2.4	26	2.6
NB Auxiliary/Entrance Lane	1	1,500	105 (65)	1,425	95.0	36	2.4	39	2.6
SB HOV Lanes	2	3,000	105 (65)	3,000	100.0	0	0	0	0
SB Inside Lanes	2	3,600	105 (65)	3,485	96.8	115	2.4	0	0
SB Outside Lanes	3	5,400	105 (65)	4,819	89.2	173	2.4	408	--
Subtotal		12,000		11,304	94.2	288	2.4	408	3.4
SB Auxiliary Lane to 568+60	1	1,500	105 (65)	1,413	94.2	36	2.4	51	3.4
SB By-Pass Lanes	2	3,000	105 (65)	2,826	94.2	72	2.4	102	3.4
SB Auxiliary/Exit Lane	1	1,500	105 (65)	1,425	95.0	36	2.4	39	2.6
SB Off-Ramp to Del Mar Heights	2	1,370	105-40 (65-25)	1,301	95.0	33	2.4	36	2.6

Notes:

1 - Total volume based on LOS C volumes of 1,800 vehicles per hour per lane for main lanes and 1,500 vehicles per hour per lane for HOV and auxiliary lanes.

2 - Ramp and connector volume based on 2030 peak hour traffic volumes or capped at 1,000 vehicles per hour per lane.

3 - Heavy truck percentages were reduced by 0.8% and 1.0% for ramp traffic volumes along I-5.

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'HVFULSWLRQ RI 7UDIILF /DQH	1XPEHU RI /DQHV	7RWDO 7UDIILF 9RROXPHV	7UDIILF 6SHHGV NP K PSK	&DUV	9ROXPHV E\ &DUV	0HGLXP 7UXFNV 07	+HDY\ 7UXFNV +7	3
6WDWH 5RXWH Interstate 5 to El Camino Real								
EB Connector from NB I-5	2	2,000	89 (55)	1,884	94.2	48	2.4	68	3.4
WB Connector to SB I-5	2	2,000	89 (55)	1,922	96.1	46	2.3	32	1.6
6WDWH 5RXWH El Camino Real to Carmel Creek Road								
EB Inside Lanes	2	3,600	105 (65)	3,460	96.1	83	2.3	57	1.6
EB Outside/By-Pass Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
Subtotal		7,200		6,919	96.1	166	2.3	115	1.6
EB On-Ramp from El Camino Real	2	2,000	40-105 (25-65)	1,942	97.1	46	2.3	12	0.6
EB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.1	35	2.3	9	0.6
EB Off-Ramp to Carmel Creek Rd	2	1,175	105-40 (65-25)	1,141	97.1	27	2.3	7	0.6
WB Inside Lanes	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0.0
WB Outside Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
Subtotal		5,400		5,218	96.6	124	2.3	86	1.6
WB On-Ramp from Carmel Creek Rd	1	960	40-105 (25-65)	932	97.1	22	2.3	6	0.6
WB Auxiliary/Exit Lane	1	1,500	105 (65)	1,456	97.067	35	2.3	9	0.6
WB Off-Ramp El Camino Real	2	2,000	105-40 (65-25)	1,942	97.1	46	2.3	12	0.6
6WDWH 5RXWH Carmel Creek Road to Carmel Country Road								
EB Inside Lanes	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
EB Outside Lanes	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
EB On-Ramp from Carmel Creek Rd	1	740	40-105 (25-65)	719	97.2	17	2.3	4	0.6
EB Off-Ramp to Carmel Country Rd	1	1,000	105-40 (65-25)	971	97.1	23	2.3	6	0.6
WB Inside Lanes	1	1,800	105 (65)	1,759	97.7	41	2.3	0	0
WB Outside Lanes	2	3,600	105 (65)	3,431	95.3	83	2.3	86	--
Subtotal		5,400		5,190	96.1	124	2.3	86	1.6
WB On-Ramp from Carmel Country Rd	1	1,000	40-105 (25-65)	971	97.1	23	2.3	6	0.6
WB Auxiliary/Exit Lane	1	1,500	105 (65)	1,457	97.1	35	2.3	9	0.6
WB Off-Ramp to Carmel Creek Rd	2	1,085	105-40 (65-25)	1,054	97.1	25	2.3	7	0.6
6WDWH 5RXWH Carmel Country Road to Carmel Valley Road								
EB Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
EB On-Ramp from Carmel Country Rd	1	585	40-105 (25-65)	568	97.1	13	2.3	4	0.6
EB Off-Ramp to Carmel Valley Rd	2	1,015	105-40 (65-25)	986	97.1	23	2.3	6	0.6
WB Lanes	2	3,600	105 (65)	3,459	96.1	83	2.3	58	1.6
WB On-Ramp from Carmel Valley Rd	1	840	40-105 (25-65)	816	97.1	19	2.3	5	0.6
WB Off-Ramp to Carmel Country Rd	1	505	105-40 (65-25)	490	97.0	12	2.3	3	0.6

Notes:

1 - Total volume based on LOS C volumes of 1,800 vehicles per hour per lane for main lanes and 1,500 vehicles per hour per lane for HOV and auxiliary lanes.

2 - Ramp and connector volume based on 2030 peak hour traffic volumes or capped at 1,000 vehicles per hour per lane.

3 - Heavy truck percentages were reduced by 0.8% and 1.0% for ramp traffic volumes along SR-56.

TABLE 7-6 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 2 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 5.1 [C]	MFR	75 [M,ST8]	71	76	B (67)	A/E	**65** [R,T]	**11**	63	13	62	14	62	14	61	15	S561/ Private Property
R 5.2	MFR	71 [M,ST5.2]	72	75	B (67)	A/E	**64** [R,T]	**11**	63	12	62	13	61	14	61	14	
R 5.3 [W]	SCH	67 [E]	69	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.4 [W]	SCH	63 [E]	65	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.5A [C]	SCH	63 [M,ST9]	70	69	B (67)	A/E	**61** [R,T]	**8**	61	8	60	9	60	9	59	10	S563/ Private Property
R 5.5	SCH	65 [E]	67 [NC]	62	B (67)	NONE	60 [T,5]	2	59	3	59	3	59	3	59	3	
R 5.6A	SCH	65 [E]	67	66	B (67)	A/E	**59** [R,T]	**7**	58	8	58	8	57	9	57	9	
R 5.6	SCH	64 [E]	65 [NC]	61	B (67)	NONE	58 [T,5]	3	57	4	57	4	57	4	57	4	
R 5.7A	SFR	70 [E]	70	73	B (67)	A/E	**66** [R,T]	**7**	66	7	66	7	66	7	65	8	S567 / R/W / Private Property
R 5.7 [C]	SFR	72 [M, LT5.2]	71	74	B (67)	A/E	**63** [R,T]	**11**	62	12	62	12	61	13	60	14	
R 5.7B	SFR	68 [E]	68 [NC]	69	B (67)	A/E	**61** [R,T]	**8**	61	8	60	9	59	10	59	10	
R 5.8	SFR	66 [E]	66 [NC]	65	B (67)	NONE	59 [R,T]	6	59	6	59	6	58	7	57	8	
R 5.8B	SFR	60 [M,LT5]	67	66	B (67)	A/E	**60** [R,T]	**6**	59	7	58	8	58	8	57	9	
R 5.8A	SFR	66 [E]	66 [NC]	63	B (67)	NONE	59 [T,5]	4	59	4	59	4	58	5	58	5	
R 5.9B	SFR	67 [E]	67	67	B (67)	A/E	67 [T,5]	0	67	0	67	0	67	0	67	0	--
R 5.9A [C]	SFR	67 [E]	67	67	B (67)	A/E	67	0	65	2	63 [T]	4	**62** [R]	**5**	61	6	S569 / R/W / Private Property
R 5.9	SFR	67 [E]	67 [NC]	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	
R 5.16 * [, W]	MFR	67 [M, ST5.1]	68	67	B (67)	A/E	65 [T]	2	63	4	62	5	61	6	61	6	Private Property
R 5.16A [W]	MFR	58 [E]	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.17 [W]	SFR	64 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.18 [W]	SFR	64 [M,LT5.1]	63	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19 [W]	SFR	63 [E]	63	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19A	SFR	62 [E]	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20A	SFR	60 [M,LT4]	67	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20	SFR	61 [E]	61 [NC]	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.21	SFR	66 [M,ST5.4]	67	66	B (67)	A/E	62 [T]	4	62	4	**61** [R]	**5**	61	5	61	5	S568 / R/W / Private Property
R 5.22	SFR	69 [E]	70	69	B (67)	A/E	**59** [R,T]	**10**	59	10	58	11	57	12	57	12	
R 5.23 [C]	SFR	69 [E]	70 [NC]	70	B (67)	A/E	**58** [R,T]	**12**	56	14	56	14	54	16	54	16	
R 5.23A	SFR	68 [E]	69	67	B (67)	A/E	**58** [R,T]	**9**	57	10	57	10	56	11	56	11	
R 5.24	SFR	68 [E]	69	65	B (67)	NONE	64	1	64	1	64	1	64	1	64	1	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007; ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
T1 - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks on connectors.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-7 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 2

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R4A to R10	13 SFR	R/W / Private Property Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 492 m (1,615 ft)	$37,000	$481,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R16 to R21A	35 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 392 m (1,286 ft)	$37,000	$1,295,000
S41	R29 to R30	7 SFR	R/W Westbound SR-56	3.7 m (12 ft) 165 m (541 ft)	$33,000	$231,000
S47	R32 to R36	11 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 339 m (1,112 ft)	$35,000	$385,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 465 m (1,526 ft)	$37,000	$259,000
S34	R46 & R47	2 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 297 m (974 ft)	$51,000	$102,000
S34 (Option)	R46 & R47	2 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 171 m (561 ft)	$49,000	$98,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-7 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 110 m (361 ft)	$37,000	$37,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S545	R4.5 to R4.12	6 SFR, 17 MFR & 1 REC (1 Frontage Unit)	R/W / Retaining Wall / Private Property Southbound I-5	2.4 m (8 ft) to 4.9 m (16 ft) 500 m (1,640 ft)	$57,000	$1,368,000
S551	R4.12A to R4.21	18 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 842 m (2,763) ft	$45,000	$855,000
S555	R4.21 & R4.22	4 SFR	Private Property Southbound I-5	2.4 m (8 ft) 123 m (404) ft	$55,000	$220,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (718) ft	$45,000	$450,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A to R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.21 to R5.23A	10 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) to 3.7 m (12 ft) 215 (705 ft)	$41,000	$410,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S27	R4A to R10	R/W / Private Property Westbound SR-56	25+06	4.3 (14)	28.5 (93)
			25+51	4.3 (14)	30.3 (99)
			25+51	4.9 (16)	30.9 (101)
			25+93	4.9 (16)	30.9 (101)
			26+20	4.9 (16)	31.0 (102)
			26+30	4.9 (16)	31.4 (103)
			26+89	4.9 (16)	31.6 (104)
			27+41	4.9 (16)	32.4 (106)
			27+89	4.9 (16)	32.1 (105)
			28+39	4.9 (16)	33.0 (108)
			28+39	4.3 (14)	32.4 (106)
			29+09	4.3 (14)	32.9 (108)
			29+66	4.3 (14)	32.8 (108)
			29+94	4.3 (14)	32.9 (108)
		Approximate Length:	492 m (1,615 ft)		
S31	R14 & R15	Private Property Westbound SR-56	31+83	2.4 (8)	35.9 (118)
			31+74	2.4 (8)	35.6 (117)
			32+01	2.4 (8)	35.5 (117)
			32+09	2.4 (8)	36.0 (118)
		Approximate Length:	77 m (253 ft)		
S35	R16 to R21A	R/W / Private Property Westbound SR-56	33+36	3.0 (10)	42.7 (140)
			33+41	3.0 (10)	42.7 (140)
			33+56	3.0 (10)	42.7 (140)
			33+84	3.0 (10)	42.7 (140)
			33+85	3.0 (10)	43.0 (141)
			33+85	3.7 (12)	43.7 (143)
			34+06	3.7 (12)	43.7 (143)
			34+54	3.7 (12)	44.4 (146)
			35+13	3.7 (12)	44.8 (147)
			35+66	3.7 (12)	45.7 (150)
			36+07	3.7 (12)	45.8 (150)
			36+83	3.7 (12)	46.3 (152)
			37+26	3.7 (12)	46.9 (154)
			37+41	3.7 (12)	46.8 (153)
			37+50	3.7 (12)	46.8 (153)
		Approximate Length:	392 m (1,286 ft)		
S41	R29 to R30	R/W Westbound SR-56	40+87	3.7 (12)	48.2 (158)
			41+14	3.7 (12)	47.2 (155)
			41+36	3.7 (12)	46.7 (153)
			41+83	3.7 (12)	45.3 (148)
			42+28	3.7 (12)	44.5 (146)
			42+40	3.7 (12)	44.5 (146)
		Approximate Length:	165 m (541 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S47	R32 to R36	R/W Westbound SR-56	44+76	3.7 (12)	46.2 (151)
			45+76	3.7 (12)	46.8 (153)
			45+76	4.3 (14)	47.4 (155)
			46+13	4.3 (14)	47.6 (156)
			46+16	4.3 (14)	48.1 (158)
			46+98	4.3 (14)	48.3 (158)
			47+13	4.3 (14)	48.3 (158)
			47+37	4.3 (14)	48.7 (160)
			47+61	4.3 (14)	49.4 (162)
			47+61	3.7 (12)	48.8 (160)
			48+07	3.7 (12)	49.2 (161)
			48+07	3.0 (10)	48.5 (159)
			48+15	3.0 (10)	48.2 (158)
		Approximate Length:	339 m (1,112 ft)		
S20	R42 to R45	Inside R/W Eastbound SR-56	17+50	3.7 (12)	22.2 (73)
			17+85	3.7 (12)	21.7 (71)
			18+45	3.7 (12)	20.7 (68)
			18+45	4.3 (14)	21.3 (70)
			19+15	4.3 (14)	20.8 (68)
			19+66	4.3 (14)	20.8 (68)
			19+66	4.9 (16)	21.4 (70)
			20+43	4.9 (16)	21.9 (72)
			21+09	4.9 (16)	22.4 (73)
			21+40	4.9 (16)	22.9 (75)
			21+49	4.9 (16)	23.9 (78)
			21+61	4.9 (16)	24.4 (80)
			21+83	4.9 (16)	25.9 (85)
			21+83	4.3 (14)	25.3 (83)
			22+02	4.3 (14)	26.8 (88)
			22+14	4.3 (14)	27.8 (91)
		Approximate Length:	465 m (1,526 ft)		
S34	R46 & R47	Inside R/W Eastbound SR-56	32+00	3.0 (10)	30.0 (99)
			32+39	3.0 (10)	30.5 (100)
			32+60	3.0 (10)	30.7 (101)
			32+80	3.0 (10)	31.0 (102)
			33+00	3.0 (10)	31.2 (103)
			33+16	3.0 (10)	31.5 (104)
			33+40	3.0 (10)	31.7 (104)
			33+59	3.0 (10)	32.0 (105)
			34+00	3.0 (10)	32.2 (106)
			34+12	3.0 (10)	32.5 (107)
			34+12	2.4 (8)	31.9 (105)
			34+31	2.4 (8)	32.4 (106)
			34+60	2.4 (8)	32.5 (107)
			34+83	2.4 (8)	32.9 (108)
			35+00	2.4 (8)	33.0 (108)
		Approximate Length:	297 m (974 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S34 (Option)	R46 & R47	Private Property Eastbound SR-56	33+08	3.7 (12)	31.2 (102)
			33+15	3.7 (12)	30.7 (101)
			33+20	3.7 (12)	30.2 (99)
			33+30	3.7 (12)	29.9 (98)
			33+30	4.3 (14)	30.5 (100)
			33+40	4.3 (14)	30.5 (100)
			33+60	4.3 (14)	30.7 (101)
			33+80	4.3 (14)	30.5 (100)
			33+87	4.3 (14)	30.2 (99)
			34+00	4.3 (14)	29.7 (97)
			34+11	4.3 (14)	29.3 (96)
			34+24	4.3 (14)	28.8 (94)
			34+40	4.3 (14)	28.4 (93)
			34+50	4.3 (14)	28.4 (93)
			34+50	3.7 (12)	27.8 (91)
			34+60	3.7 (12)	27.8 (91)
		Approximate Length:	171 m (561 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S539	R4.1	Private Property Southbound I-5	540+19	2.4 (8)	26.3 (86)
			540+22	2.4 (8)	26.3 (86)
			540+25	2.4 (8)	26.3 (86)
			540+31	2.4 (8)	26.3 (86)
			540+35	2.4 (8)	26.3 (86)
			540+39	2.4 (8)	26.3 (86)
			540+42	2.4 (8)	26.3 (86)
			540+43	2.4 (8)	26.3 (86)
		Approximate Length:	42 m (138 ft)		
S541	R4.2 to R4.4	Private Property Southbound I-5	540+36	2.4 (8)	24.4 (80)
			540+31	2.4 (8)	24.4 (80)
			540+31	3.7 (12)	25.7 (84)
			540+37	3.7 (12)	26.2 (86)
			540+69	3.7 (12)	26.5 (87)
			540+69	4.3 (14)	27.1 (89)
			540+76	4.3 (14)	27.0 (88)
			540+84	4.3 (14)	28.3 (93)
			541+19	4.3 (14)	28.5 (93)
			541+23	4.3 (14)	28.6 (94)
			541+59	4.3 (14)	29.8 (98)
			541+64	4.3 (14)	30.3 (99)
		Approximate Length:	183 m (600 ft)		
S545	R4.5 to R4.12	R/W / Retaining Wall / Private Property Southbound I-5	541+80	4.9 (16)	39.1 (128)
			541+90	4.9 (16)	39.3 (129)
			542+09	4.9 (16)	39.4 (129)
			542+24	4.9 (16)	39.2 (129)
			542+38	4.9 (16)	39.2 (129)
			542+56	4.9 (16)	38.9 (128)
			542+80	4.9 (16)	38.6 (127)
			542+80	4.3 (14)	38.0 (125)
			543+31	4.3 (14)	39.1 (128)
			543+31	3.1 (10)	37.9 (124)
			543+63	3.1 (10)	38.3 (126)
			543+63	2.4 (8)	37.7 (124)
			544+32	2.4 (8)	38.4 (126)
			544+72	2.4 (8)	38.9 (128)
			545+00	2.4 (8)	40.2 (132)
			545+27	2.4 (8)	42.7 (140)
			545+45	2.4 (8)	44.6 (146)
			545+72	2.4 (8)	46.6 (153)
			546+01	2.4 (8)	47.0 (154)
			546+44	2.4 (8)	48.6 (160)
			546+64	2.4 (8)	49.4 (162)
			546+82	2.4 (8)	50.4 (165)
			546+87	2.4 (8)	52.4 (172)
			547+00	2.4 (8)	53.0 (174)
		Approximate Length:	500 m (1,640 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S551	R4.12A to R4.21	Private Property Southbound I-5	547+00	4.3 (14)	54.9 (180)
			547+26	4.3 (14)	56.4 (185)
			547+67	4.3 (14)	58.5 (192)
			548+27	4.3 (14)	61.3 (201)
			548+47	4.3 (14)	62.3 (204)
			548+86	4.3 (14)	63.5 (208)
			548+89	4.3 (14)	64.3 (211)
			549+08	4.3 (14)	64.8 (213)
			549+27	4.3 (14)	65.8 (216)
			549+28	4.3 (14)	66.3 (217)
			549+48	4.3 (14)	66.8 (219)
			549+48	4.9 (16)	67.4 (221)
			549+87	4.9 (16)	69.4 (228)
			550+07	4.9 (16)	70.4 (231)
			550+27	4.9 (16)	70.9 (233)
			550+67	4.9 (16)	72.4 (237)
			551+44	4.9 (16)	73.5 (241)
			551+81	4.9 (16)	74.0 (243)
			552+38	4.9 (16)	75.4 (247)
			553+13	4.9 (16)	76.9 (252)
			553+73	4.9 (16)	77.5 (254)
			554+58	4.9 (16)	79.0 (259)
			555+20	4.9 (16)	79.6 (261)
		Approximate Length:	842 m (2,763) ft		
S555	R4.21 & R4.22	Private Property Southbound I-5	555+20	2.4 (8)	77.1 (253)
			555+23	2.4 (8)	77.3 (254)
			555+24	2.4 (8)	77.6 (255)
			555+48	2.4 (8)	78.4 (257)
			555+73	2.4 (8)	78.9 (259)
			555+76	2.4 (8)	79.5 (261)
			556+01	2.4 (8)	80.1 (263)
			556+03	2.4 (8)	80.6 (265)
			556+34	2.4 (8)	81.0 (266)
			556+37	2.4 (8)	81.6 (268)
		Approximate Length:	123 m (404) ft		
S557	R4.22A to R4.24	Private Property Southbound I-5	556+08	2.4 (8)	86.4 (284)
			556+13	2.4 (8)	86.9 (285)
			556+22	2.4 (8)	86.9 (285)
			556+43	2.4 (8)	86.4 (284)
			556+53	2.4 (8)	86.4 (284)
			556+53	3.0 (10)	87.0 (286)
			556+67	3.0 (10)	87.0 (286)
			556+77	3.0 (10)	87.5 (287)
			556+93	3.0 (10)	87.5 (287)
			557+01	3.0 (10)	88.0 (289)
			557+16	3.0 (10)	88.0 (289)
			557+35	3.0 (10)	89.0 (292)
			557+70	3.0 (10)	89.0 (292)
			557+94	3.0 (10)	88.5 (291)
			558+01	3.0 (10)	88.5 (291)
		Approximate Length:	219 m (718) ft		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S561	R5.1 & R5.2	Private Property Southbound I-5	560+85	0.0 (0)	99.5 (326)
			560+81	2.4 (8)	98.4 (323)
			561+14	2.4 (8)	96.4 (316)
			561+38	2.4 (8)	96.4 (316)
			561+75	2.4 (8)	96.4 (316)
			562+16	2.4 (8)	96.4 (316)
			562+21	2.4 (8)	96.4 (316)
		Approximate Length:	156 m (512 ft)		
S563	R5.5A to R5.6	Private Property Southbound I-5	563+28	2.4 (8)	95.1 (312)
			563+37	2.4 (8)	91.9 (302)
			563+70	2.4 (8)	91.4 (300)
			564+04	2.4 (8)	90.9 (298)
			564+39	2.4 (8)	91.0 (299)
			564+36	2.4 (8)	91.4 (300)
		Approximate Length:	130 m (427 ft)		
S567	R5.7A to R5.8B	R/W / Private Property Southbound I-5	564+61	2.4 (8)	101.4 (333)
			564+59	2.4 (8)	101.4 (333)
			564+80	2.4 (8)	101.4 (333)
			565+01	2.4 (8)	101.5 (333)
			565+24	2.4 (8)	101.5 (333)
			565+38	2.4 (8)	101.7 (334)
			565+60	2.4 (8)	101.6 (333)
			565+72	2.4 (8)	101.4 (333)
			565+78	2.4 (8)	101.4 (333)
			565+84	2.4 (8)	101.4 (333)
			565+70	2.4 (8)	101.9 (334)
			566+21	2.4 (8)	102.4 (336)
			566+52	2.4 (8)	102.4 (336)
			566+71	2.4 (8)	102.4 (336)
			567+09	2.4 (8)	102.6 (337)
			567+18	2.4 (8)	102.4 (336)
		Approximate Length:	299 m (991 ft)		
S569	R5.9A to R5.9	R/W / Private Property Southbound I-5	567+29	4.3 (14)	100.3 (329)
			567+66	4.3 (14)	99.8 (327)
			567+66	3.7 (12)	99.2 (325)
			568+05	3.7 (12)	99.9 (328)
			568+05	2.4 (8)	98.6 (324)
			568+00	2.4 (8)	100.6 (330)
			567+89	2.4 (8)	101.8 (334)
		Approximate Length:	106 m (348 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-8 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 2 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S568	R5.21 to R5.23A	R/W / Private Property Northbound I-5	566+24	3.7 (12)	104.5 (343)
			566+25	3.7 (12)	103.4 (339)
			566+54	3.7 (12)	104.4 (342)
			566+54	3.0 (10)	103.7 (340)
			566+71	3.0 (10)	105.0 (345)
			566+76	3.0 (10)	105.1 (345)
			566+76	2.4 (8)	104.5 (343)
			566+87	2.4 (8)	104.1 (342)
			566+62	2.4 (8)	104.1 (342)
			567+02	2.4 (8)	104.1 (342)
			567+20	2.4 (8)	104.1 (342)
			567+32	2.4 (8)	104.1 (342)
			567+35	2.4 (8)	104.1 (342)
			567+41	2.4 (8)	104.1 (342)
			567+43	2.4 (8)	104.1 (342)
			567+42	2.4 (8)	104.1 (342)
			567+46	2.4 (8)	103.6 (340)
			567+56	2.4 (8)	103.7 (340)
			567+67	2.4 (8)	103.6 (340)
			567+79	2.4 (8)	103.6 (340)
			567+90	2.4 (8)	103.8 (341)
		Approximate Length:	215 (705 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

