

2.14 Noise

2.14.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

2.14.1.1 California Environmental Quality Act

CEQA 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 CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless those measures are not feasible. The rest of this section will focus on the NEPA/Title 23 Part 772 of the Code of Federal Regulations (23 CFR 772) noise analysis; please see Chapter 3 of this document for further information on noise analysis under CEQA.

2.14.1.2 National Environmental Policy Act and 23 CFR 772

For highway transportation projects with Federal Highway Administration (FHWA) involvement (and California Department of Transportation [Caltrans], as assigned), the Federal-Aid Highway Act of 1970 and its implementing regulations (23 CFR 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 include noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 A-weighted decibels [dBA]) is lower than the NAC for commercial areas (72 dBA). Table 2.14.1 lists the noise abatement criteria for use in the NEPA/23 CFR 772 analysis.

Table 2.14.2 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise levels discussed in this section with common activities.

According to Caltrans' *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects* (April 2020), a noise impact occurs when the predicted future noise level with the project substantially exceeds the existing noise level (defined

Table 2.14.1: Noise Abatement Criteria

| Activity Category | NAC, Hourly A-Weighted Noise Level, dBA $L_{eq}(h)$ | Description of Activity Category |
|-------------------|---|--|
| 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 ¹ | 67 (Exterior) | Residential. |
| C ¹ | 67 (Exterior) | Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings. |
| D | 52 (Interior) | Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. |
| E | 72 (Exterior) | Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in Categories A–D or F. |
| F | No NAC—reporting only | Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical, etc.), and warehousing. |
| G | No NAC—reporting only | Undeveloped lands that are not permitted. |

¹ Includes undeveloped lands permitted for this activity category.

dBA = A-weighted decibels

$L_{eq}(h)$ = 1-hour A-weighted equivalent continuous noise level

NAC = Noise Abatement Criteria

NEPA = National Environmental Policy Act

Table 2.14.2: Noise Levels of Common Activities

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|--|-------------------|--|
| Jet Fly-over at 300m (1000 ft) | 110 | Rock Band |
| Gas Lawn Mower at 1 m (3 ft) | 100 | |
| Diesel Truck at 15 m (50 ft), at 80 km (50 mph) | 90 | Food Blender at 1 m (3 ft) |
| Noisy Urban Area, Daytime | 80 | Garbage Disposal at 1 m (3 ft) |
| Gas Lawn Mower, 30 m (100 ft) Commercial Area | 70 | Vacuum Cleaner at 3 m (10 ft) Normal Speech at 1 m (3 ft) |
| Heavy Traffic at 90 m (300 ft) | 60 | Large Business Office |
| Quiet Urban Daytime | 50 | Dishwasher Next Room |
| Quiet Urban Nighttime Quiet Suburban Nighttime | 40 | Theater, Large Conference Room (Background) |
| Quiet Rural Nighttime | 30 | Library |
| | 20 | Bedroom at Night, Concert Hall (Background) |
| | 10 | Broadcast/Recording Studio |
| Lowest Threshold of Human Hearing | 0 | Lowest Threshold of Human Hearing |

dBA = A-weighted decibel(s)
ft = foot/feet
m = meter(s)
mph = miles per hour

as a 12 dBA or more) or when the future noise level with the project approaches or exceeds the NAC. A noise level is considered to approach the NAC if it is within 1 dBA of the NAC.

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. If during final design the Project has substantially changed, noise barriers might not be provided. The final decision regarding the construction of recommended noise barriers will be made after the polling of benefited receptors is complete and before completion of the final design package. This document discusses noise abatement measures that would likely be incorporated in the Project.

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 consideration. Noise abatement must be predicted to reduce noise by at least 5 decibels (dB) at an impacted receptor to be considered feasible from an acoustical perspective. It must also be possible to design and construct the noise abatement measure for it to be considered feasible. Factors that affect the design and constructability of noise abatement include, but are not limited to, safety, barrier height, topography, drainage, access requirements for driveways, presence of local cross streets, underground utilities, other noise sources in the area, and maintenance of the abatement measure. The overall reasonableness of noise abatement is determined by the following three factors: (1) the noise reduction design goal of 7 dB at one or more impacted receptors; (2) the cost of noise abatement; and (3) the viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

2.14.2 Affected Environment

This section is based on the *Noise Study Report* (NSR) (May 2023) and the *Noise Abatement Decision Report* (NADR) (May 2023) prepared for the proposed Project. The NSR followed the Caltrans May 2011 *Traffic Noise Analysis Protocol*.

2.14.2.1 Surrounding Land Use and Receptors

A detailed field investigation was conducted for the development of the NSR to identify land uses that could be subject to traffic and construction noise impacts from the proposed Project. The land uses that were identified from this investigation were divided into the following categories below:

- Single- and Multifamily Residences: Activity Category B
- Recreation, Schools, and Day-Care Facilities: Activity Category C and D
- Commercial Retail Uses: Activity Category E
- Developed Areas: Activity Category F
- Undeveloped Areas: Activity Category G

Noise abatement is typically considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, the noise impact analysis focuses primarily on locations with defined outdoor activity areas (or frequent human use areas), such as residential backyards, common use areas at single- and multifamily residences, parks, schools, outdoor dining areas of restaurants, and places of worship. For the purposes of the proposed Project's noise impact analysis, the Project Area is divided into 3 segments and 28 separate Noise Study Areas (NSAs) and are summarized in Table 2.14.3, below. The NSAs are shown on Figure J-1 in Appendix J of this Environmental Impact Report/Environmental Assessment (EIR/EA).

Table 2.14.3: Summary of Noise Study Areas

| NSA No. | Figure J-1 Sheet No. | Location | Number of Receivers | Receptor Names | Surrounding Land Uses |
|-------------------|----------------------|---|---------------------|---|--|
| Segment #1 | | | | | |
| 1 | Sheets 1–2 | Redhill Avenue to Newport Boulevard – NB Side | 22 | <ul style="list-style-type: none"> M-S1A-A-NB1 through M-S1A-A-NB22 FM1 | <ul style="list-style-type: none"> Residential (Activity Category B) High School and Day-care Facility – Outdoor Use (Activity Category C) Commercial (Activity Category E) |
| 2 | Sheets 1–2 | Redhill Avenue to Newport Boulevard – SB Side | 49 | <ul style="list-style-type: none"> M-S1A-B-SB1 through M-S1A-B-SB49 FM2 and LT-1 | <ul style="list-style-type: none"> Residential (Activity Category C) Commercial (Activity Category B) |
| 3 | Sheet 3 | Newport Boulevard to SR-55 – NB Side | 41 | <ul style="list-style-type: none"> M-S1A-C-NB1 through M-S1A-C-NB41 FM3 and FM5 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) |
| 4 | Sheets 2–3 | Newport Boulevard to SR-55 – SB Side | 57 | <ul style="list-style-type: none"> M-S1A-D-SB1 through M-S1AD-SB57 FM4 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) |
| 5 | Sheets 4–7 | SR-55 to Grand Avenue – NB Side | 95 | <ul style="list-style-type: none"> M-S1B-NB1 through M-S1B-NB95 FM7, FM9 and LT-3 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) Commercial (Activity Category E) |
| 6 | Sheets 4–7 | SR-55 to Grand Avenue – SB Side | 95 | <ul style="list-style-type: none"> M-S1B-SB1 through M-S1B-SB96 FM6, FM8 and LT-2 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) Commercial (Activity Category E) |
| 7 | Sheets 7–9 | Grand Avenue to 17 th Street – NB Side | 58 | <ul style="list-style-type: none"> M-S1C-NB1 through M-S1C-NB58 FM11 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) Commercial (Activity Category E) Commercial (Activity Category F) |
| 8 | Sheets 8–9 | Grand Avenue to 17 th Street – SB Side | 15 | <ul style="list-style-type: none"> M-S1C-SB1 through M-S1C-SB15 FM10 | <ul style="list-style-type: none"> Residential (Activity Category B) Commercial (Activity Category E) |
| 9 | Sheet 9–10 | 17 th Street to Main Street – NB Side | 103 | <ul style="list-style-type: none"> M-S1D-NB1 through M-S1D-NB103 LT-4 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 10 | Sheets 9–10 | 17 th Street to Main Street – SB Side | 63 | <ul style="list-style-type: none"> M-S1D-SB1 through M-S1D-SB633 FM13 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 11 | Sheets 11–13 | Main Street to SR-57 Interchange – NB Side | 7 | <ul style="list-style-type: none"> M-S1E-NB1 through M-S1E-NB7 | <ul style="list-style-type: none"> Residential (Activity Category B) Commercial (Activity Category E) |
| 12 | Sheets 14–16 | Main Street to SR-57 Interchange – SB Side | 111 | <ul style="list-style-type: none"> M-S1E-SB1 through M-S1D-SB111 FM14, FM 15 and LT-5 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| Segment #2 | | | | | |
| 13 | Sheets 17–24 | SR-57 Interchange to Katella Avenue – NB Side | 5 | <ul style="list-style-type: none"> M-S2A-NB1 through M-S2A-NB5FM16 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor Use (Activity Category C) Commercial (Activity Category E) |
| 14 | Sheets 17–25 | SR-57 Interchange to Katella Avenue – SB Side | 51 | <ul style="list-style-type: none"> M-S2A-SB1 through M-S2A-SB51 FM17, FM18 and LT-6 | <ul style="list-style-type: none"> Residential (Activity Category B) Commercial (Activity Category C) Commercial (Activity Category E) Medical Center (UCI Medical Center) Memorial Park and Mortuary (Melrose Abbey) Public Services (Orange County Court, Juvenile Hall, and Justice Center) |

