# 2.14 Noise

## 2.14.1 Regulatory Setting

The NEPA of 1969 and the 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 such measures are not feasible. The rest of this section will focus on the NEPA/23 CFR Part 772 (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 the FHWA involvement (and the Department, 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 contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 A-weighted decibels [dBA]) are 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.

Figure 2.14-1 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 The Department's *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects May 2011*, a noise impact occurs when the predicted future noise level with the project substantially exceeds the existing noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

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

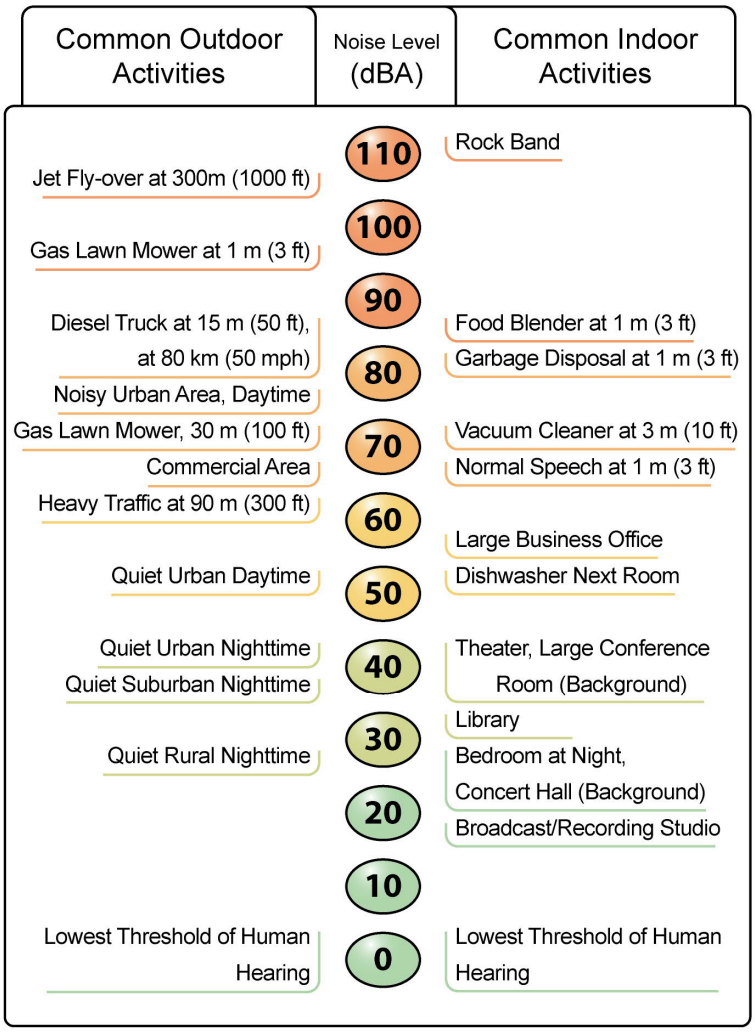
The Department's Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is feasible and reasonable. For noise abatement to be considered acoustically feasible, it must be predicted to provide at least 5 dBA minimum reduction at an impacted receptor. Other considerations include topography, access requirements, other noise sources, and safety considerations. Additionally, noise abatement must achieve design goal of at least 7 dBA noise

reduction at one or more benefited receptors. The overall reasonableness of noise abatement is determined by the noise reduction design goal, the cost of noise abatement and the viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

**Table 2.14-1: Activity Categories and Noise Abatement Criteria**

| Activity Category | Activity $L_{eq}(h)$[1] | Evaluation Location | 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. |
| B2 | 67 | Exterior | Residential. |
| C2 | 67 | Exterior | Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care 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, day care 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 A, B, C, D, or F. |
| F | NA | NA | Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing. |
| G | NA | NA | Undeveloped lands that are not permitted. |

Source: Federal Highway Administration. Title 23, Part 772 of the Code of Federal Regulations.
NA: not applicable
[1] The $L_{eq}(h)$ activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are in A-weighted decibels.
[2] Includes undeveloped lands permitted for this activity category.
$L_{eq}(h)$: equivalent continuous sound level per hour




Source: Table 2-5, Technical Noise Supplement (Caltrans 2013c).
Caltrans: California Department of Transportation; dBA: A-weighted decibels; ft: feet; km: kilometer(s); mph: miles per hour

**Figure 2.14-1. Noise Levels of Common Activities**

## 2.14.2 Affected Environment

This section is based on the September 2018 Noise Study Report (NSR) and the November 2018 Noise Abatement Decision Report (NADR) 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

Developed and undeveloped land uses in the project vicinity were identified through land use maps, aerial photography, and site inspection. Receptors were identified within each land use category. Existing land uses in the project area include single- and multifamily residences, pools associated with multifamily residences, churches, playgrounds associated with churches, a classroom associated with a church, hospitals, restaurants, gas stations, a park, a maintenance facility, vacant land, offices, and commercial and retail uses. The following describes in further detail existing land uses in the project area:

- **Southbound side of SR 55 between First Street and 4th Street**: Land uses in this area include restaurants, offices, and a gas station. Land uses in this area are 18 to 21 feet higher in elevation than SR 55. Currently, no existing walls shield these uses from traffic noise generated by SR 55. The restaurants with outdoor seating areas were evaluated under Activity Category E, which has an exterior NAC of 72 dBA $L_{eq}$. The restaurant and offices that have no outdoor frequent human use areas were evaluated under Activity Category E for reporting purposes. The gas station was classified under Activity Category F for reporting purposes.
- **Northbound side of SR 55 between First Street and Irvine Boulevard**: Land uses in this area include multifamily residences, a hospital, and offices. Land uses in this area are 18 to 20 feet higher in elevation than SR 55. Currently, no existing walls shield these uses from traffic noise generated by SR 55. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The interior areas of the hospital buildings were evaluated under Activity Category D, which has an interior NAC of 52 dBA $L_{eq}$. The offices have no outdoor frequent human use areas and, therefore, were classified under Activity Category E for reporting purposes.
- **Southbound side of SR 55 between 4th Street and 17th Street**: Land uses in this area include multifamily residences, a pool associated with the multifamily residences, a hospital, restaurants, offices, commercial, retail, and a gas station. Land uses in this area are 17 to 24 feet higher in elevation than SR 55. Currently, a 4- to 4.5-foot-high existing wall shields the hospital from traffic noise. An existing 6-foot wall shields one of the office buildings. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The pool associated with the multifamily residences was evaluated under Activity Category C, which has an exterior NAC of 67 dBA $L_{eq}$. The offices and restaurants with outdoor seating were evaluated under Activity Category E, which has an exterior NAC of 72 dBA $L_{eq}$. The offices and restaurants that have no outdoor frequent human use areas were classified under Activity Category E for reporting purposes. The interior areas of the hospital buildings were evaluated under Activity Category D, which has an interior NAC of 52 dBA $L_{eq}$. Commercial, retail uses, and the gas station were classified under Activity Category F for reporting purposes.
- **Northbound side of SR 55 between Irvine Boulevard and 17th Street**: Land uses in this area include single-family residences, offices, and a gas station. Land uses in this area are 16 to 21 feet higher in elevation than SR 55. Currently, an 8.5- to 10.5-foot-high existing wall shields the residences from traffic noise. Existing 4- to 6.5-foot-high walls shield some of the offices from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The offices have no outdoor frequent human use areas and, therefore, were classified under Activity Category E for reporting purposes. The gas station was classified as Activity Category F for reporting purposes.
- **Southbound side of SR 55 between 17th Street and Santa Clara Avenue**: Land uses in this area include single-family residences and offices. Land uses in this area range from 1 foot lower in elevation to 19 feet higher in elevation than SR 55. Currently, a 9.5- to 13.5-foot-high wall shields the residences from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The offices have no outdoor frequent human use areas and, therefore, were classified under Activity Category E for reporting purposes.

