

2.2.7 Noise

This section evaluates potential noise impacts that could result from the operation of the Tier I and Tier II projects. Cumulative impacts are discussed in Section 2.5.

Regulatory Setting

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

California Environmental Quality Act

The California Environmental Quality Act requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under the California Environmental Quality Act, then the California Environmental Quality Act dictates that mitigation measures must be incorporated into the project unless such measures are not feasible. The rest of this section will focus on the National Environmental Policy Act *23 Code of Federal Regulations 772* noise analysis; see Sections 3.1 and 3.2.1 of this document for further information on noise analysis under the California Environmental Quality Act.

National Environmental Policy Act and 23 Code of Federal Regulations 772

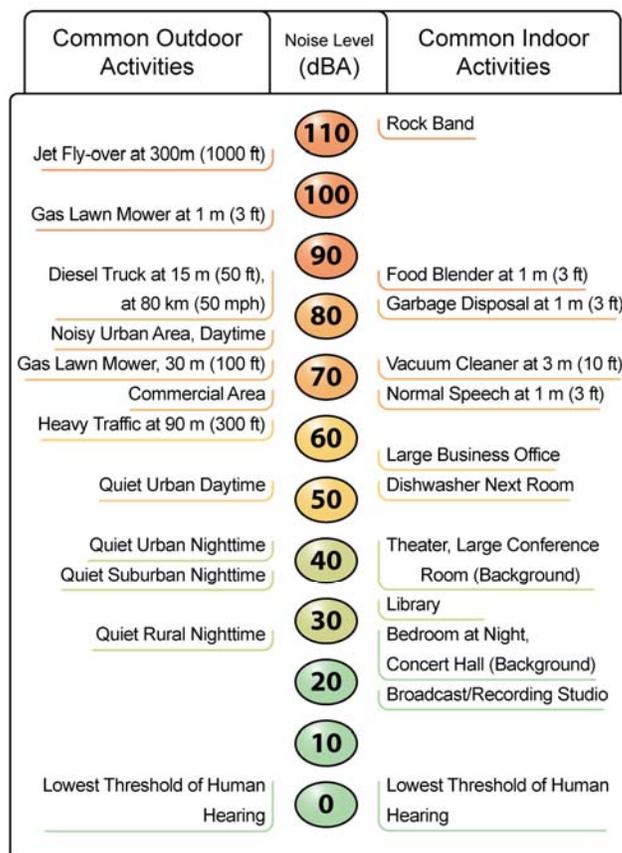
For highway transportation projects with the Federal Highway Administration involvement, the federal-Aid Highway Act of 1970 and the associated implementing regulations (*23 Code of Federal Regulations 772*) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria that are used to determine when a noise impact would occur. The noise abatement criteria differ depending on the type of land use under analysis. For example, the noise abatement criteria for residences (67 A-weighted decibels [dBA]) is lower than the noise abatement criteria for commercial areas (72 dBA). Table 2.2.7-1 lists the noise abatement criteria for use in the National Environmental Policy Act and *23 Code of Federal Regulations 772* analysis, and Figure 2.2.7-1 shows the noise levels of typical activities.

Table 2.2.7-1: Activity Categories and Noise Abatement Criteria

Activity Category	Noise Abatement Criteria, 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.

*A-weighted decibels (dBA) are adjusted to approximate the way humans perceive sound. $L_{eq}(h)$ is the steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual time-varying levels over 1 hour.
Source: Caltrans Traffic Noise Analysis Protocol, 2006.

Figure 2.2.7-1: Typical Noise Levels



In accordance with Caltrans' *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects*, August 2006, a noise impact occurs when the future noise level with the project results in a substantial increase in noise level (defined as a 12-decibel or more increase) or when the future noise level with the project approaches or exceeds the noise abatement criteria. Approaching the noise abatement criteria is defined as coming within 1 decibel of the noise abatement criteria. If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications.

The Caltrans Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5-decibel reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include acceptance by residents, the cost per benefited residence, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, and newly constructed development versus development pre-dating 1978.

Affected Environment

The information in this section is derived from the *Noise Study Report for the Santa Cruz Route 1 Project* (2013) and the *Draft Project Report for Operational Improvements on Route 1 in Santa Cruz County between 41st Avenue Overcrossing and Soquel Avenue/Drive Overcrossing* (2015).

Tier I Corridor Alternatives

Residential land uses predominate most of the Route 1 project corridor, with some commercial and industrial property, primarily in the unincorporated areas. The frequent outdoor use areas that may be affected by the project include single- and multi-family residences, a few schools, churches, hotels/motels, and a wilderness park. Maps showing the location of noise-sensitive receptors and proposed locations for barriers are provided in Appendix K.

Noise measurements were conducted at 46 locations within the project limits in April and May of 2004, September 2006, and May 2010. The measurements are primarily for evaluating the existing noise environment and calibrating the noise prediction model. Short-term measurements were conducted at 37 sites for duration of 20 minutes each, and long-term measurements were conducted at nine locations for at least 23 hours between 2004 and 2010, with one additional measurement conducted in 2013.

Of the 46 noise measurement locations, calibration measurements were conducted at 17 locations from April 2004 to May 2010. During the calibration measurements, traffic volumes on Route 1 were concurrently recorded. Overall, modeled noise levels at calibration locations during the 2004 and 2006 measurement periods were higher than measured noise levels. Deviations appeared to be occurring at calibration locations due to densely vegetated areas, heavy tree zones with height over 16 feet, and topographic complexities in study areas.

Tier II Auxiliary Lane Alternative

Land uses along Route 1 between 41st Avenue and Soquel Drive adjacent to the highway are predominantly commercial with pockets of residences. Good Sheppard School and a convalescent hospital are also located within the study area.

One long-term and four short-term noise measurements were conducted in January 2013 within the Tier II Auxiliary Lane Alternative project limits. These measurements were primarily for calibrating the traffic noise model for the Tier II project, and they were not used in the Tier I corridor study. Measured versus modeled levels for the 2013 measurements were closer to each other than the previous sets of noise measurements mainly as a result of using more accurate topographical Tier II information for the modeling.

Environmental Consequences

The long-term noise effects of the Tier I and Tier II project alternatives are discussed in this section.

The Tier I and Tier II projects are defined as Type 1 by Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772); therefore, a full noise assessment is required. Type 1 projects are defined as projects that involve construction of a highway at a new location or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes. Future (2035) noise levels were modeled for the Tier I Corridor build alternatives, the Tier II Auxiliary Lane Alternative, and the No Build Alternative.

To assess noise impacts, “noise sensitive receptors,” such as residences, schools, and parks, are identified, and baseline measurements or readings of existing noise levels are conducted at these locations, which are referred to as receivers. After existing noise levels are obtained, future noise impacts are modeled to predict the noise levels that would occur under the proposed project alternatives. Because traffic noise is loudest under moderately heavy, but free-flow traffic conditions, future traffic noise levels are modeled using traffic volumes and speeds that occur under those conditions.

A noise impact occurs when there is a substantial noise increase (when the predicted noise levels with the project exceed existing noise levels by 12 dBA) or/and the future traffic noise

level with the project approaches or exceeds the noise abatement criteria for the Activity Category of the property. See Table 2.2.7-1 for a description of the Activity Categories.

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

The Caltrans Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5-decibel (dB) reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include acceptance by residents, the cost per benefited residence, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies' input, and newly constructed development versus development dating before 1978.

Plan drawings included in Appendix K show receivers representing frequent outdoor use areas and soundwalls that have been identified as feasible to address the impacts of the Tier I Corridor build alternatives. Whether soundwalls identified as feasible from an engineering perspective also meet the criteria of being reasonable from a cost perspective will be determined as part of the noise abatement decision reports prepared for the future Tier II projects based on the cost allowances current at that time. If the cost of the wall is less than the cost allowance and no other technical issues prevent construction of the soundwall, then the soundwall would likely be considered reasonable and would be proposed for construction. The soundwall designation numbers are shown in bold text on the alignment drawings (see Appendix K).