Table 2.14.3: Summary of Noise Study Areas

| NSA No. | Figure J-1 Sheet No. | Location | Number of Receivers | Receptor Names | Surrounding Land Uses |
|-------------------|----------------------|--|---------------------|--|---|
| 15 | Sheets 25–28 | Katella Avenue to Harbor Boulevard – NB Side | 53 | <ul style="list-style-type: none"> M-S2B-NB24 through M- S2B-NB76 FM20 and LT-7 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 16 | Sheets 25–28 | Katella Avenue to Harbor Boulevard – SB Side | 6 | <ul style="list-style-type: none"> M-S2B-SB52 through M- S2B-SB57 FM19 | <ul style="list-style-type: none"> Residential (Activity Category B) Hotel Outdoor Activity Areas (Activity Category E) |
| 17 | Sheets 28–31 | Harbor Boulevard to Lincoln Avenue – NB Side | 84 | <ul style="list-style-type: none"> M-S2C-NB76 through M-S2C-NB159 FM21, FM23 and LT-8 | <ul style="list-style-type: none"> Residential (Activity Category B) Park (Activity Category C) Hotel Pool (Activity Category E) |
| 18 | Sheets 28–31 | Harbor Boulevard to Lincoln Avenue – SB Side | 45 | <ul style="list-style-type: none"> M-S2C-SB58 through M-S2C-SB102 FM22 and FM24 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor use (Activity Category C) |
| 19 | Sheets 31–36 | Lincoln Avenue to La Palma Avenue – NB Side | 83 | <ul style="list-style-type: none"> M-S2D-NB161 through M-S2D-NB243 FM25, FM26, FM27 and LT-9 | <ul style="list-style-type: none"> Residential and Apartment Outdoor Areas (Activity Category B) |
| 20 | Sheets 32–36 | Lincoln Avenue to La Palma Avenue – SB Side | 15 | <ul style="list-style-type: none"> M-S2D-SB104 through M-S2D-SB118 FM28 | <ul style="list-style-type: none"> Residential (Activity Category B) Outdoor use (Activity Category C) |
| 21 | Sheets 36–39 | La Palma Avenue to SR-91 Interchange – NB Side | 68 | <ul style="list-style-type: none"> M-S2E-NB244 through M-S2E-NB311 FM29, FM30 and LT-10 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 22 | Sheets 37–39 | La Palma Avenue to SR-91 Interchange – SB Side | 6 | <ul style="list-style-type: none"> M-S2E-SB117 through M-S2E-SB122 FM31 | <ul style="list-style-type: none"> Residential (Activity Category B) Commercial (Activity Category E) |
| Segment #3 | | | | | |
| 23 | Sheets 40–41 | SR-91 to Stanton Avenue – NB Side | 38 | <ul style="list-style-type: none"> M-S3A-NB1 through M-S3A-NB-38 FM32 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 24 | Sheets 40–41 | SR-91 to Stanton Avenue – SB Side | 26 | <ul style="list-style-type: none"> M-S3B-SB1 through M-S3B-SB-26 FM33 | <ul style="list-style-type: none"> Residential (Activity Category B) |
| 25 | Sheet 42 | Stanton Avenue to Beach Boulevard – NB Side | 17 | <ul style="list-style-type: none"> M-S3C-NB1 through M-S3C-NB17 FM35 | <ul style="list-style-type: none"> Residential (Activity Category B) Commercial (Activity Category E) |
| 26 | Sheets 41–43 | Stanton Avenue to Beach Boulevard – SB Side | 16 | <ul style="list-style-type: none"> M-S3D-SB1 through M-S3D-SB16 FM33, FM34 | |
| 27 | Sheets 44–45 | Beach Boulevard to Artesia Boulevard – NB Side | 0 | None. No noise sensitive land uses were identified | |
| 28 | Sheets 44–45 | Beach Boulevard to Artesia Boulevard – SB Side | 29 | <ul style="list-style-type: none"> M-S3E-SB17 through M-S3E-SB45 FM36, LT-11 | <ul style="list-style-type: none"> Residential (Activity Category B) Parks (Activity Category E) |

Source: Noise Study Report (May 2023)
 NB = northbound
 NSA = Noise Study Area
 SB = southbound
 SR = State Route
 UCI = University of California, Irvine

2.14.2.2 Existing Noise Level Measurements

The existing noise environment in the Study Area is described below based on short- and long-term noise monitoring that was conducted at representative receptor locations.

Short-Term Monitoring

The primary source of noise in the Study Area is traffic on Interstate (I) 5. Short-term (15-minute) noise measurements were conducted to document existing noise levels at 36 representative receptor locations in the Study Area. Table 2.14.4 contains the results of the short-term noise level measurements and a description of the noise-monitoring locations (Field Measurement Areas, FMA). These short-term noise measurements were used to calibrate and validate the noise models and to predict the noise levels at all identified receptors in the Study Area. The short-term monitoring locations are shown on Figure J-1, provided in Appendix J of this EIR/EA.

Long-Term Monitoring

Long-term traffic noise level measurements (LT, 24-hour periods) were conducted to identify variations in sound levels throughout the day and document the peak traffic noise hour within that 24-hour period. Long-term ambient noise monitoring was conducted at 11 representative locations in the Study Area. Table 2.14.5 shows the long-term monitoring locations and results. All long-term noise monitoring locations are shown on Figure J-1, provided in Appendix J of this EIR/EA.

2.14.2.3 Existing Noise Levels

The traffic volume counts and vehicle speeds measured during the ambient noise monitoring along with existing roadway conditions were used to validate the noise models. Level of Service (LOS) D traffic volumes were used to model existing traffic noise. Currently, of the 1,742 modeled receptor locations, 277 receptors approach or exceed the NAC. Figure J-1 in Appendix J of this document shows the locations of the modeled receptors.

2.14.3 Environmental Consequences

A noise analysis is required for all Type 1 projects. Alternative 2 does not meet the criteria for a Type 1 project since it does not have any changes in the physical footprint or changes in traffic capacity. Alternatives 3 and 4 are considered Type 1 projects because they are both federal-aid highway projects that would add traffic capacity to existing I-5. Therefore, operational noise impacts for Alternatives 3 and 4 are discussed below. Construction impacts for all Build Alternatives are discussed below.

Table 2.14.4: Short-Term Ambient Noise Monitoring Results

| Site No. ¹ | Address | Noise Study Area | Land Use | Activity Category and NAC | Meter Location | Measurement Dates | Start Time | Measured L _{eq(h)} (dBA) |
|-----------------------|---|------------------|------------------|---------------------------|---------------------------------|-------------------|------------|-----------------------------------|
| FM1 | 1361 El Camino Real, Tustin, CA 92780 | 1 | MFR | B (67) | Sidewalk | 11/30/2022 | 10:20 a.m. | 66.1 |
| FM2 | 14011 Charloma Dr., Tustin, CA 92780 | 2 | SFR | B (67) | Sidewalk in front of house | 11/30/2022 | 10:50 a.m. | 63.2 |
| FM3 | 1102 Edgeton Ct., Tustin, CA 92780 | 3 | Condo | B (67) | Sidewalk in front of condo unit | 11/30/2022 | 11:25 a.m. | 66.4 |
| FM4 | 17222 Nisson Rd., Tustin, CA 92780 | 4 | MFR | B (67) | Sidewalk in front of complex | 11/30/2022 | 11:55 a.m. | 58.4 |
| FM5 | 600 W. 6 th St., Tustin, CA 92780 | 3 | Place of Worship | C (67) | Sidewalk adjacent to property | 11/30/2022 | 12:20 p.m. | 68.4 |
| FM6 | 125 E. Coranado Ln., Tustin, CA 92780 | 6 | Mobile Homes | B (67) | In front of mobile home | 11/29/2022 | 2:15 p.m. | 60.2 |
| FM7 | 16882 Stoneglass, Tustin, CA 92780 | 5 | Apartment | B (67) | Sidewalk in front of complex | 11/29/2022 | 1:55 p.m. | 63.5 |
| FM8 | 621 Patricia Ln., Santa Ana, CA 92701 | 6 | Park | C (67) | Middle of park | 11/29/2022 | 12:15 p.m. | 64.8 |
| FM9 | 1541 S. Stafford St., Santa Ana, CA 92701 | 5 | SFR | B (67) | Sidewalk in front of house | 11/29/2022 | 11:35 a.m. | 65.5 |
| FM10 | 1329 N. Custer St., Santa Ana, CA 92701 | 8 | SFR | B (67) | Sidewalk in front of house | 11/29/2022 | 11:00 a.m. | 66.7 |
| FM11 | 1546 N. Fairmont St., Santa Ana, CA 92701 | 7 | SFR | B (67) | Sidewalk in front of house | 11/29/2022 | 10:30 a.m. | 65.9 |
| FM12 | 306 22 nd St., Santa Ana, CA 92706 | 9 | SFR | B (67) | Sidewalk in front of house | 11/29/2022 | 10:00 a.m. | 63.3 |
| FM13 | 221 20 th St., Santa Ana, CA 92706 | 10 | SFR/MFR | B (67) | Sidewalk in front of house | 11/18/2022 | 1:52 p.m. | 64.5 |
| FM14 | 2357 N. Riverside Dr., Santa Ana, CA 92706 | 12 | SFR | B (67) | Sidewalk in front of house | 11/18/2022 | 1:10 p.m. | 58.6 |
| FM15 | 715 W. Pepper Tree Ln., Santa Ana, CA 92706 | 12 | SFR | B (67) | Sidewalk in front of house | 11/18/2022 | 10:55 a.m. | 62.3 |