- **Northbound side of SR 55 between 17th Street and Santa Clara Avenue**: Land uses in this area include single-family residences, restaurants, commercial, retail, and a gas station. Land uses in this area range from 3 feet lower in elevation to 15 feet higher in elevation than SR 55. Currently, a 16-foot-high existing wall shields the residences from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The restaurants with outdoor seating were evaluated under Activity Category E, which has an exterior NAC of 72 dBA $L_{eq}$. The restaurants that have no outdoor frequent human use areas were classified under Activity Category E for reporting purposes. The offices have no outdoor frequent human use areas and, therefore, were classified under Activity Category E for reporting purposes. The commercial, retail, and gas station were classified under Activity Category F for reporting purposes.
- **Southbound side of SR 55 between Santa Clara Avenue and Fairhaven Avenue**: Land uses in this area include single- and multifamily residences and a pool associated with the multifamily residences. Land uses in this area range from 6 feet lower in elevation to 3 feet higher in elevation than SR 55. Currently, 13.5- to 16-foot existing walls shield these residences from traffic noise. The single- and multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The pool associated with the multifamily residences was evaluated under Activity Category C, which has an exterior NAC of 67 dBA $L_{eq}$.
- **Northbound side of SR 55 between Santa Clara Avenue and Fairhaven Avenue**: Land uses in this area include single-family residences. Land uses in this area range from4 feet lower in elevation to 6 feet higher in elevation than SR 55. Currently, a 14.5- to 16.5-foot-high existing wall shields these residences from traffic noise. The height of a section of this wall includes a portion of the wall that functions as a retaining wall. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$.
- **Southbound side of SR 55 between Fairhaven Avenue and SR 22**: Land uses in this area include multifamily residences and a maintenance facility. Land uses in this area range from 7 feet lower in elevation to 1 foot higher in elevation than SR 55. Currently, 9.5- to 14.5-foot existing walls shield the residences from traffic noise. An existing 4.5- to 7.5-foot existing wall shields the maintenance facility from traffic noise. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The maintenance facility was classified as Activity Category F for reporting purposes.
- **Northbound side of SR 55 between Fairhaven Avenue and SR 22**: Land uses in this area include single-family residences, a church, a playground associated with the church, and classrooms associated with the church. Land uses in this area are 2 to 6 feet lower than SR 55. Currently, a 9- to 11.5-foot-high existing wall shields these uses from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The playground associated with the church was evaluated under Activity Category C, which has an exterior NAC of 67 dBA $L_{eq}$. The interior areas of the church and the classrooms associated with the church were evaluated under Activity Category D, which has an interior NAC of 52 dBA $L_{eq}$.

- **Southbound side of SR 55 near Katella Avenue Ramps**: Land uses in this area include multifamily residences, commercial, retail, and gas stations. Land uses in this area are 18 to 29 feet lower in elevation than SR 55. Currently, a 16- to 20-foot wall shields some of the residences from traffic noise. The height of this wall includes a portion of the wall that functions as a retaining wall. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The commercial, retail, and gas stations were classified under Activity Category F for reporting purposes.
- **Southbound side of SR 55 near Lincoln Avenue**: Land uses in this area include single-family residences, a park, restaurants, offices, commercial, retail, and a gas station. Land uses in this area range from 41 feet lower in elevation to 65 feet higher in elevation than SR 55. Currently, 5.5- to 7-foot walls shield some of the residence uses from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. Areas of frequent human use in the park were evaluated under Activity Category C, which has an exterior NAC of 67 dBA $L_{eq}$. Areas of the park that have no frequent human use areas were classified under Activity Category C for reporting purposes. The restaurant and offices with outdoor seating were evaluated under Activity Category E, which has an exterior NAC of 72 dBA $L_{eq}$. The restaurant with no outdoor frequent human use areas was classified under Activity Category E for reporting purposes. The commercial, retail, and gas station were classified under Activity Category F for reporting purposes.
- **Northbound side of SR 55 near Lincoln Avenue**: Land uses in this area include single-family residences, a church, a playground associated with the church, restaurants, offices, commercial, retail, a gas station, and vacant land. Land uses in this area range from 3 feet lower in elevation to 90 feet higher in elevation than SR 55. Currently, 4- to 6.5-foot walls shield some of the residence uses from traffic noise The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA $L_{eq}$. The playground associated with the church was evaluated under Activity Category C, which has an exterior NAC of 67 dBA $L_{eq}$. The interior area of the church was evaluated under Activity Category D, which has an interior NAC of 52 dBA $L_{eq}$. The restaurants and offices have no outdoor frequent human use areas and, therefore, were classified under Activity Category E for reporting purposes. The commercial, retail, and gas station were classified under Activity Category F for reporting purposes. The vacant land was classified as Activity Category G for reporting purposes.

#### 2.14.2.2 Exiting 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 project area is traffic on SR 55. In some portions of the project area, secondary sources of noise include traffic on SR 22, First Street, 4th Street/Irvine Boulevard, 17th Street, Santa Clara Avenue, Fairhaven Avenue, Katella Avenue, Lincoln Avenue, Nohl Ranch Road, Tustin Street, Santiago Boulevard, and/or Yorba Street. Short-term (15-minute) exterior noise measurements were conducted to document existing noise levels at 57

representative receptor locations[1] in the project area. Short-term noise level measurements were conducted using Larson Davis Models 831, 824, 820 Type 1 sound level meters. Table 2.14-2 contains the results of the short-term noise level measurements and a description of the noise monitoring locations. These short-term noise measurements were used to calibrate the noise model and the locations were used as representative modeling locations. A total of 327 receptors were modeled in the project area.

Figure 2.14-9 shows the short-term monitoring locations. Table 2.14-3 shows the meteorological conditions during the short-term noise measurements. All short-term noise monitoring locations are shown on Figure 2.14-9.

Long-Term Monitoring

Long-term traffic noise level measurements were conducted to document the peak traffic noise hour. Long-term ambient noise monitoring was conducted using five dosimeters and a Larson Davis Model 720 Type 2 sound level meter at seven representative locations in the project area.

Figure 2.14-9 shows the long-term noise monitoring locations. Table 2.14-4 through Table 2.14-10 contain the results of the long-term noise measurements, which are summarized below.

- The long-term noise level measurement at LT-1 was performed at 17272 Amaganset Way from 9:00 a.m. on Wednesday, February 28, 2018, to 9:00 a.m. on Thursday, February 29, 2018. Table 2.14-4 shows that traffic noise peaks during the 11:00 a.m., 12:00 p.m., 1:00 p.m., 2:00 p.m., and 3:00 p.m. hours at LT-1.
- The long-term noise level measurement at LT-2 was performed at 14291 Yorba Street from 7:00 p.m. on Tuesday, April 24, 2018, to 7:00 p.m. on Wednesday, April 25, 2018. Table 2.14-5 shows that traffic noise peaks during the 9:00 a.m., 10:00 a.m., 11:00 a.m., 12:00 p.m., 1:00 p.m., and 2:00 p.m. hours at LT-2.
- The long-term noise level measurement at LT-3 was performed at 13702 Marshall Lane from 10:00 a.m. on Tuesday, March 6, 2018, to 10:00 a.m. on Wednesday, March 7, 2018. Table 2.14-6 shows that traffic noise peaks during the 6:00 a.m., 7:00 a.m., and 1:00 p.m. hours at LT-3.
- The long-term noise level measurement at LT-4 was performed at 13201 Marshall Lane from 9:00 a.m. on Tuesday, March 6, 2018, to 9:00 a.m. on Wednesday, March 7, 2018. Table 2.14-7 shows that traffic noise peaks during the 8:00 a.m. hour at LT-4.
- The long-term noise level measurement at LT-5 was performed at 828 South Breezy Way from 9:00 a.m. on Wednesday, March 7, 2018, to 9:00 a.m. on Thursday, March 8, 2018. Table 2.14-8 shows that traffic noise peaks during the 6:00 a.m., 7:00 a.m., 2:00 p.m., 3:00 p.m., and 6:00 p.m. hours at LT-5.
- The long-term noise level measurement at LT-6 was performed at 1453 Highland Street from 9:00 a.m. on Wednesday, March 7, 2018, to 9:00 a.m. on Thursday, March 8, 2018. Table 2.14-9 shows that traffic noise peaks during the 5:00 a.m. hour at LT-6.