The noise analysis for the Tier II Auxiliary Lane Alternative identified soundwalls that are considered feasible; however, the Noise Abatement Decision Report prepared for the Tier II Auxiliary Lane Alternative found that none of the feasible soundwalls are considered reasonable. The Tier I and Tier II projects would result in noise impacts that require the consideration of noise abatement. Long-term and short-term noise measurements have been conducted at the acoustically representative sites in the project area. The short-term measurements were conducted at various hours of the day during free-flowing traffic conditions. As allowed by Caltrans' Technical Noise Supplement, short-term measurements were not necessarily conducted during the worst noise hour. Therefore, the short-term measured levels must be converted to equivalent worst-hour noise levels. This is done by evaluating the relationship between the worst-hour noise level and the noise level during other hours of the day using results of the nearby long-term noise measurements.

Traffic counts were taken during the noise measurements to calibrate the model. Future noise was modeled for design year 2035, based on the results of traffic modeling for design year 2035. Noise modeling results for each alternative were analyzed to determine whether future noise with the project would approach (within 1 dBA) or exceed the Noise Abatement Criteria. The results of this analysis are presented in Appendix K, Tables 1 through 3, and are described below.

The preliminary noise abatement features presented in this report are based on preliminary project alignments and profiles, which may be subject to change. As such, the physical characteristics of noise abatement described herein also may be subject to change. If pertinent factors change substantially during the final project design, the preliminary noise abatement decision may be changed or eliminated from the final project.

Tier I Corridor Alternatives

A volume of 1,800 vehicles per hour per lane was utilized in modeling Route 1 mainline traffic volume and 1,500 vehicles per hour was utilized in modeling Route 1 HOV lane traffic volume. Year 2035 ramp traffic volumes were compared to the volume of 1,000 vehicles per hour per lane, and the lesser of the two volumes were used in modeling ramp traffic. The results of the modeling are shown in Appendix K, Tables 1 and 2.

The Route 1/17 Merge Lanes Project construction was completed in 2009, and the soundwalls for this project were built in the area north of Route 1 near La Fonda Avenue. Construction of the soundwalls for the Highway 1 Soquel/Morrissey Auxiliary Lanes Project was completed in December 2013. These soundwalls were included in the traffic noise impact analysis for the Tier I Corridor Alternatives. Due to the benefit of these soundwalls, Tier I Corridor Alternative noise levels at areas represented by Receivers R166 through R170 would be lower than the existing noise levels, which were established for this analysis before construction of these soundwalls.

An assessment of the feasibility of noise abatement for the Tier I Corridor Alternatives is presented below. As future Tier II projects are programmed, they will be subject to separate environmental reviews, including updated noise analyses. As a result of those analyses, some of the projected future noise levels and attenuation recommendations provided below could change. In addition, those analyses will evaluate the reasonableness of feasible soundwalls based on cost and technical issues in accordance with the Caltrans Traffic Noise Analysis Protocol.

Receptors R1 through R6 represent single-family residences on the southbound side of Route 1, west of San Andreas Road. Receptor locations are shown on Sheets 1 and 2 in Appendix K. Under either of the corridor build alternatives, noise abatement would not be warranted for these homes because traffic noise levels at these receptors would not approach or exceed the noise abatement criterion for residential uses (67 decibels).

Receptors R7 through R13 represent single-family residences south of Bonita Drive on the southbound side of the highway, east of the Freedom Boulevard interchange.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R7 and R9 through R13. Although no abatement is warranted at Receptor R8 because the noise level would not approach or exceed the criterion, Receptor R8 would receive a 2- to 5-decibel noise reduction from a soundwall constructed for adjacent receptors, depending on the height of the barrier selected. Although traffic noise would exceed the criterion at Receptors R11 and R13, these homes are located at much higher elevations than Route 1; therefore, Soundwall S59 would not provide the required minimum 5-decibel noise reduction for these residences, and it would not be feasible to abate traffic noise for these receptors. It would be feasible to abate traffic noise at impacted Receptors R7, R9, R10, and R12 with Soundwall S59 ranging from 8 to 10 feet high for 1,804 feet along the right-of-way. However, because the future peak-hour traffic noise level for the frequent outdoor use area at one single-family residence represented by Receptor R11 would be 75 dBA, this residence would be considered severely impacted. A severe noise impact is considered to occur when predicted exterior noise levels equal or exceed 75 dBA- $L_{eq}(h)$ ¹ or are 30 decibels or more above existing noise levels. In these instances, noise abatement measures must be considered. Because Soundwall S59 would not adequately reduce noise levels, it was determined to be infeasible for this soundwall to address noise impacts at the residence represented by Receptor R11. Consideration of acoustic treatment to the building, such as sound insulation materials and double-paned windows, would still be required for this residence.

TSM Alternative: Noise levels at these receptors would not approach or exceed the noise abatement criterion; therefore, noise abatement is not warranted for these homes.

Receptor R14 represents the outdoor use area of Christ Lutheran Church, which is on the northbound side of the highway and just east of Soquel Drive and Freedom Boulevard. This receptor is shown on Sheet 3 in Appendix K. A soundwall is not warranted because the traffic noise level under either corridor build alternative would not approach or exceed the noise abatement criterion.

Receptors R15 through R22 represent single-family residences and several houses used as commercial offices on the southbound side of Route 1, just west of Freedom Boulevard.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R16 through R22. No abatement is warranted at Receptor R15 because the noise level would not approach or exceed the criterion. Although traffic noise would exceed the noise abatement criterion at Receptors R21 and R22, these homes are at much higher elevations than Route 1, and Soundwall S71 would not provide the required minimum 5-decibel noise reduction for these residences. It would be feasible to abate traffic noise at

¹ $L_{eq}(h)$ is the energy average of A-weighted sound levels occurring during a one-hour period.

Receptors R16 through R20 with Soundwall S71 ranging from 14 to 16 feet high for 3,271 feet along the right-of-way and shoulder.

TSM Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R17, R18, and R20 through R22. No abatement is warranted at Receptors R15, R16, R18A, and R19 because the traffic noise levels would not approach or exceed the noise abatement criterion. Although traffic noise would exceed the criterion at Receptors R21 and R22, these homes are at much higher elevations than Route 1; it would not be feasible to reduce traffic noise by 5 decibels. It would be feasible to abate traffic noise at Receptors R17 through R20 with Soundwall S71 ranging from 14 to 16 feet high for 2,739 feet along the right-of-way and shoulder.

Receptors R24 through R34 represent single- and multi-family residences on the northbound side of Route 1 to the west of Freedom Boulevard. Although traffic noise levels under either build corridor alternative would exceed the noise abatement criterion at Receptor R27, this residence is at a much higher elevation than Route 1, and Soundwall S68 would not provide the required minimum 5-dB noise reduction for this residence; therefore, it would not be feasible to abate traffic noise (or block the line-of-sight) by constructing a soundwall on the right-of-way.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R26 through R33. No abatement is warranted at Receptors R24, R25, and R34 because the traffic noise level would not approach or exceed the noise abatement criterion. It would be feasible to abate traffic noise at Receptors R25, R26, and R28 through R33 with Soundwall S68 ranging from 10 to 16 feet high for 2,624 feet along the right-of-way and edge of shoulder.

TSM Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R25 through R27 and R29 through R33. No abatement is warranted at Receptors R24, R28, and R34 because the traffic noise level would not approach or exceed the noise abatement criterion. It would be feasible to abate traffic noise at Receptors R25, R26, and R29 through R33 with Soundwall S68 ranging from 10 to 16 feet high for 2,622 feet along the right-of-way and edge of shoulder.

Receptors R35, R35A, and R36 represent single-family residences on the northbound side of Route 1, south of Monroe Avenue and east of Rio Del Mar Boulevard, and along Soquel Drive. Traffic noise levels under either corridor build alternative would exceed the noise abatement criterion at these receptors. These receptors are shown on Sheet 5 in Appendix K.