Table 2.14.4: Short-Term Ambient Noise Monitoring Results

| Site No. ¹ | Address | Noise Study Area | Land Use | Activity Category and NAC | Meter Location | Measurement Dates | Start Time | Measured L _{eq(h)} (dBA) |
|-----------------------|--|------------------|-----------------|---------------------------|----------------------------------|-------------------|------------|-----------------------------------|
| FM16 | 3099 W. Chapman Ave., Orange, CA 92868 | 13 | MFR | B (67) | Sidewalk in front of pool | 11/18/2022 | 12:15 p.m. | 65.0 |
| FM17 | 2303 S. Manchester Ave. Anaheim, CA 92802 | 14 | Cemetery | C (67) | In front of church building | 11/17/2022 | 2:30 p.m. | 61.3 |
| FM18 | 1835 S. Manchester Ave., Anaheim, CA 92802 | 14 | Mobile Homes | B (67) | Adjacent to mobile home | 11/17/2022 | 2:00 p.m. | 58.0 |
| FM19 | 1441 S. Manchester Ave., Anaheim, CA 92802 | 16 | Hotel | E (72) | Sidewalk in front of building | 11/17/2022 | 12:20 p.m. | 74.1 |
| FM20 | 412 W. Guinida Ln., Anaheim, CA 92805 | 15 | MFR | B (67) | Sidewalk in front of building | 11/17/2022 | 12:00 p.m. | 66.8 |
| FM21 | 837 W. Cottonwood Cir., Anaheim, CA 92805 | 17 | Park | C (67) | Middle of park | 11/17/2022 | 11:10 a.m. | 66.4 |
| FM22 | 1106 W. South St., Anaheim, CA 92802 | 18 | SFR | B (67) | Sidewalk in front of house | 11/17/2022 | 10:45 a.m. | 67.5 |
| FM23 | 1136 W. Fay Ln., Anaheim, CA 92805 | 17 | MFR | B (67) | Sidewalk in front of building | 11/17/2022 | 10:15 a.m. | 61.1 |
| FM24 | 1280 W. Santa Ana St., Anaheim, CA 92802 | 18 | Park | C (67) | Middle of park | 11/15/2022 | 2:15 p.m. | 62.9 |
| FM25 | 216 N. Wilshire Ave., Anaheim, CA 92801 | 19 | SFR | B (67) | Sidewalk in front of building | 11/15/2022 | 1:40 p.m. | 69.0 |
| FM26 | 1860 W. Crescent Ave., Anaheim, CA 92801 | 19 | MFR | B (67) | Sidewalk in front of building | 11/15/2022 | 12:40 p.m. | 63.2 |
| FM27 | 2144 Fir Ave., Anaheim, CA 92801 | 19 | SFR | B (67) | Sidewalk in front of house | 11/15/2022 | 11:35 a.m. | 61.6 |
| FM28 | 1008 Monterey St., Anaheim, CA 92801 | 20 | SFR | B (67) | Sidewalk in front of house | 11/15/2022 | 10:20 a.m. | 61.1 |
| FM29 | 1190 Ventura St., Anaheim, CA 92801 | 21 | SFR | B (67) | Sidewalk in front of house | 11/15/2022 | 9:50 a.m. | 65.3 |

Table 2.14.4: Short-Term Ambient Noise Monitoring Results

| Site No. ¹ | Address | Noise Study Area | Land Use | Activity Category and NAC | Meter Location | Measurement Dates | Start Time | Measured L _{eq(h)} (dBA) |
|-----------------------|--|------------------|----------|---------------------------|----------------------------------|-------------------|------------|-----------------------------------|
| FM30 | 2533 Avondale Pl., Anaheim, CA 92801 | 21 | MFR | B (67) | Sidewalk in front of house | 11/15/2022 | 9:20 a.m. | 64.2 |
| FM31 | 1437 N. Wildwood Ln., Anaheim, CA 92801 | 22 | MFR | B (67) | Sidewalk in front of building | 10/26/2022 | 2:00 p.m. | 60.4 |
| FM32 | 6918 Dale St., Buena Park, CA 90621 | 23 | MFR | B (67) | Gate in front of building | 10/26/2022 | 12:30 p.m. | 71.2 |
| FM33 | 8161 Utah Ave., Buena Park, CA 90621 | 24 | SFR | B (67) | Sidewalk in front of house | 10/26/2022 | 12:00 a.m. | 56.7 |
| FM34 | 7942 Pinchot Ct., Buena Park, CA 90621 | 26 | MFR | B (67) | Sidewalk in front of building | 10/26/2022 | 11:30 a.m. | 59.9 |
| FM35 | 6410 Homewood Ave., Buena Park, CA 90621 | 25 | SFR | B (67) | Sidewalk in front of house | 10/26/2022 | 10:45 a.m. | 62.1 |
| FM36 | 6481 Fullerton Ave., Buena Park, CA 90621 | 28 | SFR | B (67) | Sidewalk in front of house | 10/26/2022 | 10:15 a.m. | 56.6 |

Source: *Noise Study Report* (May 2023)

¹ See Figure J-1 for the measurement location.

Comm = commercial

dBA = A-weighted decibels

L_{eq}(h) = 1-hour equivalent continuous noise level

MFR = multifamily residential

NAC = Noise Abatement Criteria

Rec = recreational

SFR = single-family residential

Table 2.14.5: Long-Term 24-Hour Noise Level Measurement Results

| Site No. ¹ | Address | Area | Land Use ² | Activity Category and (NAC) | Meter Location | Measurement Dates | Start Time | Duration (hours) | Measured Worst-Hour L _{eq(h)} (dBA) |
|-----------------------|---|------|-----------------------|-----------------------------|-----------------------------------|-------------------------|------------|------------------|--|
| LT-1 | 14082 Del Amo Dr., Tustin, CA 92780 | 2 | Residential | B (67) | Front yard along sidewalk | 12/14/2022–12/15/2022 | 11:00 | 24 | 67.8 |
| LT-2 | 102 Portola Ln., Tustin, CA 92780 | 6 | Residential | B (67) | Front of mobile home | 12/14/2022–12/15/2022 | 11:00 | 24 | 63.5 |
| LT-3 | 812 Concord St., Santa Ana, CA 92701 | 5 | Residential | B (67) | Front yard along sidewalk | 12/14/2022–12/15/2022 | 10:00 | 24 | 69.0 |
| LT-4 | 2211 N. Spurgeon St., Santa Ana, CA 92706 | 9 | Residential | B (67) | Front yard along sidewalk | 12/14/2022–12/15/2022 | 11:00 | 24 | 67.2 |
| LT-5 | 502 Memory Ln., Santa Ana, CA 92706 | 12 | Residential | B (67) | Front yard on light pole | 12/14/2022–12/15/2022 | 11:00 | 24 | 75.2 |
| LT-6 | 2414 Tapestry Wy., Anaheim, CA 92802 | 14 | MFR | B (67) | Front yard on tree. | 12/07/2022–12/08/2022 | 11:00 | 24 | 66.8 |
| LT-7 | 109 S. Dickel St., Anaheim, CA 92805 | 15 | Residential | B (67) | Front of mobile home along fence | 12/07/2022–12/08/2022 | 11:00 | 24 | 68.9 |
| LT-8 | 548 S. West St., Anaheim, CA 92802 | 17 | Residential | B (67) | Empty lot adjacent to SFR | 11/17/2022 – 11/18/2022 | 9:00 | 24 | 66.6 |
| LT-9 | 2048 W. Greenleaf Ave., Anaheim, CA 92801 | 19 | MFR | B (67) | Front yard in tree along sidewalk | 12/07/2022–12/08/2022 | 10:00 | 24 | 72.9 |
| LT-10 | 1300 N. Ferndale St. | 21 | Residential | B (67) | Front yard in tree along sidewalk | 12/07/2022–12/08/2022 | 11:00 | 24 | 68.5 |
| LT-11 | 7501 8 th St. Buena Park, CA 90621 | 28 | Park | C (67) | Tree in park | 12/07/2022–12/08/2022 | 11:00 | 24 | 68.9 |

Source: *Noise Study Report* (May 2023)

¹ See Figure 1 and 2 in Appendix C for the measurement location.

² Comm = commercial; MFR = multifamily residential; Rec = recreational; SFR = single-family residential

2.14.3.1 Temporary Impacts

Build Alternatives (Alternatives 2, 3, and 4)

During the construction phases of the Build Alternatives, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction (for Alternative 2, this includes the areas around the proposed park-and-ride facilities only). Construction noise varies depending on the construction process, type, and condition of equipment used and the layout of the construction site. Table 2.14.6 summarizes noise levels produced by construction equipment commonly used on roadway construction projects. Equipment involved in construction is expected to generate noise levels ranging from 80 to 89 dBA at a distance of 50 feet. Noise produced by construction equipment would diminish the farther away from the construction site that receptor is located.

Table 2.14.6: Typical Construction Equipment Noise Levels

| Equipment | Maximum Noise Level (dBA at 50 feet) |
|-----------------|---|
| Scrapers | 89 |
| Bulldozers | 85 |
| Heavy Trucks | 88 |
| Backhoe | 80 |
| Pneumatic Tools | 85 |
| Concrete Pump | 82 |

Source: Federal Highway Administration, *Roadway Construction Noise Handbook* (January 2006).
dBA = A-weighted decibels

Table 2.14.6 lists typical construction equipment noise levels (maximum instantaneous noise level [L_{max}]) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor.

Temporary construction noise impacts related to the Build Alternatives would be unavoidable to areas immediately adjacent to the Project Area. Project Feature PF-N-1 requires compliance with Caltrans Standard Specifications Section 14-8.02 (2018) and would address construction noise impacts on sensitive land uses adjacent to the Project Area. The noise level from the contractor's operations between the hours of 9:00 p.m. and 6:00 a.m. shall not exceed 86 dBA L_{max} at a distance of 50 feet.

PF-N-1 The control of noise from construction activities will conform to the California Department of Transportation (Caltrans) Standard Specifications, Section 14-8.02, "Noise Control." The nighttime noise level from the Contractor's operations, between the hours of 9:00 p.m. and

6:00 a.m., will not exceed 86 A-weighted decibels (dBA) 1-hour A-weighted equivalent continuous sound level ($L_{eq}(h)$) at a distance of 50 feet. In addition, the Contractor would equip all internal combustion engines with a manufacturer-recommended muffler and would not operate any internal combustion engine on the job site without the appropriate muffler.

No Build Alternative (Alternative 1)

The No Build Alternative would not result in the construction of improvements within the Project Area as proposed under the Build Alternatives and, therefore, would not result in temporary noise effects.

2.14.3.2 Permanent Impacts

Potential long-term noise impacts associated with the Build Alternatives are solely from traffic noise. The future worst-case traffic noise impacts at frequent outdoor human use areas within the Study Area were modeled for the No Build Alternative and the Build Alternatives to determine appropriate noise abatement measures. For purposes of this analysis, Alternative 2 was assumed to have the same results as the No Build Alternative as it would maintain the existing highway lane configuration and not increase the highway capacity.

Build Alternatives (Alternatives 3 and 4)

Future traffic noise impacts are considered to occur at receptor locations where predicted design-year noise levels approach or exceed the NAC for the applicable activity category and/or experience a substantial noise increase of 12 dBA over their corresponding existing noise levels. Tables J-1 through J-4 in Appendix J of this EIR/EA show the traffic noise level results for Existing, Future No Build, Alternative 3, and Alternative 4. It should be noted that the Project Area has been divided into three segments since the design for Alternatives 3 and 4 are the same throughout much of the corridor. Segment 1 (Table J-1) is on I-5 from Red Hill Avenue to State Route (SR) 57, where Alternatives 3 and 4 have the same design. Segment 2 (Table J-2) is on I-5 from SR-57 to SR-91, where Alternatives 3 and 4 have unique designs, with Alternative 3 converting the existing high-occupancy vehicle (HOV) lane to an express lane (EL) and Alternative 4 converting the existing HOV lane to an EL but also providing one additional EL in each direction. Segment 3 (Table J-3) is on I-5 from SR-91 to the Orange County/Los Angeles (OC/LA) County line, where Alternatives 3 and 4 have the same design.