[1] A total of 62 measurements were conducted for 57 locations because measurements were conducted twice at five locations to improve the K-factor.

- The long-term noise level measurement at LT-7 was performed at 3001 North Valleyview Street from 10:00 a.m. on Wednesday, March 7, 2018, to 10:00 a.m. on Thursday, March 8, 2018. Table 2.14-10 shows that traffic noise peaks during the 7:00 a.m., 4:00 p.m., 5:00 p.m., and 6:00 p.m. hours at LT-7.

All long-term noise monitoring locations are shown on Figure 2.14-9.

## Table 2.14-2: Short-Term Ambient Noise Monitoring Results

| Monitor No. | Figure | Date | Start Time | Duration | dBA $L_{eq}$ | Location Description | Land Use | Noise Sources | Notes |
|---|---|---|---|---|---|---|---|---|---|
| ST-1 | Figure 2.14-9, Sheet 11 | 2/28/2018 | 9:27 AM | 15 minutes | 74.0 | 171 North Tustin Avenue, behind the medical offices. | Office | Traffic on SR 55 and SB SR 55 ramps. | |
| ST-2 | Figure 2.14-9, Sheet 1 | 2/28/2018 | 9:27 AM | 15 minutes | 59.0 | 165 North Myrtle Avenue, on the sidewalk in front of the building. | Residential | Traffic on SR 55, traffic on SB SR 55 Irvine Boulevard off-ramp, and light traffic on North Myrtle Avenue. | |
| ST-3 | Figure 2.14-9, Sheet 11 | 2/28/2018 | 9:27 AM | 15 minutes | 60.7 | 2321 East 4th Street. North of the Two Fisherman Grill patio area. | Restaurant | Traffic on SR 55 and SB SR 55 East 4th Street off-ramp and distant, intermittent traffic on East 4th Street. | |
| ST-4 | Figure 2.14-9, Sheet 11 | 2/28/2018 | 10:14 AM | 15 minutes | 59.5 | 521 North Tustin Avenue, The Village Apartments. South of the patio of Building 581, Unit A. | Residential | Traffic on SR 55 and SB SR 55 East 4th Street off-ramp. | Patios have vinyl fence/wall. Too small to be 10 ft away from surface. |
| ST-5 | Figure 2.14-9, Sheet 12 | 4/25/2018 | 11:49 AM | 15 minutes | 62.0 | 521 North Tustin Avenue, The Village Apartments. On the second floor walkway of Building 571, in front of Unit K. South of the balcony of Building 563, Unit G. | Residential | Traffic on SR 55 and SB SR 55 East 4th Street off-ramp. | |
| ST-6 | Figure 2.14-9, Sheet 12 | 2/28/2018 | 10:55 AM | 15 minutes | 60.9 | 521 North Tustin Avenue, The Village Apartments. Southeast of the patio of Building 563, Unit A. | Residential | Traffic on SR 55 and SB SR 55 East 4th Street off-ramp. | Patios have vinyl fence/wall. Too small to be 10 ft away from surface. |
| ST-7 | Figure 2.14-9, Sheet 12 | 2/28/2018 | 11:46 AM | 15 minutes | 62.7 | 999 North Tustin Avenue, east of the hospital building. | Hospital | Traffic on SR 55. | 4.5-ft existing wall. |
| ST-8 | Figure 2.14-9, Sheet 13 | 2/28/2018 | 12:22 PM | 15 minutes | 58.1 | 1301 North Tustin Avenue, east of the hospital building. | Hospital | Traffic on SR 55. | 6-ft existing wall. |
| ST-9 | Figure 2.14-9, Sheet 13 | 2/28/2018 | 12:55 PM | 15 minutes | 72.8 | 1403 North Tustin Avenue, east of the office building. | Office | Traffic on SR 55 and SB SR 55 17th Street on-ramp. | |
| ST-10 | Figure 2.14-9, Sheets 13 & 14 | 3/6/2018 | 10:01 AM | 15 minutes | 66.2 | 2400 17th Street. In the parking lot of Vista Paint. | Retail | Traffic on SR 55, SB SR 55 17th Street on-ramp, and 17th Street. | |
| ST-11 | Figure 2.14-9, Sheet 1 | 2/28/2018 | 10:14 AM | 15 minutes | 61.7 | West of 17291 Irvine Boulevard. Granada Plaza B, Suites 300-495. | Office | Traffic on SR 55 and NB SR 55 Irvine Boulevard on-ramp. | Paused measurement for aircraft noise and parking lot activity. |
| ST-12 | Figure 2.14-9, Sheet 1 | 2/28/2018 | 10:14 AM | 15 minutes | 58.8 | 17272 Roseleaf Avenue, in front of the homes. | Residential | Traffic on SR 55 and NB SR 55 Irvine Boulevard on-ramp and light traffic on Yorba Street. | 10.5-ft existing wall. |

| Monitor No. | Figure | Date | Start Time | Duration | dBA $L_{eq}$ | Location Description | Land Use | Noise Sources | Notes |
|---|---|---|---|---|---|---|---|---|---|
| ST-13 | Figure 2.14-9, Sheet 2 | 4/24/2018 | 1:36 PM | 15 minutes | 55.0 | 17272 Amaganset Way, in front of the homes. | Residential | Traffic on SR 55. | 10.5-ft existing wall. |
| ST-14 | Figure 2.14-9, Sheet 2 | 2/28/2018 | 10:55 AM | 15 minutes | 54.3 | 14491 Heights Drive, in front of the home. | Residential | Traffic on SR 55. | Birds and wind. 10.5-ft existing wall. |
| ST-15 | Figure 2.14-9, Sheet 2 | 2/28/2018 | 11:46 AM | 15 minutes | 62.3 | 14411 Heights Drive, in the backyard. | Residential | Traffic on SR 55. | Birds and wind. 10.5-ft existing wall. |
| ST-16 | Figure 2.14-9, Sheet 2 | 2/28/2018 | 11:46 AM | 15 minutes | 62.8 | 14341 Yorba Street, in the backyard. | Residential | Traffic on SR 55. | 8.5-ft existing wall. |
| ST-17 | Figure 2.14-9, Sheet 3 | 4/25/2018 | 12:29 PM | 15 minutes | 62.8 | 14291 Yorba Street, in the backyard. | Residential | Traffic on SR 55. | 8.5-ft existing wall. |
| ST-18 | Figure 2.14-9, Sheet 3 | 2/28/2018 | 12:22 PM | 15 minutes | 68.9 | 14211 Yorba Street, south of the office building. | Office | Traffic on SR 55 and NB SR 55 17th Street off-ramp. | 4-ft existing wall. |
| ST-19 | Figure 2.14-9, Sheet 3 | 2/28/2018 | 12:55 PM | 15 minutes | 63.5 | 14101 Yorba Street, north of the building. In the fourth parking space from the building. | Office | Traffic on SR 55 and NB SR 55 17th Street off-ramp. | 6.5-ft existing wall. |
| ST-20 | Figure 2.14-9, Sheet 3 | 2/28/2018 | 12:55 PM | 15 minutes | 64.7 | 14101 Yorba Street, in the parking lot south of the office building. | Office | Traffic on SR 55, NB SR 55 17th Street off-ramp, and light traffic on Yorba Street. | |
| ST-21 | Figure 2.14-9, Sheet 14 | 3/6/2018 | 10:01 AM | 15 minutes | 59.5 | 13922 Deodar Street, in the backyard. | Residential | Traffic on SR 55, SB SR 55 17th Street off-ramp, and SB 17th Street loop off-ramp. | 10.5-ft existing wall. |
| ST-22 | Figure 2.14-9, Sheet 14 | 3/6/2018 | 10:40 AM | 15 minutes | 59.8 | 13802 Deodar Street, in the backyard. | Residential | Traffic on SR 55 and SB 17th Street off-ramp. | 12-ft existing wall. |
| ST-23 | Figure 2.14-9, Sheet 15 | 3/6/2018 | 11:14 AM | 15 minutes | 62.4 | 2013 Deodar Street, in the backyard. | Residential | Traffic on SR 55. | 11-ft existing wall. |
| ST-24[1] | Figure 2.14-9, Sheet 15 | 4/10/2018 | 2:45 PM | 15 minutes | 60.0 | 2109 Deodar Street, in the backyard. | Residential | Traffic on SR 55. | 12-ft existing wall. |
| ST-24[2] | N/A | 3/6/2018 | 11:14 AM | 15 minutes | 54.6 | 2109 Deodar Street, in the backyard. | Residential | Traffic on SR 55. | 12-ft existing wall. |
| ST-25 | Figure 2.14-9, Sheet 15 | 3/6/2018 | 11:59 AM | 15 minutes | 61.6 | 2413 East Buffalo Avenue, in the backyard. | Residential | Traffic on SR 55. | 13.5-ft existing wall. |
| ST-26 | Figure 2.14-9, Sheet 4 | 3/6/2018 | 10:01 AM | 15 minutes | 54.9 | 13931 Carroll Way, next to the outdoor eating area of Date Cafe. | Restaurant | Traffic on SR 55 and NB SR 55 17th Street on-ramp, parking lot activity, and vehicles passing by. | Motorcycle startup and idle vehicle running for 1 minute. |
| ST-27[1] | Figure 2.14-9, Sheet 4 | 4/10/2018 | 2:01 PM | 15 minutes | 60.2 | 13801 Marshall Lane, in the backyard. | Residential | Traffic on SR 55, NB SR 55 17th Street on-ramp. | 16-ft existing wall. |