HOV Lane Alternative: Although traffic noise would exceed the criterion at Receptors R35 and R35A, these homes are at a much higher elevation than Route 1; Soundwall S74 would not provide the required minimum 5-decibel noise reduction for these residences, and it would not be feasible to block the line-of-sight with a soundwall to abate traffic noise. It

would be feasible to abate traffic noise at Receptor R36 with a 14-foot-high soundwall for 493 feet along the shoulder. However, because the future peak-hour traffic noise level for the frequent outdoor use area at one single-family residence represented by Receptor R35 would be 75 dBA, this residence would be considered severely impacted. As noted above, in the discussion of Receptors R7 through R13, in instances of severe noise impact, noise abatement measures must be considered. Because Soundwall S74 would not adequately reduce noise levels, it was determined to be infeasible. Consideration of acoustic treatment to the building, such as sound insulation materials and double-paned windows, would still be required for this residence.

TSM Alternative: Although traffic noise would exceed the criterion at Receptor R35, this home is at a much higher elevation than Route 1, and it would not be feasible to block the line-of-sight with a soundwall to abate traffic noise; however, it would be feasible to abate traffic noise at Receptor R36 with 14-foot-high Soundwall S74 for 493 feet along the shoulder. The Noise Study Report (2013) did not identify an impact for Receptor 35A under the TSM Alternative.

Receptors R37 and R38 represent single-family residences and the Rio Del Mar Club on the southbound side of Route 1, just east of the south Santa Cruz Branch Line bridge. Because traffic noise levels at Receptor R37 would not approach or exceed the noise abatement criterion for residential uses, a soundwall is not warranted for homes represented by this receptor. Under both the HOV Lane Alternative and the TSM Alternative, the traffic noise level would approach or exceed the noise abatement criterion at frequent outdoor use areas of the Rio Del Mar Club, represented by Receptor R38. It would be feasible to abate traffic noise at Receptor R38 with 10-foot-high Soundwall S85 for 377 feet (376 feet under the TSM Alternative) along the right-of-way. Soundwall S85 is shown on Sheet 6 in Appendix K.

Receptors R39 and R39A represent single-family residences on the northbound side of Route 1, west of Rio Del Mar Boulevard. Traffic noise levels at these receptors would not approach or exceed the noise abatement criterion under either corridor build alternative. A soundwall is not warranted for these homes. Receptors R39 and R39A are shown on Sheets 5 and 6, respectively, in Appendix K.

Receptors R40, R40A, and R41 represent single- and multi-family residences on the northbound side of Route 1, just east of the south Aptos Santa Cruz Branch Line crossing. Traffic noise levels under either Tier I corridor build alternative would exceed the noise abatement criterion at these receptors. These receptors are shown in Appendix K, Sheet 7.

HOV Lane Alternative: The future peak-hour noise levels for the frequent outdoor use area at one single-family residence represented by Receiver R40 would exceed the criterion of 67 dBA; however, Soundwall S86 would not provide the required minimum 5-decibel noise

reduction for this residence. Because of its high elevation relative to Route 1, the residence would have a clear view to the highway over the soundwall; therefore, the barrier becomes ineffective in reducing traffic noise. It would be feasible to abate traffic noise at receptors R40A and R41 with Soundwall S86 ranging from 8 to 10 feet high for 561 feet along the right-of-way. Soundwall S86 is shown on Sheet 6 in Appendix K. In addition, the future peak-hour noise levels for the frequent outdoor use areas at Receivers R40A and R41 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S86 would provide the 5-decibel reduction for these severely impacted receivers to meet the feasibility criterion. If Soundwall S86 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: It would be feasible to abate traffic noise with Soundwall S86 ranging from 8 to 16 feet high for 907 feet along the right-of-way. Soundwall S86 is shown on Sheet 6 in Appendix K.

Receptors R42 through R45 represent two single-family and nine multi-family residences on the southbound side of Route 1 and just west of the south Santa Cruz Branch Line Railroad bridge. Predicted future traffic noise levels at Receptor R43 for either build alternative would not approach or exceed the noise abatement criterion, and no abatement would be warranted; however, Receptor R43 would incidentally receive a 5- to 8-decibel (4- to 6-decibel under the TSM Alternative) noise reduction from Soundwall S87 constructed to abate traffic noise at Receptors 42 and 44. The noise reduction at Receptor 43 would depend on the height of the soundwall selected. The predicted future traffic noise levels would exceed the noise abatement criterion at Receptors R42 and R44. These receptors, along with Soundwall S87, are shown on Sheet 6 in Appendix K for both build alternatives.

HOV Lane Alternative: The future peak-hour noise levels for the frequent outdoor use areas at two single-family residences represented by Receiver R45 would exceed the criterion of 67 dBA; however, extending Soundwall S87 would not provide the required minimum 5-decibel noise reduction for these residences. Because of their high elevations relative to Route 1, these residences would have a clear view over the soundwall to the highway; therefore, the barrier would be ineffective in reducing traffic noise. Traffic noise abatement would be feasible at Receptors R42 through R44 with 14-foot-high Soundwall S87 for 378 feet along the right-of-way. The future peak-hour noise levels for the frequent outdoor use areas Receivers R42 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S87 would provide the 5-decibel reduction for these severely impacted receivers to meet the feasibility criterion. If Soundwall S87 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Traffic noise abatement would be feasible at Receptors R42, R44, and R45 with Soundwall S87 ranging from 14 to 16 feet high for 517 feet along the right-of-way.

Receptors R45A through R47 represent single-family residences and undeveloped land on the southbound side of Route 1 and southeast of Aptos Creek as shown on Sheet 7 in Appendix K. Under Caltrans noise abatement criteria, no noise abatement is warranted for undeveloped land. The frequent outdoor use area of a single-family residence represented by Receiver R46 would experience a predicted peak-hour noise of 75 dBA; however, extending Soundwall S89 (discussed under Receptors R48 through R50) would not provide the required minimum 5-decibel noise reduction for this residence. Because of the residence's high elevation relative to Route 1, it would have a clear view to the highway; therefore, a barrier would be ineffective in reducing traffic noise. Because Soundwall S89 does not provide feasible noise mitigation, building acoustic treatment would be required for the single-family residence represented by Receptor R46. Under the TSM Alternative, Receptor R45A would receive a 5-decibel noise reduction from Soundwall S87, described under Receptors R42 through R45.

Receptors R48 and R50 represent single-family, multi-family residences, and undeveloped land lots on the southbound side of Route 1 at Aptos Creek. Predicted future noise levels would approach or exceed the noise abatement criterion for residential uses at homes represented by Receptor R49. No abatement is warranted at the homes represented by Receptor R50 because the noise level at this location would not approach or exceed the noise abatement criterion. However, it would be feasible to abate noise at Receptor R49 through R50 with 10-foot-high Soundwall S89 for 489 feet along the edge of the roadway shoulder. The undeveloped land lots would be protected because Soundwall S89 would be extended to the east to protect Receptor R49. Soundwall S89 is shown on Sheet 7 in Appendix K.

Receptors R51 to R54 represent single- and multi-family residences on the southbound side of Route 1 and just east of the north Aptos Santa Cruz Branch Line Railroad bridge.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R52 through R53A. No abatement is warranted at the homes represented by Receptors R51 and R54 because the noise level at these locations would not approach or exceed the noise abatement criterion. It would be feasible to abate traffic noise at Receptors R52 through R53A with 10-foot-high Soundwall S93 for 568 feet along the right-of-way. Soundwall S93 is shown on Sheet 7 in Appendix K. The future peak-hour noise levels for the frequent outdoor use areas at Receiver R52 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S93 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S93 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R52 and R54. No abatement is warranted at the homes represented by Receptors R51 and R53 because the noise level at these locations would not approach or exceed the noise abatement criterion. It is not feasible to abate noise at the homes represented by Receptor R54 because the soundwall cannot be extended through the railroad crossing. It would be feasible to abate noise at Receptor R52 with 8-foot-high Soundwall S93 for 568 feet along the right-of-way. Soundwall S93 is shown on Sheet 7 in Appendix K.

Receptors R55 to R59 represent single-family residences on the southbound side of Route 1 and on the south side of the Santa Cruz Branch Line tracks east of State Park Drive, as shown on Sheets 7 and 8 in Appendix K. No abatement is warranted at Receptors R56 through R59 because the noise level would not approach or exceed the noise abatement criterion for residential uses. Under the TSM Alternative, the traffic noise level would approach the noise abatement criterion at homes represented by Receptor R55, but traffic noise reduction is not feasible because a soundwall cannot be extended through the railroad crossing. The noise level at Receptor R55 under the HOV Lane Alternative would not warrant abatement.