ALTERNATIVE 3

Table 7-9 presents the results of the barrier analysis. Table 7-10 provides a summary of the noise barriers, including the number of benefited residences, reasonable allowance per residence, and reasonable allowance cost per noise barrier. Table 7-11 presents a summary of soundwall locations and the minimum heights and lengths to achieve at least 5 dB noise reduction.

Areas with Noise Abatement

Soundwall S27: Soundwall S27 would be 4.3 to 4.9 m (14 to 16 ft) in height located along the westbound R/W between stations 25+93 and 29+66. The soundwall would provide a 5 dB noise reduction for single-family residences represented by Receptors R6A through R9. This proposed soundwall would replace an existing 2.4 m (8 ft) high glass/block soundwall located on the R/W line. Soundwall S27 has been raised higher than otherwise required in front of Receptor R6 to provide a 5 dB noise reduction to Receptors R6A and R7. Sheet 13 shows the location and heights of Soundwall S27 to achieve the minimum 5 dB noise reduction.

Soundwall S31: Soundwall S31 would be 2.4 m (8 ft) in height located adjacent to westbound SR-56 inside Notre Dame Academy property along the playground between stations 31+83 and 32+09. A soundwall has not been considered at the R/W line because the R/W is depressed by approximately 5 to 9 m (16 to 30 ft). There is an existing earthen berm between the playground and the highway; however, the berm does not provide enough protection for the receptors to prevent an impact. The soundwall would provide a 5 dB noise reduction for the playground represented by Receptors R14 and R15. Sheet 14 shows the location and height of Soundwall S31 to achieve the minimum 5 dB noise reduction.

Soundwall S35: Soundwall S35 would be located on the westbound side of SR-56 on the R/W and private property between stations 33+84 and 35+66. The portion of the soundwall that is located inside private property is between stations 33+84 to 33+85. The 3.0 to 3.7 m (10 to 12-ft) high soundwall would provide a 5 dB noise reduction for attached single-family residences represented by Receptors R17 through R18A. There is an existing 1.8 m (6-ft) high block property wall located on the R/W and property line. Receptor R19 would be located behind the wall which is extended to provide feasible abatement to Receptor R18A. However, Receptor R19 is not impacted and would not receive the required 5 dB noise reduction to become benefitted. Sheet 14 shows the location and heights of Soundwall S35 S31 to achieve the minimum 5 dB noise reduction.

Soundwall S47: Soundwall S47 would be located on the westbound R/W line between stations 44+76 and 48+07. The 3.7 to 4.3 m (12 to 14-ft) high soundwall would provide a 5 dB noise reduction to single-family residences represented by Receptors R32 through R35A. There is an existing 1.8 m (6-ft) high block property wall located on the R/W. Receptor R36, which is not impacted, would be located behind the wall which is extended to provide a 5 dB noise reduction to Receptor R35A. However, Receptor R36 would not receive the required 5 dB noise reduction to become benefitted. Soundwall S47 has been raised higher than otherwise required at Receptor R32 to provide a 5 dB noise reduction at Receptor R33. Sheets 15 and 16 show the location and heights of Soundwall S47 to achieve the minimum 5 dB noise reduction.

Soundwall S20: Soundwall S20 would be 3.7 to 4.9 m (12 to 16 ft) in height located inside the eastbound R/W on top of an existing earthen berm between stations 17+50 and 22+14. The soundwall would provide a 5 dB noise reduction for the sports field and

playground of the San Diego Jewish Academy represented by Receptors R42 through R45. Soundwall S20 has been raised higher than otherwise required at Receptors R42 and 43 to provide a 5 dB noise reduction at Receptor R44. Sheet 12 shows the location and heights of Soundwall S20 to achieve the minimum 5 dB noise reduction.

Soundwall S34: Soundwall S34 would be located along the eastbound side of SR-56 inside the R/W on top of an existing earthen berm between stations 32+00 and 34+00. The 2.4 to 3.0 m (8 to 10-ft) high soundwall would provide a 5 dB noise reduction for a single-family residences represented by Receptor R46. Receptor R47, which is not impacted, would be located behind the wall which is extended to provide a 5 dB noise reduction to Receptor R46. However, Receptor R47 would not receive the required 5 dB noise reduction to become benefitted. Soundwall S34 has been further extended to end at a logical point. The 3.0 m (10 ft) section of the soundwall is required to cut the line-of-sight to truck stack exhausts. Sheet 14 shows the location and heights of Soundwall S34 to achieve the minimum 5 dB noise reduction.

Soundwall S34 (Option): Soundwall S34 would be located along the eastbound side of SR-56 on private property between stations 33+15 and 33+87. The 3.7 to 4.3 m (12 to 14-ft) high soundwall would provide a 5 dB noise reduction for the single-family residence represented by Receptor R46. Sheet 14 shows the location and heights of optional Soundwall S34 to achieve the minimum 5 dB noise reduction.

Soundwall S539: Soundwall S539 would be 2.4 m (8 ft) in height located on private property between stations 540+19 and 540+44. Due to the higher elevation of the property, a soundwall would not be feasible at any other location. The soundwall would provide a 5 dB noise reduction for one single-family residence represented by Receptor R4.1. Sheet 7 shows the location and height of Soundwall S539 to achieve the minimum 5 dB noise reduction.

Soundwall S541: Soundwall S541 would be located on the southbound side of I-5 on private property between stations 540+36 and 541+64. The soundwall would be 2.4, 3.7, and 4.3 m (8, 12, and 14 ft) in height and would provide a minimum of 5 dB noise reduction for the recreational area of a gated housing community, comprised of a pool and tennis courts, represented by Receptors R4.2 R4.2A and R4.4 as well as a single-family resident represented by Receptor R4.3. There is an existing 1.8 to 2.1 m (6 to 7 ft) high property wall located next to the pool and spa area. Soundwall S541 has been raised higher than otherwise required at Receptor R4.2 to provide feasible noise reduction at Receptor R4.2A. Soundwall S541 has been raised higher than otherwise required at Receptor R4.4 to break the truck stack line-of-sight at Receptor R4.3. Soundwall S541 would not provide a 5 dB noise reduction to the residence represented by Receptor R4.4A because the soundwall would not completely block the line-of-sight to the highway. Sheet 17 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S551: Soundwall S551 would be 4.3 to 4.9 m (14 to 16 ft) in height located on the southbound side of I-5 on private property between stations 545+72 and 556+37. The soundwall would provide a minimum of 5 dB noise reduction to single-family residences represented by Receptors R4.11A through R4.21A. There is an existing 2.4 m (8 ft) high glass/block soundwall located on the property line. Soundwall S551 has been raised higher than otherwise required at Receptor R4.12 to provide a 5 dB noise reduction at Receptor R4.12A. Soundwall S551 would not be able to provide feasible noise abatement to every residence located behind the wall. However, the wall would provide at least a 3 to 4 dB noise reduction to all residences. Sheets 17, 18, and 19 show the minimum length and heights for this soundwall to provide feasible abatement.

Project Build without Barrier column on Table 7-9 represents the traffic noise level with the existing 2.4 m (8 ft) glass/block soundwall and the proposed project.

Soundwall S557: Soundwall S557 would be located on the southbound side of I-5 on private property between stations 556+08 and 558+01. The soundwall would be 2.4 to 3.0 m (8 to 10 ft) in height and would provide a minimum of 5 dB noise reduction to grassy backyard outdoor use areas for multi-family residences represented by Receptors R4.22A through R4.24. However, there is only 1.5 m (5 ft) of flat surface area behind these residences and many large trees in the area that would have to be removed for Soundwall S557 to be built. Sheet 19 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S561: Soundwall S561 would be 2.4 (8 ft) in height located along the southbound side of I-5 between stations 560+85 and 562+21. It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the residence elevation; however, a soundwall on private property would provide feasible noise abatement for the outdoor use areas for the multi-family residences, represented by Receptors R5.1 and R5.2, in this area. The outdoor use areas for the multi-family residences are patios. Permission will be needed from the property owners of the multi-family residences to place Soundwall S561 at this location. Sheet 19 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S563: Soundwall S563 would be located along the southbound side of I-5 between stations 563+28 and 564+36 at a height of 2.4 m (8 ft). It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the school elevation; however, a soundwall along the property line would provide a minimum of 5 dB noise reduction for the outdoor use areas at Del Mar Hills Elementary School, represented by Receptors R5.5A and R5.6A. This soundwall would not provide noise abatement to any classroom. However, an existing wall located along southbound I-5 protects a second playground and the classrooms represented by Receptors R5.3 and R5.4, respectively. Receptors R5.3 and R5.4 would not be impacted. Permission will be needed from the school district to place Soundwall S563 at this location. Sheet 20 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S567: Soundwall S567 would be located along the southbound side of I-5 between stations 564+61 and 567+18. The 2.4 m (8-ft) high wall would provide feasible noise abatement for single family residences, represented by Receptors R5.7A to R5.8B from highway traffic noise. While the northern end of Soundwall S567 and Soundwall S569 both run along the R/W and are near each other, they are considered different walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Permission will be needed from the property owners of some of the single-family residences to place Soundwall S561 at the southern end of this location. Sheet 20 the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S569: Soundwall S569 would be 2.4 to 4.3 m (8 to14 ft) in height located along the southbound side of I-5 between stations 567+29 and 568+05. The wall would provide a minimum of 5 dB noise reduction for single family residences, represented by Receptors R5.9A and R5.9, from highway traffic noise. While both Soundwalls S567 and S569 run along the R/W and are near each other, they are considered different

walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Sheet 20 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S568: Soundwall S568 would be 2.4 m (8 ft) in height and would provide feasible noise abatement for single family residences, represented by Receptors R5.22 to R5.23A, from highway traffic noise. Receptor R5.21 is not predicted to be impacted; however, Soundwall S568 would begin at the property of Receptor R5.21 to provide a minimum of 5 dB noise reduction for Receptor R5.22 and as a logical starting point. Sheet 20 shows the minimum length and height for this soundwall to provide feasible abatement.

Areas without noise abatement

There are no areas along SR-56 that are impacted by the widening and improvement project that were not feasible to abate with standard noise abatement techniques.

Several areas along I-5 are impacted by the widening and improvement project, but were not feasible to abate with standard noise abatement techniques. The receptor locations for these areas and the explanation for non-abatement are described in the following paragraphs:

Receptors R4.5 and R4.9: Receptors R4.5and R4.9 represent two groups of multi-family residences on the southbound side of I-5, north of Carmel Valley Road. Receptor R4.5 is protected by an existing 2.4 m (8-ft) high soundwall. The existing soundwall decreases in height from 4.3 to 2.4 m (14 to 8 ft) in front of Receptor R4.9 The results show that raising the height of the existing soundwall to 4.9 m (16 ft) would not provide a 5 dB benefit to any of the residences; therefore, it would not be feasible. Sheet 17 shows the location of the receptors.

Receptor R5.16: Receptor R5.16 was chosen for noise measurement purposes only and does not represent an area of outdoor use. However, this receptor does represent multi-family residential units. Therefore, the interior criteria shall be used. Assuming a 20 dB noise reduction due to the building with widows closed, the interior noise level of Receptor R5.16 is predicted to be 46 dBA which is below the indoor noise criteria of 52 dBA. However, with the windows open, the indoor noise level is predicted to be as high as 56 dBA. Sheet 19 shows the location of Receptor R5.16.

Receptor R5.9B: Receptor R5.9B is located between Soundwalls S567 and S569 on the southbound side of I-5 along Minorca Cove. Due to the sharp decrease in elevation along the R/W, it would not be practical to build a soundwall at the R/W and the shoulder would not be effective due to the difference in elevation. Furthermore, because Soundwalls S567 and S569 which are located at the R/W are feasible for the other single-family residences in this area, it would not be practical to locate a soundwall on private property for this single residence to close the gap in between Soundwalls S567 and S569. Sheet 20 shows the location of Receptor R5.9B.