| Monitor No. | Figure | Date | Start Time | Duration | dBA $L_{eq}$ | Location Description | Land Use | Noise Sources | Notes |
|---|---|---|---|---|---|---|---|---|---|
| ST-27[2] | Figure 2.14-9, Sheet 4 | 3/6/2018 | 10:40 AM | 15 minutes | 41.7 | 13811 Marshall Lane, in front of the home. | Residential | Traffic on SR 55. | Birds, wind, and very light traffic on Marshall Lane. 16-ft existing wall. |
| ST-28 | Figure 2.14-9, Sheet 4 | 3/6/2018 | 10:40 AM | 15 minutes | 51.8 | 13751 Marshall Lane, on the sidewalk in front of the home. | Residential | Traffic on SR 55. | Some aircraft noise, 16-ft existing wall. |
| ST-29 | Figure 2.14-9, Sheet 5 | 3/6/2018 | 11:14 AM | 15 minutes | 60.7 | 13662 Marshall Lane, in the driveway in front of the home. | Residential | Traffic on SR 55. | 16-ft existing wall. |
| ST-30 | Figure 2.14-9, Sheet 5 | 3/6/2018 | 11:59 AM | 15 minutes | 55.1 | 13562 Marshall Lane, in the backyard. | Residential | Traffic on SR 55. | Some aircraft noise, 16-ft existing wall. |
| ST-31 | Figure 2.14-9, Sheet 16 | 3/6/2018 | 12:41 PM | 15 minutes | 58.1 | 2351 East Santa Clara Avenue, Latitude Apartment Homes. In front of the patios of Building 2329, Units 29A and 29E. | Residential | Traffic on SR 55 and occasional faint traffic on Fairview Avenue. | 16-ft existing wall. First row patios are shielded by carports. |
| ST-32 | Figure 2.14-9, Sheet 16 | 3/6/2018 | 12:41 PM | 15 minutes | 60.0 | Between 2409 and 2417 Deodar Street, behind the homes. | Residential | Traffic on SR 55. | 16-ft existing wall. |
| ST-33 | Figure 2.14-9, Sheet 16 | 3/6/2018 | 1:26 PM | 15 minutes | 57.8 | 2513 Deodar Street, in the backyard. | Residential | Traffic on SR 55. | Some aircraft noise, 16-ft existing wall. |
| ST-34 | Figure 2.14-9, Sheet 17 | 3/6/2018 | 1:26 PM | 15 minutes | 58.7 | 2617 Deodar Street, in the backyard. | Residential | Traffic on SR 55. | 13.5-ft existing wall. |
| ST-35[1] | Figure 2.14-9, Sheet 6 | 4/10/2018 | 11:01 AM | 15 minutes | 61.8 | 13321 Marshall Lane, in the backyard | Residential | Traffic on SR 55. | 16.5-ft existing wall.[3] |
| ST-35[2] | N/A | 3/6/2018 | 11:59 AM | 15 minutes | 52.4 | 13321 Marshall Lane, on the sidewalk in front of the home. | Residential | Traffic on SR 55. | Light traffic on Marshall Lane. Aircraft noise filtered out. 16.5-ft existing wall.[3] |
| ST-36 | Figure 2.14-9, Sheet 6 | 3/6/2018 | 12:41 PM | 15 minutes | 58.4 | 13271 Marshall Lane, in the backyard. | Residential | Traffic on SR 55. | 16.5-ft existing wall.[3] |
| ST-37 | Figure 2.14-9, Sheet 6 | 3/6/2018 | 1:26 PM | 15 minutes | 60.7 | 13142 Marshall Lane, in the front yard. | Residential | Traffic on SR 55. | 14.5-ft existing wall. |
| ST-38 | Figure 2.14-9, Sheet 7 | 3/7/2018 | 2:27 PM | 15 minutes | 56.5 | 13022 Marshall Lane, in the backyard. | Residential | Traffic on SR 55. | 14.5-ft existing wall. |
| ST-39 | Figure 2.14-9, Sheet 17 | 3/7/2018 | 2:27 PM | 15 minutes | 58.1 | 2029 East Stearns Avenue, north of the front of the homes. At the cul-de-sac of East Stearns Avenue. | Residential | Traffic on SR 55 and EB SR 22 to SB SR 55 connector. | Aircraft and motorcycles filtered out, 14.5 ft existing wall. |
| ST-40 | Figure 2.14-9, Sheet 17 | 3/7/2018 | 1:49 PM | 15 minutes | 52.4 | 2014 East Kirkwood Avenue, in the front yard. | Residential | Traffic on SR 55 and EB SR 22 to SB SR 55 connector. | Aircraft filtered out, 9.5 ft existing wall. |