Receptors R62 through R65 represent single- and multi-family residences on the northbound side of Route 1 from Aptos Creek to the north Aptos Santa Cruz Branch Line Railroad crossing. Traffic noise levels under either of the Tier I Corridor Alternatives would exceed the noise abatement criterion at these receptors.

HOV Lane Alternative: Noise abatement would be feasible for Receptors R63 through R65 with Soundwall S90 ranging in height from 8 to 12 feet and extending 673 feet along the right-of-way and roadway shoulder. No feasible traffic noise abatement could be provided to Receptor R62, even with the maximum soundwall height of 16 feet, because a soundwall would not provide the required minimum 5- decibel noise reduction for these residences. Due to the high elevations of the residences represented by Receptor R62 relative to Route 1, a barrier would not be effective in reducing traffic noise. Soundwall S90 is shown on Sheet 7 in Appendix K. The future peak-hour noise level for the frequent outdoor use areas at Receivers R64 and R65 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S90 would provide the 5-decibel reduction for these severely impacted receivers to meet the feasibility criterion. If Soundwall S90 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Feasible traffic noise abatement could be provided to Receptors R62 through R65 with Soundwall S90 ranging in height from 8 to 14 feet and extending 1,922 feet along the right-of-way and roadway shoulder. The acoustically feasible Soundwall S90 is shown on Sheet 7 in Appendix K.

Receptors R66 through R80 represent single- and multi-family residences and a frontage unit on the southbound side of Route 1 between State Park Drive and Park Avenue.

HOV Lane Alternative: The traffic noise level would approach or exceed the noise abatement criterion at Receptors R66 through R73 and R75 through R78A. No noise abatement is warranted for the traffic noise levels at Receptors R74, R79, and R80. Noise abatement would be feasible for Receptors R66 through R73 with Soundwall S103 ranging in height from 12 to 14 feet and extending 2,789 feet along the right-of-way and roadway shoulder. Receptor R74 would incidentally receive some traffic noise reduction from the soundwall. Soundwall S103 is shown on Sheets 8 and 9 in Appendix K. The future peak-hour noise levels for the frequent outdoor use areas at Receivers R68 and R72 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S103 would provide the 5-decibel reduction for these severely impacted receivers to meet the feasibility criterion. If Soundwall S103 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

Feasible traffic noise abatement would be provided to Receptors R76 through R78A with 10-foot-high Soundwall S115 extending 3,347 feet along the right-of-way and roadway shoulder; feasible abatement could not be provided to Receptor R75 even with the maximum soundwall height of 16 feet. Soundwall S115 is shown on Sheets 10 and 11 in Appendix K. The future peak-hour noise levels for the frequent outdoor use areas represented by Receiver R78A would exceed 75 dBA; therefore, these units would be considered severely impacted. Soundwall S115 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S115 is determined to be unreasonable, providing a portion of this soundwall from Station 115+00 to 121+00 (Post Mile 11.56 to 11.93) would still be required for these severely impacted frontage units.

TSM Alternative: The traffic noise level would approach or exceed the noise abatement criterion at all receptors except Receptors R74, R75, R79, and R80; therefore, no traffic noise abatement is warranted at Receptors R74, R75, R79, and R80. Feasible traffic noise abatement would be provided at the other receptors by Soundwall S111 ranging in height from 8 to 14 feet and extending 7,014 feet along the right-of-way. Receptors R74 and R75 would incidentally receive some traffic noise reduction from the soundwall. Soundwall S111 is shown on Sheets 10 and 11 in Appendix K.

Receptors R81 and R82 represent the Best Western Seacliff Inn, which is on the northbound side of Route 1, just west of the State Park Drive interchange. Traffic noise levels would not approach or exceed the noise abatement criterion at the outdoor pool area represented by Receptor R82 under either of the Tier I Corridor Alternatives; however, the noise level would exceed the noise abatement criterion at the outdoor seating areas of several motel rooms represented by Receptor R81. A 5-decibel traffic noise reduction would be achieved with

12-foot-high Soundwall S100 extending 728 feet along the right-of-way. Soundwall S100 is shown on Sheets 8 and 9 in Appendix K.

Receptor R83 represents the Resurrection Catholic Church, which is on the northbound side of Route 1, east of Mar Vista Drive. No abatement is warranted for this location because the traffic noise levels under either Tier I Corridor Alternative would not approach or exceed the noise abatement criterion. This receptor is shown on Sheet 9 in Appendix K.

Receptors R84 through R101 represent the Seacliff Mobile Home Park, multi- and single-family residences, and Cabrillo College, all of which are on the northbound side of Route 1 between State Park Drive and Park Avenue.

HOV Lane Alternative: The predicted future traffic noise level would approach or exceed the noise abatement criterion at Receptors R87 through R91. No abatement is warranted at the mobile homes represented by Receptors R84 through R86 because the traffic noise levels would not approach or exceed the criterion. Receptors R89A and R91 were used for modeling purposes and does not represent any outdoor use areas. Feasible traffic noise abatement would be provided for Receptors R85 through R89 and R90 by Soundwall S106, which would range from 8 to 16 feet high for a length of 1,148 feet along the right-of-way and shoulder. Soundwall S106 is shown on Sheet 9 in Appendix K. The future peak-hour noise level for the frequent outdoor use area at Receiver R89 would exceed 75 dBA; therefore, this residence would be considered severely impacted. Soundwall S106 would provide the 5-decible reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S106 is determined to be unreasonable, providing the soundwall or building acoustic treatment would still be required for this severely impacted residence. Feasible traffic noise abatement for impacted Receptors R92 through R101 would be provided by Soundwall S118, which would range from 10 to 16 feet high for a length of 4,577 feet. Soundwall S118 is shown on Sheets 10 through 12 in Appendix K. The future peak-hour noise levels for the frequent outdoor use areas represented by Receivers R93, R98, and R101 would exceed 75 dBA; therefore, these residences and frontage units would be considered severely impacted. Soundwall S118 would provide the 5-decibel reduction for these severely impacted receivers to meet the feasibility criterion. If Soundwall S118 is determined to be unreasonable, providing three separate portions of this soundwall from Station 108+30 to 110+00 (Post Mile 11.14 to 11.25), Station 114+80 to Station 116+75 (Post Mile 11.55 to 11.67), and Station 119+50 to 122+20 (Post Mile 11.84 to 12.00) or building acoustic treatments would still be required for these severely impacted residences and the school building.

TSM Alternative: Predicted future traffic noise levels would approach or exceed the noise abatement criterion at Receptors R88 through R101. No abatement is warranted at the mobile homes represented by Receptors R84 through R86, or at the multi-family residences at Receptor R87 because traffic noise levels would not approach or exceed the criterion. Feasible traffic noise

abatement for Receptors R88 through R101 would be provided by Soundwalls S106 and S118, which would range in height from 8 to 14 feet with a total combined length of 5,604 feet along the right-of-way and shoulder. Soundwalls S106 and S118 are shown on Sheets 9 through 12 in Appendix K.

Receptor R102 represents multi-family residences on the northbound side of Route 1, just east of Cabrillo College Drive. Noise levels under either of the Tier I Corridor Alternatives would exceed the noise abatement criterion at these residences.

HOV Lane Alternative: Traffic noise abatement for Receptor R102 could be provided by 12-foot-high Soundwall S122 extending 397 feet along the shoulder of the highway; however, Soundwall S122 would be required to work as a system with Soundwall S118 to provide feasible abatement to Receptor R102. Soundwall S122 is shown on Sheets 11 and 12 in Appendix K. The future peak-hour noise levels for the frequent outdoor use areas represented by Receiver R102 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S122 and part of Soundwall 118 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S122 or S118 are determined to be unreasonable, providing Soundwall 122 and part of Soundwall S118 from Station 121+00 to 122+20 (Post Mile 11.93 to 12.00), or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Feasible traffic noise abatement would be provided to Receptor R102 with 8-foot-high Soundwall S122 extending 397 feet along the shoulder of the highway; however, Soundwall S122 would be required to work as a system with Soundwall S118 to provide feasible abatement to Receptor R102. Soundwall S122 is shown on Sheet 12 in Appendix K.