Traffic noise impacts occur when either of the following takes place: (1) if the traffic noise level at a sensitive receptor location is predicted to “approach (within 1 dBA) or exceed” the NAC, or (2) if the predicted traffic noise level is substantially higher (12 dB) than its corresponding modeled existing noise level at the sensitive receptor locations analyzed. When traffic noise impacts occur, noise abatement measures must be considered.

Of the 1,742 modeled receptors, 304 receptors under Alternative 3 and 304 receptors under Alternative 4 would approach or exceed the NAC. Of the 304 impacted receptors under Alternative 3 and 304 impacted receptors under Alternative 4, none of the receptors would experience a substantial noise increase (12 dB increase in the Design Year [2055] condition from the Existing condition). Discussion of the receptors that approach or exceed the NAC are provided below by segment.

Alternatives 3 and 4—Segment 1 (Red Hill Avenue to SR-57)

Alternatives 3 and 4 are discussed together in this subsection since there is no difference in the design between these two alternatives in segment 1 from Red Hill Avenue to SR-57. The following receptor locations would be or would continue to be exposed to noise levels that approach or exceed the NAC under Alternatives 3 and 4.

- **NSA 3 (M-S1A-C-NB1 through M-S1A-C-NB12, M-S1A-C-NB20, and M-S1A-C-NB25):** These receptors represent second-floor balconies of an apartment/condominium complex located along Chelsea Way and South B Street in Tustin. Currently, an existing 18-foot-high private wall (EPW) is located along the ROW/property boundary. One new noise barrier (Noise Barrier [NB] Seg1A-C-NB1) located along the EOS and increasing the height of two existing noise barriers (NB Seg1A-C-NB2A [existing sound wall (ESW)-5] and NB Seg1A-C-NB2B [ESW-6]) were modeled along the edge of the shoulder and ROW. (Note: raising the heights of the existing barrier did not meet the feasible criteria)
- **NSA 5 (M-S1B-NB1, M-S1B-NB4 through M-S1B-NB6, M-S1B-NB14 through M-S1B-NB24, M-S1B-NB26, M-S1B-NB27, M-S1B-NB34, M-S1B-NB36, M-S1B-NB38, M-SB1-NB40, and M-SB1B-NB41):** These receptors represent an apartment/condominium complex, an outdoor school area, and single-family residential units located along Main Street and SR-55 in Tustin. Currently, three existing noise barriers are located along the shoulder and northbound I-5 ROW. ESW-9 is a 10-foot-high noise barrier, ESW-10 is a 12-foot-high noise barrier, and ESW-11 is a 10-foot-high noise barrier. One new noise barrier (NB Seg1B-NB2), and increasing the height of three noise barriers (NB Seg1B-NB1 [ESW-9], NB Seg1B-NB3 [ESW-10] and NB

Seg1B-NB4 [ESW-11]) were modeled. NB Seg1B-NB2 was modeled along the shoulder of northbound I-5, NB Seg1B-NB1 (ESW-9) was modeled along the shoulder of SR-55 to the I-5 flyover ramp, and NB Seg1B-NB3 (ESW-10) and NB Seg1B-NB4 (ESW-11) were modeled along the northbound I-5 ROW.

- **NSA 6 (M-S1B-SB67, M-S1B-SB76, and M-S1B-SB78):** These receptors represent a single-family residential area and a park located along Patricia Lane, Eastside Avenue, and East 6th Street in Santa Ana. Currently, one existing 12- to 14-foot-high noise barrier (ESW-12) is located along the right shoulder/ROW of the southbound I-5 on-ramp from just south of the Grand Avenue on-ramp to the 4th Street off-ramp. An increase in the height of noise barrier NB Seg1B-SB2 (ESW-12) was modeled in the same location to model the noise reduction to the receptors.
- **NSA 7 (M-S1C-NB1 through M-S1C-NB7, M-S1C-NB11 through M-S1C-NB17, M-S1C-NB19, M-S1C-NB27, M-S1C-NB39, M-S1C-NB40, M-S1C-NB49, and M-S1C-NB50):** These receptors represent single-family residential units located along North Eastwood Avenue, Martha Lane, Hathaway Street, Fairmont Street, Dorman Street, and Oakmont Place. Currently, two existing noise barriers are located along the ROW and/or shoulder of northbound I-5. ESW-13 is a 12- to 14-foot-high noise barrier and ESW-14 is a 14-foot-high noise barrier. An increase in the height of two noise barriers (NB Seg1C-NB1 [ESW-13] and NB Seg1C-NB2 [ESW-14]) were modeled. NB Seg1C-NB1 (ESW-13) was modeled along the ROW/shoulder of northbound I-5 and NB Seg1C-NB2(ESW-14) was modeled along the ROW of northbound I-5.
- **NSA 8 (M-S1C-SB1 and M-S1C-SB3 through M-S1C-SB5):** These receptors represent single-family residential units located just north of East Washington Avenue along North Custer Street and North Logan Street in Santa Ana. Currently, there are no existing noise barriers in this area. One new noise barrier (NB Seg1C-SB1) was modeled along the top of slope along the ROW of southbound I-5.
- **NSA 9 (M-S1D-NB1, M-S1D-NB9, M-S1D-NB10, M-S1D-NB14, M-S1D-NB23 through M-S1D-NB25, and M-S1D-NB50 through M-S1D-NB51):** These receptors represent single-family residential units located along the northbound side of I-5 between East 17th Street and East Santa Clara Avenue in Santa Ana . Currently, one 14-foot-high existing noise barrier (ESW-17) is located along the ROW/shoulder of northbound I-5. An increase in the height of noise barrier NB Seg1D-NB1 (ESW-17) was modeled in the same location.

- **NSA 10 (M-S1D-SB13 through M-S1D-SB19, M-S1D-SB30 through M-S1D-SB32, M-S1D-SB35 through M-S1D-SB38, M-S1D-SB40 through M-S1D-SB42, M-S1D-SB44, M-S1D-SB53, M-S1D-SB55, and M-S1D-SB57):** These receptors represent apartment complexes and single-family residential units located along the southbound side of I-5 between East 15th Street and North Main Street in Santa Ana. Currently, one existing 12-foot-high noise barrier (ESW-18) is located along the shoulder of southbound I-5. One new noise barrier (NB Seg 1D-SB1) and increasing the height of one noise barrier (NB Seg1D-SB2 [ESW-18]) were modeled. NB Seg 1D-SB1 was modeled along the shoulder of southbound I-5 toward the 17th Street off-ramp and NB Seg1D-SB2 (ESW-18) was modeled along the ROW/shoulder of southbound I-5 from the southbound Main Street on-ramp to the 17th Street off-ramp.
- **NSA 11 (M-S1E-NB2 through M-S1E-NB7):** These receptors represent an apartment complex located along the northbound side of I-5 on South Flower Street in Orange. Currently, one existing 16-foot-high noise barrier (ESW-20) is located along the ROW of the SR-22 ramp to northbound I-5/SR-57. An increase in the height of noise barrier NB Seg1E-NB1 (ESW-20) in the same location was modeled.
- **NSA 12 (M-S1E-SB13, M-S1E-SB33 through M-S1E-SB39, M-S1E-SB56, M-S1E-SB57, M-S1E-SB92, and M-S1E-SB100 through M-S1E-SB102):** These receptors represent single-family residential units located along the southbound side of I-5 from North Broadway to the I-5/SR-22 interchange in Santa Ana. Currently, one existing 8- to 16-foot-high noise barrier (ESW-21) is located along the shoulder of southbound I-5. An increase in the heights of noise barriers NB Seg1E-SB1 and Seg1E-SB2 in the same location were modeled.

Alternative 3—Segment 2 (SR-57 to SR-91)

Alternatives 3 and 4 have unique designs in this segment. Therefore, they are discussed separately. The following receptor locations would be or would continue to be exposed to noise levels that approach or exceed the NAC under Alternative 3.

- **NSA 13 (M-S2A-NB1 and M-S2A-NB2):** These receptors represent an outdoor frequent human use area at an apartment/condominium complex located at North Chapman Avenue and North Rampart Street in Orange. Currently, there are no existing noise barriers at this location. One new noise barrier, NB Seg2A-NB1, was modeled on the edge-of-shoulder (EOS) along the northbound I-5 off-ramp to Chapman Avenue.

- **NSA 14 (M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, M-S2A-SB44, and M-S2A-SB51):** These receptors represent an apartment complex and mobile home units located along Manchester Avenue between West Chapman Avenue and West Katella Avenue in Anaheim. Currently, one existing 12- to 14-foot-high noise barrier (ESW-26) is located along the southbound I-5 shoulder between The City Drive and Gene Autry Way. An increase in the height of two noise barriers, NB Seg2A-SB1 (ESW-26) and NB Seg2A-SB2 (ESW-26), were modeled in the same location as the existing wall. One new noise barrier, NB Seg2A-SB3 was modeled on the EOS along the southbound I-5 off-ramp to Manchester Avenue.
- **NSA 15 (M-S2B-NB25 through M-S2B-NB32, M-S2B-NB35 through M-S2B-NB36, M-S2B-NB41, and M-S2B-NB48):** These receptors represent an apartment complex and mobile home units (with pool area) located along northbound I-5 between Anaheim Boulevard and West Palais Road in Anaheim. Currently, one existing 10- to 16-foot noise barrier (ESW-28) is located along the northbound I-5 EOS/ROW just north of the northbound I-5 on-ramp from Anaheim Boulevard. An increase in the height of noise barrier NB Seg2B-NB1 (ESW-28) was modeled in the same location as the existing wall.
- **NSA 16 (M-S2B-SB55 and M-S2B-SB56):** These receptors represent a condominium complex, and a park located at Disney Way and South Zeyn Street in Anaheim. Currently, there are no existing noise barriers in this area. One new noise barrier (NB Seg2B-SB1) was modeled in the same location as the existing wall.
- **NSA 17 (M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149):** These receptors represent single-family residential units, two apartment complexes, and a park located along northbound I-5 between West Cottonwood Circle and Lincoln Avenue in Anaheim. Currently, three existing noise barriers shield these receptors. ESW-32 is a 14- to 16-foot-high noise barrier located along the northbound I-5 ROW just north of the northbound I-5 on-ramp from Ball Road to Santa Ana Street. ESW-33 is a 16-foot-high noise barrier located along the northbound I-5 ROW from Santa Ana Street to West Broadway, and ESW-34 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW from West Broadway to Lincoln Avenue. An increase in the heights of three noise barriers (NB Seg2C-NB1 [ESW-32], NB Seg2C-NB2 [ESW-33], and NB Seg2C-NB3[ESW-34]) were modeled in the same locations as the existing walls.