| Monitor No. | Figure | Date | Start Time | Duration | dBA $L_{eq}$ | Location Description | Land Use | Noise Sources | Notes |
|---|---|---|---|---|---|---|---|---|---|
| ST-41 | Figure 2.14-9, Sheet 7 | 3/7/2018 | 2:27 PM | 15 minutes | 63.2 | 2201 East Fairhaven Avenue, Grace Church of Orange. Near the playground area. | Church | Traffic on SR 55 and NB SR 55 to WB SR 22 connector. | 11 ft existing wall. |
| ST-42 | Figure 2.14-9, Sheets 7-9 | 3/7/2018 | 1:49 PM | 15 minutes | 62.8 | 816 South Breezy Way, in the backyard. | Residential | Traffic on SR 55 and NB SR 55 to WB SR 22 connector. | 9.5-10.5-ft existing wall. |
| ST-43 | Figure 2.14-9, Sheets 7-9 | 3/7/2018 | 1:13 PM | 15 minutes | 60.1 | 732 South Breezy Way, in the backyard. | Residential | Traffic on SR 55 and NB SR 55 to WB SR 22 connector. | 9.5-10.5-ft existing wall. |
| ST-44 | Figure 2.14-9, Sheet 18 | 3/7/2018 | 1:13 PM | 15 minutes | 67.2 | 681 South Tustin Street, south of Caltrans maintenance facility. | Maintenance Facility | Traffic on EB SR 22 to NB SR 55 connector and SR 55. | 4.5- to 7-ft existing wall. |
| ST-45 | Figure 2.14-9, Sheet 19 | 3/7/2018 | 12:22 PM | 15 minutes | 65.5 | 1940 East Katella Avenue, Chevron gas station. | Gas Station | Traffic on SR 55, SB SR 55 Katella Avenue on-ramp, and Katella Avenue. | |
| ST-46 | Figure 2.14-9, Sheet 19 | 3/7/2018 | 12:22 PM | 15 minutes | 59.8 | 1918 East Vanowen Avenue, Ridgewood Village Apartments. Behind the multifamily homes. | Residential | Traffic on SR 55, SB SR 55 Katella Avenue off-ramp, and Katella Avenue. | 16-ft existing wall.[3] |
| ST-47 | Figure 2.14-9, Sheet 19 | 3/7/2018 | 12:22 PM | 15 minutes | 59.6 | 1453 North Highland Street, Ridgewood Village Apartments. Behind the homes. | Residential | Traffic on SR 55 and SB SR 55 Katella Avenue off-ramp. | Retaining wall only. |
| ST-48 | Figure 2.14-9, Sheet 20 | 3/7/2018 | 11:29 AM | 15 minutes | 60.8 | 2652 North Tustin Street, in the parking lot. Near the Starbucks patio area. | Restaurant | Traffic on Tustin Street and SR 55. | Vehicles in parking lot. |
| ST-49 | Figure 2.14-9, Sheet 21 | 3/7/2018 | 10:32 AM | 15 minutes | 57.4 | 2864 North Tustin Street, in Eisenhower Park. | Park | Traffic on SR 55, SB SR 55 Lincoln Avenue off-ramp, and North Tustin Street. | |
| ST-50 | Figure 2.14-9, Sheet 21 | 3/7/2018 | 10:32 AM | 15 minutes | 58.1 | 3047 North Valley View Street, in the backyard. | Residential | Traffic on SR 55 and North Tustin Street. | Birds and wind. |
| ST-51[1] | Figure 2.14-9, Sheet 9 | 4/10/2018 | 10:35 AM | 15 minutes | 71.9 | 2650 North Santiago Boulevard, behind the businesses. | Restaurant/ Commercial/ Retail | Traffic on SR 55 and NB SR 55 Lincoln Avenue off-ramp. | |
| ST-51[2] | N/A | 3/7/2018 | 11:29 AM | 15 minutes | 69.4 | 2680 North Santiago Boulevard, southwest of Farukhi and Co. | Restaurant/ Commercial/ Retail | Traffic on SR 55 and SR 55 NB off-ramp to Lincoln Avenue. | |
| ST-52 | Figure 2.14-9, Sheet 9 | 7/17/2018 | 10:39 AM | 15 minutes | 58.0 | 2680 North Vista Glen Road, in the backyard. | Residential | Traffic on SR 55, North Santiago Boulevard, SR 55 NB off-ramp to Lincoln Avenue, and SR 55 NB on-ramp from Lincoln Avenue. | |

| Monitor No. | Figure | Date | Start Time | Duration | dBA $L_{eq}$ | Location Description | Land Use | Noise Sources | Notes |
|---|---|---|---|---|---|---|---|---|---|
| ST-53 | Figure 2.14-9, Sheet 9 | 7/17/2018 | 11:16 AM | 15 minutes | 59.4 | 2011 East Vista Royale Drive, in the backyard. | Residential | Traffic on SR 55, North Santiago Boulevard, Lincoln Avenue/Nohl Ranch Road, SR 55 NB off-ramp to Lincoln Avenue, and SR 55 NB on-ramp from Lincoln Avenue. | |
| ST-54[1] | Figure 2.14-9, Sheet 9 | 4/10/2018 | 9:22 AM | 15 minutes | 71.3 | 2854 North Santiago Boulevard, in Flappy Jack's Pancake House parking lot. | Restaurant | Traffic on SR 55. | |
| ST-54[2] | N/A | 3/7/2018 | 10:32 AM | 15 minutes | 66.3 | 2854 North Santiago Boulevard, in Flappy Jack's Pancake House parking lot. | Restaurant | Traffic on SR 55. | |
| ST-55 | Figure 2.14-9, Sheet 10 | 3/7/2018 | 9:52 AM | 15 minutes | 72.2 | 2910 North Santiago Boulevard, Orange Hills Assembly Church. In the north parking lot. | Church | Traffic on SR 55 and North Santiago Boulevard. | |
| ST-56 | Figure 2.14-9, Sheet 10 | 4/24/2018 | 10:41 AM | 15 minutes | 62.8 | 2890 East Maple Tree Drive, in the backyard. | Residential | Traffic on SR 55 and faint traffic on North Santiago Boulevard and North Tustin Street. | |
| ST-57 | Figure 2.14-9, Sheet 10 | 4/24/2018 | 10:41 AM | 15 minutes | 58.5 | 2942 East Maple Tree Drive, in the backyard. | Residential | Traffic on SR 55 and faint traffic on North Santiago Boulevard and North Tustin Street. | 6.5-ft existing wall. |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels; ft: foot/feet; EB: eastbound; NB: northbound; SB: southbound; SR 55: State Route 55; WB; westbound
Source: Compiled by LSA (2018).

[1] Noise level measurement was re-conducted to improve the K-factor. The noise level measurement was calibrated using the traffic counts collected during the original measurement.

[2] Original noise level measurement which was re-conducted to improve the K-factor.

[3] The height of this wall includes a portion of the wall that functions as a retaining wall.

## Table 2.14-3: Meteorological Conditions

| Date | Temperature (°F) | Average Wind Speed (mph) |
|---|---|---|
| 2/28/2018 | 60.4 – 72.4 | 0.7 – 4.0 |
| 3/6/2018 | 75.9 – 89.8 | 0.7 – 2.0 |
| 3/7/2018 | 64.0 – 80.0 | 0.0 – 3.5 |
| 4/10/2018 | 76.7 – 95.4 | 0.7 – 2.4 |
| 4/24/2018 | 77.1 – 78.1 | 1.0 – 1.9 |
| 4/25/2018 | 72.9 – 76.3 | 1.2 – 1.8 |
| 7/17/2018 | 85.1 – 96.8 | 0.9 – 1.3 |

**Notes**: °F: degrees Fahrenheit; mph: miles per hour
Source: Compiled by LSA (2018).

## Table 2.14-4: Long-Term 24-Hour Noise Level Measurement Results at 17272 Amaganset Way, Tustin, CA (LT-1)

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 9:00 AM | 2/28/2018 | 59 |
| 2 | 10:00 AM | 2/28/2018 | 60 |
| 3 | 11:00 AM | 2/28/2018 | **61** [a] |
| 4 | 12:00 PM | 2/28/2018 | **61** [a] |
| 5 | 1:00 PM | 2/28/2018 | **61** [a] |
| 6 | 2:00 PM | 2/28/2018 | **61** [a] |
| 7 | 3:00 PM | 2/28/2018 | 60 |
| 8 | 4:00 PM | 2/28/2018 | 60 |
| 9 | 5:00 PM | 2/28/2018 | 59 |
| 10 | 6:00 PM | 2/28/2018 | 59 |
| 11 | 7:00 PM | 2/28/2018 | 59 |
| 12 | 8:00 PM | 2/28/2018 | 59 |
| 13 | 9:00 PM | 2/28/2018 | 59 |
| 14 | 10:00 PM | 2/28/2018 | 58 |
| 15 | 11:00 PM | 2/28/2018 | 56 |
| 16 | 12:00 AM | 2/29/2018 | 54 |
| 17 | 1:00 AM | 2/29/2018 | 53 |
| 18 | 2:00 AM | 2/29/2018 | 53 |
| 19 | 3:00 AM | 2/29/2018 | 55 |
| 20 | 4:00 AM | 2/29/2018 | 58 |
| 21 | 5:00 AM | 2/29/2018 | 60 |
| 22 | 6:00 AM | 2/29/2018 | 60 |
| 23 | 7:00 AM | 2/29/2018 | 60 |
| 24 | 8:00 AM | 2/29/2018 | 59 |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 2
Source: Compiled by LSA (2018).
[a] **Bold** numbers represent the peak traffic noise hours.