Receptors R103 through R105 represent multi-family residences and a community pool at Capitola Knolls on the southbound side of Route 1 between Park Avenue and Callas Lane. Traffic noise levels under either Tier I Corridor Alternative would exceed the noise abatement criterion at these receptors. Noise abatement would be feasible at Receptors R103 through R105 with 8-foot-high Soundwall S125 extending 853 feet (852 feet under the TSM Alternative) along the highway right-of-way and private property. Soundwall S125 is shown on Sheet 12 in Appendix K.

Receptors R106 through R108 represent multi-family residences at Capitola Knolls on the southbound side of Route 1, just east of Kennedy Drive. Traffic noise levels under either Tier I Corridor Alternative would exceed the noise abatement criterion at these receptors.

HOV Lane Alternative: Traffic noise abatement would be feasible at the multi-family residences at Receptors R106 and R107 with 8- to 10-foot-high Soundwall S129 extending 735 feet along the highway right-of-way and private property. Soundwall S129 is shown on Sheet 12 in Appendix K. The future peak-hour noise level for the frequent outdoor use areas represented by Receiver R108 would exceed 75 dBA; therefore, these residences would be

considered severely impacted. Soundwall S129 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S129 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Traffic noise abatement would be feasible at the multi-family residences at Receptors R106 and R107 with 8-foot-high Soundwall S129 extending 735 feet along the highway right-of-way. Although a 5-decibel noise reduction would not be achieved at the multi-family residences at Receptor R108, they would still receive some traffic noise reduction from the soundwall. Soundwall S129 is shown on Sheet 12 in Appendix K.

Receptor R109 represents multi-family residences on the southbound side of Route 1, just east of Nobel Creek. Because the noise level under either Tier I Corridor Alternative at this receptor would not approach or exceed the noise abatement criterion, a soundwall is not warranted for these homes. This receptor is shown on Sheet 13 in Appendix K.

Receptors R110 and R111 represent a single-family residence and mobile homes on the southbound side of Route 1. These receptors are shown on Sheet 13 in Appendix K.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at these receptors. Feasible traffic noise abatement would only be able to be provided to Receptor R110 with 12-foot-high Soundwall S133 extending a length of 600 feet along the roadway shoulder. The future peak-hour noise levels at four mobile homes represented by Receiver R111 would exceed the noise abatement criterion of 67 dBA; however, Soundwall S133 would not provide the required minimum 5-decibel noise reduction for these residences. Because these residences are partially protected by an existing building, a barrier would not be effective in reducing traffic noise.

TSM Alternative: The future predicted traffic noise level would approach or exceed the noise abatement criterion at Receptor R110. Noise abatement would not be warranted at Receptor R111 because the traffic noise level would not approach the criterion. Traffic noise abatement would be feasible at Receptor R110 with 12-foot-high Soundwall S133 extending a length of 399 feet along the right-of-way.

Receptors R112 through R114 represent multi-family residences on the southbound side of Route 1, east of Capitola Avenue. These receptors are shown on Sheet 13 in Appendix K. Future predicted traffic noise levels would approach or exceed the noise abatement criterion at Receptors R112 through R114 under the HOV Lane Alternative and at Receptors R113 and R114 under the TSM Alternative. An existing soundwall already protects these residences from highway noise. Further noise abatement is not feasible because replacing the existing soundwall with a higher one would not provide an additional 5-decibel reduction of traffic noise levels.

Receptors R115 through R118 represent multi-family residences and the Capitola Inn on the southbound side of Route 1 just west of Capitola Avenue, as shown on Sheets 13 and 14 in

Appendix K. The future predicted traffic noise level under either Tier I Corridor Alternative at Receptor R115 would not approach or exceed the noise abatement criterion; however, the predicted future traffic noise levels at Receptors R116 through R118 would exceed the noise abatement criteria. An existing soundwall protects these receptors from highway noise. Further abatement would not be feasible because replacing the existing soundwall with a higher one would not provide an additional 5-decibel reduction of traffic noise levels.

Receptors R119 through R121 represent single-family residences, a school, and a church on the northbound side of Route 1 just east of Park Avenue.

HOV Lane Alternative: Traffic noise levels would approach or exceed the noise abatement criterion at Receptors R119 and R120. Feasible traffic noise abatement would be provided with 10-foot-high Soundwall S124 extending at a length of 906 feet along the right-of-way. Although Receptor R121 is not impacted by traffic noise levels, Soundwall S124 would provide some reduction of traffic noise. Soundwall S124 is shown on Sheet 12 in Appendix K.

TSM Alternative: Predicted future peak-hour traffic noise levels would approach or exceed the noise abatement criterion at Receptor R119. Traffic noise abatement would be feasible at Receptor R119 with Soundwall S124 8 feet in height and extending 906 feet along the right-of-way. This soundwall would also provide some reduction of traffic noise levels to six frontage units (the outdoor areas) of a church represented by Receptor R120; however, raising Soundwall S124 to 10 feet in height along the entire length would add these six frontage units to the total number of benefited frequent outdoor use areas.

Receptors R122 through R125 represent single- and multi-family residences on the northbound side of Route 1 between Monterey Avenue and Pepperwood Way.

HOV Lane Alternative: Predicted future peak-hour traffic noise levels would approach or exceed the noise abatement criterion at these receptors. Noise abatement of traffic noise would be feasible with Soundwall S128 ranging in height from 10 to 14 feet and extending 1,654 feet in length along the shoulder of the highway. The acoustically feasible Soundwall S128 is shown on Sheets 12 and 13 in Appendix K. Soundwall S128 would only provide noise abatement to the nine mobile homes represented by Receiver R125 if the east end portion of Soundwall S132 from Post Miles 12.52 to 12.58 was also constructed. However, if Soundwall S128 is determined to be unreasonable, then the west end portion of Soundwall 128 from Station 128+50 to 130+75 (Post Miles 12.40 to 12.54) and the east end portion of Soundwall 132 from Station 130+54 to 131+50 (Post Miles 12.52 to 12.58) should be considered as a soundwall system for reasonableness analysis for the frequent outdoor use areas of the nine mobile homes represented by Receiver R125.

TSM Alternative: Traffic noise levels during the future peak noise hour would approach or exceed the noise abatement criterion at Receptors R123 through R125. Noise abatement is not

warranted at Receptor R122 because the traffic noise level does not approach the criterion. Feasible traffic noise abatement at Receptors R123 through R125 would be provided with Soundwall S128 ranging in height from 10 to 14 feet and extending 1,392 feet in length along the shoulder of the highway. Soundwall S128 would only provide noise abatement to the nine mobile homes represented by Receiver R125 if the east end portion of Soundwall S132 from Post Miles 12.52 to 12.58 was also constructed. However, if Soundwall S128 is determined to be unreasonable, then the west end portion of Soundwall 128 from Station 128+50 to 130+75 (Post Miles 12.40 to 12.54) and the east end portion of Soundwall 132 from Station 130+54 to 131+50 (Post Miles 12.52 to 12.58) should be considered as a soundwall system for reasonableness analysis for the frequent outdoor use areas of the nine mobile homes represented by Receiver R125.

Receptors R126 through R129 represent single- and multi-family residences on the northbound side of Route 1 between Pepperwood Way and Rosedale Avenue and are shown on Sheet 13 in Appendix K. Predicted future noise levels under either Tier I Corridor Alternative would exceed the noise abatement criterion at these receptors.

HOV Lane Alternative: Noise abatement of future predicted peak-hour traffic noise levels would be feasible with Soundwall S132 ranging in height from 10 to 12 feet and extending 1,151 feet in length along the highway right-of-way. Soundwall S132 would only provide noise abatement to the nine single-family residences and one mobile home represented by Receiver R126 if the west end portion of Soundwall 128 from Station 128+50 to 131+75 (Post Miles 12.40 to 12.60) was also constructed. Soundwall S132 is shown on Sheet 13 in Appendix K. The future peak-hour noise levels for two single-family residences represented by Receiver R127 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S132 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S132 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences.