- **NSA 18 (M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100, and M-S2C-SB101):** These receptors represent single-family residential units and a park located along Disneyland Drive/Manchester Avenue between Locust Avenue and Broadway in Anaheim. Currently, one 10- to 16-foot-high noise barrier (ESW-35) is located along the southbound I-5 ROW from Santa Ana Street to the I-5 off-ramp at Ball Road/Disney Way. An increase in the height of noise barrier (NB Seg2C-SB1 [ESW-35]) was modeled in the same location. One new noise barrier (NB Seg2C-SB2) was modeled located along the southbound I-5 ROW from West Broadway to Santa Ana Street.
- **NSA 19 (M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216):** These receptors represent single-family residential units and five apartment complexes (with frequent human use areas) located along North Wilshire Avenue and northbound I-5 between North Pearl Street and West Glenoaks Avenue in Anaheim. Currently, four existing noise barriers shield these receptors. ESW-36 is a 16-foot-high noise barrier located along the northbound I-5 ROW from Lincoln Avenue to Euclid Street. ESW-37 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW on the northbound I-5 on-ramp from Euclid Street. ESW-38 and ESW-39 are a pair of 16-foot-high noise barriers located along the northbound I-5 EOS/ROW from Crescent Avenue to the Brookhurst Street off-ramp. An increase in the heights of four noise barriers NB Seg2D-NB1 (ESW-36), NB Seg2D-NB2 (ESW-37), NB Seg2D-NB3 (ESW-38), and NB Seg2D-NB4 (ESW-39) were modeled in the same locations as the existing walls.
- **NSA 21 (M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280):** These receptors represent single-family residential units located along northbound I-5 between North Ventura Street and North Elmira Street in Anaheim. Currently, two existing noise barriers shield these receptors. ESW-43 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW from the La Palma Avenue on-ramp to the northbound I-5/SR-91 ramp. ESW-44 is a 12-foot-high noise barrier located along the northbound I-5 EOS off-ramp to the westbound SR-91 ramp. An increase in the height of two noise barriers (NB Seg2E-NB1 [ESW-43] and NB Seg2E-NB2 [ESW-44]) were modeled in the same locations as the existing walls.

Alternative 4—Segment 2 (SR-57 to SR-91)

Alternatives 3 and 4 have unique designs in this segment. Therefore, they are discussed separately. The following receptor locations would be or would continue to be exposed to noise levels that approach or exceed the NAC under Alternative 4.

- **NSA 13 (M-S2A-NB1 and M-S2A-NB2):** These receptors represent an outdoor frequent human use area at an apartment/condominium complex located at North Chapman Avenue and North Rampart Street in Orange. Currently, there are no existing noise barriers at this location. One new noise barrier, NB Seg2A-NB1, was modeled on the EOS along the northbound I-5 off-ramp to Chapman Avenue.
- **NSA 14 (M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, and M-S2A-SB52):** These receptors represent an apartment complex and mobile home units located along Manchester Avenue between West Chapman Avenue and West Katella Avenue in Anaheim. Currently, one existing 12- to 14-foot noise barrier (ESW-26) is located along the southbound I-5 shoulder between The City Drive and Gene Autry Way. An increase in the heights of two noise barriers (NB Seg2A-SB1 [ESW-26] and NB Seg2A-SB2 [ESW-26]) were modeled in the same location as the existing wall. One new noise barrier (NB Seg2A-SB3) was modeled on the EOS along the southbound I-5 off-ramp to Manchester Avenue.
- **NSA 15 (M-S2B-NB25 through M-S2B-NB32, M-S2B-NB35, M-S2B-NB36, M-S2B-NB41, and M-S2B-NB48):** These receptors represent an apartment complex and mobile home units (with a pool area) located along northbound I-5 between Anaheim Boulevard and West Palais Road in Anaheim. Currently, one existing 14- to 16-foot noise barrier (ESW-28) is located along the northbound I-5 EOS/ROW just north of the northbound I-5 on-ramp from Anaheim Boulevard. An increase in the height of noise barrier NB Seg2B-NB1 (ESW-28) was modeled in the same location as the existing wall.
- **NSA 16 (M-S2B-SB55 and M-S2B-SB56):** These receptors represent a condominium complex and park located at Disney Way and South Zeyn Street in Anaheim. Currently, there are no existing noise barriers in this area. One new noise barrier (NB Seg2B-SB1) was modeled in the same location as the existing wall.
- **NSA 17 (M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149):** These receptors represent single-family residential units, two apartment complexes, and a park located along northbound I-5 between West Cottonwood Circle and Lincoln Avenue in Anaheim. Currently, three existing noise barriers shield these receptors. ESW-32 is a 14- to 16-foot-high noise barrier located

along the northbound I-5 ROW just north of the northbound I-5 on-ramp from Ball Road to Santa Ana Street. ESW-33 is a 16-foot-high noise barrier located along the northbound I-5 ROW from Santa Ana Street to West Broadway, and ESW-34 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW from West Broadway to Lincoln Avenue. An increase in the heights of three noise barriers (NB Seg2C-NB1 [ESW-32], NB Seg2C-NB2 [ESW-33], and NB Seg2C-NB3 [ESW-34]) were modeled in the same locations as the existing walls.

- **NSA 18 (M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100, and M-S2C-SB101):** These receptors represent single-family residential units and a park located along Disneyland Drive/Manchester Avenue between Locust Avenue and Broadway in Anaheim. Currently, one 10- to 16-foot-high noise barrier (ESW-35) is located along the southbound I-5 ROW from Santa Ana Street to the I-5 off-ramp at Ball Road/Disney Way. An increase in the height of noise barrier NB Seg2C-SB1 (ESW-35) was modeled in the same location. One new noise barrier (NB Seg2C-SB2) was modeled located along the southbound I-5 ROW from West Broadway to Santa Ana Street.
- **NSA 19 (M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216):** These receptors represent single-family residential units and five apartment complexes (with frequent human use areas) located along North Wilshire Avenue and northbound I-5 between North Pearl Street and West Glenoaks Avenue in Anaheim. Currently, four existing noise barriers shield these receptors. ESW-36 is a 16-foot-high noise barrier located along the northbound I-5 ROW from Lincoln Avenue to Euclid Street. ESW-37 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW on the northbound I-5 on-ramp from Euclid Street. ESW-38 and ESW-39 are a pair of 16-foot-high noise barriers located along the northbound I-5 EOS/ROW from Crescent Avenue to the Brookhurst Street off-ramp. An increase in the height of four noise barriers (NB Seg2D-NB1 [ESW-36], NB Seg2D-NB2 [ESW-37], NB Seg2D-NB3 [ESW-38] and NB Seg2D-NB4 [ESW-39]) were modeled in the same locations as the existing walls.
- **NSA 21 (M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280):** These receptors represent single-family residential units located along northbound I-5 between North Ventura Street and North Elmira Street in Anaheim. Currently, two existing noise barriers shield these receptors. ESW-43 is a 16-foot-high noise barrier located along the northbound I-5 EOS/ROW from the La Palma Avenue on-ramp to the northbound I-5/SR-91 ramp. ESW-44 is a

12-foot-high noise barrier located along the northbound I-5 EOS off-ramp to the westbound SR-91 ramp. An increase in the height of two noise barriers (NB Seg2E-NB1 [ESW-43] and NB Seg2E-NB2 [ESW-44]) was modeled in the same locations as the existing walls.

Alternatives 3 and 4—Segment 3 (SR-91 to the OC/LA County Line)

Alternatives 3 and 4 are discussed together in this subsection since there is no difference in the design between these two alternatives in segment 3 from SR-91 to the OC/LA County Line. The following receptor locations would be or would continue to be exposed to noise levels that approach or exceed the NAC under Alternatives 3 and 4.

- **NSA 23 (M-S3A-NB4, M- S3A-NB8, M- S3A-NB10, M- S3A-NB20A, M-S3A-NB22 through M- S3A-NB26, M- S3A-NB28, and M- S3A-NB30):** These receptors represent an apartment/condominium complex located Auto Center Drive between Maxwell Avenue and Dale Street in Buena Park. Currently, there are no existing noise barriers at this location. One new noise barrier (NB Seg3A-NB1) was modeled on the EOS of the westbound SR-91 on-ramp to northbound I-5 between the Orangethorpe on-ramp and Auto Center Drive.
- **NSA 28 (M-S3E-SB45):** This receptor represents a park located at 7171 8th Street in Buena Park. Currently, one existing 14-foot-high noise barrier (ESW-48) shields this receptor and is located along the property line and adjacent to the railroad and northbound I-5. An increase in the height of noise barrier NB Seg3E-SB1 (ESW-48) was modeled in the same locations as the existing wall.

Noise Abatement Consideration

Noise abatement measures such as noise barriers were considered in order to shield receptors within the Study Area that would become or would continue to be exposed to traffic noise levels approaching or exceeding the NAC. All properties requiring abatement consideration are within Activity Categories B, C, and E (67, 67, and 72 dBA L_{eq} NAC, respectively). Noise barriers were analyzed for each of these receptor locations. Depending on the location of the potential barrier and existing barrier height, noise barrier heights from 6 to 22 feet at 2-foot increments were analyzed. The locations of the modeled noise barriers for Alternatives 3 and 4 are shown on Figure J-1 in Appendix J of this EIR/EA.