**Figure 2.14-2. Long-term 24-hour Noise Level Measurement at LT-1**

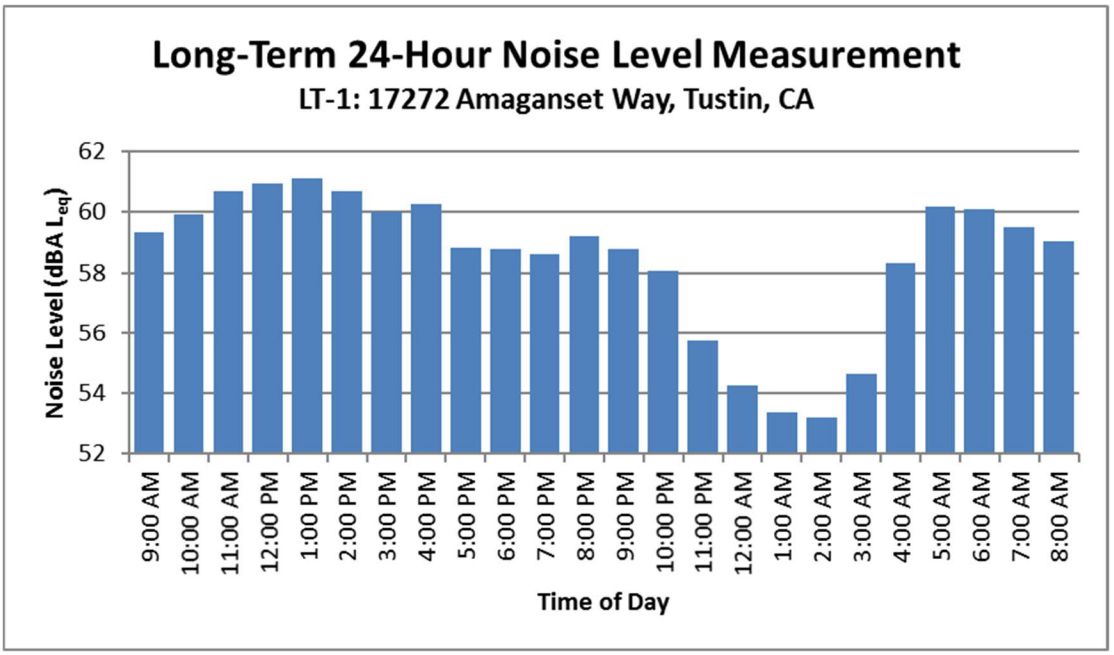



**Table 2.14-5: Long-Term 24-Hour Noise Level Measurement Results at 14291 Yorba Street, Tustin, CA (LT-2)**

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 7:00 PM | 4/24/2018 | 62 |
| 2 | 8:00 PM | 4/24/2018 | 62 |
| 3 | 9:00 PM | 4/24/2018 | 62 |
| 4 | 10:00 PM | 4/24/2018 | 61 |
| 5 | 11:00 PM | 4/24/2018 | 59 |
| 6 | 12:00 AM | 4/25/2018 | 57 |
| 7 | 1:00 AM | 4/25/2018 | 55 |
| 8 | 2:00 AM | 4/25/2018 | 55 |
| 9 | 3:00 AM | 4/25/2018 | 57 |
| 10 | 4:00 AM | 4/25/2018 | 60 |
| 11 | 5:00 AM | 4/25/2018 | 62 |
| 12 | 6:00 AM | 4/25/2018 | 61 |
| 13 | 7:00 AM | 4/25/2018 | 61 |
| 14 | 8:00 AM | 4/25/2018 | 61 |
| 15 | 9:00 AM | 4/25/2018 | **63** [a] |
| 16 | 10:00 AM | 4/25/2018 | **63** [a] |
| 17 | 11:00 AM | 4/25/2018 | **63** [a] |
| 18 | 12:00 PM | 4/25/2018 | **63** [a] |
| 19 | 1:00 PM | 4/25/2018 | **63** [a] |
| 20 | 2:00 PM | 4/25/2018 | 62 |
| 21 | 3:00 PM | 4/25/2018 | 61 |

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 22 | 4:00 PM | 4/25/2018 | 61 |
| 23 | 5:00 PM | 4/25/2018 | 60 |
| 24 | 6:00 PM | 4/25/2018 | 62 |

Figure 2.14-9, Sheet 3
Source: Compiled by LSA (2018).
[a] Bold numbers represent the peak traffic noise hours.
dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels

**Figure 2.14-3. Long-term 24-hour Noise Level Measurement at LT-2**

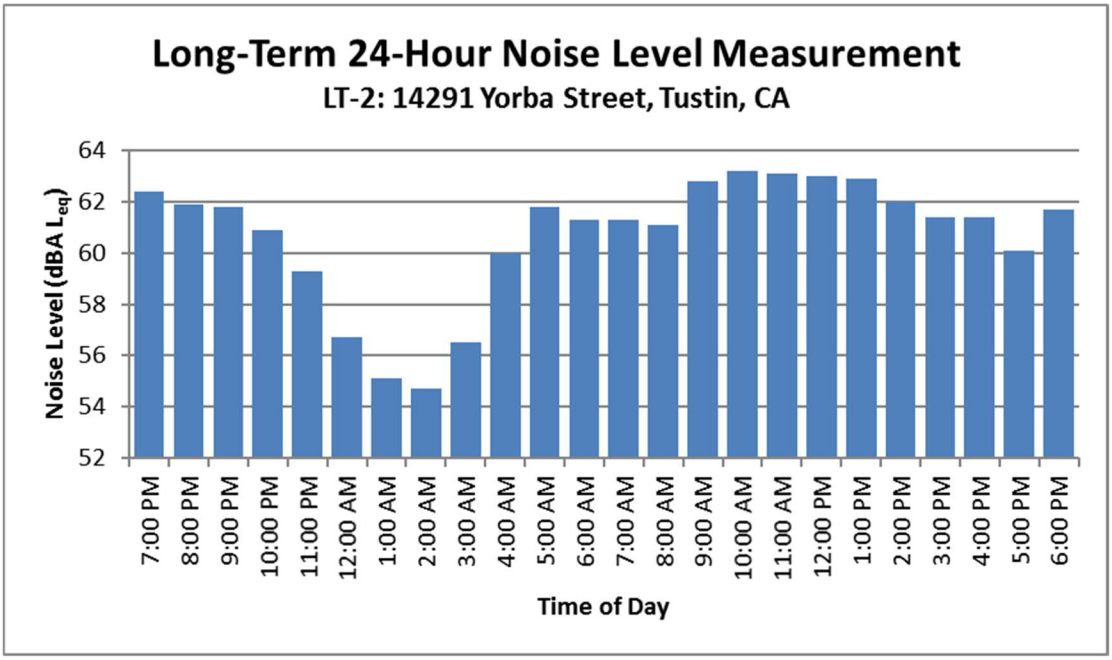


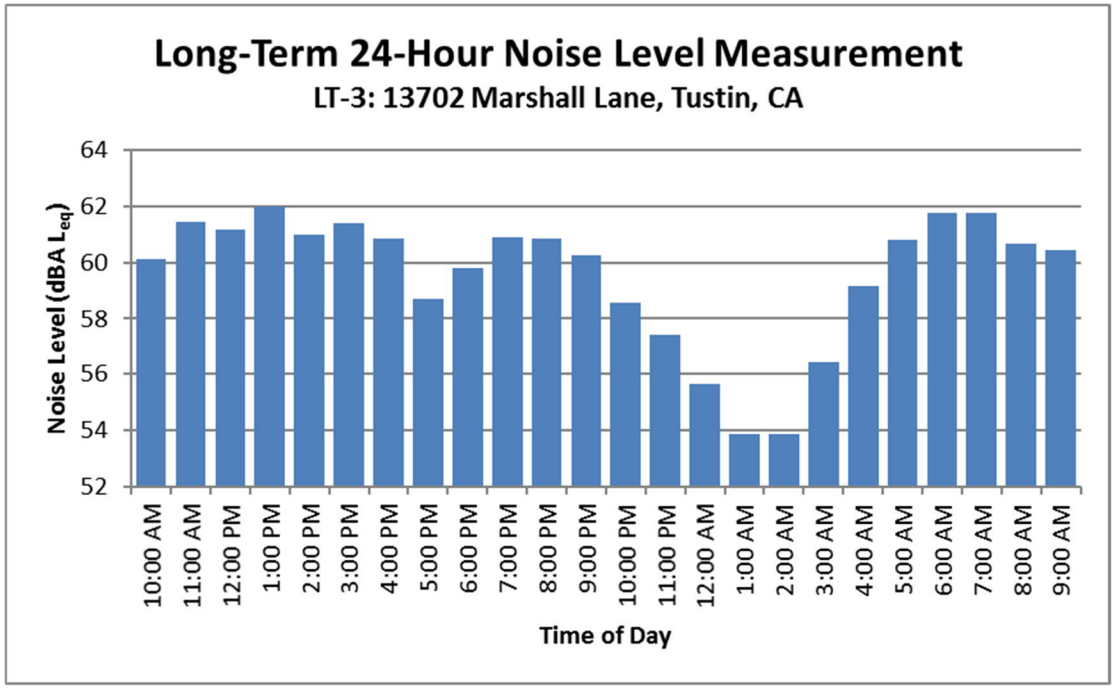

**Table 2.14-6: Long-Term 24-Hour Noise Level Measurement Results at 13702 Marshall Lane, Tustin, CA (LT-3)**

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 10:00 AM | 3/6/2018 | 60 |
| 2 | 11:00 AM | 3/6/2018 | 61 |
| 3 | 12:00 PM | 3/6/2018 | 61 |
| 4 | 1:00 PM | 3/6/2018 | **62** [a] |
| 5 | 2:00 PM | 3/6/2018 | 61 |
| 6 | 3:00 PM | 3/6/2018 | 61 |
| 7 | 4:00 PM | 3/6/2018 | 61 |
| 8 | 5:00 PM | 3/6/2018 | 59 |
| 9 | 6:00 PM | 3/6/2018 | 60 |
| 10 | 7:00 PM | 3/6/2018 | 61 |
| 11 | 8:00 PM | 3/6/2018 | 61 |
| 12 | 9:00 PM | 3/6/2018 | 60 |
| 13 | 10:00 PM | 3/6/2018 | 59 |

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 14 | 11:00 PM | 3/6/2018 | 57 |
| 15 | 12:00 AM | 3/7/2018 | 56 |
| 16 | 1:00 AM | 3/7/2018 | 54 |
| 17 | 2:00 AM | 3/7/2018 | 54 |
| 18 | 3:00 AM | 3/7/2018 | 56 |
| 19 | 4:00 AM | 3/7/2018 | 59 |
| 20 | 5:00 AM | 3/7/2018 | 61 |
| 21 | 6:00 AM | 3/7/2018 | **62** [a] |
| 22 | 7:00 AM | 3/7/2018 | **62** [a] |
| 23 | 8:00 AM | 3/7/2018 | 61 |
| 24 | 9:00 AM | 3/7/2018 | 60 |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 5
Source: Compiled by LSA (2018).
[a] Bold numbers represent the peak traffic noise hours.

**Figure 2.14-4. Long-term 24-hour Noise Level Measurement at LT-3**



## Table 2.14-7: Long-Term 24-Hour Noise Level Measurement Results at 13201 Marshall Lane, Tustin, CA (LT-4)

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 9:00 AM | 3/6/2018 | 64 |
| 2 | 10:00 AM | 3/6/2018 | 63 |
| 3 | 11:00 AM | 3/6/2018 | 64 |
| 4 | 12:00 PM | 3/6/2018 | 64 |
| 5 | 1:00 PM | 3/6/2018 | 64 |
| 6 | 2:00 PM | 3/6/2018 | 64 |
| 7 | 3:00 PM | 3/6/2018 | 64 |
| 8 | 4:00 PM | 3/6/2018 | 64 |
| 9 | 5:00 PM | 3/6/2018 | 61 |
| 10 | 6:00 PM | 3/6/2018 | 63 |
| 11 | 7:00 PM | 3/6/2018 | 63 |
| 12 | 8:00 PM | 3/6/2018 | 64 |
| 13 | 9:00 PM | 3/6/2018 | 64 |
| 14 | 10:00 PM | 3/6/2018 | 62 |
| 15 | 11:00 PM | 3/6/2018 | 60 |
| 16 | 12:00 AM | 3/7/2018 | 58 |
| 17 | 1:00 AM | 3/7/2018 | 57 |
| 18 | 2:00 AM | 3/7/2018 | 57 |
| 19 | 3:00 AM | 3/7/2018 | 58 |
| 20 | 4:00 AM | 3/7/2018 | 61 |
| 21 | 5:00 AM | 3/7/2018 | 64 |
| 22 | 6:00 AM | 3/7/2018 | 65 |
| 23 | 7:00 AM | 3/7/2018 | 65 |
| 24 | 8:00 AM | 3/7/2018 | **66** [a] |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 6
Source: Compiled by LSA (2018).
[a] Bold numbers represent the peak traffic noise hour.

**Figure 2.14-5. Long-term 24-hour Noise Level Measurement at LT-4**

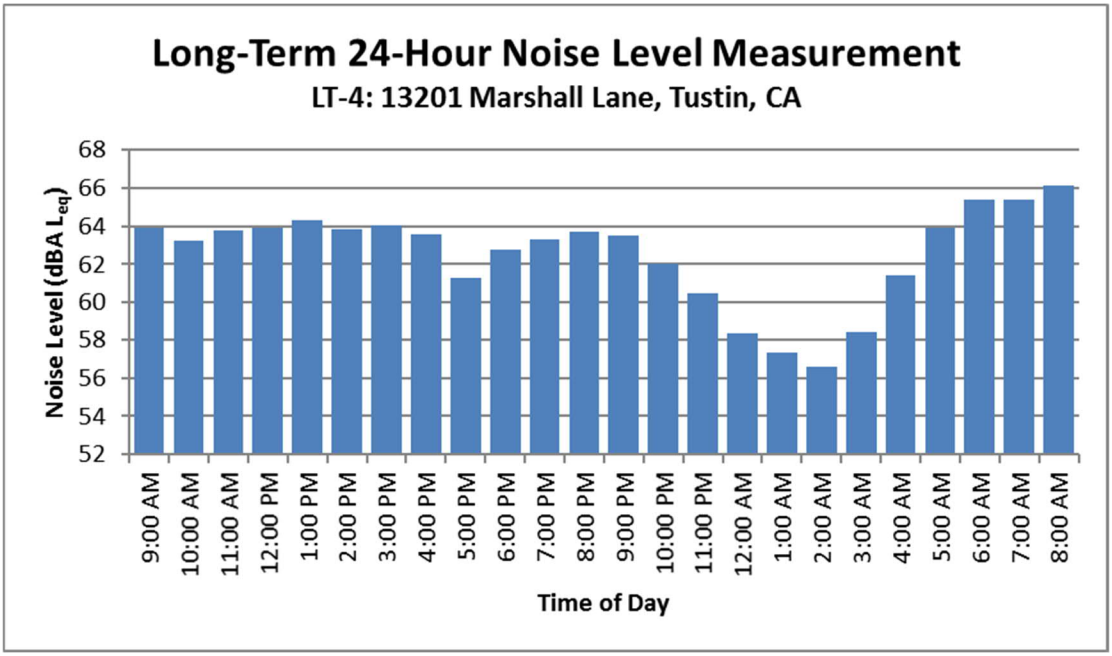



**Table 2.14-8: Long-Term 24-Hour Noise Level Measurement Results at 828 South Breezy Way, Orange, CA (LT-5)**

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 9:00 AM | 3/7/2018 | 64 |
| 2 | 10:00 AM | 3/7/2018 | 63 |
| 3 | 11:00 AM | 3/7/2018 | 64 |
| 4 | 12:00 PM | 3/7/2018 | 64 |
| 5 | 1:00 PM | 3/7/2018 | 64 |
| 6 | 2:00 PM | 3/7/2018 | **65** [a] |
| 7 | 3:00 PM | 3/7/2018 | **65** [a] |
| 8 | 4:00 PM | 3/7/2018 | 64 |
| 9 | 5:00 PM | 3/7/2018 | 62 |
| 10 | 6:00 PM | 3/7/2018 | **65** [a] |
| 11 | 7:00 PM | 3/7/2018 | 64 |
| 12 | 8:00 PM | 3/7/2018 | 64 |
| 13 | 9:00 PM | 3/7/2018 | 63 |
| 14 | 10:00 PM | 3/7/2018 | 62 |
| 15 | 11:00 PM | 3/7/2018 | 59 |
| 16 | 12:00 AM | 3/8/2018 | 58 |
| 17 | 1:00 AM | 3/8/2018 | 56 |
| 18 | 2:00 AM | 3/8/2018 | 56 |
| 19 | 3:00 AM | 3/8/2018 | 57 |
| 20 | 4:00 AM | 3/8/2018 | 60 |
| 21 | 5:00 AM | 3/8/2018 | 63 |
| 22 | 6:00 AM | 3/8/2018 | **65** [a] |
| 23 | 7:00 AM | 3/8/2018 | **65** [a] |
| 24 | 8:00 AM | 3/8/2018 | 64 |