TSM Alternative: Feasible noise abatement of future predicted peak-hour traffic noise levels for impacted Receptors R126 through R129 would be provided by Soundwall S132 ranging in height from 10 to 12 feet and extending 1,160 feet along the highway right-of-way. Soundwall S132 is shown on Sheet 13 in Appendix K.

Receptors R130 through R132 represent single-family residences on the northbound side of Route 1 just east of Capitola Avenue, as shown on Sheet 13 in Appendix K. Traffic noise levels under either Tier I Corridor Alternative would exceed the noise abatement criterion. Under the HOV Lane Alternative, noise abatement would be feasible with 10-foot-high Soundwall S136 extending 663 feet along the highway right-of-way. The future peak-hour noise levels at three single-family residences represented by Receiver R131 would exceed 75 dBA; therefore, these residences would be considered severely impacted. Soundwall S136

would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S136 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for these severely impacted residences. Under the TSM Alternative, existing and newly constructed/under construction soundwalls at this location already provide substantial noise reduction for receptors located behind the soundwalls. Raising the soundwall to 16 feet would not provide the additional 5-decibel reduction; therefore, noise abatement for these receptors would not be feasible.

Receptors R133 through R136 represent single- and multi-family residences on the northbound side of Route 1 between Capitola Avenue and south Main Street. These receptors are shown on Sheets 13 and 14 in Appendix K. Traffic noise levels under either of the Tier I Corridor Alternatives would not approach or exceed the noise abatement criterion at Receptors R133, R134, and R136; therefore, a soundwall is not warranted for these homes. Although the noise level at the residences represented by Receptor R135 would exceed the noise abatement criterion, Soundwall S136 would not provide the required minimum 5-decibel noise reduction for these residences. Because these residences are either protected or partially protected by an existing soundwall, a barrier would not be effective in reducing traffic noise.

Receptor R137 represents the Riverview Condominiums on the southbound side of Route 1 just east of Robertson Street. This receptor is shown on Sheet 14 in Appendix K. The traffic noise level would approach the noise abatement criterion. This receptor is approximately 16 feet below the edge of Route 1 and receives some shielding from the edge of the roadway. In addition, the vertical span of the proposed southbound 41st Avenue to Bay Avenue connector road would block the noise pathway to this receptor.

HOV Lane Alternative: A soundwall would not achieve the minimum 5-decibel traffic noise reduction; therefore, abatement is not feasible for this location.

TSM Alternative: Traffic noise abatement would be feasible with 10-foot-high Soundwall S143 extending 501 feet along the shoulder of the highway.

Receptors R138 through R140, shown on Sheet 14 in Appendix K, represent single-family residences on the northbound side of Route 1, southeast of Soquel Wharf Road. Traffic noise levels under either Tier I Corridor Alternative would not exceed or approach the noise abatement criterion; therefore, a soundwall would not be warranted.

Receptor 141 represents a single-family residence on the northbound side of Route 1 to the west of Robertson Street. The traffic noise level would exceed the noise abatement criterion. This receptor is shown on Sheet 15 in Appendix K.

HOV Lane Alternative: Noise abatement would be feasible with 16-foot-high Soundwall S144 extending 151 feet along the right-of-way.

TSM Alternative: Noise abatement would be feasible with 12-foot-high Soundwall S144 extending 246 feet along the shoulder and right-of-way.

Receptors 142 and 143 represent single- and multi-family residences on the northbound side of Route 1 to the east of 41st Avenue. The traffic noise level at Receptor R142 would not approach or exceed the noise abatement criterion, and no abatement would be warranted. The traffic noise level at Receptor R143 would exceed the noise abatement criterion. Noise abatement would be feasible with 8-foot-high Soundwall S146 extending 289 feet (293 under the TSM Alternative) in length along the right-of-way.

Receptors R144 and R145 represent single-family residences on the southbound side of Route 1, west of South Rodeo Gulch Road, which are shown on Sheet 16 in Appendix K. Under the HOV Lane Alternative, future peak-hour noise levels for the frequent outdoor use areas at one single-family residence represented by Receiver R144 would exceed the noise abatement criterion of 67 dBA; however, a soundwall along the right-of-way would not provide the required minimum 5-decibel noise reduction for this residence. Because this residence is protected by an existing large commercial building, a barrier would not be effective in reducing traffic noise. At R145 (and R44 under the TSM Alternative), predicted future traffic noise levels would not approach or exceed the noise abatement criterion under either Tier I Corridor Alternative; therefore, a soundwall is not warranted.

Receptor 146A represents single-family residences on the northbound side of Route 1, west of 41st Avenue, which is shown on Sheet 15 in Appendix K. Predicted future traffic noise levels at this receptor would exceed the noise abatement criterion for the HOV Lane Alternative but would not for the TSM Alternative; therefore, a soundwall is not warranted for the TSM Alternative.

HOV Lane Alternative: Noise abatement would be feasible with 16-foot-high Soundwall S150 extending 709 feet along the shoulder of the roadway.

Receptors R146 through R148 represent single-family residences and the Good Shepherd School on the northbound side of Route 1 to the west of Rodeo Gulch. Traffic noise levels would exceed the noise abatement criterion. These receptors are shown on Sheet 16 in Appendix K.

HOV Lane Alternative: Abatement of traffic noise would be feasible with two soundwalls: 14-foot-high Soundwall S154 along the shoulder with a slightly overlapping a second Soundwall S158 ranging from 10 to 14 feet in height along the right-of-way. Together, these soundwalls would extend a total of 1,328 feet. The future peak-hour noise level for the frequent outdoor use area at three single-family residences and two frontage units of Good Shepard Catholic School represented by Receptor R147 would exceed 75 dBA; therefore, this residence would be considered severely impacted. Soundwall S158 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If

Soundwall S158 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for this severely impacted residence.

TSM Alternative: Abatement of traffic noise would be feasible with two soundwalls, 10-foot-high Soundwall S154 along the shoulder and slightly overlapping a second Soundwall S158 ranging from 10 to 12 feet in height along the right-of-way. Together, these soundwalls would extend a total of 1,346 feet. The future peak-hour noise level for the frequent outdoor use area at one single-family residence represented by Receptor R147 would exceed 75 A-weighted decibels, this residence would be considered severely impacted. If Soundwall S158 is determined to be unreasonable, providing the soundwall or building acoustic treatments would still be required for this severely impacted residence. This area has been analyzed using more up-to-date information under the Tier II Auxiliary Lane Alternative.

Receptors R149 through R151 represent single-family residences and a convalescent hospital (Pleasant Care Rehabilitation and Nursing Center) on the northbound side of Route 1, east of the Soquel Drive interchange. Predicted future traffic noise levels at the frequent outdoor use area of the convalescent hospital at Receptor R151 would not approach or exceed the noise abatement criterion under either Tier I Corridor Alternative, and no abatement would be warranted. These receptors are shown on Sheets 17 and 18 in Appendix K. Predicted future traffic noise levels at the single-family residences at Receptors R149 and R150 would exceed the noise abatement criterion under both alternatives. A 5-decibel reduction in traffic noise would be achieved at the residences with 12-foot-high Soundwall S165 extending 656 feet along the right-of-way. The future peak-hour noise level for the frequent outdoor use area at one single-family residence represented by Receptor R149 would exceed 75 A-weighted decibels, therefore, this residence would be considered severely impacted. Soundwall S165 would provide the 5-decibel reduction for this severely impacted receiver to meet the feasibility criterion. If Soundwall S165 is determined to be unreasonable, providing the soundwall or building acoustic treatment would still be required for this severely impacted residence.

This area has been analyzed using updated information for the Tier II Auxiliary Lane Alternative.

Receptors R153 through R156 represent single- and multi-family residences and a school (Harbor High School) on the southbound side of Route 1 between Soquel Avenue and La Fonda Avenue. These receptors are shown on Sheets 18 and 19 in Appendix K.