TABLE 7-9 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 3

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 1 W	HM	56 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 2 W	SFR	55 E	58	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 3 W	SFR	57 E	59	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4 W	SFR	58 E	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4A W	SFR	58 E	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5 W	SFR	62 E	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 6A W	SFR	64 E	66	67	B (67)	A/E	-- T	--	65	2	63	4	62	5	**62 R,5**	**5**	S27 / R/W / Private Property
R 6 W,C	SFR	63 M,ST4	65	67	B (67)	A/E	-- T	--	64	3	63	4	62	5	**61 R,5**	**6**	
R 7 W	SFR	63 E	65	66	B (67)	A/E	-- T	--	64	2	63	3	62	4	**61 R**	**5**	
R 8 W	SFR	63 E	66	66	B (67)	A/E	-- T	--	65	1	63	3	62	4	**61 R**	**5**	
R 9 W	SFR	62 M,LT1,CAL	65	66	B (67)	A/E	-- T	--	64	2	62	4	**61 R**	**5**	60	6	
R 9A W	SFR	61 E	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 10 W	SFR	60 E	63	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 11 W	SFR	57 E	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 12 W	SFR	57 E	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 13 W	SFR	59 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 14 C	SCH	64 M,ST3	69	70	B (67)	A/E	**60 R,T**	**10**	59	11	58	12	57	13	56	14	S31 / Private Property
R 15	SCH	62 E	68	68	B (67)	A/E	**60 R,T**	**8**	59	9	58	10	58	10	56	12	
R 16 W	SFR	64 E	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 17 W,C	SFR	66 E	66	67	B (67)	A/E	64 T	3	62	5	**61 R**	**6**	60	7	59	8	S35 / R/W / Private Property
R 18 W	SFR	65 E	65	66	B (67)	A/E	64 T	2	62	4	**61 R**	**5**	60	6	59	7	
R 18A W	SFR	65 E	65	66	B (67)	A/E	64 T	2	62	4	**61 R**	**5**	60	6	59	7	
R 19 W	SFR	64 M,ST2,CAL	64	64	B (67)	NONE	63 T	1	62 5	2	60	4	59	5	58	6	
R 20 W	SFR	65 E	65	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 21 W	SFR	65 E	65	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 21A W	SFR	63 E	63	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 21B W	SFR	62 E	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 22 W	SFR	61 E	61	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 23 W	SFR	60 E	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 24	REC	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 25 W	SFR	57 E	57	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 26 *, W	SFR	58 M,ST1	58	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 27 W	SFR	58 E	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 28 W	SFR	61 E	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29A W	SFR	61 E	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29 W,C	SFR	63 E	63	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29B W	SFR	64 E	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 30A W	SFR	64 E	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 30 W	SFR	64 E	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 31 W	SFR	54 E	54	54	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height recommended to meet requirements at adjacent receptors.

R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical receptor.

W - Includes the benefits of an existing soundwall/property wall.

* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-9 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 3 (CONT'D)

REC. NO.		LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
				FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 32	W,C	SFR	67 E	67	67	B (67)	A/E	64 T	3	62	5	**61 R,5**	**6**	60	7	59	8	S47 / R/W
R 33	W	SFR	66 E	66	66	B (67)	A/E	64 T	2	62	4	**61 R**	**5**	60	6	59	7	
R 34	W	SFR	65 E	65	66	B (67)	A/E	64 T	2	63	3	62	4	**61 R**	**5**	60	6	
R 35	W	SFR	65 E	65	65	B (67)	NONE	64 T	1	62	3	61	4	**60 R**	**5**	59	6	
R 35A	W	SFR	65 E	65	66	B (67)	A/E	64 T	2	62	4	**61 R**	**5**	60	6	59	7	
R 36	W	SFR	65 E	65	65	B (67)	NONE	63 T	2	62	3	**60 R**	**5**	60	5	58	7	
R 37	W	SFR	59 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 38	W	SFR	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 39	W	SFR	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 40	W	SFR	59 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 41	W	SFR	58 E	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 42		SCH	63 E	67	68	B (67)	A/E	66	2	65	3	63 T	5	**63 R,5**	**5**	61	7	S20 / Inside R/W
R 43		SCH	63 M,ST5	67	67	B (67)	A/E	65	2	64	3	63 T	4	**62 R,5**	**5**	61	6	
R 44		SCH	65 E	69	69	B (67)	A/E	67	2	66	3	66	3	65 T	4	**64 R**	**5**	
R 45	C	SCH	65 E	68	69	B (67)	A/E	67	2	66	3	66	3	65	4	**64 R,T**	**5**	
R 46	C	SFR	66 E	70	70	B (67)	A/E	**64 R,T**	**6**	62	8	62	8	61	9	61	9	S34 / Inside R/W
R 47		SFR	61 E	65	65	B (67)	NONE	61 T	4	59	6	59	6	58	7	57	8	
R 46	C	SFR	66 E	70	70	B (67)	A/E	70	0	66	4	**61 R,T**	**9**	60	10	58	12	S34 / Private Property (Option)
R 47		SFR	61 E	65	65	B (67)	NONE	62	3	61	4	60	5	58 T	7	57	8	
R 48	*	SFR	56 M,ST1A	57	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 49		SFR	53 E	54	54	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 50		SFR	53 E	54	54	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 51		SFR	57 E	58	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 52		SFR	57 E	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 53		SFR	55 E	56	57	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54		SFR	58 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54A		REC	61 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 55		SFR	59 E	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 56		SFR	52 E	54	54	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 57	W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 58	W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 59	W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 60	W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 61	W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 62	W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 63	W	SFR	58 E	59	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 64	W	SFR	62 E	63	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height recommended to meet requirements at adjacent receptors.

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T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical receptor.

W - Includes the benefits of an existing soundwall/property wall.

* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-9 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 3 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 4.1 [C]	SFR	70 [E]	71	73	B (67)	A/E	**65** [R,T]	**8**	64	9	63	10	63	10	62	11	S539 / Private Property
R 4.2 [W]	REC	71 [E]	72	72	B (67)	A/E	67 [T]	5	65	7	**64** [R,5]	**8**	62	10	61	11	S541 / Private Property
R 4.2A [W]	REC	72 [E]	73	70	B (67)	A/E	68 [T]	2	66	4	**65** [R]	**5**	64	6	63	7	
R 4.3	SFR	72 [E]	73	76	B (67)	A/E	75	1	74	2	71	5	**69** [R,T]	**7**	68	8	
R 4.4 [W,C]	REC	70 [E]	70	75	B (67)	A/E	70 [T]	5	66	9	65	10	**63** [R,5]	**12**	62	13	
R 4.4A	SFR	71 [M,LT2,F]	72	74	B (67)	A/E	74	0	73	1	72	2	71	3	70	4	
R 4.5 [W]	MFR	69 [M,ST4.1]	72	66	B (67)	A/E	--	--	--	--	65	1	64	2	63	3	Private Property
R 4.6 [W]	MFR	68 [E]	68	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	Private Property
R 4.7A [W]	REC	66 [M,ST6]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.7 [W]	REC	66 [E]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.8 [W]	MFR	65 [E]	65	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.9 [W]	MFR	68 [M,ST4.2]	67	66	B (67)	A/E	--	--	--	--	--	--	65	1	65	1	
R 4.10 [W]	SFR	65 [E]	65	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 4.11 [W]	SFR	74 [E]	74	69	B (67)	A/E	-- [T]	--	68	1	67	2	66	3	66	3	S551 / Private Property
R 4.11A [W]	SFR	72 [E]	72	69	B (67)	A/E	-- [T]	--	67	2	66	3	65	4	**64** [R]	**5**	
R 4.12 [W]	SFR	72 [E]	72	70	B (67)	A/E	-- [T]	--	68	2	66	4	65	5	**64** [R,5]	**6**	
R 4.12A [W]	SFR	70 [E]	69	69	B (67)	A/E	-- [T]	--	66	3	65	4	64	5	**63** [R,5]	**6**	
R 4.13 [W]	SFR	69 [M,ST4.3]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	63 [5]	4	
R 4.14 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	63 [5]	4	
R 4.14A [W]	SFR	67 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**62** [R,5]	**6**	
R 4.15 [W]	SFR	66 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	64	4	**63** [R]	**5**	
R 4.16A [W]	SFR	66 [M,LT3]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.16 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	63 [5]	4	
R 4.16B [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	63	3	63	3	62 [5]	4	
R 4.17 [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	64	2	63	3	62 [5]	4	
R 4.17A [W]	SFR	66 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**63** [R,5]	**5**	
R 4.18 [W]	SFR	68 [E]	68	67	B (67)	A/E	-- [T]	--	65	2	64	3	64	3	63 [5]	4	
R 4.18A [W]	SFR	67 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.19 [W]	SFR	68 [M,LT4.1]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 4.19A [W]	SFR	69 [E]	69	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	63 [5]	3	
R 4.20 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 4.20A [W,C]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	66	2	64	4	63	5	**62** [R,5]	**6**	
R 4.21 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	63 [5]	4	
R 4.21A [W]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	66	2	65	3	64	4	**63** [R]	**5**	
R 4.22 [W]	SFR	68 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	64 [5]	2	63	3	
R 4.22A	MFR	71 [E]	71	72	B (67)	A/E	**61** [R,T]	**11**	61	11	60	12	59	13	59	13	S557 / Private Property
R 4.23	MFR	77 [M,ST4.4]	77	79	B (67)	A/E	76	3	**70** [R,T]	**9**	68	11	66	13	64	15	
R 4.23A [C]	MFR	77 [M,ST7]	76	79	B (67)	A/E	75	4	**69** [R,T]	**10**	66	13	65	14	63	16	
R 4.24	MFR	72 [E]	72	73	B (67)	A/E	67	6	**64** [R,T]	**9**	62	11	60	13	60	13	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-9 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS –– ALTERNATIVE 3 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 5.1 [C]	MFR	75 [M,ST8]	71	75	B (67)	A/E	**64** [R,T]	**11**	63	12	62	13	61	14	60	15	S561/ Private Property
R 5.2	MFR	71 [M,ST5.2]	72	74	B (67)	A/E	**64** [R,T]	**10**	63	11	62	12	61	13	60	14	
R 5.3 [W]	SCH	67 [E]	69	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.4 [W]	SCH	63 [E]	65	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.5A [C]	SCH	63 [M,ST9]	70	68	B (67)	A/E	**61** [R,T]	**7**	60	8	60	8	59	9	59	9	S563/ Private Property
R 5.5	SCH	65 [E]	67 [NC]	62	B (67)	NONE	-- [T]	--	59	3	59	3	58	4	58	4	
R 5.6A	SCH	65 [E]	67	65	B (67)	NONE	**59** [R,T]	**6**	58	7	57	8	57	8	57	8	
R 5.6	SCH	64 [E]	65 [NC]	60	B (67)	NONE	57 [T]	3	57	3	57	3	57	3	57	3	
R 5.7A	SFR	70 [E]	70	72	B (67)	A/E	**66** [R,T]	**6**	65	7	65	7	65	7	65	7	S567 / R/W / Private Property
R 5.7 [C]	SFR	72 [M, LT5.2]	71	73	B (67)	A/E	**63** [R,T]	**10**	62	11	61	12	60	13	60	13	
R 5.7B	SFR	68 [E]	68 [NC]	68	B (67)	A/E	**61** [R,T]	**7**	60	8	60	8	59	9	58	10	
R 5.8	SFR	66 [E]	66 [NC]	64	B (67)	NONE	**59** [R,T]	**5**	59	5	58	6	58	6	57	7	
R 5.8B	SFR	60 [M,LT5]	67	66	B (67)	A/E	**59** [R,T]	**7**	59	7	58	8	58	8	57	9	
R 5.8A	SFR	66 [E]	66 [NC]	62	B (67)	NONE	59 [T]	3	59	3	59	3	58	4	58	4	
R 5.9B	SFR	67 [E]	67	67	B (67)	A/E	67 [T]	0	67	0	67	0	67	0	67	0	--
R 5.9A [C]	SFR	67 [E]	67	67	B (67)	A/E	67	0	65	2	63 [T]	4	**62** [R]	**5**	60	7	S569 / R/W / Private Property
R 5.9	SFR	67 [E]	67 [NC]	66	B (67)	A/E	62 [T]	4	61	5	**61** [R,5]	**5**	60	6	59	7	
R 5.16 [*, W]	MFR	67 [M, ST5.1]	68	66	B (67)	A/E	64 [T]	2	63	3	62	4	61	5	60	6	Private Property
R 5.16A [W]	MFR	58 [E]	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.17 [W]	SFR	64 [E]	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.18 [W]	SFR	64 [M,LT5.1]	63	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19 [W]	SFR	63 [E]	63	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19A	SFR	62 [E]	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20A	SFR	60 [M,LT4]	67	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20	SFR	61 [E]	61 [NC]	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.21	SFR	66 [M,ST5.4]	67	65	B (67)	NONE	-- [T]	--	--	--	--	--	--	--	--	--	S568 / R/W / Private Property
R 5.22	SFR	69 [E]	70	69	B (67)	A/E	**59** [R,T]	**10**	58	11	58	11	57	12	56	13	
R 5.23 [C]	SFR	69 [E]	70 [NC]	69	B (67)	A/E	**58** [R,T]	**11**	56	13	55	14	53	16	53	16	
R 5.23A	SFR	68 [E]	69	67	B (67)	A/E	**58** [R,T]	**9**	57	10	57	10	57	10	56	11	
R 5.24	SFR	68 [E]	69	65	B (67)	NONE	65	0	65	0	65	0	65	0	65	0	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
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T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
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F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-10 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 3

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R6A to R9	11 SFR	R/W Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 362 m (1,188 ft)	$37,000	$407,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R17 to R19	14 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 195 m (640 ft)	$33,000	$462,000
S47	R32 to R36	10 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 340 m (1,115 ft)	$35,000	$350,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 465 m (1,526 ft)	$35,000	$245,000
S34	R46	1 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 258 m (846 ft)	$49,000	$49,000
S34 (Option)	R46	1 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 89 m (292 ft)	$51,000	$51,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-10 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 3 (CONT'D)

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 110 m (361 ft)	$39,000	$39,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S551	R4.11 to 4.22	20 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,081 m (3,547 ft)	$45,000	$900,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (718 ft)	$43,000	$430,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A & R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.21 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-11 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 3

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S27	R6A to R9	R/W Westbound SR-56	25+93	4.9 (16)	30.9 (101)
			26+20	4.9 (16)	31.0 (102)
			26+30	4.9 (16)	31.4 (103)
			26+89	4.9 (16)	31.6 (104)
			27+41	4.9 (16)	32.4 (106)
			27+89	4.9 (16)	32.1 (105)
			28+39	4.9 (16)	33.0 (108)
			29+09	4.9 (16)	33.5 (110)
			29+09	4.3 (14)	32.9 (108)
			29+66	4.3 (14)	32.8 (108)
		Approximate Length:	362 m (1,188 ft)		
S31	R14 & R15	Private Property Westbound SR-56	31+83	2.4 (8)	35.9 (118)
			31+74	2.4 (8)	35.6 (117)
			32+01	2.4 (8)	35.5 (117)
			32+09	2.4 (8)	36.0 (118)
		Approximate Length:	77 m (253 ft)		
S35	R17 to R19	R/W / Private Property Westbound SR-56	33+84	3.0 (10)	42.7 (140)
			33+85	3.0 (10)	43.0 (141)
			33+85	3.7 (12)	43.7 (143)
			34+06	3.7 (12)	43.7 (143)
			34+54	3.7 (12)	44.4 (146)
			35+13	3.7 (12)	44.8 (147)
			35+13	3.0 (10)	44.1 (145)
			35+66	3.0 (10)	45.0 (148)
		Approximate Length:	195 m (640 ft)		
S47	R32 to R36	R/W Westbound SR-56	44+76	3.7 (12)	46.2 (151)
			45+76	3.7 (12)	46.8 (153)
			46+13	3.7 (12)	47.0 (154)
			46+16	3.7 (12)	47.5 (156)
			46+16	4.3 (14)	48.1 (158)
			46+98	4.3 (14)	48.3 (158)
			47+13	4.3 (14)	48.3 (158)
			47+37	4.3 (14)	48.7 (160)
			47+37	3.7 (12)	48.1 (158)
			47+61	3.7 (12)	48.8 (160)
			48+07	3.7 (12)	49.2 (161)
			48+15	3.7 (12)	48.9 (160)
		Approximate Length:	340 m (1,115 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-11 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 3 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S20	R42 to R45	Inside R/W Eastbound SR-56	17+50	3.7 (12)	22.2 (73)
			17+85	3.7 (12)	21.7 (71)
			18+45	3.7 (12)	20.7 (68)
			18+45	4.3 (14)	21.3 (70)
			19+15	4.3 (14)	20.8 (68)
			19+15	4.9 (16)	21.4 (70)
			19+66	4.9 (16)	21.4 (70)
			20+43	4.9 (16)	21.9 (72)
			21+09	4.9 (16)	22.4 (73)
			21+40	4.9 (16)	22.9 (75)
			21+49	4.9 (16)	23.9 (78)
			21+49	4.3 (14)	23.3 (76)
			21+61	4.3 (14)	23.8 (78)
			21+83	4.3 (14)	25.3 (83)
			21+83	3.7 (12)	24.7 (81)
			22+02	3.7 (12)	26.2 (86)
			22+14	3.7 (12)	27.2 (89)
		Approximate Length:	465 m (1,526 ft)		
S34	R46	Inside R/W Eastbound SR-56	32+00	3.0 (10)	30.0 (99)
			32+39	3.0 (10)	30.5 (100)
			32+60	3.0 (10)	30.7 (101)
			32+80	3.0 (10)	31.0 (102)
			32+80	2.4 (8)	30.4 (100)
			33+00	2.4 (8)	30.6 (101)
			33+16	2.4 (8)	30.9 (102)
			33+40	2.4 (8)	31.1 (102)
			33+59	2.4 (8)	31.4 (103)
			34+00	2.4 (8)	31.6 (104)
			34+12	2.4 (8)	31.9 (105)
			34+31	2.4 (8)	32.4 (106)
			34+60	2.4 (8)	32.5 (107)
		Approximate Length:	258 m (846 ft)		
S34 (Option)	R46	Private Property Eastbound SR-56	33+08	3.7 (12)	31.2 (102)
			33+15	3.7 (12)	30.7 (101)
			33+20	3.7 (12)	30.2 (99)
			33+30	3.7 (12)	29.9 (98)
			33+30	4.3 (14)	30.5 (100)
			33+40	4.3 (14)	30.5 (100)
			33+60	4.3 (14)	30.7 (101)
			33+80	4.3 (14)	30.5 (100)
			33+87	4.3 (14)	30.2 (99)
		Approximate Length:	89 m (292 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-11 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 3 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S539	R4.1	Private Property Southbound I-5	540+19	2.4 (8)	26.3 (86)
			540+22	2.4 (8)	26.3 (86)
			540+25	2.4 (8)	26.3 (86)
			540+31	2.4 (8)	26.3 (86)
			540+35	2.4 (8)	26.3 (86)
			540+39	2.4 (8)	26.3 (86)
			540+42	2.4 (8)	26.3 (86)
			540+43	2.4 (8)	26.3 (86)
		Approximate Length:	42 m (138 ft)		
S541	R4.2 to R4.4	Private Property Southbound I-5	540+36	2.4 (8)	24.4 (80)
			540+31	2.4 (8)	24.4 (80)
			540+31	3.7 (12)	25.7 (84)
			540+37	3.7 (12)	26.2 (86)
			540+69	3.7 (12)	26.5 (87)
			540+76	3.7 (12)	26.4 (86)
			540+84	3.7 (12)	27.7 (91)
			540+84	4.3 (14)	28.3 (93)
			541+19	4.3 (14)	28.5 (93)
			541+23	4.3 (14)	28.6 (94)
			541+59	4.3 (14)	29.8 (98)
			541+64	4.3 (14)	30.3 (99)
		Approximate Length:	183 m (600 ft)		
S551	R4.11 to 4.22	Private Property Southbound I-5	545+72	4.3 (14)	48.8 (160)
			546+01	4.3 (14)	48.9 (160)
			546+01	4.9 (16)	49.5 (162)
			546+43	4.9 (16)	51.0 (167)
			546+44	4.9 (16)	51.4 (169)
			546+64	4.9 (16)	51.9 (170)
			546+82	4.9 (16)	52.9 (173)
			546+87	4.9 (16)	54.9 (180)
			547+26	4.9 (16)	57.0 (187)
			547+67	4.9 (16)	59.1 (194)
			548+27	4.9 (16)	61.9 (203)
			548+47	4.9 (16)	62.9 (206)
			548+86	4.9 (16)	64.1 (210)
			548+89	4.9 (16)	64.9 (213)
			549+08	4.9 (16)	65.4 (215)
			549+27	4.9 (16)	66.4 (218)
			549+28	4.9 (16)	66.9 (219)
			549+48	4.9 (16)	67.4 (221)
			549+87	4.9 (16)	69.4 (228)
			550+07	4.9 (16)	70.4 (231)
			550+27	4.9 (16)	70.9 (233)
			550+67	4.9 (16)	72.4 (237)
			551+44	4.9 (16)	73.5 (241)
			551+81	4.9 (16)	74.0 (243)
			552+38	4.9 (16)	75.4 (247)
			553+13	4.9 (16)	76.9 (252)
			553+73	4.9 (16)	77.5 (254)
			554+58	4.9 (16)	79.0 (259)
			555+24	4.9 (16)	79.8 (262)
			555+24	4.9 (16)	80.1 (263)
			555+48	4.9 (16)	80.9 (265)
			555+73	4.9 (16)	81.4 (267)
			555+73	4.3 (14)	80.8 (265)
			555+76	4.3 (14)	81.4 (267)
			556+01	4.3 (14)	82.0 (269)
			556+03	4.3 (14)	82.5 (271)
			556+34	4.3 (14)	82.9 (272)
			556+37	4.3 (14)	83.5 (274)
		Approximate Length:	1,081 m (3,547 ft		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-11 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 3 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S557	R4.22A to R4.24	Private Property Southbound I-5	556+08	2.4 (8)	86.4 (284)
			556+13	2.4 (8)	86.9 (285)
			556+22	2.4 (8)	86.9 (285)
			556+43	2.4 (8)	86.4 (284)
			556+53	2.4 (8)	86.4 (284)
			556+53	3.0 (10)	87.0 (286)
			556+67	3.0 (10)	87.0 (286)
			556+77	3.0 (10)	87.5 (287)
			556+93	3.0 (10)	87.5 (287)
			557+01	3.0 (10)	88.0 (289)
			557+16	3.0 (10)	88.0 (289)
			557+35	3.0 (10)	89.0 (292)
			557+70	3.0 (10)	89.0 (292)
			557+94	3.0 (10)	88.5 (291)
			558+01	3.0 (10)	88.5 (291)
		Approximate Length:	219 m (718 ft)		
S561	R5.1 & R5.2	Private Property Southbound I-5	560+85	0.0 (0)	99.5 (326)
			560+81	2.4 (8)	98.4 (323)
			561+14	2.4 (8)	96.4 (316)
			561+38	2.4 (8)	96.4 (316)
			561+75	2.4 (8)	96.4 (316)
			562+16	2.4 (8)	96.4 (316)
			562+21	2.4 (8)	96.4 (316)
		Approximate Length:	156 m (512 ft)		
S563	R5.5A to R5.6	Private Property Southbound I-5	563+28	2.4 (8)	95.1 (312)
			563+37	2.4 (8)	91.9 (302)
			563+70	2.4 (8)	91.4 (300)
			564+04	2.4 (8)	90.9 (298)
			564+39	2.4 (8)	91.0 (299)
			564+36	2.4 (8)	91.4 (300)
		Approximate Length:	130 m (427 ft)		
S567	R5.7A to R5.8B	R/W / Private Property Southbound I-5	564+61	2.4 (8)	101.4 (333)
			564+59	2.4 (8)	101.4 (333)
			564+80	2.4 (8)	101.4 (333)
			565+1	2.4 (8)	101.5 (333)
			565+24	2.4 (8)	101.5 (333)
			565+38	2.4 (8)	101.7 (334)
			565+60	2.4 (8)	101.6 (333)
			565+72	2.4 (8)	101.4 (333)
			565+78	2.4 (8)	101.4 (333)
			565+84	2.4 (8)	101.4 (333)
			565+70	2.4 (8)	101.9 (334)
			566+21	2.4 (8)	102.4 (336)
			566+52	2.4 (8)	102.4 (336)
			566+71	2.4 (8)	102.4 (336)
			567+09	2.4 (8)	102.6 (337)
			567+18	2.4 (8)	102.4 (336)
		Approximate Length:	299 m (991 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