Alternatives 3 and 4 - Segment 1 (Red Hill Avenue to SR-57)

The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Alternatives 3 and

4 within segment 1 (Red Hill Avenue to SR-57) and are summarized in Table J-1 in Appendix J of this EIR/EA:

- **NB Seg1A-C-NB1:** A 1,150-foot-long noise barrier along the EOS on the northbound side of I-5, just north of the on-ramp from Newport Boulevard, was analyzed to shield receptors M-S1A-C-NB1 through M-S1A-C-NB12, M-S1A-C-NB20, and M-S1A-C-NB25.
- **NB Seg1A-C-NB2A (ESW-4) and NB Seg1A-C-NB2B (ESW-5):** Existing 12-foot-high, 2,192-foot-long and 10-foot-high, 508-foot-long noise barriers, respectively, are located along the ROW (ESW-4) and EOS (ESW-5) of the northbound I-5 connector ramp to SR-55. These noise barriers were analyzed to raise the existing heights and were analyzed to shield receptors M-S1A-C-NB1 through M-S1A-C-NB12, M-S1A-C-NB20, and M-S1A-C-NB25.
- **NB Seg1B-NB1 (ESW-9):** An existing 10-foot-high, 1,112-foot-long noise barrier is located along the EOS of the northbound SR-55 to I-5 flyover ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S1B-NB1, M-S1B-NB4 through M-S1B-NB6, M-S1B-NB14 through M-S1B-NB24, M-S1B-NB26 and M-S1B-NB27, M-S1B-NB34, M-S1B-NB36, M-S1B-NB38, M-SB1-NB40, and M-SB1B-NB41.
- **NB Seg1B-NB2:** A 600-foot-long noise barrier along the EOS on the northbound side of I-5 just north of Main Street to just south of First Street was analyzed to shield receptors M-S1B-NB1, M-S1B-NB4 through M-S1B-NB6, M-S1B-NB14 through M-S1B-NB24, M-S1B-NB26 and M-S1B-NB27, M-S1B-NB34, M-S1B-NB36, M-S1B-NB38, M-SB1-NB40, and M-SB1B-NB41.
- **NB Seg1B-NB3 (ESW-10) and Seg1B-NB4 (ESW-11):** Existing 12-foot-high, 3,243-foot-long and 10-foot-high, 3,390-foot-long noise barriers, respectively, are located along the ROW of northbound I-5. These noise barriers were analyzed to raise the existing heights and were analyzed to shield receptors M-S1B-NB1, M-S1B-NB4 through M-S1B-NB6, M-S1B-NB14 through M-S1B-NB24, M-S1B-NB26 and M-S1B-NB27, M-S1B-NB34, M-S1B-NB36, M-S1B-NB38, M-SB1-NB40 and M-SB1B-NB41.
- **NB Seg1B-SB2 (ESW-12):** An existing 12- to 14-foot-high, 1,510-foot-long noise barrier is located along the EOS/ROW of the southbound I-5 on-ramp from just south of the Grand Ave on-ramp to the 4th Street off-ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S1B-SB67, M-S1B-SB76, and M-S1B-SB78.

- **NB Seg1C-NB1 (ESW-13):** An existing 12- to 14-foot-high, 1,305-foot-long noise barrier is located along the ROW/EOS of northbound I-5 from East 17th Street to Lincoln Avenue. This noise barrier was analyzed to raise the existing height and to shield receptors M-S1C-NB1 through M-S1C-NB7, M-S1C-NB11 through M-S1C-NB17, M-S1C-NB19, M-S1C-NB27, M-S1C-NB39, M-S1C-NB40, M-S1C-NB49, and M-S1C-NB50.
- **NB Seg1C-NB2 (ESW-14):** An existing 14-foot-high, 1,127-foot-long noise barrier is located along the ROW of northbound I-5 from Lincoln Avenue to Santiago Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S1C-NB1 through M-S1C-NB7, M-S1C-NB11 through M-S1C-NB17, M-S1C-NB19, M-S1C-NB27, M-S1C-NB39, M-S1C-NB40, M-S1C-NB49, and M-S1C-NB50.
- **NB Seg1C-SB1:** An 800-foot-long noise barrier along the top of slope along the southbound I-5 ROW between Lincoln Avenue and just south of North Santiago Street was analyzed to shield receptors M-S1C-SB1 and M-S1C-SB3 through M-S1C-SB5.
- **NB Seg1D-NB1 (ESW-17):** An existing 14-foot-high, 3,650-foot-long noise barrier is located along the ROW/EOS of northbound I-5 from East 17th Street to Edgewood Road. This noise barrier was analyzed to raise the existing height and to shield receptors M-S1D-NB1, M-S1D-NB9, M-S1D-NB10, M-S1D-NB14, M-S1D-NB23 through M-S1D-NB25, and M-S1D-NB50 through M-S1D-NB51.
- **NB Seg1D-SB1:** A 1,008-foot-long noise barrier along the EOS of southbound I-5 toward the 17th Street off-ramp was analyzed to shield receptors M-S1D-SB13 through M-S1D-SB19, M-S1D-SB30 through M-S1D-SB32, M-S1D-SB35 through M-S1D-SB38, M-S1D-SB40 through M-S1D-SB42, M-S1D-SB44, M-S1D-SB53, M-S1D-SB55, and M-S1D-SB57.
- **NB Seg1D-SB2 (ESW-18):** An existing 12-foot-high, 1,210-foot-long noise barrier is located along the ROW/EOS of southbound I-5 from the southbound Main Street on-ramp to the 17th Street off-ramp. This noise barrier was analyzed to raise the existing height for the section of the noise barrier needing replacement and to shield receptors M-S1D-SB13 through M-S1D-SB19, M-S1D-SB30 through M-S1D-SB32, M-S1D-SB35 through M-S1D-SB38, M-S1D-SB40 through M-S1D-SB42, M-S1D-SB44, M-S1D-SB53, M-S1D-SB55, and M-S1D-SB57.
- **NB Seg1E-NB1 (ESW-20):** This is an existing 16-foot-high, 933-foot-long noise barrier located along the ROW of the SR-22 ramp to northbound I-5/SR-57. This noise barrier was analyzed to raise the existing height and was analyzed to shield receptors M-S1E-NB2 through M-S1E-NB7.

- **NB Seg1E-SB1 and NB Seg1E-SB2 (ESW-21):** This is an existing 8- to 16-foot-high, 2,160-foot-long noise barrier located along the EOS of southbound I-5 between North Broadway and the SR-22/I-5 interchange. This noise barrier was analyzed in two segments (see NB Seg1E-SB2 below) to raise the existing height and to shield receptors M-S1E-SB13, M-S1E-SB33 through M-S1E-SB39, M-S1E-SB56, M-S1E-SB57, M-S1E-SB92, and M-S1E-SB100 through M-S1E-SB102.

Alternative 3—Segment 2 (SR-57 to SR-91)

The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Alternative 3 within segment 2 (SR-57 to SR-91) and are summarized in Table J-2 in Appendix J of this EIR/EA:

- **NB Seg2A-NB1:** A 1,548-foot-long noise barrier along the EOS on the northbound side of I-5 along the northbound I-5 off-ramp to Chapman Avenue was analyzed to shield receptors M-S2A-NB1 and M-S2A-NB2.
- **NB Seg2A-SB1 and NB Seg2A-SB2 (ESW-26):** An existing 12- to 14-foot-high, 3,224-foot-long noise barrier is located along the southbound I-5 EOS along the southbound I-5 off-ramp to The City Drive and between Gene Autry Way and Orangewood Avenue. NB Seg2A-SB1 was analyzed to raise the existing height of a 2,365-foot-long segment of ESW-26 and NB Seg2A-SB2 was analyzed to raise the existing height of a 859-foot-long segment of ESW-26. These noise barriers were analyzed to shield receptors M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, M-S2A-SB44, and M-S2A-SB52.
- **NB Seg2A-SB3:** A 1,654-foot-long noise barrier along the EOS on the southbound side of I-5 along the off-ramp to Manchester Avenue was analyzed to shield receptors M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, M-S2A-SB44, and M-S2A-SB52.
- **NB Seg2B-NB1 (ESW-28):** An existing 10- to 16-foot-high, 3,658-foot-long noise barrier is located along the ROW/EOS of northbound I-5 north of the on-ramp from Anaheim Boulevard. This noise barrier was analyzed to raise the existing height and was analyzed to shield receptors M-S2B-NB25 through M-S2B-NB32, M-S2B-NB35 through M-S2B-NB36, M-S2B-NB41, and M-S2B-NB48.
- **NB Seg2B-SB1:** A 1,540-foot-long noise barrier along the EOS on the southbound side of I-5 along the off-ramp to Disney Way/Katella Avenue was analyzed to shield receptors M-S2B-SB55 and M-S2B-SB56.

- **NB Seg2C-NB1 (ESW-32):** An existing 14- to 16-foot-high, 3,128-foot-long noise barrier is located along the ROW of northbound I-5 just north of the on-ramp from Ball Road to Santa Ana Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-NB2 (ESW-33):** This is an existing 16-foot-high, 758-foot-long noise barrier located along the ROW of northbound I-5 from Santa Ana Street to West Broadway. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-NB3 (ESW-34):** An existing 16-foot-high, 986-foot-long noise barrier is located along the EOS/ROW of northbound I-5 from West Broadway to Lincoln Avenue. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-SB1 (ESW-35):** An existing 10- to 16-foot-high, 2,360-foot-long noise barrier is located along the ROW of southbound I-5 from Santa Ana Street to the Ball Road/Disney Way off-ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100, and M-S2C-SB101.
- **NB Seg2C-SB2:** A 780-foot-long noise barrier along the ROW on the southbound side of I-5 from West Broadway to Santa Ana Street was analyzed to shield receptors M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100 and M-S2C-SB101.
- **NB Seg2D-NB1 (ESW-36):** An existing 16-foot-high, 2,336-foot-long noise barrier is located along the ROW of northbound I-5 from Lincoln Avenue to Euclid Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216.
- **NB Seg2D-NB2 (ESW-37):** An existing 16-foot-high, 1,336-foot-long noise barrier is located along the EOS/ROW of the northbound I-5 on-ramp from Euclid Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-

NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216.

- **NB Seg2D-NB3 (ESW-38) and NB Seg2D-NB4 (ESW-39):** A pair of existing 16-foot-high, 2,115- and 2,116-foot-long noise barriers are located along the EOS/ROW of northbound I-5 from Crescent Avenue to the Brookhurst Street off-ramp. These noise barriers were analyzed to raise the existing heights and were analyzed to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215 and M-S2D-NB216.
- **NB Seg2E-NB1 (ESW-43):** An existing 16-foot-high, 4,503-foot-long noise barrier is located along the EOS/ROW of northbound I-5 from the La Palma Avenue on-ramp to the I-5/SR-91 ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280.
- **NB Seg2E-NB2 (ESW-44):** An existing 12-foot-high, 1,177-foot-long noise barrier is located along the EOS of the northbound I-5 off-ramp to the westbound SR-91 ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280.