HOV Lane Alternative: The traffic noise level at Receptor R156 would not approach or exceed the noise abatement criterion, and no traffic noise abatement would be warranted for this location. The traffic noise levels at Receptors R153, R154 (Harbor High School), and R155 would exceed the noise abatement criterion. A 5-decibel reduction in traffic noise would be achieved with Soundwall S173 14 feet in height and extending 1,519 feet along the right-of-way and shoulder of the highway.

TSM Alternative: Traffic noise levels at Receptor R153, R154 and R156 (Harbor High School) from traffic lanes would not approach or exceed the noise abatement criterion and would warrant no noise abatement. The traffic noise level at Receptor R155 would exceed the noise abatement criterion. A 5-decibel reduction of traffic noise would be achieved with 12-foot-high Soundwall S173 extending 433 feet along the right-of-way.

Receptor R157 represents a single-family residence on the southbound side of Route 1, just west of La Fonda Avenue. This receptor is shown on Sheet 19 in Appendix K. The predicted future traffic noise level under either Tier I Corridor Alternative would exceed the noise abatement criterion, and it would be more than 75 A-weighted decibels, which is considered severely impacted. Noise attenuation in the form of acoustic treatment to the building shell has been provided as part of the Route 1/17 Merge Lanes Project.

Receptors R158 and R158B represent two single-family residences and four frontage units (the outdoor areas) of Santa Cruz Adult School on the southbound side of Route 1. Traffic noise levels would exceed the noise abatement criterion at these receptors. These receptors are shown on Sheet 19 in Appendix K.

HOV Lane Alternative: Feasible traffic noise abatement could be provided with Soundwall S177, 12 feet in height and extending 853 feet in length along the shoulder.

TSM Alternative: Traffic noise abatement would be feasible for two single-family residences with Soundwall S177 12 feet in height and extending 372 feet along the right-of-way.

Receptors R159 through R164 represent single-family residences and a church (Santa Cruz Community Church) on the southbound side of Route 1 between La Fonda Avenue and Morrissey Boulevard. These receptors are shown on Sheets 19 and 20 in Appendix K.

Traffic noise levels from the future predicted peak noise hour would exceed the noise abatement criterion at Receptors R159 and R160. An existing soundwall built as part of the Route 1/17 Merge Lanes Project currently provides traffic noise abatement at Receptors R159 through R164. This soundwall would be 12 feet in height located along the shoulder and right-of-way of the highway. Increasing the height of this soundwall would not provide the required minimum 5-decibel noise reduction; therefore, no new soundwall is identified for this area.

Receptors R165A and R165 represent multi- and single-family residences on the northbound side of Route 1, east of the Soquel Drive interchange. Noise levels would exceed the noise abatement criterion at these receptors.

HOV Lane Alternative: Abatement of predicted future traffic noise would be feasible with Soundwall S170 12 feet in height and extending 656 feet along the shoulder and right-of-way.

TSM Alternative: Traffic noise abatement would be feasible with Soundwall S170 ranging from 12 to 14 feet in height and extend 832 feet along the ramp shoulder.

Receptors R166 through R168 represent single-family residences on the northbound side of Route 1 between Arana Gulch and La Fonda Avenue. Noise levels at these locations would exceed the noise abatement criterion under either Tier I Corridor Alternative. No noise abatement is practical at Receptor R166 because of the complex topography and a soundwall would not provide the required minimum 5-dB noise reduction. A soundwall providing feasible traffic noise abatement for impacted Receptors R167 and R168 was constructed as part of the Highway 1 Soquel/Morrissey Auxiliary Lanes Project; therefore, no additional abatement is needed for this area.

Receptors R169 and R170 represent single-family residences on the northbound side of Route 1 between La Fonda Avenue and Morrissey Boulevard. Noise levels would exceed the noise abatement criterion under either Tier I Corridor Alternative. A soundwall providing feasible traffic noise abatement for impacted Receptors R167 and R168 was constructed as part of the Highway 1 Soquel/Morrissey Auxiliary Lanes Project; therefore, no additional abatement is needed for this area. Sheet 19 in Appendix K shows the location of these receptors.

Receptors R171 through R176A represent single-family residences on the northbound side of Route 1 between La Fonda Avenue and Pacheco Avenue. Noise levels would approach or exceed the noise abatement criterion under either Tier I Corridor Alternative. Noise abatement would be feasible with a soundwall ranging from 10 to 12 feet high and extending 2,009 feet along the right-of-way. This soundwall was built as part of the Highway 1 Soquel/Morrissey Auxiliary Lanes Project. Portions of the soundwall could be replaced in kind to its existing height, and portions would be made taller.

Receptors R178 through R182 represent single-family residences on the southbound side of Route 1 between Morrissey Boulevard and Dellview Avenue. Noise levels would not approach or exceed the noise abatement criterion under either of the Tier I build alternatives.

Receptors R183 through R187 represent single-family residences on the northbound side of Route 1 between Pacheco Avenue and Branciforte Avenue.

HOV Lane Alternative: Future peak-hour noise levels for the frequent outdoor use areas at 26 single-family residences represented by Receivers R183 through R187 would exceed the noise abatement criterion of 67 dBA; however, these receivers are protected by an existing soundwall, and increasing the height of this soundwall would not provide the required minimum 5-decibel noise reduction.

TSM Alternative: Noise levels would approach or exceed the noise abatement criterion at Receptor R184. Noise abatement is not warranted at Receptor R183 or R185 through R187 because the noise level does not approach or exceed the criterion. Noise abatement at Receptor R184 would not be feasible because an existing or newly constructed/under

construction soundwall at this location already provides substantial noise reduction for receptors located behind the soundwalls. Raising this soundwall to 16 feet would not provide the additional 5-decibel reduction; therefore, it would not be feasible.

Tier II Auxiliary Lane Alternative

Traffic volumes for the Tier II Auxiliary Lane Alternative were the same as the Tier I Corridor TSM Alternative conditions. A higher level of accuracy of the computer modeling in the Tier II traffic noise impact analysis was the result of newer, more detailed topographic information and availability of updated project engineering details.

Receivers representing frequent outdoor use areas and soundwalls that would be considered feasible and reasonable are shown on the plan drawings in Appendix K. If the cost of the soundwall is less than the cost allowance, then the soundwall would likely be considered reasonable and incorporated into the project. See the Regulatory Setting section for more information on the criteria for reasonableness and feasibility.

Receptors R144, R145, and R146A represent single-family residences on the northbound side of Route 1, west of 41st Avenue, which is shown on Sheet 15 in Appendix K. Predicted future traffic noise levels at these receptors would not exceed the noise abatement criterion for the Tier II Auxiliary Lane Alternative; therefore, a soundwall is not needed.

Receptors R146 through R148 represent single-family residences and the Good Shepherd School on the northbound side of Route 1 to the west of Rodeo Gulch. Noise levels would exceed the noise abatement criterion at frequent outdoor use areas of three single-family residences. Noise abatement would be feasible with 14-foot-high Soundwall S154 along the northbound shoulder and slightly overlapping a second Soundwall S158 ranging from 10 to 12 feet high along the right-of-way. Together, these soundwalls would extend 1,145 feet. The total cost allowance ranges from \$55,000 for a wall height of 8 feet to \$285,000 for a height of 16 feet, and the current estimated construction cost of these soundwalls ranges from \$368,000 for an 8-foot wall to \$735,000 for a 16-foot wall. These soundwalls are not considered reasonable and are not recommended for inclusion in the Tier II Auxiliary Lane Alternative.

However, the residence represented by Receptor R147 is predicted to be exposed to a traffic noise level of 75 A-weighted decibels; therefore, it is considered to be severely impacted. Where severe impacts are identified, unusual and extraordinary abatement must be considered. Although Soundwall S158 has been determined to be unreasonable based on cost, noise abatement, such as a soundwall shorter in length or acoustic treatment of the building shell, must be considered in this instance.