TABLE 7-11 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 3 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S569	R5.9A & R5.9	R/W / Private Property Southbound I-5	567+29	4.3 (14)	100.3 (329)
			567+66	4.3 (14)	99.8 (327)
			567+66	3.7 (12)	99.2 (325)
			568+05	3.7 (12)	99.9 (328)
			568+05	2.4 (8)	98.6 (324)
			568+00	2.4 (8)	100.6 (330)
			567+89	2.4 (8)	101.8 (334)
		Approximate Length:	106 m (348 ft)		
S568	R5.21 to R5.23A	R/W / Private Property Northbound I-5	566+24	2.4 (8)	103.2 (339)
			566+25	2.4 (8)	102.1 (335)
			566+54	2.4 (8)	103.1 (338)
			566+71	2.4 (8)	104.4 (343)
			566+76	2.4 (8)	104.5 (343)
			566+87	2.4 (8)	104.1 (342)
			566+62	2.4 (8)	104.1 (342)
			567+02	2.4 (8)	104.1 (342)
			567+20	2.4 (8)	104.1 (342)
			567+32	2.4 (8)	104.1 (342)
			567+35	2.4 (8)	104.1 (342)
			567+41	2.4 (8)	104.1 (342)
			567+43	2.4 (8)	104.1 (342)
			567+42	2.4 (8)	104.1 (342)
			567+46	2.4 (8)	103.6 (340)
			567+56	2.4 (8)	103.7 (340)
			567+67	2.4 (8)	103.6 (340)
			567+79	2.4 (8)	103.6 (340)
			567+90	2.4 (8)	103.8 (341)
		Approximate Length:	215 (705 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

ALTERNATIVE 4

Table 7-12 presents the results of the barrier analysis. Table 7-13 provides a summary of the noise barriers, including the number of benefited residences, reasonable allowance per residence, and reasonable allowance cost per barrier. Table 7-14 presents a summary of soundwall locations and the minimum heights and lengths to achieve at least 5 dB noise reduction.

Areas with Noise Abatement

Soundwall S27: Soundwall S27 would be 3.7 to 4.9 m (12 to 16 ft) in height located along the westbound R/W between stations 25+93 and 29+66. The soundwall would provide a minimum of 5 dB noise reduction for single-family residences represented by Receptors R6A through R9. This proposed soundwall would replace an existing 2.4 m (8-ft) high glass/block soundwall located on the R/W and property line. Sheet 23 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S31: Soundwall S31 would be 2.4 m (8 ft) in height located adjacent to westbound SR-56 inside of the private property of Notre Dame Academy along the playground between stations 31+83 and 32+09. A soundwall has not been considered at the R/W line because the R/W is depressed by approximately 5 to 9 m (16 to 30 ft). There is an existing earthen berm between the playground and the highway; however, the berm does not provide enough protection for the receptors to prevent an impact. The soundwall would provide a minimum of 5 dB noise reduction for the playground represented by Receptors R14 and R15. Sheet 24 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S35: Soundwall S35 would be located on the westbound side of SR-56 on the R/W line and private property between stations 33+84 and 37+50. The portion of the soundwall that is located at the property line is between stations 33+36 to 33+85 and the portion inside private property is between stations 37+41 to 37+50. The 3.0 to 3.7 m (10 to 12-ft) high soundwall would provide feasible noise abatement for attached single-family residences represented by Receptors R17 through R21A. Receptor R19, which is not impacted, would be located behind the wall. However, this receptor would not receive the required 5 dB noise reduction to become benefitted. There is an existing 1.8 m (6-ft) high block property wall located on the R/W and property line. Sheet 24 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S41: Soundwall S41 would be 3.7 m (12 ft) in height located on the westbound side of the highway on the R/W line between stations 41+36 and 42+40. The soundwall would provide a minimum of 5 dB noise reduction for single-family residences represented by Receptors R30A and R30. There is an existing 1.8 m (6-ft) high block property wall located on the R/W. Sheet 25 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S47: Soundwall S47 would be located on the westbound R/W line between stations 44+76 and 48+07. The 3.7 to 4.3 m (12 to 14-ft) high soundwall would provide a 5 dB noise reduction to single-family residences represented by Receptors R32 through R35A. There is an existing 1.8 m (6-ft) high block property wall located on the R/W. Soundwall S47 has been raised higher than otherwise required at Receptor R32 to provide feasible noise abatement at Receptor R33. Receptor R36, which is not impacted, would be located behind the wall. However, this receptor would not receive the required minimum of 5 dB noise reduction to become benefitted. Sheets 25 and 26 show the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S20: Soundwall S20 would be 3.7 to 4.9 m (12 to 16 ft) in height located inside the eastbound R/W on top of an existing earthen berm between stations 17+25 and 22+44. The soundwall would provide a minimum of 5 dB noise reduction for the sports field and playground of the San Diego Jewish Academy represented by Receptors R42 through R45. Soundwall S20 has been raised higher than otherwise required in front of Receptors R42, R43, and R44 to provide a 5 dB noise reduction to Receptor R45. Sheet 22 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S34: Soundwall S34 would be located along the eastbound side of SR-56 inside the R/W on top of an existing earthen berm between stations 32+00 and 34+60. The 2.4 to 3.0 m (8 to 10-ft) high soundwall would provide feasible noise abatement for a single-family residences represented by Receptor R46. Receptor R47, which is not impacted, would be located behind the wall which is extended to provide a 5 dB noise reduction to Receptor R46. However, Receptor R47 would not receive the required 5 dB noise reduction to become benefitted. Soundwall S34 has been further extended to end at a logical point. The 3.0 m (10 ft) section of the soundwall is required to cut the line-of-sight to truck stack exhausts. Sheet 24 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S34 (Option): Soundwall S34 would be located along the eastbound side of SR-56 on private property between stations 33+08 and 33+87. The 3.7 to 4.3 m (12 to 14-ft) high soundwall would provide a 5 dB noise reduction for the single-family residence represented by Receptor R46. Sheet 24 shows the location and heights of optional Soundwall S34 to achieve the minimum 5 dB noise reduction.

Soundwall S539: Soundwall S539 would be 2.4 m (8 ft) in height located on private property between stations 540+19 and 540+44. Due to the higher elevation of the property, a soundwall would not be feasible at any other location. The soundwall would provide a 5 dB noise reduction for one single-family residence represented by Receptor R4.1. Sheet 7 shows the location and height of Soundwall S539 to achieve the minimum 5 dB noise reduction.

Soundwall S541: Soundwall S541 would be located on the southbound side of I-5 on private property between stations 540+36 and 541+64. The soundwall would be 2.4 to 4.3 m (8 to 14 ft) in height and would provide a minimum of 5 dB noise reduction for the recreational area of a gated housing community, comprised of a pool and tennis courts, represented by Receptors R4.2 and R4.4 as well as a single-family residence represented by Receptor R4.3. There is an existing 1.8 to 2.1 m (6 to 7 ft) high property wall located on the property line. Soundwall S541 has been raised higher than otherwise required at Receptors R4.4 to break the truck stack line-of-sight at Receptor R4.3. Soundwall S541 would not provide a 5 dB noise reduction to the residence represented by Receptor R4.4A because the soundwall would not completely block the line-of-sight to the highway. Sheet 27 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S551: Soundwall S551 would be 4.3 to 4.9 m (14 to 16 ft) in height located on the southbound side of I-5 on private property between stations 545+72 and 556+37. The soundwall would provide a minimum of 5 dB noise reduction to single-family residences represented by Receptors R4.12 through R4.21A. There is an existing 2.4 m (8 ft) high glass/block soundwall located on the property line. Soundwall S551 has been raised higher than otherwise required at Receptor R4.12 to provide a 5 dB noise reduction at Receptor R4.12A. Soundwall S551 would not be able to provide feasible noise abatement to every residence located behind the wall. However, the wall would

provide at least a 3 to 4 dB noise reduction to all residences. Sheets 27, 28, and 29 show the minimum length and heights for this soundwall to provide feasible abatement.

Project Build without Barrier column on Table 7-12 represents the traffic noise level with the existing 2.4 m (8 ft) glass/block soundwall and the proposed project.

Soundwall S557: Soundwall S557 would be located on the southbound side of I-5 on private property between stations 556+08 and 558+01. The soundwall would be 2.4 to 3.0 m (8 to 10 ft) in height and would provide a minimum of 5 dB noise reduction to grassy backyard outdoor use areas for multi-family residences represented by Receptors R4.22A through R4.24. However, there is only 1.5 m (5 ft) of flat surface area behind these residences and many large trees in the area that would have to be removed for Soundwall S557 to be built. Sheet 29 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S561: Soundwall S561 would be 2.4 m (8 ft) in height located along the southbound side of I-5 between stations 560+85 and 562+21. It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the residence elevation; however, a soundwall on private property would provide feasible noise abatement for the outdoor use areas for the multi-family residences, represented by Receptors R5.1 and R5.2, in this area. The outdoor use areas for the multi-family residences are patios. Permission will be needed from the property owners of the multi-family residences to place Soundwall S561 at this location. Sheet 29 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S563: Soundwall S563 would be located along the southbound side of I-5 between stations 563+28 and 564+39 at a height of 2.4 m (8 ft). It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the school elevation; however, a soundwall along the property line would provide a minimum of 5 dB noise reduction for the outdoor use areas at Del Mar Hills Elementary School, represented by Receptors R5.5A and R5.6A. This soundwall would not provide noise abatement to any classroom. However, an existing wall located along southbound I-5 protects a second playground and the classrooms represented by Receptors R5.3 and R5.4, respectively. Receptors R5.3 and R5.4 would not be impacted. Permission will be needed from the school district to place Soundwall S563 at this location. Sheet 30 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S567: Soundwall S567 would be located along the southbound side of I-5 between stations 564+61 and 567+18. The 2.4 m (8-ft) high wall would provide feasible noise abatement for single family residences, represented by Receptors R5.7A to R5.8B from highway traffic noise. While the northern end of Soundwall S567 and Soundwall S569 both run along the R/W and are near each other, they are considered different walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Permission will be needed from the property owners of some of the single-family residences to place Soundwall S561 at the southern end of this location. Sheet 30 the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S569: Soundwall S569 would be 2.4 to 4.3 m (8 to14 ft) in height located along the southbound side of I-5 between stations 567+29 and 568+05. The wall would provide a minimum of 5 dB noise reduction for single family residences, represented by

Receptors R5.9A and R5.9, from highway traffic noise. While both soundwalls S567 and S569 run along the R/W and are near each other, they are considered different walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Sheet 30 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S568: Soundwall S568 would be 2.4 m (8 ft) in height located along the northbound side of I-5 between stations 566+87 and 567+90. The soundwall would provide feasible noise abatement for single family residences, represented by Receptors R5.22 to R5.23A, from highway traffic noise. Receptor R5.21 is not predicted to be impacted; however, Soundwall S568 would begin at the property of Receptor R5.21 to provide a minimum of 5 dB noise reduction for Receptor R5.22 and as a logical starting point. Sheet 30 shows the minimum length and height for this soundwall to provide feasible abatement.

Areas without noise abatement

There are no areas along SR-56 that are impacted by the widening and improvement project that were not feasible to abate with standard noise abatement techniques.

Several areas along I-5 are impacted by the widening and improvement project, but were not feasible to abate with standard noise abatement techniques. The receptor locations for these areas and the explanation for non-abatement are described in the following paragraphs:

Receptors R4.5 and R4.9: Receptors R4.5 and R4.9 represent two groups of multi-family residences on the southbound side of I-5, north of Carmel Valley Road. Receptor R4.5 is protected by an existing 2.4 m (8-ft) high soundwall. The existing soundwall decreases in height from 4.3 to 2.4 m (14 to 8 ft) in front of Receptor R4.9 The results show that raising the height of the existing soundwall to 4.9 m (16 ft) would not provide a 5 dB benefit to any of the residences; therefore, it would not be feasible. Sheet 27 shows the location of the receptors.

Receptor R5.16: Receptor R5.16 was chosen for noise measurement purposes only and does not represent an area of outdoor use. However, this receptor does represent multi-family residential units. Therefore, the interior criteria shall be used. Assuming a 20 dB noise reduction due to the building with widows closed, the interior noise level of Receptor R5.16 is predicted to be 47 dBA which is below the indoor noise criteria of 52 dBA. However, with the windows open, the indoor noise level is predicted to be as high as 57 dBA. Sheet 29 shows the location of Receptor R5.16.

Receptor R5.9B: Receptor R5.9B is located between Soundwalls S567 and S569 on the southbound side of I-5 along Minorca Cove. Due to the sharp decrease in elevation along the R/W, it would not be practical to build a soundwall at the R/W and the shoulder would not be effective due to the difference in elevation. Furthermore, because Soundwalls S567 and S569 which are located at the R/W are feasible for the other single-family residences in this area, it would not be practical to locate a soundwall on private property for this single residence to close the gap in between Soundwalls S567 and S569. Sheet 30 shows the location of Receptor R5.9B.

TABLE 7-12 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 4

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 1 [W]	HM	56 [E]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 2 [W]	SFR	55 [E]	58	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 3 [W]	SFR	57 [E]	59	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4 [W]	SFR	58 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 4A [W]	SFR	58 [E]	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5 [W]	SFR	62 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 6A [W]	SFR	64 [E]	66	68	B (67)	A/E	-- [T]	--	66	2	64	4	**63** [R]	**5**	62	6	
R 6 [W]	SFR	63 [M,ST4]	65	67	B (67)	A/E	-- [T]	--	65	2	63	4	63	4	**62** [R]	**5**	
R 7 [W]	SFR	63 [E]	65	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	S27 / R/W
R 8 [W]	SFR	63 [E]	66	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 9 [W,C]	SFR	62 [M,LT1,CAL]	65	66	B (67)	A/E	-- [T]	--	64	2	62	4	62	4	**60** [R]	**6**	
R 9A [W]	SFR	61 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 10 [W]	SFR	60 [E]	63	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 11 [W]	SFR	57 [E]	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 12 [W]	SFR	57 [E]	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 13 [W]	SFR	59 [E]	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 14 [C]	SCH	64 [M,ST3]	69	71	B (67)	A/E	**61** [R,T]	**10**	60	11	58	13	58	13	57	14	S31 / Private
R 15	SCH	62 [E]	68	69	B (67)	A/E	**61** [R,T]	**8**	60	9	59	10	58	11	57	12	Property
R 16 [W]	SFR	64 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 17 [W,C]	SFR	66 [E]	66	67	B (67)	A/E	65 [T]	2	63	4	**62** [R]	**5**	61	6	60	7	
R 18 [W]	SFR	65 [E]	65	67	B (67)	A/E	64 [T]	3	63	4	**62** [R]	**5**	61	6	60	7	
R 18A [W]	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	63	3	**61** [R]	**5**	61	5	60	6	S35 / R/W / Private
R 19 [W]	SFR	64 [M,ST2,CAL]	64	65	B (67)	NONE	64 [T]	1	62	3	61 [5]	4	60	5	59	6	Property
R 20 [W]	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	
R 21 [W]	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	
R 21A [W]	SFR	63 [E]	63	65	B (67)	NONE	62 [T]	3	61	4	**60** [R]	**5**	59	6	58	7	
R 21B [W]	SFR	62 [E]	62	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 22 [W]	SFR	61 [E]	61	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 23 [W]	SFR	60 [E]	60	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 24	REC	62 [E]	62	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 25 [W]	SFR	57 [E]	57	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 26 [*, W]	SFR	58 [M,ST1]	58	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 27 [W]	SFR	58 [E]	58	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 28 [W]	SFR	61 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 29A [W]	SFR	61 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29 [W]	SFR	63 [E]	63	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29B [W]	SFR	64 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 30A [W,C]	SFR	64 [E]	64	66	B (67)	A/E	63 [T]	3	62	4	**61** [R]	**5**	60	6	59	7	S41 / R/W
R 30 [W]	SFR	64 [E]	64	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	
R 31 [W]	SFR	54 [E]	54	55	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height recommended to meet requirements at adjacent receptors.