Alternative 4—Segment 2 (SR-57 to SR-91)

The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Alternative 4 within segment 2 (SR-57 to SR-91) and are summarized in Table J-3 in Appendix J of this EIR/EA:

- **NB Seg2A-NB1:** A 1,548-foot-long noise barrier along the EOS on the northbound side of I-5 along the northbound I-5 off-ramp to Chapman Avenue was analyzed to shield receptors M-S2A-NB1 and M-S2A-NB2.
- **NB Seg2A-SB1 and NB Seg2A-SB2 (ESW-26):** Existing 12- to 14-foot-high, 3,224-foot-long noise barriers are located along the southbound I-5 EOS along the southbound I-5 off-ramp to The City Drive and between Gene Autry Way and Oranewood Avenue. NB Seg2A-SB1 was analyzed to raise the existing height of a 2,365-foot-long segment of ESW-26 and NB Seg2A-SB2 was analyzed to raise the existing height of a 859-foot-long segment of ESW-26. These noise barriers were

analyzed to shield receptors M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, and M-S2A-SB52.

- **NB Seg2A-SB3:** A 1,654-foot-long noise barrier along the EOS on the southbound side of I-5 along the off-ramp to Manchester Avenue was analyzed to shield receptors M-S2A-SB2 through M-S2A-SB16, M-S2A-SB33 through M-S2A-SB37A, and M-S2A-SB52.
- **NB Seg2B-NB1 (ESW-28):** An existing 14- to 16-foot-high, 3,658-foot-long noise barrier is located along the ROW/EOS of northbound I-5 north of the on-ramp from Anaheim Boulevard. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2B-NB25 through M-S2B-NB32, M-S2B-NB35 through M-S2B-NB36, M-S2B-NB41, and M-S2B-NB48.
- **NB Seg2B-SB1:** A 1,540-foot-long noise barrier along the EOS on the southbound side of I-5 along the off-ramp to Disney Way/Katella Avenue was analyzed to shield receptors M-S2B-SB55 and M-S2B-SB56.
- **NB Seg2C-NB1 (ESW-32):** An existing 14- to 16-foot-high, 3,128-foot-long noise barrier is located along the ROW of northbound I-5 just north of the on-ramp from Ball Road to Santa Ana Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-NB2 (ESW-33):** An existing 16-foot-high, 758-foot-long noise barrier is located along the ROW of northbound I-5 from Santa Ana Street to West Broadway. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-NB3 (ESW-34):** An existing 16-foot-high, 986-foot-long noise barrier is located along the EOS/ROW of northbound I-5 from West Broadway to Lincoln Avenue. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-NB83 through M-S2C-NB86, M-S2C-NB120, M-S2C-NB121, M-S2C-NB141, M-S2C-NB143 through M-S2C-NB145M, M-S2C-NB148, and M-S2C-NB149.
- **NB Seg2C-SB1 (ESW-35):** An existing 10- to 16-foot-high, 2,360-foot-long noise barrier is located along the ROW of southbound I-5 from Santa Ana Street to the Ball Road/Disney Way off-ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100, and M-S2C-SB101.

- **NB Seg2C-SB2:** A 780-foot-long noise barrier along the ROW on the southbound side of I-5 from West Broadway to Santa Ana Street was analyzed to shield receptors M-S2C-SB69 through M-S2C-SB71, M-S2C-SB82 through M-S2C-SB92, M-S2C-SB100, and M-S2C-SB101.
- **NB Seg2D-NB1 (ESW-36):** An existing 16-foot-high, 2,336-foot-long noise barrier is located along the ROW of northbound I-5 from Lincoln Avenue to Euclid Street. This noise barrier was analyzed to raise the existing height and was analyzed to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216.
- **NB Seg2D-NB2 (ESW-37):** An existing 16-foot-high, 1,336-foot-long noise barrier is located along the EOS/ROW of the northbound I-5 on-ramp from Euclid Street. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216.
- **NB Seg2D-NB3 (ESW-38) and NB Seg2D-NB4 (ESW-39):** A pair of existing 16-foot-high, 2,115- and 2,116-foot-long noise barriers are located along the EOS/ROW of northbound I-5 from Crescent Avenue to the Brookhurst Street off-ramp. These noise barriers were analyzed to raise the existing heights and to shield receptors M-S2D-NB165, M-S2D-NB173 through M-S2D-NB180, M-S2D-NB188, M-S2D-NB204, M-S2D-NB208, M-S2D-NB212, M-S2D-NB213, M-S2D-NB215, and M-S2D-NB216.
- **NB Seg2E-NB1 (ESW-43):** An existing 16-foot-high, 4,503-foot-long noise barrier is located along the EOS/ROW of northbound I-5 from the La Palma Avenue on-ramp to the I-5/SR-91 ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280.
- **NB Seg2E-NB2 (ESW-44):** An existing 12-foot-high, 1,177-foot-long noise barrier is located along the EOS of the northbound I-5 off-ramp to the westbound SR-91 ramp. This noise barrier was analyzed to raise the existing height and to shield receptors M-S2E-NB246 through M-S2E-NB257, M-S2E-NB259 through M-S2E-NB261, M-S2E-NB263, M-S2E-NB267, M-S2E-NB268, and M-S2E-NB278 through M-S2E-NB280.

Alternatives 3 and 4—Segment 3 (SR-91 to the OC/LA County Line)

The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Alternatives 3 and 4 within segment 3 (SR-91 to the OC/LA County Line) and are summarized in Table J-4 in Appendix J of this EIR/EA:

- **NB Seg3A-NB1:** A 1,226-foot-long noise barrier along the EOS of the westbound SR-91 on-ramp to northbound I-5 between the Orangethorpe on-ramp and Auto Center Drive, was analyzed to shield receptors M-NB4, M-NB8, M-NB10, M-NB20A, M-NB22 to M-NB26, M-NB28 and M-NB30.
- **NB Seg3E-SB1 (ESW-48):** This is an existing 14-foot-high, 1,908-foot-long noise barrier, located along along the property line of the homes adjacent to the railroad and northbound I-5. This noise barrier was analyzed to shield receptor M-S3E-SB45.

Feasibility and Reasonable Allowance

Section 3 of the Caltrans *Traffic Noise Analysis Protocol* states that a minimum noise reduction of 5 dBA must be achieved at the impacted receptors in order for the proposed noise abatement measure to be considered feasible. Greater noise reductions are encouraged if they can be reasonably achieved. Feasibility may also be restricted by the following factors: (1) topography, (2) access requirement for driveways, (3) presence of local cross-streets, (4) underground utilities, (5) other noise sources in the area, and (6) safety considerations. Analysis was completed raising the heights of existing barriers or proposing new noise barriers or soundwalls within the Project Area to determine if the barrier would meet the feasible and reasonable noise reduction criterias.

Noise Barrier Feasibility

Table 2.14.7 summarizes the feasibility of the modeled noise barriers for both Alternatives 3 and 4 since there are no noise barriers unique to Alternative 3 or Alternative 4 that were found to be feasible. Table 2.14.7 lists the noise barrier number, feasible noise barrier heights, approximate lengths, highest noise attenuation, number of benefited units/receptors, total reasonable allowance, and noise barrier locations.

Of the 33 modeled noise barriers evaluated for Alternatives 3 and 4, five noise barriers were determined to be feasible. The remaining noise barriers were determined to be not feasible because the noise barriers were not capable of reducing noise levels by 5 dBA or more at impacted receptors.

Table 2.14.7: Summary of Feasible Noise Barriers for Alternatives 3 and 4

| Noise Barrier No. | Height (ft) | Approximate Length (ft) | Highest Noise Attenuation (dBA) | Number of Benefited Receptors/ Units ¹ | Total Reasonable Allowance ² | Noise Barrier Location |
|-------------------------------|-------------|-------------------------|---------------------------------|---|---|------------------------|
| Seg1A-C-NB1 | 12 | 1,150 | 5.1 | 2 | \$214,000 | EOS |
| | 14 | | 6.7 | 3 | \$321,000 | |
| | 16 | | 9.0 | 3 | \$321,000 | |
| Seg 1A-C-NB2A Seg1A-C-NB2B | 22 | 2,192/508 | 6.2 | 10 | \$1,070,000 | ROW/EOS |
| Seg1B-NB2 | 10 | 600 | 5.0 | 1 | \$107,000 | EOS |
| | 12 | | 6.2 | 1 | \$107,000 | |
| | 14 | | 5.9 | 2 | \$214,000 | |
| | 16 | | 7.5 | 2 | \$214,000 | |
| Seg1C-SB1 | 8 | 800 | 5.0 | 2 | \$214,000 | ROW |
| | 10 | | 5.0 | 2 | \$214,000 | |
| | 12 | | 6.3 | 2 | \$214,000 | |
| | 14 | | 6.9 | 3 | \$321,000 | |
| | 16 | | 7.4 | 5 | \$535,000 | |
| Seg1D-SB2A | 12 | 2,370 | 8.8 | 12 | \$1,284,000 | ROW/EOS |
| | 14 | | 10.5 | 20 | \$2,140,000 | |
| | 16 | | 12.0 | 22 | \$2,354,000 | |
| | 18 | | 13.1 | 22 | \$2,354,000 | |
| | 20 | | 14.0 | 22 | \$2,354,000 | |
| | 22 | | 14.5 | 23 | \$2,461,000 | |
| Seg1D-SB2A Seg1D-SB2B | 12 | 2,370 | 8.8 | 12 | \$1,284,000 | ROW/EOS |
| | 14 | 2,370 | 10.5 | 20 | \$2,140,000 | ROW/EOS |
| | 16 | 2,370 | 12.0 | 22 | \$2,354,000 | ROW/EOS |
| | 18 | 2,370 | 13.1 | 22 | \$2,354,000 | ROW/EOS |
| | 20 | 2,370 | 14.0 | 24 | \$2,568,000 | ROW/EOS |
| | 22 | 2,370 | 14.5 | 25 | \$2,675,000 | ROW/EOS |
| Seg3A- NB1 | 12 | 1,050 | 5.9 | 5 | \$535,000 | EOS |
| | 14 | | 7.0 | 12 | \$1,284,000 | |
| | 16 | | 7.9 | 12 | \$1,284,000 | |

Source: *Noise Abatement Decision Report* (May 2023).