Receptors R149 through R151 represent single-family residences and a convalescent hospital (Pleasant Care Rehabilitation and Nursing Center) on the northbound side of Route 1, east of the Soquel Drive interchange. Predicted future traffic noise levels at the frequent outdoor use area of

the convalescent hospital at Receptor R151 would not approach or exceed the noise abatement criterion under the Tier II Auxiliary Lane Alternative, and no abatement would be warranted. Predicted future noise levels at the single-family residences at Receptors R149 and R150 would exceed the noise abatement criterion under the Tier II Auxiliary Lane Alternative. A 5-decibel reduction in traffic noise would be achieved at the residences with 12-foot-high Soundwall S165 extending 178 feet along the right-of-way. The cost allowance is \$94,000. The current estimated construction cost of the soundwall is \$314,000. This soundwall is not considered reasonable and is not recommended for inclusion in the Tier II Auxiliary Lane Alternative.

Avoidance, Minimization, and/or Noise Abatement

Tier I Corridor Alternatives

The selection of a Tier I Corridor Alternative would not result in actual construction and commitments to providing the soundwalls described above. As projects in the Tier I corridor are prioritized and programmed for funding, they will be subject to separate environmental review and additional noise analysis if warranted. Based on the impacts that have been identified in this section, the avoidance, minimization, and mitigation measures shown below are provided on a conceptual basis. These measures are subject to revision based on the changes in the setting, project design, or regulatory requirements in place when future, tiered projects undergo environmental review.

Based on the studies completed to date, Caltrans and the Federal Highway Administration identified soundwalls that meet the criteria for feasibility. The reasonableness of these soundwalls will be analyzed during Tier II environmental review as future Tier II projects proceed to implementation. There are 20 recommended soundwalls under the HOV Lane Alternative and 15 under the TSM Alternative, including two soundwalls that were constructed as part of the Highway 1 Soquel/Morrissey Auxiliary Lanes Project. Tables 2.2.7-2 and 2.2.7-3 present lists of soundwalls that meet the feasibility requirement.

Tier II Auxiliary Lane Alternative

Soundwalls are not recommended for the Tier II Auxiliary Lane Alternative because they do not meet the reasonableness criteria; however, noise abatement in the form of a short soundwall or building acoustical treatment will be considered for one house where the future predicted traffic noise level is higher than 75 A-weighted decibels. Table 2.2.7-4 presents a list of soundwalls that met the feasibility requirement for the Tier II Auxiliary Lane Alternative; however, the Noise Abatement Decision Report prepared for this project found that these soundwalls do not meet the reasonableness criteria.

**Table 2.2.7-2: Feasible Noise Barriers
(Reasonableness to be Determined for Future Tier II Projects)
Tier I Corridor HOV Lane Alternative**

Barrier	Benefited Receivers	Land Uses Represented by Receivers	Sheet(s) in Appendix K
S59	R7, R9 – R10, R12	7 single-family residences along Bonita Dr.	2, 3
S68	R25, R26, R28 – R33	6 single-family & 21 multi-family residences along Soquel Dr.	3, 4
S71	R16 – R20	27 single-family residences along Bonita Dr.	3 – 5
S74	R36	1 single-family residence along Soquel Dr.	4, 5
S85	R38	4 frontage units of Rio del Mar Club	6
S86	R40A, R41	1 single-family and 10 multi-family residences	6, 7
S87	R42-R44	1 single-family and 9 multi-family residences	6, 7
S89	R48, R49, R50	2 single-family and 2 multi-family residences and 3 undeveloped land lots	7
S90	R63 – R65	2 single-family and 5 multi-family residences	7
S93	R52 – R53A	13 multi-family residences of Loma Del Mar and Seacliff Garden Apartments	7, 8
S100	R81	12 units of the Best Western Seacliff Inn Motel	8, 9
S103	R66 – R73	52 multi-family and 11 single-family residences and 1 frontage unit along McGregory Drive	8 -10
S115	R76 – R78A	34 frontage units for New Brighton State Beach	10, 11
S106	R85 – R89,R90	14 multi-family residences, 13 mobile homes, and one single-family residence	9
S118	R92 – R101	9 multi-family and 5 single-family residences, and 23 frontage units (1 college, 1 school, 1 church, and 1 park)	10 – 12
S122	R102	6 multi-family residences	11, 12
S124	R119, R120	1 frontage unit of a Montessori school and 6 frontage units of Mt. Calvary Lutheran Church and School	12
S125	R103 – R105	14 multi-family residential units and the community pool of Capitola Knolls Apartments	12
S129	R106 – R108	8 multi-family residences of Capitola Knolls Apartments	12
S128	R122 – R125	3 single-family residences and 9 mobile homes	12, 13
S132	R126 – R129	9 single-family residences and 1 mobile home	13
S133	R110	1 single-family residence	13
S136	R130 – R132	8 single-family residences	13
S144	R141	1 single-family residence	14, 15
S146	R143	4 multi-family residences	15
S150	R146A	3 single-family residences	15
S154 & S158	R146 – R148	3 single-family residences and 2 frontage units of Good Shepherd Catholic School	16
S165	R149 – R150	2 single-family residences	17, 18
S170	R165A	1 single-family and 5 multi-family residences	18
S173	R153 – R155	1 single-family residence, 3 multi-family residences and 4 frontage units of Harbor High School	18, 19
S177	R158, R158A	2 single-family residences, 4 frontage units of Santa Cruz Adult School	19

**Table 2.2.7-3: Feasible Noise Barriers
(Reasonableness to be Determined for Future Tier II Projects)
Tier I Corridor TSM Alternative**

Barrier	Benefited Receivers	Land Uses Represented by Receivers	Sheet(s) in Appendix K
S68	R25, R26, R29 – R33	3 single-family and 21 multi-family residences along Soquel Dr.	3, 4
S71	R17, R18, R20	20 single-family residences along Bonita Dr.	3 – 5
S74	R36	1 single-family residence along Soquel Dr.	4, 5
S85	R38	4 frontage units of Rio del Mar Club	6
S86	R40 – R41	2 single-family and 10 multi-family residences	6, 7
S87	R42, R44-R45A	3 single-family and 9 multi-family residences	6, 7
S89	R49	2 single-family and 2 multi-family residences	7
S90	R62 – R65	4 single-family and 5 multi-family residences	7
S93	R52	4 multi-family residences	7, 8
S100	R81	12 units of the Best Western Seacliff Inn Motel	8, 9
S106	R87 – R91	1 single-family and 14 multi-family residences, and 6 mobile homes	9
S111	R66 – R73, R75 – R78A	11 single-family and 56 multi-family residences, and 35 frontage units (Wilderness Park and a pool)	8 –12
S118	R93 – R101	9 multi-family and 6 single-family residences, and 23 frontage units	10 – 12
S122	R102	6 multi-family residence	11, 12
S124	R119	1 frontage unit of a Montessori school and 6 frontage units of Mt. Calvary Lutheran Church and School	12
S125	R103 – R105	14 multi-family residential units and the community pool of Capitola Knolls Apartments	12
S129	R106 – R107	12 multi-family residences	12
S128	R123 – R125	2 single-family residences and 9 mobile homes	12, 13
S132	R126 – R129	9 single-family residences and 1 mobile home	13
S133	R110	1 single-family residence	13
S143	R137	3 multi-family residences	14
S144	R141	1 single-family residence	14, 15
S146	R143	4 multi-family residences	15
S154 & S158	R146 – R148	3 single-family residences and 2 frontage units of Good Shepherd Catholic School	16
S165	R149 – R150	2 single-family residences	17, 18
S170	R165A, R165	3 single-family and 5 multi-family residences	18
S173	R155	1 single-family residence	18, 19
S177	R158	2 single-family residences	19

**Table 2.2.7-4: Summary of Noise Barrier Key Information –
Tier II Auxiliary Lane Alternative**

Barrier	Height Evaluated (feet)	Acoustically Feasible?	Number of Benefited Receivers	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance?
S154 & S158	8	Yes	1	\$55,000	\$368,000	No
	10	Yes	1	\$55,000	\$459,000	No
	12	Yes	2	\$114,000	\$551,000	No
	14	Yes	5	\$285,000	\$643,000	No
	16	Yes	5	\$285,000	\$735,000	No
S165	8	Yes	1	\$45,000	\$210,000	No
	10	Yes	2	\$90,000	\$262,000	No
	12	Yes	2	\$94,000	\$314,000	No
	14	Yes	2	\$94,000	\$367,000	No
	16	Yes	2	\$94,000	\$419,000	No