R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical receptor.

W - Includes the benefits of an existing soundwall/property wall.

* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-12 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 4 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 32 W,C	SFR	67 E	67	67	B (67)	A/E	65 T	2	62	5	**61** R,5	**6**	60	7	59	8	S47 / R/W
R 33 W	SFR	66 E	66	66	B (67)	A/E	64 T	2	62	4	**61** R	**5**	60	6	59	7	
R 34 W	SFR	65 E	65	66	B (67)	A/E	64 T	2	63	3	62	4	**61** R	**5**	60	6	
R 35 W	SFR	65 E	65	65	B (67)	NONE	64 T	1	62	3	61	4	**60** R	**5**	59	6	
R 35A W	SFR	65 E	65	66	B (67)	A/E	64 T	2	62	4	**61** R	**5**	60	6	59	7	
R 36 W	SFR	65 E	65	65	B (67)	NONE	63 T	2	62	3	63 5	2	60	5	59	6	
R 37 W	SFR	59 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 38 W	SFR	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 39 W	SFR	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 40 W	SFR	59 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 41 W	SFR	58 E	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 42	SCH	63 E	67	67	B (67)	A/E	65	2	64	3	62 T	5	61	6	**62** R,5	**5**	S20 / Inside R/W
R 43	SCH	63 M,ST5	67	67	B (67)	A/E	65	2	64	3	62 T	5	61	6	**61** R,5	**6**	
R 44 C	SCH	65 E	69	69	B (67)	A/E	66	3	65	4	65	4	64 T	5	**63** R,5	**6**	
R 45	SCH	65 E	68	68	B (67)	A/E	66	2	65	3	65	3	61	7	**63** R,T	**5**	
R 46 C	SFR	66 E	70	70	B (67)	A/E	**65** R,T	**5**	63	7	62	8	61	9	61	9	S34/ Inside R/W
R 47	SFR	61 E	65	65	B (67)	NONE	62 T	3	60	5	59	6	64	1	58	7	
R 46 C	SFR	66 E	70	70	B (67)	A/E	70	0	66	4	**62** R,T	**8**	60	10	58	12	S34/ Private Property (Option)
R 47	SFR	61 E	65	65	B (67)	NONE	62	3	62	3	61	4	59 T	6	58	7	
R 48 *	SFR	56 M,ST1A	57	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 49	SFR	53 E	54	55	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 50	SFR	53 E	54	55	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 51	SFR	57 E	58	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 52	SFR	57 E	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 53	SFR	55 E	56	57	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54	SFR	58 E	60	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54A	REC	61 E	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 55	SFR	59 E	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 56	SFR	52 E	54	54	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 57 W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 58 W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 59 W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 60 W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 61 W	SFR	59 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 62 W	SFR	58 E	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 63 W	SFR	58 E	59	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 64 W	SFR	62 E	63	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.
3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.

R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
W - Includes the benefits of an existing soundwall/property wall.
* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-12 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 4 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 4.1 [C]	SFR	70 [E]	71	72	B (67)	A/E	**65** [R,5]	**7**	64	8	63	9	62	10	62	10	S539 / Private Property
R 4.2 [W]	REC	71 [E]	72	72	B (67)	A/E	67 [T]	5	64	8	**64** [R,5]	**8**	61	11	60	12	S541 / Private Property
R 4.2A [W]	REC	72 [E]	73	70	B (67)	A/E	68 [T]	2	66	4	**64** [R]	**6**	64	6	63	7	
R 4.3	SFR	72 [E]	73	76	B (67)	A/E	75	1	73	3	71	5	**69** [R,T]	**7**	67	9	
R 4.4 [W,C]	REC	70 [E]	70	75	B (67)	A/E	69 [T]	6	66	9	64	11	**63** [R,5]	**12**	62	13	
R 4.4A	SFR	71 [M,LT2,F]	72	74	B (67)	A/E	74	0	73	1	72	2	70	4	70	4	
R 4.5 [W]	MFR	69 [M,ST4.1]	72	66	B (67)	A/E	--	--	65	1	65	1	64	2	63	3	Private Property
R 4.6 [W]	MFR	68 [E]	68	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	Private Property
R 4.7A [W]	REC	66 [M,ST6]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.7 [W]	REC	66 [E]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.8 [W]	MFR	65 [E]	65	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.9 [W]	MFR	68 [M,ST4.2]	67	66	B (67)	A/E	--	--	66	0	66	0	65	1	65	1	
R 4.10 [W]	SFR	65 [E]	65	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 4.11 [W]	SFR	74 [E]	74	69	B (67)	A/E	-- [T]	--	68	1	67	2	66	3	66 [5]	3	S551 / Private Property
R 4.11A [W]	SFR	72 [E]	72	69	B (67)	A/E	-- [T]	--	67	2	66	3	66	3	**64** [R]	**5**	
R 4.12 [W,C]	SFR	72 [E]	72	70	B (67)	A/E	-- [T]	--	68	2	66	4	65	5	**64** [R,5]	**6**	
R 4.12A [W]	SFR	70 [E]	69	69	B (67)	A/E	-- [T]	--	66	3	65	4	64	5	**63** [R,5]	**6**	
R 4.13 [W]	SFR	69 [M,ST4.3]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**63**	4	
R 4.14 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	**63**	4	
R 4.14A [W]	SFR	67 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**63** [R,5]	**5**	
R 4.15 [W]	SFR	66 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	64	4	**63** [R]	**5**	
R 4.16A [W]	SFR	66 [M,LT3]	68	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 4.16 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	64	3	63 [5]	4	
R 4.16B [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.17 [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	64	2	63	3	62 [5]	4	
R 4.17A [W]	SFR	66 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	64	4	**63** [R]	**5**	
R 4.18 [W]	SFR	68 [E]	68	67	B (67)	A/E	-- [T]	--	65	2	64	3	64	3	63 [5]	4	
R 4.18A [W]	SFR	67 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.19 [W]	SFR	68 [M,LT4.1]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 4.19A [W]	SFR	69 [E]	69	66	B (67)	A/E	-- [T]	--	66	0	64	2	63	3	63 [5]	3	
R 4.20 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	64	3	64	3	63 [5]	4	
R 4.20A [W]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	66	2	65	3	63	5	**63** [R]	**5**	
R 4.21 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	63 [5]	4	
R 4.21A [W]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	66	2	65	3	64	4	**63** [R]	**5**	
R 4.22 [W]	SFR	68 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	64 [5]	2	63	3	
R 4.22A	MFR	71 [E]	71	72	B (67)	A/E	**62** [R,T]	**10**	62	10	60	12	60	12	59	13	S557 / Private Property
R 4.23	MFR	77 [M,ST4.4]	77	79	B (67)	A/E	76	3	**70** [R,T]	**9**	68	11	66	13	64	15	
R 4.23A [C]	MFR	77 [M,ST7]	76	79	B (67)	A/E	75	4	**69** [R,T]	**10**	67	12	65	14	63	16	
R 4.24	MFR	72 [E]	72	73	B (67)	A/E	67	6	**64** [R,T]	**9**	62	11	60	13	60	13	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-12 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 4 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 5.1 [C]	MFR	75 [M,ST8]	71	75	B (67)	A/E	**64** [R,T]	**11**	63	12	62	13	61	14	60	15	S561 / Private Property
R 5.2	MFR	71 [M,ST5.2]	72	75	B (67)	A/E	**64** [R,T]	**11**	63	12	62	13	61	14	60	15	
R 5.3 [W]	SCH	67 [E]	69	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.4 [W]	SCH	63 [E]	65	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.5A [C]	SCH	63 [M,ST9]	70	69	B (67)	A/E	**61** [R,T]	**8**	60	9	60	9	59	10	59	10	S563 / Private Property
R 5.5	SCH	65 [E]	67 [NC]	62	B (67)	NONE	59 [5]	3	59	3	59	3	59	3	58	4	
R 5.6A	SCH	65 [E]	67	66	B (67)	A/E	**59** [R,T]	**7**	58	8	58	8	57	9	57	9	
R 5.6	SCH	64 [E]	65 [NC]	61	B (67)	NONE	58 [5]	3	57	4	57	4	57	4	57	4	
R 5.7A	SFR	70 [E]	70	72	B (67)	A/E	**66** [R,T]	**6**	66	6	66	6	65	7	65	7	S567 / R/W / Private Property
R 5.7 [C]	SFR	72 [M, LT5.2]	71	74	B (67)	A/E	**63** [R,T]	**11**	62	12	61	13	60	14	60	14	
R 5.7B	SFR	68 [E]	68 [NC]	68	B (67)	A/E	**61** [R,T]	**7**	60	8	60	8	59	9	59	9	
R 5.8	SFR	66 [E]	66 [NC]	64	B (67)	NONE	**59** [R,T]	**5**	59	5	58	6	58	6	57	7	
R 5.8B	SFR	60 [M,LT5]	67	66	B (67)	A/E	**60** [R,T]	**6**	59	7	58	8	58	8	57	9	
R 5.8A	SFR	66 [E]	66 [NC]	62	B (67)	NONE	59 [5]	3	59	3	59	3	58	4	58	4	
R 5.9B	SFR	67 [E]	67	67	B (67)	A/E	67 [5]	0	67	0	67	0	67	0	67	0	--
R 5.9A [C]	SFR	67 [E]	67	67	B (67)	A/E	67	0	65	2	63 [T]	4	**62** [R]	**5**	61	6	S569 / R/W / Private Property
R 5.9	SFR	67 [E]	67 [NC]	66	B (67)	A/E	63 [T]	3	62	4	**61** [R]	**5**	60	6	59	7	
R 5.16 * [, W]	MFR	67 [M, ST5.1]	68	67	B (67)	A/E	64 [T]	3	63	4	62	5	61	6	60	7	Private Property
R 5.16A [W]	MFR	58 [E]	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.17 [W]	SFR	64 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.18 [W]	SFR	64 [M,LT5.1]	63	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19 [W]	SFR	63 [E]	63	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19A	SFR	62 [E]	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20A	SFR	60 [M,LT4]	67	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20	SFR	61 [E]	61	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.21	SFR	66 [M,ST5.4]	67 [NC]	65	B (67)	NONE	62 [T,5]	3	61	4	61	4	61	4	60	5	S568 / R/W / Private Property
R 5.22	SFR	69 [E]	70	69	B (67)	A/E	**59** [R,T]	**10**	58	11	58	11	57	12	56	13	
R 5.23 [C]	SFR	69 [E]	70 [NC]	69	B (67)	A/E	**58** [R,T]	**11**	56	13	55	14	53	16	53	16	
R 5.23A	SFR	68 [E]	69	67	B (67)	A/E	**58** [R,T]	**9**	57	10	56	11	56	11	55	12	
R 5.24	SFR	68 [E]	69	65	B (67)	NONE	64	1	64	1	64	1	64	1	64	1	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-13 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 4