¹ Number of receptors/units that are attenuated by 5 dBA or more by the modeled barrier.

² Calculated by multiplying the number of benefited receptors by \$107,000 (reasonable allowance per benefited receptor/unit).

dBA = A-weighted decibels

EOS = edge-of-shoulder

ft = foot/feet

ROW = right-of-way

Noise Barrier Reasonableness

The reasonableness of a noise barrier is determined by comparing the estimated cost of constructing the noise barrier against the total reasonable allowance. The total reasonable allowance is determined based on the number of benefited residences/receptors multiplied by the reasonable allowance per residence/receptor. Additionally, in accordance with the Caltrans *Traffic Noise Analysis Protocol*, each noise barrier must provide at least 7 dBA of noise reduction at one or more benefited residences/receptors to be considered reasonable. Therefore, if the estimated noise barrier construction cost exceeds the total reasonable allowance or was not predicted to provide at least 7 dBA of noise reduction at one or more benefited residences/receptors, the noise barrier is

determined to be not reasonable. However, if the estimated noise barrier construction cost is less than the total reasonable allowance and is predicted to provide at least 7 dBA of noise reduction at one or more benefited residences/receptors, the noise barrier is determined to be reasonable.

The estimated noise barrier construction cost for each barrier under each alternative was developed by the project engineer. A summary of abatement information in Table 2.14.8 lists all the feasible noise barriers, along with their heights, approximate lengths, highest noise attenuation, number of benefited units/receptors, total reasonable allowance per barrier, and whether the noise barrier is reasonable. As shown in Table 2.14.8, NB No. Seg1D-SB2-A under Alternatives 3 and 4 was determined to be reasonable. Further, measure N-1 described in Section 2.14.4 will require noise abatement in the form of noise barriers and would minimize operational noise impacts on sensitive land uses adjacent to the Project Area.

The design of noise barriers is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the proposed Project. Preliminary information on the physical location, length, and height of noise barriers is provided in this EIR/EA. If pertinent parameters change substantially during the final Project design, preliminary noise barrier designs may be modified or eliminated from the final Project. Should a Build Alternative be selected as the Preferred Alternative, a final decision on the construction of location-specific noise abatement would be made upon completion of the Project design. The minimum heights and locations of the soundwalls that would provide feasible abatement and achieve the 7 dB design goal are shown graphically on the figures in Appendix J.

Nonacoustical Factors Relating to Feasibility

Factors not relating to acoustics that must be considered for noise barriers include: geometric standards, safety, maintenance, security, and utility relocations, geotechnical considerations, and visual impacts. As previously mentioned, noise barriers would not be constructed for the No Build Alternative (Alternative 1) or Alternative 2.

NB No. Seg1D-SB2-A for Alternatives 3 and 4 is proposed to be constructed in a location that would require additional improvements. These improvements include geometric standards, such as minimum sight distances, safety, geotechnical considerations, and utility relocations.

Table 2.14.8: Summary of Reasonable Noise Barriers for Alternatives 3 and 4

| Noise Barrier No. | Figure Sheet (Figure J-1 in Appendix J of this EIR/EA) | Noise Barrier Location | Height (ft) | Approximate Length (ft) | Highest Noise Attenuation (dBA) | Number of Benefited Receptors/ Units ¹ | Total Reasonable Allowance ² | Estimated Construction Cost ³ | Reasonable? |
|---|--|------------------------|-------------|-------------------------|---------------------------------|---|---|--|-------------|
| Seg1A-C-NB1 | 3 | EOS | 12 | 1,150 | 5.1 | 2 | \$214,000 | \$1,658,760 | No* |
| | | | 14 | | 6.7 | 3 | \$321,000 | \$1,762,720 | No* |
| | | | 16 | | 9.0 | 3 | \$321,000 | \$1,866,680 | No |
| Seg1B-NB2 | 4 and 5 | EOS | 10 | 600 | 5.0 | 1 | \$107,000 | \$652,200 | No* |
| | | | 12 | | 6.2 | 1 | \$107,000 | \$706,440 | No* |
| | | | 16 | | 7.5 | 2 | \$214,000 | \$852,120 | No |
| Seg1C-SB1 | 8 | ROW | 8 | 800 | 5.8 | 2 | \$214,000 | \$1,226,480 | No* |
| | | | 10 | | 5.8 | 2 | \$214,000 | \$1,295,600 | No* |
| | | | 12 | | 6.3 | 2 | \$214,000 | \$1,364,720 | No* |
| | | | 14 | | 6.9 | 3 | \$321,000 | \$1,463,600 | No* |
| | | | 16 | | 7.6 | 5 | \$535,000 | \$1,552,560 | No |
| Seg1D-SB1 + Seg1D-SB2-A + Seg1D-SB2-B** | 9 and 10 | ROW/ EOS | 12 | 3,030 | 9.2 | 12 | \$1,284,400 | \$4,010,613 | No |
| | | | 14 | | 10.9 | 20 | \$2,140,000 | \$4,360,444 | No |
| | | | 16 | | 12.2 | 22 | \$2,354,000 | \$4,682,870 | No |
| | | | 18 | | 13.4 | 22 | \$2,354,000 | \$5,005,297 | No*** |
| | | | 20 | | 14.3 | 24 | \$2,568,000 | \$5,327,724 | No*** |
| | | | 22 | | 14.9 | 26 | \$2,782,000 | \$5,650,151 | No*** |
| Seg1D-SB2-A + Seg1D-SB2-B** | 9 and 10 | ROW/ EOS | 12 | 2,370 | 8.8 | 12 | \$1,284,000 | \$2,502,904 | No |
| | | | 14 | | 10.5 | 20 | \$2,140,000 | \$2,773,998 | No |
| | | | 16 | | 12.0 | 22 | \$2,354,000 | \$3,025,872 | No |
| | | | 18 | | 13.1 | 22 | \$2,354,000 | \$3,277,746 | No*** |
| | | | 20 | | 14.0 | 24 | \$2,568,000 | \$3,529,620 | No*** |
| | | | 22 | | 14.6 | 25 | \$2,675,000 | \$3,781,494 | No*** |
| Seg1D-SB2-A** | 9 and 10 | ROW/ EOS | 12 | 1,210 | 8.8 | 12 | \$1,284,000 | \$854,600 | Yes |
| | | | 14 | | 10.5 | 20 | \$2,140,000 | \$983,646 | Yes |
| | | | 16 | | 12.0 | 22 | \$2,354,000 | \$1,107,360 | Yes |
| | | | 18 | | 13.1 | 22 | \$2,354,000 | \$1,231,074 | No*** |
| | | | 20 | | 14.0 | 22 | \$2,354,000 | \$1,354,788 | No*** |
| | | | 22 | | 14.5 | 23 | \$2,461,000 | \$1,478,502 | No*** |

Table 2.14.8: Summary of Reasonable Noise Barriers for Alternatives 3 and 4

| Noise Barrier No. | Figure Sheet (Figure J-1 in Appendix J of this EIR/EA) | Noise Barrier Location | Height (ft) | Approximate Length (ft) | Highest Noise Attenuation (dBA) | Number of Benefited Receptors/ Units ¹ | Total Reasonable Allowance ² | Estimated Construction Cost ³ | Reasonable? |
|-------------------|--|------------------------|-------------|-------------------------|---------------------------------|---|---|--|-------------|
| Seg3A-NB1 | 40 | EOS | 12 | 1,050 | 5.9 | 5 | \$535,000 | \$1,585,020 | No* |
| | | | 14 | | 7.0 | 12 | \$1,284,000 | \$1,719,000 | No |
| | | | 16 | | 7.9 | 12 | \$1,284,000 | \$1,839,960 | No |

Source: *Noise Abatement Decision Report* (May 2023).

¹ Number of receptors/units that are attenuated by 5 dBA or more by the modeled barrier.

² Calculated by multiplying the number of benefited receptors by \$107,000 (reasonable allowance per benefited receptor/unit).

³ The estimated noise barrier construction cost information was provided by WSP (April 2023).

* One asterisk represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.

** This noise barrier must be constructed to replace the existing wall that would be removed to accommodate widening under Alternatives 3 and 4.

*** Noise barriers at the EOS cannot exceed 16 ft in height due to safety concerns according to Caltrans.

dBA = A-weighted decibels

EIR/EA = Environmental Impact Report/Environmental Assessment

EOS = edge-of-shoulder

ft = foot/feet

ROW = right-of-way

No Build Alternative (Alternative 1) and Build Alternative (Alternative 2)

As noted previously, Alternative 2 was assumed to have the same results as the No Build Alternative as it will maintain the existing highway lane configuration. As such, long-term traffic noise impacts are assumed to be the same as the No Build Alternative. Potential long-term noise effects under the No Build Alternative and Alternative 2 would be solely from traffic noise. Future No Build noise levels are shown in Tables J-1 through J-4 in Appendix J of this EIR/EA. Of the 1,742 modeled receptor locations, 277 receptors would continue to approach or exceed the NAC under the future No Build condition.

2.14.4 Avoidance, Minimization, and/or Mitigation Measures

The Build Alternatives will incorporate the Project Feature PF-N-1 outlined above in Section 2.14.3.1 to help address potential temporary and permanent noise impacts. In addition, measure N-1 will be implemented with Build Alternatives 3 and 4 to require noise abatement in the form of noise barriers and would minimize operational noise impacts on sensitive land uses adjacent to the Project Area.

- N-1** Based on the studies completed to date, the California Department of Transportation (Caltrans) intends to incorporate noise abatement in the form of a barrier (Seg1D-SB2-A) for Alternatives 3 and 4 on the southbound side of I-5 from East 17th Street to West 20th Street, with an approximate length of 1,210 and average heights ranging from 12 to 16 feet. Calculations based on preliminary design data show that the barrier will reduce noise levels by 5 to 12 dBA for approximately 12 to 22 residences at a cost of \$855,000 to \$1,108,000. This measure may change based on input received from the public. If conditions have substantially changed during final design, noise abatement may not be constructed. The final decision on noise abatement will be made upon completion of the project design.