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R6A to R9	11 SFR	R/W Westbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 362 m (1,188 ft)	$37,000	$407,000
S31	R14 and R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R17 to R21A	31 SFR	R/W / Private Property Westbound SR-56	2.4 m (8 ft) to 3.7 m (12 ft) 370 m (1,214 ft)	$33,000	$1,023,000
S41	R30A and R30	4 SFR	R/W Westbound SR-56	3.7 m (12 ft) 105 m (345 ft)	$33,000	$132,000
S47	R32 to R35A	10 SFR	R/W Westbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 323 m (1,060 ft)	$35,000	$350,000
S20	R42 to R45	1 SCH (7 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 519 m (1,703 ft)	$37,000	$259,000
S34	R46	1 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 258 m (846 ft)	$47,000	$47,000
S34 (Option)	R46	1 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 89 m (292 ft)	$49,000	$49,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-13 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 42 m (138 ft)	$37,000	$37,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.0 (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S551	R4.12 to 4.21A	23 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,078 m (3,537 ft)	$47,000	$1,081,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (719 ft)	$43,000	$430,000
S561	R5.1 and R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A to R5.6A	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A and R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) to 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.22 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S27	R6A to R9	R/W Westbound SR-56	25+93	3.7 (12)	29.7 (97)
			26+20	3.7 (12)	29.8 (98)
			26+20	4.3 (14)	30.4 (100)
			26+30	4.3 (14)	30.8 (101)
			26+89	4.3 (14)	31.0 (102)
			26+89	4.9 (16)	31.6 (104)
			27+41	4.9 (16)	32.4 (106)
			27+89	4.9 (16)	32.1 (105)
			28+39	4.9 (16)	33.0 (108)
			29+09	4.9 (16)	33.5 (110)
			29+66	4.9 (16)	33.4 (110)
		Approximate Length:	362 m (1,188 ft)		
S31	R14 and R15	Private Property Westbound SR-56	31+83	2.4 (8)	35.9 (118)
			31+74	2.4 (8)	35.6 (117)
			32+01	2.4 (8)	35.5 (117)
			32+09	2.4 (8)	36.0 (118)
		Approximate Length:	77 m (253 ft)		
S35	R17 to R21A	R/W / Private Property Westbound SR-56	33+84	3.0 (10)	42.7 (140)
			33+85	3.0 (10)	43.0 (141)
			33+85	3.7 (12)	43.7 (143)
			34+06	3.7 (12)	43.7 (143)
			34+54	3.7 (12)	44.4 (146)
			35+13	3.7 (12)	44.8 (147)
			35+66	3.7 (12)	45.7 (150)
			36+07	3.7 (12)	45.8 (150)
			36+83	3.7 (12)	46.3 (152)
			37+26	3.7 (12)	46.8 (153)
			37+37	3.7 (12)	46.3 (152)
			37+41	3.7 (12)	46.8 (153)
			37+50	3.7 (12)	46.8 (153)
		Approximate Length:	370 m (1,214 ft)		
S41	R30A and R30	R/W Westbound SR-56	41+36	3.7 (12)	46.7 (153)
			41+83	3.7 (12)	45.3 (148)
			42+28	3.7 (12)	44.5 (146)
			42+40	3.7 (12)	44.5 (146)
		Approximate Length:	105 m (345 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S47	R32 to R35A	R/W Westbound SR-56	44+76	3.7 (12)	46.2 (151)
			45+76	3.7 (12)	46.8 (153)
			46+13	3.7 (12)	47.0 (154)
			46+16	3.7 (12)	47.5 (156)
			46+16	4.3 (14)	48.1 (158)
			46+98	4.3 (14)	48.3 (158)
			47+13	4.3 (14)	48.3 (158)
			47+37	4.3 (14)	48.7 (160)
			47+37	3.7 (12)	48.1 (158)
			47+61	3.7 (12)	48.8 (160)
			48+07	3.7 (12)	49.2 (161)
			48+07	3.7 (12)	49.2 (161)
		Approximate Length:	323 m (1,060 ft)		
S20	R42 to R45	Inside R/W Eastbound SR-56	17+25	3.7 (12)	22.7 (74)
			17+50	3.7 (12)	22.2 (73)
			17+85	3.7 (12)	21.7 (71)
			17+85	4.3 (14)	22.3 (73)
			18+45	4.3 (14)	21.3 (70)
			18+45	4.9 (16)	21.9 (72)
			19+15	4.9 (16)	21.4 (70)
			19+66	4.9 (16)	21.4 (70)
			19+66	4.9 (16)	21.4 (70)
			20+43	4.9 (16)	21.9 (72)
			21+09	4.9 (16)	22.4 (73)
			21+40	4.9 (16)	22.9 (75)
			21+49	4.9 (16)	23.9 (78)
			21+61	4.9 (16)	24.4 (80)
			21+83	4.9 (16)	25.9 (85)
			22+02	4.9 (16)	27.4 (90)
			22+14	4.9 (16)	28.4 (93)
			22+14	4.3 (14)	27.8 (91)
			22+34	4.3 (14)	28.8 (94)
			22+34	3.7 (12)	28.2 (92)
			22+44	3.7 (12)	29.2 (96)
		Approximate Length:	519 m (1,703 ft)		
S34	R46	Inside R/W Eastbound SR-56	32+00	3.0 (10)	30.0 (99)
			32+39	3.0 (10)	30.5 (100)
			32+60	3.0 (10)	30.7 (101)
			32+80	3.0 (10)	31.0 (102)
			32+80	2.4 (8)	30.4 (100)
			33+00	2.4 (8)	30.6 (101)
			33+16	2.4 (8)	30.9 (102)
			33+40	2.4 (8)	31.1 (102)
			33+59	2.4 (8)	31.4 (103)
			34+00	2.4 (8)	31.6 (104)
			34+12	2.4 (8)	31.9 (105)
			34+31	2.4 (8)	32.4 (106)
			34+60	2.4 (8)	32.5 (107)
		Approximate Length:	258 m (846 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S34 (Option)	R46	Private Property Eastbound SR-56	33+08	3.7 (12)	31.2 (102)
			33+15	3.7 (12)	30.7 (101)
			33+20	3.7 (12)	30.2 (99)
			33+30	3.7 (12)	29.9 (98)
			33+30	4.3 (14)	30.5 (100)
			33+40	4.3 (14)	30.5 (100)
			33+60	4.3 (14)	30.7 (101)
			33+80	4.3 (14)	30.5 (100)
			33+87	4.3 (14)	30.2 (99)
		Approximate Length:	89 m (292 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S539	R4.1	Private Property Southbound I-5	540+19	2.4 (8)	26.3 (86)
			540+22	2.4 (8)	26.3 (86)
			540+25	2.4 (8)	26.3 (86)
			540+31	2.4 (8)	26.3 (86)
			540+35	2.4 (8)	26.3 (86)
			540+39	2.4 (8)	26.3 (86)
			540+42	2.4 (8)	26.3 (86)
			540+43	2.4 (8)	26.3 (86)
		Approximate Length:	42 m (138 ft)		
S541	R4.2 to R4.4	Private Property Southbound I-5	540+36	2.4 (8)	24.4 (80)
			540+31	2.4 (8)	24.4 (80)
			540+31	3.7 (12)	25.7 (84)
			540+37	3.7 (12)	26.2 (86)
			540+69	3.7 (12)	26.5 (87)
			540+76	3.7 (12)	26.4 (86)
			540+84	3.7 (12)	27.7 (91)
			540+84	4.3 (14)	28.3 (93)
			541+19	4.3 (14)	28.5 (93)
			541+23	4.3 (14)	28.6 (94)
			541+59	4.3 (14)	29.8 (98)
			541+64	4.3 (14)	30.3 (99)
		Approximate Length:	183 m (600 ft)		
S551	R4.12 to 4.21A	Private Property Southbound I-5	545+72	4.3 (14)	48.8 (160)
			546+01	4.3 (14)	48.9 (160)
			546+01	4.9 (16)	49.5 (162)
			546+43	4.9 (16)	51.0 (167)
			546+44	4.9 (16)	51.4 (169)
			546+64	4.9 (16)	51.9 (170)
			546+82	4.9 (16)	52.9 (173)
			546+87	4.9 (16)	54.9 (180)
			547+26	4.9 (16)	57.0 (187)
			547+67	4.9 (16)	59.1 (194)
			548+27	4.9 (16)	61.9 (203)
			548+47	4.9 (16)	62.9 (206)
			548+86	4.9 (16)	64.1 (210)
			548+89	4.9 (16)	64.9 (213)
			549+08	4.9 (16)	65.4 (215)
			549+27	4.9 (16)	66.4 (218)
			549+28	4.9 (16)	66.9 (219)
			549+48	4.9 (16)	67.4 (221)
			549+87	4.9 (16)	69.4 (228)
			550+07	4.9 (16)	70.4 (231)
			550+27	4.9 (16)	70.9 (233)
			550+67	4.9 (16)	72.4 (237)
			551+44	4.9 (16)	73.5 (241)
			551+81	4.9 (16)	74.0 (243)
			552+38	4.9 (16)	75.4 (247)
			553+13	4.9 (16)	76.9 (252)
			553+73	4.9 (16)	77.5 (254)
			554+58	4.9 (16)	79.0 (259)
			555+24	4.9 (16)	79.8 (262)
			555+24	4.9 (16)	80.1 (263)
			555+48	4.9 (16)	80.9 (265)
			555+73	4.9 (16)	81.4 (267)
			555+73	4.3 (14)	80.8 (265)
			555+76	4.3 (14)	81.4 (267)
			556+01	4.3 (14)	82.0 (269)
			556+03	4.3 (14)	82.5 (271)
			556+34	4.3 (14)	82.9 (272)
			556+37	4.3 (14)	83.5 (274)
		Approximate Length:	1,078 m (3,537 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S557	R4.22A to R4.24	Private Property Southbound I-5	556+08	2.4 (8)	86.4 (284)
			556+13	2.4 (8)	86.9 (285)
			556+22	2.4 (8)	86.9 (285)
			556+43	2.4 (8)	86.4 (284)
			556+53	2.4 (8)	86.4 (284)
			556+53	3.0 (10)	87.0 (286)
			556+53	3.0 (10)	87.0 (286)
			556+67	3.0 (10)	87.0 (286)
			556+77	3.0 (10)	87.5 (287)
			556+93	3.0 (10)	87.5 (287)
			557+01	3.0 (10)	88.0 (289)
			557+16	3.0 (10)	88.0 (289)
			557+35	3.0 (10)	89.0 (292)
			557+70	3.0 (10)	89.0 (292)
			557+94	3.0 (10)	88.5 (291)
			558+01	3.0 (10)	88.5 (291)
		Approximate Length:	219 m (719 ft)		
S561	R5.1 and R5.2	Private Property Southbound I-5	560+85	0.0 (0)	99.5 (326)
			560+81	2.4 (8) [3]	98.4 (323)
			561+14	2.4 (8)	96.4 (316)
			561+38	2.4 (8)	96.4 (316)
			561+75	2.4 (8)	96.4 (316)
			562+16	2.4 (8)	96.4 (316)
			562+21	2.4 (8)	96.4 (316)
		Approximate Length:	156 m (512 ft)		
S563	R5.5A to R5.6A	Private Property Southbound I-5	563+28	0.0 (0)	92.7 (304)
			563+17	2.4 (8) [3]	91.9 (302)
			563+70	2.4 (8)	91.4 (300)
			564+04	2.4 (8)	90.9 (298)
			564+39	2.4 (8)	91.0 (299)
			564+36	2.4 (8)	91.4 (300)
		Approximate Length:	130 m (427 ft)		
S567	R5.7A to R5.8B	R/W / Private Property Southbound I-5	564+61	2.4 (8)	101.4 (333)
			564+59	2.4 (8)	101.4 (333)
			564+80	2.4 (8)	101.4 (333)
			565+01	2.4 (8)	101.5 (333)
			565+24	2.4 (8)	101.5 (333)
			565+38	2.4 (8)	101.7 (334)
			565+60	2.4 (8)	101.6 (333)
			565+72	2.4 (8)	101.4 (333)
			565+78	2.4 (8)	101.4 (333)
			565+84	2.4 (8)	101.4 (333)
			565+70	2.4 (8)	101.9 (334)
			566+21	2.4 (8)	102.4 (336)
			566+52	2.4 (8)	102.4 (336)
			566+71	2.4 (8)	102.4 (336)
			567+09	2.4 (8)	102.6 (337)
			567+18	2.4 (8)	102.4 (336)
		Approximate Length:	299 m (991 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-14 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 4 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S569	R5.9A and R5.9	R/W / Private Property Southbound I-5	567+29	4.3 (14)	100.3 (329)
			567+66	4.3 (14)	99.8 (327)
			567+66	3.7 (12)	99.2 (325)
			568+05	3.7 (12)	99.9 (328)
			568+05	2.4 (8)	98.6 (324)
			568+00	2.4 (8)	100.6 (330)
			567+89	2.4 (8)	101.8 (334)
		Approximate Length:	106 m (348 ft)		
S568	R5.22 to R5.23A	R/W / Private Property Northbound I-5	566+24	2.4 (8)	103.2 (339)
			566+25	2.4 (8)	102.1 (335)
			566+54	2.4 (8)	103.1 (338)
			566+71	2.4 (8)	104.4 (343)
			566+76	2.4 (8)	104.5 (343)
			566+87	2.4 (8)	104.1 (342)
			566+62	2.4 (8)	104.1 (342)
			567+02	2.4 (8)	104.1 (342)
			567+20	2.4 (8)	104.1 (342)
			567+32	2.4 (8)	104.1 (342)
			567+35	2.4 (8)	104.1 (342)
			567+41	2.4 (8)	104.1 (342)
			567+43	2.4 (8)	104.1 (342)
			567+42	2.4 (8)	104.1 (342)
			567+46	2.4 (8)	103.6 (340)
			567+56	2.4 (8)	103.7 (340)
			567+67	2.4 (8)	103.6 (340)
			567+79	2.4 (8)	103.6 (340)
			567+90	2.4 (8)	103.8 (341)
		Approximate Length:	215 (705 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

ALTERNATIVE 5

Table 7-15 presents the results of the barrier analysis. Table 7-16 provides a summary of the barrier, including the number of benefited residences, reasonable allowance per residence, and reasonable allowance cost per barrier. Table 7-18 presents a summary of barrier locations and the minimum heights and lengths to achieve at least 5 dB noise reduction.

Areas with noise abatement

Soundwall S27: Soundwall S27 would be 4.3 to 4.9 m (14 to 16 ft) in height located along the westbound R/W and private property between stations 25+06 and 29+94. The portion of the soundwall that is located inside private property is between stations 29+66 to 29+94. The soundwall would provide a minimum of 5 dB noise reduction for single-family residences represented by Receptors R5 through R9A. Soundwall S27 has been raised higher than otherwise required at Receptors R6A and R6 to provide feasible noise abatement at Receptors R5 and R7, respectively. Receptors R4A and R10 would be located behind the wall. However, these receptors would not be impacted and would not receive the required minimum of 5 dB noise reduction to become benefitted. This proposed soundwall would replace an existing 2.4 m (8-ft) high glass/block soundwall located on the R/W and property line. Sheet 33 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S31: Soundwall S31 would be 2.4 m (8 ft) in height located adjacent to westbound SR-56 inside of the private property of Notre Dame Academy along the playground between stations 31+83 and 32+09. A soundwall has not been considered at the R/W line because the R/W is depressed by approximately 5 to 9 m (16 to 30 ft). There is an existing earthen berm between the playground and the highway; however, the berm does not provide enough protection for the receptors to prevent an impact. The soundwall would provide a minimum of 5 dB noise reduction for the playground represented by Receptors R14 and R15. Sheet 34 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S35: Soundwall S35 would be located on the westbound side of SR-56 on the R/W line and private property between stations 33+36 and 37+50. The portion of the soundwall that is located at the property line is between stations 33+36 to 33+85 as well as 37+41 to 37+50. The 3.0 to 3.7 m (10 to 12-ft) high soundwall would provide feasible noise abatement for attached single-family residences represented by Receptors R16 through R21A. There is an existing 1.8 m (6-ft) high block property wall located on the R/W and property line. A soundwall is not needed for the area between Sta 33+56 and 33+84 because there is no outdoor use areas behind this area. The existing 1.8 m (6 ft) high block wall in conjunction with the identified soundwall is adequate to provide feasible noise abatement to the nearby outdoor use areas. Sheet 34 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S41: Soundwall S41 would be 3.0 to 3.7 m (10 to 12 ft) in height located on the westbound side of the highway on the R/W line between stations 40+87 and 42+40. The soundwall would provide a minimum of 5 dB noise reduction for single-family residences represented by Receptors R29 through R30. There is an existing 1.8 m (6-ft) high block property wall located on the R/W. Sheet 35 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S47: Soundwall S47 would be located on the westbound R/W line between stations 44+76 and 48+15. The 3.0 to 4.3 m (10 to 14-ft) high soundwall would provide a 5 dB noise reduction to single-family residences represented by Receptors R32 through R36. There is an existing 1.8 m (6-ft) high block property wall located on the

R/W. Soundwall S47 has been raised higher than otherwise required at Receptor R32 to provide feasible noise abatement at Receptor R33. Sheets 35 and 36 show the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S20: Soundwall S20 would be 3.7 to 4.9 m (12 to 16 ft) in height located inside the eastbound R/W on top of an existing earthen berm between stations 15+63 and 22+34. The soundwall would provide a minimum of 5 dB noise reduction for the sports field of the San Diego Jewish Academy represented by Receptors R42 and R43. Sheets 31 and 32 show the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S34: Soundwall S34 would be located along the eastbound side of SR-56 inside the R/W on top of an existing earthen berm between stations 32+00 and 35+40. The 2.4 to 3.0 m (8 to 10-ft) high soundwall would provide feasible noise abatement for a single-family residences represented by Receptor R46 and R47. The 3.0 m (10 ft) section of the soundwall is required to cut the line-of-sight to truck stack exhausts for Receptor R46. Sheet 34 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S34 (Option): Soundwall S34 would be located along the eastbound side of SR-56 on private property between stations 33+08 and 34+60. The 3.7 to 4.3 m (12 to 14-ft) high soundwall would provide a 5 dB noise reduction for single-family residences represented by Receptors R46 and R47. Sheet 34 shows the location and heights of optional Soundwall S34 to achieve the minimum 5 dB noise reduction..

Soundwall S539: Soundwall S539 would be 2.4 m (8 ft) in height located on private property between stations 540+19 and 540+44. Due to the higher elevation of the property, a soundwall would not be feasible at any other location. The soundwall would provide a 5 dB noise reduction for one single-family residence represented by Receptor R4.1. Sheet 7 shows the location and height of Soundwall S539 to achieve the minimum 5 dB noise reduction.

Soundwall S541: Soundwall S541 would be located on the southbound side of I-5 on private property between stations 540+36 and 541+64. The soundwall would be 2.4, 3.7, and 4.3 m (8, 12, and 14 ft) in height and would provide a minimum of 5 dB noise reduction for the recreational area of a gated housing community comprised of a pool and tennis courts represented by Receptors R4.2, R4.2A, R4.4, and a single-family residence represented by Receptor R4.3. There is an existing 1.8 to 2.1 m (6 to 7 ft) high property wall located next to the pool and spa area. Soundwall S541 has been raised higher than otherwise required at Receptor R4.2 to provide feasible noise reduction at Receptor R4.2A. Soundwall S541 has been raised higher than otherwise required at Receptor R4.4 to break the truck stack line-of-sight at Receptor R4.3. Soundwall S541 would not provide a 5 dB noise reduction to the residence represented by Receptor R4.4A because the soundwall would not completely block the line-of-sight to the highway. Sheet 37 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S551: Soundwall S551 would be 4.3 to 4.9 m (14 to 16 ft) in height located on the southbound side of I-5 on private property between stations 545+72 and 556+37. The soundwall would provide a minimum of 5 dB noise reduction to single-family residences represented by Receptors R4.11A through R4.21A. There is an existing 2.4 m (8-ft) high glass/block property soundwall located on the property line. Soundwall S551 has been raised higher than otherwise required at Receptor R4.12 and R4.20A to provide a 5 dB noise reduction to the residence represented by R4.11A as well as the residences represented by Receptor R4.20, respectively. Soundwall S551 would not be

able to provide feasible noise abatement to every residence located behind the wall. However, the wall would provide at least a 2 to 4 dB noise reduction to all residences. Sheets 37, 38, and 39 show the minimum length and height for this soundwall to provide feasible abatement.

Project Build without Barrier column on Table 7-15 represents the traffic noise level with the existing 8 ft glass/block soundwall and the proposed project.

Soundwall S557: Soundwall S557 would be located on the southbound side of I-5 on private property between stations 556+08 and 558+01. The soundwall would be 2.4 to 3.0 m (8 to 10 ft) in height and would provide a minimum of 5 dB noise reduction to grassy backyard outdoor use areas for multi-family residences represented by Receptors R4.22A through R4.24. However, there is only approximately 1.5 m (5 ft) of flat surface area behind these residences and many large trees in the area that would have to be removed for Soundwall S557 to be built. Sheet 39 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S561: Soundwall S561 would be 2.4 (8 ft) in height located along the southbound side of I-5 between stations 560+85 and 562+21. It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the residence elevation; however, a soundwall on private property would provide feasible noise abatement for the outdoor use areas for the multi-family residences, represented by Receptors R5.1 and R5.2, in this area. The outdoor use areas for the multi-family residences are patios. Sheet 39 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S563: Soundwall S563 would be located along the southbound side of I-5 between stations 563+28 and 564+39 at a height of 2.4 m (8 ft). It is not feasible to abate for highway traffic noise from within the R/W in this area due to the R/W elevation compared to the school elevation; however, a soundwall along the property line would provide a minimum of 5 dB noise reduction for the outdoor use areas at Del Mar Hills Elementary School, represented by Receptors R5.5A and R5.6A. Receptors R5.5, R5.6A, and R5.6 would not be impacted; however, it would not be practical to end the soundwall midway along the outdoor area to provide the required 5 dB noise reduction to Receptor R5.5A only. Therefore, the wall has been continued to end at a logical point in which Receptor R5.6A would also receive feasible noise abatement. This soundwall would not provide noise abatement to any classroom. However, an existing wall located along southbound I-5 protects a second playground at a higher elevation and the classrooms represented by Receptors R5.3 and R5.4, respectively. Receptors R5.3 and R5.4 would not be impacted. Sheet 40 shows the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S567: Soundwall S567 would be located along the southbound side of I-5 between stations 564+61 and 567+18. The 2.4 m (8-ft) high wall would provide feasible noise abatement for single family residences, represented by Receptors R5.7A to R5.8B from highway traffic noise. While both Soundwalls S567 and S569 run along the R/W and are near each other, they are considered different walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Sheet 40 the minimum length and height for this soundwall to provide feasible abatement.

Soundwall S569: Soundwall S569 would be 2.4 to 4.3 m (8 to14 ft) in height located along the southbound side of I-5 between stations 567+29 and 568+05. The wall would provide a minimum of 5 dB noise reduction for single family residences, represented by

Receptors R5.9A and R5.9, from highway traffic noise. While both soundwalls S567 and S569 run along the R/W and are near each other, they are considered different walls because of an elevation drop between them that prevents the gap from being closed. Furthermore, because it would not be practical to close the gap due to the elevation drop, noise abatement is not considered for the single-family residence between Receptors R5.8A and R5.9A. Sheet 40 shows the minimum length and heights for this soundwall to provide feasible abatement.

Soundwall S568: Soundwall S568 would be 2.4 m (8 ft) in height and would provide feasible noise abatement for single family residences, represented by Receptors R5.22 to R5.23A, from highway traffic noise. Receptor R5.21 is not predicted to be impacted; however, Soundwall S568 would begin at the property of Receptor R5.21 to provide a minimum of 5 dB noise reduction for Receptor R5.22 and as a logical starting point. Sheet 40 shows the minimum length and height for this soundwall to provide feasible abatement.

Areas without Noise Abatement

There are no areas along SR-56 that are impacted by the widening and improvement project that were not feasible to abate with standard noise abatement techniques.

Several areas along I-5 are impacted by the widening and improvement project, but were not feasible to abate with standard noise abatement techniques. The receptor locations for these areas and the explanation for non-abatement are described in the following paragraphs:

Receptors R4.5 and R4.9: Receptors R4.5and R4.9 represent two groups of multi-family residences on the southbound side of I-5, north of Carmel Valley Road. Receptor R4.5 is protected by an existing 2.4 m (8-ft) high soundwall. The existing soundwall decreases in height from 4.3 to 2.4 m (14 to 8 ft) in front of Receptor R4.9. The results show that raising the height of the existing soundwall to 4.9 m (16 ft) would not provide a 5 dB benefit to any of the residences; therefore, it would not be feasible. Sheet 37 shows the location of the receptors.

Receptor R5.16: Receptor R5.16 was chosen for noise measurement purposes only and does not represent an area of outdoor use. However, this receptor does represent multi-family residential units. Therefore, the interior criteria shall be used. Assuming a 20 dB noise reduction due to the building with widows closed, the interior noise level of Receptor R5.16 is predicted to be 47 dBA which is below the indoor noise criteria of 52 dBA. However, with the windows open, the indoor noise level is predicted to be as high as 57 dBA. Sheet 39 shows the location of Receptor R5.16.

Receptor R5.9B: Receptor R5.9B is located between Soundwalls S567 and S569 on the southbound side of I-5 along Minorca Cove. Due to the sharp decrease in elevation along the R/W, it would not be practical to build a soundwall at the R/W and the shoulder would not be effective due to the difference in elevation. Furthermore, because Soundwalls S567 and S569 which are located at the R/W are feasible for the other single-family residences in this area, it would not be practical to locate a soundwall on private property for this single residence in between Soundwalls S567 and S569. Sheet 40 shows the location of Receptor R5.9B.

TABLE 7-15 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 5

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 1 [W]	HM	56 [E]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 2 [W]	SFR	55 [E]	58	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 3 [W]	SFR	57 [E]	59	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4 [W]	SFR	58 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4A [W]	SFR	58 [E]	61	63	B (67)	NONE	-- [T]	--	62	1	61	2	60	3	59 [5]	4	
R 5 [W]	SFR	62 [E]	64	66	B (67)	A/E	-- [T]	--	65	1	63	3	62	4	**61** [R]	**5**	
R 6A [W,C]	SFR	64 [E]	66	69	B (67)	A/E	-- [T]	--	67	2	65	4	64	5	**63** [R,5]	**6**	
R 6 [W]	SFR	63 [M,ST4]	65	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**62** [R,5]	**6**	S27 / R/W / Private Property
R 7 [W]	SFR	63 [E]	65	67	B (67)	A/E	-- [T]	--	66	1	65	2	63	4	**62** [R]	**5**	
R 8 [W]	SFR	63 [E]	66	68	B (67)	A/E	-- [T]	--	66	2	64	4	**63** [R]	**5**	62	6	
R 9 [W]	SFR	62 [M,LT1,CAL]	65	67	B (67)	A/E	-- [T]	--	65	2	63	4	**62** [R]	**5**	61	6	
R 9A [W]	SFR	61 [E]	64	66	B (67)	A/E	-- [T]	--	64	2	62	4	**61** [R]	**5**	60	6	
R 10 [W]	SFR	60 [E]	63	65	B (67)	NONE	-- [T]	--	63	2	62	3	61 [5]	4	60	5	
R 11 [W]	SFR	57 [E]	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 12 [W]	SFR	57 [E]	60	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 13 [W]	SFR	59 [E]	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 14 [C]	SCH	64 [M,ST3]	69	71	B (67)	A/E	**62** [R,T]	**9**	60	11	59	12	58	13	58	13	S31 / Private Property
R 15	SCH	62 [E]	68	70	B (67)	A/E	**61** [R,T]	**9**	61	9	60	10	59	11	57	13	
R 16 [W]	SFR	64 [E]	64	66	B (67)	A/E	63 [T]	3	**61** [R]	**5**	59	7	58	8	57	9	
R 17 [W]	SFR	66 [E]	66	68	B (67)	A/E	66 [T]	2	64	4	**63** [R]	**5**	61	7	61	7	
R 18 [W,C]	SFR	65 [E]	65	68	B (67)	A/E	65 [T]	3	64	4	**62** [R]	**6**	62	6	61	7	
R 18A [W]	SFR	65 [E]	65	68	B (67)	A/E	65 [T]	3	64	4	**62** [R]	**6**	62	6	60	8	S35 / R/W / Private Property
R 19 [W]	SFR	64 [M,ST2,CAL]	64	67	B (67)	A/E	65 [T]	2	63	4	**62** [R]	**5**	61	6	60	7	
R 20 [W]	SFR	65 [E]	65	67	B (67)	A/E	65 [T]	2	63	4	**62** [R]	**5**	61	6	60	7	
R 21 [W]	SFR	65 [E]	65	67	B (67)	A/E	65 [T]	2	63	4	**62** [R]	**5**	61	6	60	7	
R 21A [W]	SFR	63 [E]	63	66	B (67)	A/E	63 [T]	3	62 [5]	4	**61** [R]	**5**	60	6	59	7	
R 21B [W]	SFR	62 [E]	62	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 22 [W]	SFR	61 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 23 [W]	SFR	60 [E]	60	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 24	REC	62 [E]	62	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 25 [W]	SFR	57 [E]	57	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 26 [*, W]	SFR	58 [M,ST1]	58	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 27 [W]	SFR	58 [E]	58	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 28 [W]	SFR	61 [E]	61	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29A [W]	SFR	61 [E]	61	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 29 [W,C]	SFR	63 [E]	63	66	B (67)	A/E	63 [T]	3	**61** [R]	**5**	60	6	59	7	58	8	
R 29B [W]	SFR	64 [E]	64	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	S41 / R/W
R 30A [W]	SFR	64 [E]	64	66	B (67)	A/E	64 [T]	2	63	3	**61** [R]	**5**	60	6	59	7	
R 30 [W]	SFR	64 [E]	64	66	B (67)	A/E	64 [T]	2	63	3	**61** [R]	**5**	60	6	60	6	
R 31 [W]	SFR	54 [E]	54	55	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.
3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.

R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
W - Includes the benefits of an existing soundwall/property wall.
* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-15 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 5 (CONT'D)

REC. NO.		LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
				FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 32	W,C	SFR	67 [E]	67	68	B (67)	A/E	65 [T]	3	63	5	**62** [R,5]	**6**	60	8	60	8	S47 / R/W
R 33	W	SFR	66 [E]	66	67	B (67)	A/E	65 [T]	2	63	4	**62** [R]	**5**	61	6	60	7	
R 34	W	SFR	65 [E]	65	66	B (67)	A/E	65 [T]	1	63	3	62	4	**61** [R]	**5**	61	5	
R 35	W	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	63	3	62	4	**61** [R]	**5**	60	6	
R 35A	W	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	63	3	62	4	**61** [R]	**5**	60	6	
R 36	W	SFR	65 [E]	65	66	B (67)	A/E	64 [T]	2	62	4	**61** [R]	**5**	60	6	59	7	
R 37	W	SFR	59 [E]	59	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 38	W	SFR	62 [E]	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 39	W	SFR	62 [E]	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 40	W	SFR	59 [E]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 41	W	SFR	58 [E]	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 42		SCH	63 [E]	67	66	B (67)	A/E	64	2	64	2	63 [T]	3	62	4	**61** [R]	**5**	S20 / Inside R/W
R 43	C	SCH	63 [M,ST5]	67	66	B (67)	A/E	64	2	64	2	63 [T]	3	62	4	**61** [R]	**5**	
R 44		SCH	65 [E]	69	68	B (67)	A/E	66	2	65	3	65	3	64 [T]	4	64	4	
R 45		SCH	65 [E]	68	68	B (67)	A/E	66	2	65	3	65	3	64	4	64 [T]	4	
R 46	C	SFR	66 [E]	70	71	B (67)	A/E	**66** [R,T]	**5**	64	7	63	8	63	8	62	9	S34/ Inside R/W
R 47		SFR	61 [E]	65	67	B (67)	A/E	**62** [R,T]	**5**	61	6	60	7	60	7	59	8	
R 46	C	SFR	66 [E]	70	71	B (67)	A/E	71	0	68	3	**63** [R,T]	**8**	61	10	60	11	S34/ Private Property (Option)
R 47		SFR	61 [E]	65	67	B (67)	A/E	64	3	63	4	63	4	**61** [R,T]	**6**	60	7	
R 48	*	SFR	56 [M,ST1A]	57	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 49		SFR	53 [E]	54	56	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 50		SFR	53 [E]	54	56	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 51		SFR	57 [E]	58	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 52		SFR	57 [E]	58	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 53		SFR	55 [E]	56	58	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54		SFR	58 [E]	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 54A		REC	61 [E]	62	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 55		SFR	59 [E]	60	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 56		SFR	52 [E]	54	55	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 57	W	SFR	58 [E]	59	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 58	W	SFR	58 [E]	59	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 59	W	SFR	59 [E]	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 60	W	SFR	59 [E]	60	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 61	W	SFR	59 [E]	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 62	W	SFR	58 [E]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 63	W	SFR	58 [E]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 64	W	SFR	62 [E]	63	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; HM - hotel/motel; REC - recreational use area.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - Calibration site; E - Calculated from No-Build alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height recommended to meet requirements at adjacent receptors.

R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical receptor.

W - Includes the benefits of an existing soundwall/property wall.

* - This was a monitoring site, which is representative of the nearby outdoor use area, but it is not a frequent outdoor use areas.

TABLE 7-15 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 5 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 4.1 [C]	SFR	70 [E]	71	72	B (67)	A/E	**65** [R,T]	**7**	64	8	63	9	62	10	62	10	S541 / Private Property
R 4.2 [W]	REC	71 [E]	72	72	B (67)	A/E	67 [T]	5	64	8	**72** [R,5]	**0**	61	11	60	12	S541 / Private Property
R 4.2A [W]	REC	72 [E]	73	70	B (67)	A/E	68 [T]	2	66	4	**70** [R]	**0**	64	6	63	7	
R 4.3	SFR	72 [E]	73	76	B (67)	A/E	75	1	73	3	71	5	**69** [R,T]	**7**	67	9	
R 4.4 [W,C]	REC	70 [E]	70	75	B (67)	A/E	69 [T]	6	66	9	64	11	**63** [R,5]	**12**	62	13	
R 4.4A	SFR	71 [M,LT2,F]	72	74	B (67)	A/E	74	0	73	1	72	2	70	4	70	4	
R 4.5 [W]	MFR	69 [M,ST4.1]	72	66	B (67)	A/E	--	--	65	1	65	1	64	2	63	3	Private Property
R 4.6 [W]	MFR	68 [E]	68	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	Private Property
R 4.7A [W]	REC	66 [M,ST6]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.7 [W]	REC	66 [E]	66	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.8 [W]	MFR	65 [E]	65	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 4.9 [W]	MFR	68 [M,ST4.2]	67	66	B (67)	A/E	--	--	66	0	66	0	65	1	65	1	
R 4.10 [W]	SFR	65 [E]	65	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 4.11 [W]	SFR	74 [E]	74	69	B (67)	A/E	-- [T]	--	68	1	67	2	66 [5]	3	65	4	S551 / Private Property
R 4.11A [W]	SFR	72 [E]	72	69	B (67)	A/E	--		67	2	66	3	65	4	**64** [R]	**5**	
R 4.12 [W,C]	SFR	72 [E]	72	70	B (67)	A/E	-- [T]	--	68	2	66	4	65	5	**64** [R,5]	**6**	
R 4.12A [W]	SFR	70 [E]	69	69	B (67)	A/E	-- [T]	--	66	3	65	4	64	5	**63** [R,5]	6	
R 4.13 [W]	SFR	69 [M,ST4.3]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**63** [5]	4	
R 4.14 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	**63** [5]	4	
R 4.14A [W]	SFR	67 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**62** [R,5]	6	
R 4.15 [W]	SFR	66 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	64	4	**63** [R]	**5**	
R 4.16A [W]	SFR	66 [M,LT3]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.16 [W]	SFR	67 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	64	3	63 [5]	4	
R 4.16B [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	63	3	63	3	62 [5]	4	
R 4.17 [W]	SFR	66 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	63	3	62	4	62 [5]	4	
R 4.17A [W]	SFR	66 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	**62** [R]	**5**	
R 4.18 [W]	SFR	68 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.18A [W]	SFR	67 [E]	68	66	B (67)	A/E	-- [T]	--	64	2	63	3	62	4	62 [5]	4	
R 4.19 [W]	SFR	68 [M,LT4.1]	69	66	B (67)	A/E	-- [T]	--	64	2	63	3	62	4	**61** [R]	**5**	
R 4.19A [W]	SFR	69 [E]	69	66	B (67)	A/E	-- [T]	--	65	1	64	2	63	3	62 [5]	4	
R 4.20 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	65	2	64	3	63	4	62 [5]	5	
R 4.20A [W]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	65	3	64	4	63	5	**62** [R,5]	**6**	
R 4.21 [W]	SFR	68 [E]	69	67	B (67)	A/E	-- [T]	--	66	1	65	2	64	3	63 [5]	4	
R 4.21A [W]	SFR	68 [E]	69	68	B (67)	A/E	-- [T]	--	66	2	65	3	64	4	**63** [R]	**5**	
R 4.22 [W]	SFR	68 [E]	68	66	B (67)	A/E	-- [T]	--	65	1	64	2	64 [5]	2	63	3	
R 4.22A	MFR	71 [E]	71	72	B (67)	A/E	**62** [R,T]	**10**	62	10	60	12	60	12	59	13	S557 / Private Property
R 4.23	MFR	77 [M,ST4.4]	77	79	B (67)	A/E	76	3	**70** [R,T]	**9**	68	11	66	13	64	15	
R 4.23A [C]	MFR	77 [M,ST7]	76	79	B (67)	A/E	75	4	**69** [R,T]	**10**	67	12	65	14	63	16	
R 4.24	MFR	72 [E]	72	73	B (67)	A/E	67	6	**64** [R,T]	**9**	62	11	60	13	60	13	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-15 – PREDICTED FUTURE NOISE AND BARRIER ANALYSIS – ALTERNATIVE 5 (CONT'D)

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R 5.1 C	MFR	75 M,ST8	71	75	B (67)	A/E	**64** R,T	**11**	63	12	62	13	61	14	60	15	S561 / Private Property
R 5.2	MFR	71 M,ST5.2	72	75	B (67)	A/E	**64** R,T	**11**	63	12	62	13	61	14	60	15	
R 5.3 W	SCH	67 E	69	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.4 W	SCH	63 E	65	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.5A C	SCH	63 M,ST9	70	69	B (67)	A/E	**61** R,T	**8**	60	9	60	9	59	10	59	10	S563 / Private Property
R 5.5	SCH	65 E	67 NC	62	B (67)	NONE	59 5	3	59	3	59	3	59	3	58	4	
R 5.6A	SCH	65 E	67	66	B (67)	A/E	**59** R,T	**7**	58	8	58	8	57	9	57	9	
R 5.6	SCH	64 E	65 NC	61	B (67)	NONE	58 5	3	57	4	57	4	57	4	57	4	
R 5.7A	SFR	70 E	70	72	B (67)	A/E	**66** R,T	**6**	66	6	66	6	65	7	65	7	S567 / R/W / Private Property
R 5.7 C	SFR	72 M, LT5.2	71	74	B (67)	A/E	**63** R,T	**11**	62	12	61	13	60	14	60	14	
R 5.7B	SFR	68 E	68 NC	68	B (67)	A/E	**61** R,T	**7**	60	8	60	8	59	9	59	9	
R 5.8	SFR	66 E	66 NC	64	B (67)	NONE	**59** R,T	**5**	59	5	58	6	58	6	57	7	
R 5.8B	SFR	60 M,LT5	67	66	B (67)	A/E	**60** R,T	**6**	59	7	58	8	58	8	57	9	
R 5.8A	SFR	66 E	66 NC	62	B (67)	NONE	59 5	3	59	3	59	3	58	4	58	4	
R 5.9B	SFR	67 E	67	67	B (67)	A/E	67	0	67	0	67	0	67	0	67	0	--
R 5.9A C	SFR	67 E	67	67	B (67)	A/E	67	0	65	2	63 T	4	62 R	**5**	61	6	S569 / R/W / Private Property
R 5.9	SFR	67 E	67 NC	66	B (67)	A/E	63 T	3	62	4	**61** R	**5**	60	6	59	7	
R 5.16 * , W	MFR	67 M, ST5.1	68	67	B (67)	A/E	64 T	3	63	4	62	5	61	6	60	7	Private Property
R 5.16A W	MFR	58 E	60	60	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.17 W	SFR	64 E	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--
R 5.18 W	SFR	64 M,LT5.1	63	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19 W	SFR	63 E	63	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.19A	SFR	62 E	62	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20A	SFR	60 M,LT4	67	62	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.20	SFR	61 E	61	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R 5.21	SFR	66 M,ST5.4	67 NC	65	B (67)	NONE	62 T,5	3	61	4	61	4	61	4	60	5	S568 / R/W / Private Property
R 5.22	SFR	69 E	70	69	B (67)	A/E	**59** R,T	**10**	58	11	58	11	57	12	56	13	
R 5.23 C	SFR	69 E	70 NC	69	B (67)	A/E	**58** R,T	**11**	56	13	55	14	53	16	53	16	
R 5.23A	SFR	68 E	69	67	B (67)	A/E	**58** R,T	**9**	57	10	56	11	56	11	55	12	
R 5.24	SFR	68 E	69	65	B (67)	NONE	64	1	64	1	64	1	64	1	64	1	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; CHR - church.
3 - M - Measured noise level; STxx or LTxx - measurement site number conducted in 2007;
ST4.xx or LT5.xx - measurement site number conducted in 2004;
E - Calculated from No-Build alternative and measurement sites.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptors.
R - The minimum height required to meet feasibility requirements of Caltrans' Noise Abatement Criteria.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
C - Critical receptor.
F - Measurement was adjusted to compensate for existing wooden fence that was not modeled.
W - Includes the benefits of an existing soundwall/property wall.
NC - "No-Build" levels do not match the levels in the I-5 North Coast Corridor Widening Noise Study Report due to noise model refinements based on additional topographical data.
* - This site was chosen as monitoring purpose only. No noise frequent outdoor land use in this area.

TABLE 7-16 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 5

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S27	R5 to R9A	13 SFR	R/W / Private Property Westbound SR-56	4.3 m (14 ft) to 4.9 m (16 ft) 492 m (1,614 ft)	$37,000	$481,000
S31	R14 & R15	1 SCH (2 Frontage Units)	Private Property Westbound SR-56	2.4 m (8 ft) 77 m (253 ft)	$41,000	$82,000
S35	R16 to R21A	36 SFR	R/W / Private Property Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 392 m (1,286 ft)	$37,000	$1,332,000
S41	R29 to R30	7 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 3.7 m (12 ft) 164 m (538 ft)	$35,000	$245,000
S47	R32 to R36	11 SFR	R/W Westbound SR-56	3.0 m (10 ft) to 4.3 m (14 ft) 339 m (1,112 ft)	$35,000	$385,000
S20	R42 & R43	1 SCH (4 Frontage Units)	Inside R/W Eastbound SR-56	3.7 m (12 ft) to 4.9 m (16 ft) 670 m (2,198 ft)	$35,000	$140,000
S34	R46 & R47	2 SFR	Inside R/W Eastbound SR-56	2.4 m (8 ft) to 3.0 m (10 ft) 318 m (1,043 ft)	$47,000	$94,000
S34 (Option)	R46 & R47	2 SFR	Private Property Eastbound SR-56	3.7 m (12 ft) to 4.3 m (14 ft) 171 m (561 ft)	$49,000	$98,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-16 – SUMMARY OF FEASIBLE BARRIERS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptor No.	Type[1] and No. of Benefited Residences	Barrier Location/ Hwy. Side	Barrier Height/ Total Length	Reasonable Cost per Residence[2]	Reasonable Allowance Cost Per Barrier(s)
S539	R4.1	1 SFR	Private Property Southbound I-5	2.4 m (8 ft) 42 m (138 ft)	$37,000	$37,000
S541	R4.2 to R4.4	1 SFR & 1 REC (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft), 3.7 m (12 ft), & 4.3 m (14 ft) 183 m (600 ft)	$45,000	$225,000
S551	R4.11A to 4.21A	21 SFR	Private Property Southbound I-5	4.3 m (14 ft) to 4.9 m (16 ft) 1,078 m (3,537 ft)	$47,000	$987,000
S557	R4.22A to R4.24	10 MFR	Private Property Southbound I-5	2.4 m (8 ft) to 3.0 m (10 ft) 219 m (719 ft)	$43,000	$430,000
S561	R5.1 & R5.2	6 MFR	Private Property Southbound I-5	2.4 m (8 ft) 156 m (512 ft)	$41,000	$246,000
S563	R5.5A & R5.6A	1 SCH (4 Frontage Units)	Private Property Southbound I-5	2.4 m (8 ft) 130 m (427 ft)	$47,000	$188,000
S567	R5.7A to R5.8B	13 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft) 299 m (991 ft)	$49,000	$637,000
S569	R5.9A & R5.9	3 SFR	R/W / Private Property Southbound I-5	2.4 m (8 ft), 3.7 (12 ft), and 4.3 m (14 ft) 106 m (348 ft)	$43,000	$129,000
S568	R5.22 to R5.23A	9 SFR	R/W / Private Property Northbound I-5	2.4 m (8 ft) 215 (705 ft)	$37,000	$333,000

Notes:
1 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational facility.
2 - Based on the base reasonable allowance of $31,000 per residence.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S27	R5 to R9A	R/W / Private Property Westbound SR-56	25+06	4.9 (16)	29.1 (95)
			25+51	4.9 (16)	30.9 (101)
			25+93	4.9 (16)	30.9 (101)
			26+20	4.9 (16)	31.0 (102)
			26+30	4.9 (16)	31.4 (103)
			26+89	4.9 (16)	31.6 (104)
			27+41	4.9 (16)	32.4 (106)
			27+89	4.9 (16)	32.1 (105)
			28+39	4.9 (16)	33.0 (108)
			28+39	4.3 (14)	32.4 (106)
			29+09	4.3 (14)	32.9 (108)
			29+66	4.3 (14)	32.8 (108)
			29+94	4.3 (14)	32.9 (108)
		Approximate Length:	492 m (1,614 ft)		
S31	R14 & R15	Private Property Westbound SR-56	31+83	2.4 (8)	35.9 (118)
			31+74	2.4 (8)	35.6 (117)
			32+01	2.4 (8)	35.5 (117)
			32+09	2.4 (8)	36.0 (118)
		Approximate Length:	77 m (253 ft)		
S35	R16 to R21A	R/W / Private Property Westbound SR-56	33+36	3.0 (10)	42.7 (140)
			33+41	3.0 (10)	42.7 (140)
			33+56	3.0 (10)	42.7 (140)
			33+84	3.0 (10)	42.7 (140)
			33+85	3.0 (10)	43.0 (141)
			33+85	3.7 (12)	43.7 (143)
			34+06	3.7 (12)	43.7 (143)
			34+54	3.7 (12)	44.4 (146)
			35+13	3.7 (12)	44.8 (147)
			35+66	3.7 (12)	45.7 (150)
			36+07	3.7 (12)	45.8 (150)
			36+83	3.7 (12)	46.3 (152)
			37+26	3.7 (12)	46.8 (153)
			37+37	3.7 (12)	46.3 (152)
			37+41	3.7 (12)	46.8 (153)
			37+50	3.7 (12)	46.8 (153)
		Approximate Length:	392 m (1,286 ft)		
S41	R29 to R30	R/W Westbound SR-56	40+87	3.0 (10)	47.5 (156)
			41+14	3.0 (10)	46.5 (153)
			41+14	3.7 (12)	47.2 (155)
			41+36	3.7 (12)	46.7 (153)
			41+83	3.7 (12)	45.3 (148)
			42+28	3.7 (12)	44.5 (146)
			42+40	3.7 (12)	44.5 (146)
		Approximate Length:	164 m (538 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S47	R32 to R36	R/W Westbound SR-56	44+76	3.7 (12)	46.2 (151)
			45+76	3.7 (12)	46.8 (153)
			46+13	3.7 (12)	47.0 (154)
			46+16	3.7 (12)	47.5 (156)
			46+16	4.3 (14)	48.1 (158)
			46+98	4.3 (14)	48.3 (158)
			47+13	4.3 (14)	48.3 (158)
			47+37	4.3 (14)	48.7 (160)
			47+61	4.3 (14)	49.4 (162)
			47+61	3.7 (12)	48.8 (160)
			48+07	3.7 (12)	49.2 (161)
			48+07	3.0 (10)	48.5 (159)
			48+15	3.0 (10)	48.2 (158)
		Approximate Length:	339 m (1,112 ft)		
S20	R42 & R43	Inside R/W Eastbound SR-56	15+63	4.3 (14)	19.3 (63)
			15+76	4.3 (14)	20.3 (67)
			16+00	4.3 (14)	21.8 (71)
			16+12	4.3 (14)	22.3 (73)
			16+12	4.9 (16)	22.9 (75)
			16+41	4.9 (16)	23.9 (78)
			16+73	4.9 (16)	23.9 (78)
			16+73	4.9 (16)	23.9 (78)
			16+99	4.9 (16)	23.9 (78)
			17+25	4.9 (16)	23.9 (78)
			17+50	4.9 (16)	23.4 (77)
			17+85	4.9 (16)	22.9 (75)
			18+45	4.9 (16)	21.9 (72)
			19+15	4.9 (16)	21.4 (70)
			19+66	4.9 (16)	21.4 (70)
			19+66	4.9 (16)	21.4 (70)
			20+43	4.9 (16)	21.9 (72)
			21+09	4.9 (16)	22.4 (73)
			21+40	4.9 (16)	22.9 (75)
			21+49	4.9 (16)	23.9 (78)
			21+61	4.9 (16)	24.4 (80)
			21+83	4.9 (16)	25.9 (85)
			22+02	4.9 (16)	27.4 (90)
			22+02	4.3 (14)	26.8 (88)
			22+14	4.3 (14)	27.8 (91)
			22+14	3.7 (12)	27.2 (89)
			22+34	3.7 (12)	28.2 (92)
		Approximate Length:	670 m (2,198 ft)		
S34	R46 & R47	Inside R/W Eastbound SR-56	32+00	3.0 (10)	30.0 (99)
			32+39	3.0 (10)	30.5 (100)
			32+60	3.0 (10)	30.7 (101)
			32+80	3.0 (10)	31.0 (102)
			33+00	3.0 (10)	31.2 (103)
			33+00	2.4 (8)	30.6 (101)
			33+16	2.4 (8)	30.9 (102)
			33+40	2.4 (8)	31.1 (102)
			33+59	2.4 (8)	31.4 (103)
			34+00	2.4 (8)	31.6 (104)
			34+12	2.4 (8)	31.9 (105)
			34+31	2.4 (8)	32.4 (106)
			34+60	2.4 (8)	32.5 (107)
			34+83	2.4 (8)	32.9 (108)
			35+00	2.4 (8)	33.0 (108)
			35+20	2.4 (8)	33.4 (110)
			35+40	2.4 (8)	33.6 (110)
		Approximate Length:	318 m (1,043 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S34 (Option)	R46 & R47	Private Property Eastbound SR-56	33+08	3.7 (12)	31.2 (102)
			33+15	3.7 (12)	30.7 (101)
			33+20	3.7 (12)	30.2 (99)
			33+30	3.7 (12)	29.9 (98)
			33+30	4.3 (14)	30.5 (100)
			33+30	4.3 (14)	30.5 (100)
			33+40	4.3 (14)	30.5 (100)
			33+60	4.3 (14)	30.7 (101)
			33+80	4.3 (14)	30.5 (100)
			33+87	4.3 (14)	30.2 (99)
			34+00	4.3 (14)	29.7 (97)
			34+11	4.3 (14)	29.3 (96)
			34+24	4.3 (14)	28.8 (94)
			34+40	4.3 (14)	28.4 (93)
			34+50	4.3 (14)	28.4 (93)
			34+50	3.7 (12)	27.8 (91)
			34+60	3.7 (12)	27.8 (91)
		Approximate Length:	171 m (561 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S539	R4.1	Private Property Southbound I-5	540+19	2.4 (8)	26.3 (86)
			540+22	2.4 (8)	26.3 (86)
			540+25	2.4 (8)	26.3 (86)
			540+31	2.4 (8)	26.3 (86)
			540+35	2.4 (8)	26.3 (86)
			540+39	2.4 (8)	26.3 (86)
			540+42	2.4 (8)	26.3 (86)
			540+43	2.4 (8)	26.3 (86)
		Approximate Length:	42 m (138 ft)		
S541	R4.2 to R4.4	Private Property Southbound I-5	540+36	2.4 (8)	24.4 (80)
			540+31	2.4 (8)	24.4 (80)
			540+31	3.7 (12)	25.7 (84)
			540+37	3.7 (12)	26.2 (86)
			540+69	3.7 (12)	26.5 (87)
			540+76	3.7 (12)	26.4 (86)
			540+84	3.7 (12)	27.7 (91)
			540+84	4.3 (14)	28.3 (93)
			541+19	4.3 (14)	28.5 (93)
			541+23	4.3 (14)	28.6 (94)
			541+59	4.3 (14)	29.8 (98)
			541+64	4.3 (14)	30.3 (99)
		Approximate Length:	183 m (600 ft)		
S551	R4.11A to 4.21A	Private Property Southbound I-5	545+72	4.3 (14)	48.8 (160)
			546+01	4.3 (14)	48.9 (160)
			546+01	4.9 (16)	49.5 (162)
			546+43	4.9 (16)	51.0 (167)
			546+44	4.9 (16)	51.4 (169)
			546+64	4.9 (16)	51.9 (170)
			546+82	4.9 (16)	52.9 (173)
			546+87	4.9 (16)	54.9 (180)
			547+26	4.9 (16)	57.0 (187)
			547+67	4.9 (16)	59.1 (194)
			548+27	4.9 (16)	61.9 (203)
			548+47	4.9 (16)	62.9 (206)
			548+86	4.9 (16)	64.1 (210)
			548+89	4.9 (16)	64.9 (213)
			549+08	4.9 (16)	65.4 (215)
			549+27	4.9 (16)	66.4 (218)
			549+28	4.9 (16)	66.9 (219)
			549+48	4.9 (16)	67.4 (221)
			549+87	4.9 (16)	69.4 (228)
			550+07	4.9 (16)	70.4 (231)
			550+27	4.9 (16)	70.9 (233)
			550+67	4.9 (16)	72.4 (237)
			551+44	4.9 (16)	73.5 (241)
			551+81	4.9 (16)	74.0 (243)
			552+38	4.9 (16)	75.4 (247)
			553+13	4.9 (16)	76.9 (252)
			553+73	4.9 (16)	77.5 (254)
			554+58	4.9 (16)	79.0 (259)
			555+24	4.9 (16)	79.8 (262)
			555+24	4.9 (16)	80.1 (263)
			555+48	4.9 (16)	80.9 (265)
			555+73	4.9 (16)	81.4 (267)
			555+73	4.3 (14)	80.8 (265)
			555+76	4.3 (14)	81.4 (267)
			556+01	4.3 (14)	82.0 (269)
			556+03	4.3 (14)	82.5 (271)
			556+34	4.3 (14)	82.9 (272)
			556+37	4.3 (14)	83.5 (274)
		Approximate Length:	1,078 m (3,537 ft		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S557	R4.22A to R4.24	Private Property Southbound I-5	556+08	2.4 (8)	86.4 (284)
			556+13	2.4 (8)	86.9 (285)
			556+22	2.4 (8)	86.9 (285)
			556+43	2.4 (8)	86.4 (284)
			556+53	2.4 (8)	86.4 (284)
			556+53	3.0 (10)	87.0 (286)
			556+53	3.0 (10)	87.0 (286)
			556+67	3.0 (10)	87.0 (286)
			556+77	3.0 (10)	87.5 (287)
			556+93	3.0 (10)	87.5 (287)
			557+01	3.0 (10)	88.0 (289)
			557+16	3.0 (10)	88.0 (289)
			557+35	3.0 (10)	89.0 (292)
			557+70	3.0 (10)	89.0 (292)
			557+94	3.0 (10)	88.5 (291)
			558+01	3.0 (10)	88.5 (291)
		Approximate Length:	219 m (719 ft)		
S561	R5.1 & R5.2	Private Property Southbound I-5	560+85	0.0 (0)	99.5 (326)
			560+81	2.4 (8) [3]	98.4 (323)
			561+14	2.4 (8)	96.4 (316)
			561+38	2.4 (8)	96.4 (316)
			561+75	2.4 (8)	96.4 (316)
			562+16	2.4 (8)	96.4 (316)
			562+21	2.4 (8)	96.4 (316)
		Approximate Length:	156 m (512 ft)		
S563	R5.5A & R5.6A	Private Property Southbound I-5	563+28	0.0 (0)	92.7 (304)
			563+17	2.4 (8) [3]	91.9 (302)
			563+70	2.4 (8)	91.4 (300)
			564+04	2.4 (8)	90.9 (298)
			564+39	2.4 (8)	91.0 (299)
			564+36	2.4 (8)	91.4 (300)
		Approximate Length:	130 m (427 ft)		
S567	R5.7A to R5.8B	R/W / Private Property Southbound I-5	564+61	2.4 (8)	101.4 (333)
			564+59	2.4 (8)	101.4 (333)
			564+80	2.4 (8)	101.4 (333)
			565+01	2.4 (8)	101.5 (333)
			565+24	2.4 (8)	101.5 (333)
			565+38	2.4 (8)	101.7 (334)
			565+60	2.4 (8)	101.6 (333)
			565+72	2.4 (8)	101.4 (333)
			565+78	2.4 (8)	101.4 (333)
			565+84	2.4 (8)	101.4 (333)
			565+70	2.4 (8)	101.9 (334)
			566+21	2.4 (8)	102.4 (336)
			566+52	2.4 (8)	102.4 (336)
			566+71	2.4 (8)	102.4 (336)
			567+09	2.4 (8)	102.6 (337)
			567+18	2.4 (8)	102.4 (336)
		Approximate Length:	299 m (991 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

TABLE 7-17 – BARRIER LOCATIONS AND ELEVATIONS – ALTERNATIVE 5 (CONT'D)

Barrier No.	Receptors Protected (Receptor No.)	Barrier Location	Barrier Stations[1]	Approximate Barrier Height, m (ft)	Top of Barrier Elevation[2], m (ft)
S569	R5.9A & R5.9	R/W / Private Property Southbound I-5	567+29	4.3 (14)	100.3 (329)
			567+66	4.3 (14)	99.8 (327)
			567+66	3.7 (12)	99.2 (325)
			568+05	3.7 (12)	99.9 (328)
			568+05	2.4 (8)	98.6 (324)
			568+00	2.4 (8)	100.6 (330)
			567+89	2.4 (8)	101.8 (334)
		Approximate Length:	106 m (348 ft)		
S568	R5.22 to R5.23A	R/W / Private Property Northbound I-5	566+24	2.4 (8)	103.2 (339)
			566+25	2.4 (8)	102.1 (335)
			566+54	2.4 (8)	103.1 (338)
			566+71	2.4 (8)	104.4 (343)
			566+76	2.4 (8)	104.5 (343)
			566+87	2.4 (8)	104.1 (342)
			566+62	2.4 (8)	104.1 (342)
			567+02	2.4 (8)	104.1 (342)
			567+20	2.4 (8)	104.1 (342)
			567+32	2.4 (8)	104.1 (342)
			567+35	2.4 (8)	104.1 (342)
			567+41	2.4 (8)	104.1 (342)
			567+43	2.4 (8)	104.1 (342)
			567+42	2.4 (8)	104.1 (342)
			567+46	2.4 (8)	103.6 (340)
			567+56	2.4 (8)	103.7 (340)
			567+67	2.4 (8)	103.6 (340)
			567+79	2.4 (8)	103.6 (340)
			567+90	2.4 (8)	103.8 (341)
		Approximate Length:	215 (705 ft)		

Notes:

1 - Stations correspond to the mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Barrier height transitions from previous height.

8.0 CONSTRUCTION NOISE

During the construction phases of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Table 8-1 summarizes noise levels produced by construction equipment commonly used on roadway construction projects. As indicated, equipment involved in construction is expected to generate noise levels ranging from 74 to 101 dBA at a distance of 15 m (50 ft). The loudest equipment are the vibratory and impact pile driver, which will most likely be used for the construction of the connector structures. Noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance. No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with Caltrans' Standard Specifications and would be short-term, intermittent, and dominated by local traffic noise.

The noise level requirement specified herein shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor.

Sound control shall conform to the provisions in Section 14-8.02, "Noise Control," of the Standard Specifications and S5-310 “Sound Control Requirements”. According to requirements of these specifications, construction noise cannot exceed 86 dBA at 15 m (50 ft) from the job site activities from 9 p.m. to 6 a.m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level outside the limits of the State right of way.

Using alternative warning methods instead of a sound signal should be considered unless required by safety laws. Internal combustion engine must be equipped with the manufacturer-recommended muffler. An internal combustion engine cannot be operated on the job site without the appropriate muffler.

Construction equipment shall not be operated, nor shall the engines of this equipment be allowed to run, between the hours of 7:00 p.m. and 7:00 a.m., or on Sundays, except that within the limits of the project and subject to control of the Engineer, equipment may be operated during the restricted hours to:

A. Service traffic control facilities.

B. Service construction equipment.

Minor deviations from this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Engineer, the work will be expedited and sound levels resulting from this work will not cause adverse public reaction.

Before start of construction activities, detailed calculation must be conducted to determine noise levels associated with various construction phases. If results of these calculations indicated possibility of noise impacts, appropriate noise control measures must be considered to meet Caltrans requirements. Noise monitoring must also be considered during the construction activities to verify meeting applicable noise limits.

Minor deviations from this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Engineer, the work will be expedited and sound levels resulting from this work will not cause adverse public reaction.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed thereof.

TABLE 8-1 – CONSTRUCTION EQUIPMENT NOISE

Equipment	Maximum Noise Level (dBA at 50 feet)
Auger Drill Rig	86
Asphalt Paver	89
Asphalt Roller	78
Backhoe	75
Compactor	76
Concrete Pump	81
Crane	85
Dozer	85
Excavator	83
Front End Loader	74
Grader	75
Heavy Duty Dump Trucks	77
Vibratory Roller	78
Pavement Breaker	88
Pile Driver, Impact	101
Pile Driver, Vibratory	96

Source: Parsons

9.0 REFERENCES

23 CFR Part 772, 2009. *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 23 Codes of Federal Regulations, Part 772, April.

Caltrans, 2009. California Department of Transportation. *Technical Noise Supplement - A Technical Noise Supplement to the Traffic Noise Analysis Protocol,* November.

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FHWA, 1978. *FHWA Highway Traffic Noise Prediction Model,* FHWA-RD-77-108, by T. M. Barry and J. A. Reagan, December.

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SANDAG, 2003, San Diego's Regional Planning Agency. 2003 Mobility 2030 – The Transportation Plan for the San Diego Region, SANDAG, April 2003

APPENDIX A

NOISE MEASUREMENT DATA

APPENDIX B

MEASUREMENT SITE PHOTOGRAPHS

APPENDIX C

RECEPTOR AND NOISE BARRIER LOCATIONS

APPENDIX D

COST ANALYSIS
WORKSHEETS A AND B

APPENDIX E

STREET ADDRESSES FOR RECEPTORS

APPENDIX F

COMPUTER NOISE MODELING INPUT/OUTPUT FILES

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