**Notes**: dBA Leq: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 7
Source: Compiled by LSA (2018).
[a] Bold numbers represent the peak traffic noise hours.

**Figure 2.14-6. Long-term 24-hour Noise Level Measurement at LT-5**

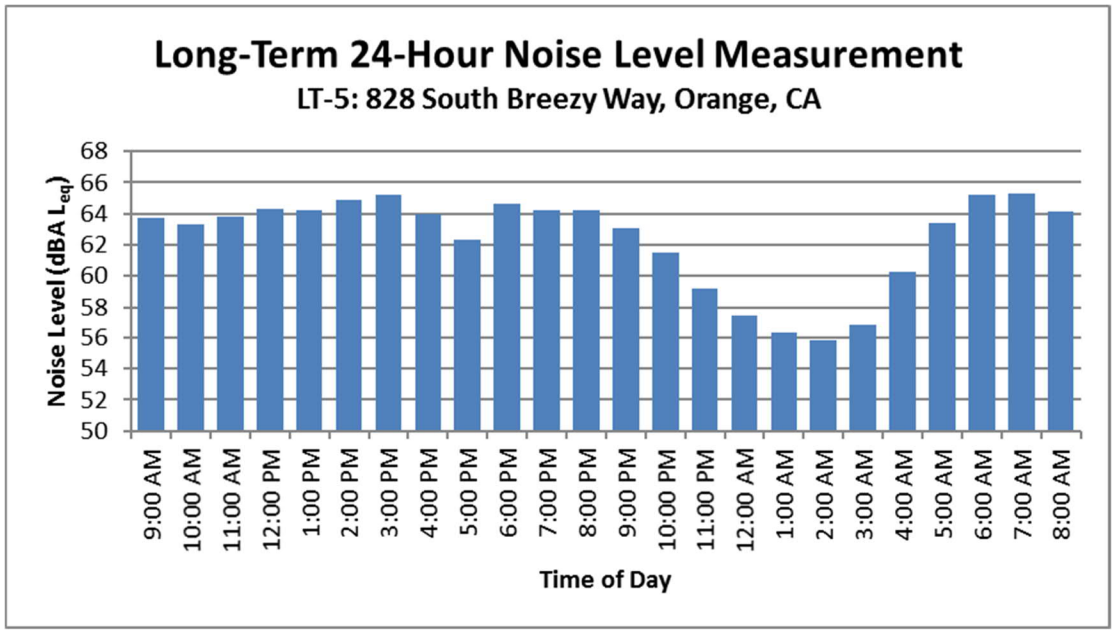



**Table 2.14-9: Long-Term 24-Hour Noise Level Measurement Results at 1453 North Highland Street, Orange, CA (LT-6)**

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 9:00 AM | 3/7/2018 | 64 |
| 2 | 10:00 AM | 3/7/2018 | 64 |
| 3 | 11:00 AM | 3/7/2018 | 63 |
| 4 | 12:00 PM | 3/7/2018 | 61 |
| 5 | 1:00 PM | 3/7/2018 | 61 |
| 6 | 2:00 PM | 3/7/2018 | 61 |
| 7 | 3:00 PM | 3/7/2018 | 61 |
| 8 | 4:00 PM | 3/7/2018 | 61 |
| 9 | 5:00 PM | 3/7/2018 | 62 |
| 10 | 6:00 PM | 3/7/2018 | 63 |
| 11 | 7:00 PM | 3/7/2018 | 62 |
| 12 | 8:00 PM | 3/7/2018 | 62 |
| 13 | 9:00 PM | 3/7/2018 | 61 |
| 14 | 10:00 PM | 3/7/2018 | 60 |
| 15 | 11:00 PM | 3/7/2018 | 58 |
| 16 | 12:00 AM | 3/8/2018 | 57 |
| 17 | 1:00 AM | 3/8/2018 | 56 |
| 18 | 2:00 AM | 3/8/2018 | 55 |
| 19 | 3:00 AM | 3/8/2018 | 58 |
| 20 | 4:00 AM | 3/8/2018 | 63 |
| 21 | 5:00 AM | 3/8/2018 | **65** [a] |
| 22 | 6:00 AM | 3/8/2018 | 64 |
| 23 | 7:00 AM | 3/8/2018 | 62 |
| 24 | 8:00 AM | 3/8/2018 | 63 |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 19
Source: Compiled by LSA (2018).
[a] **Bold** numbers represent the peak traffic noise hours.

**Figure 2.14-7. Long-term 24-hour Noise Level Measurement at LT-6**

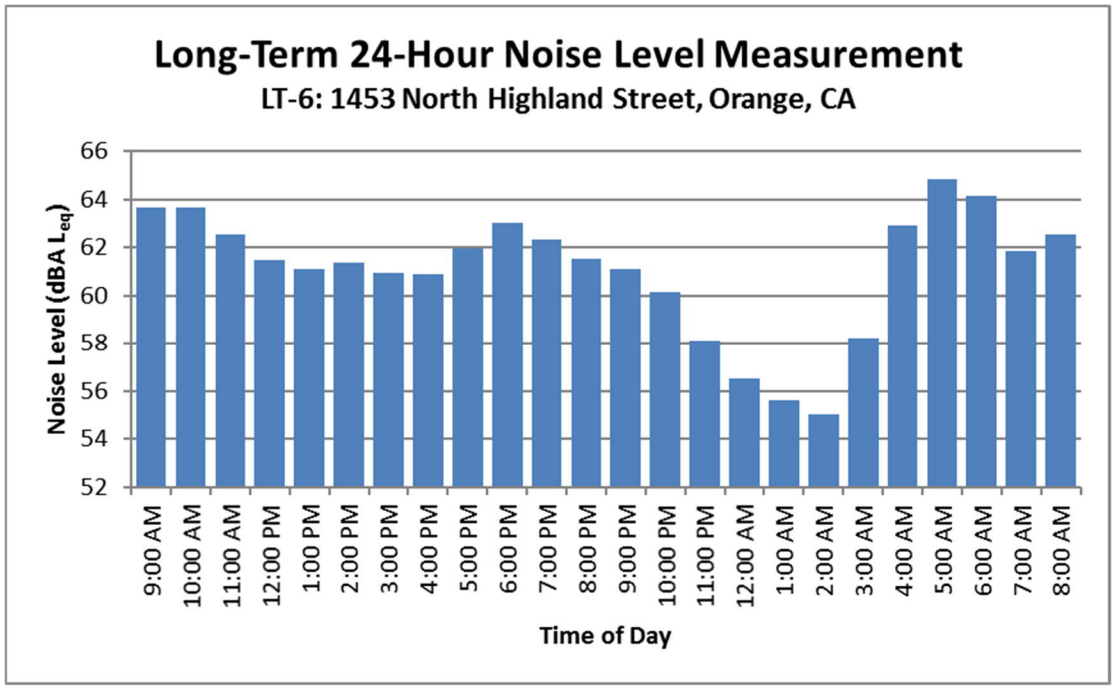


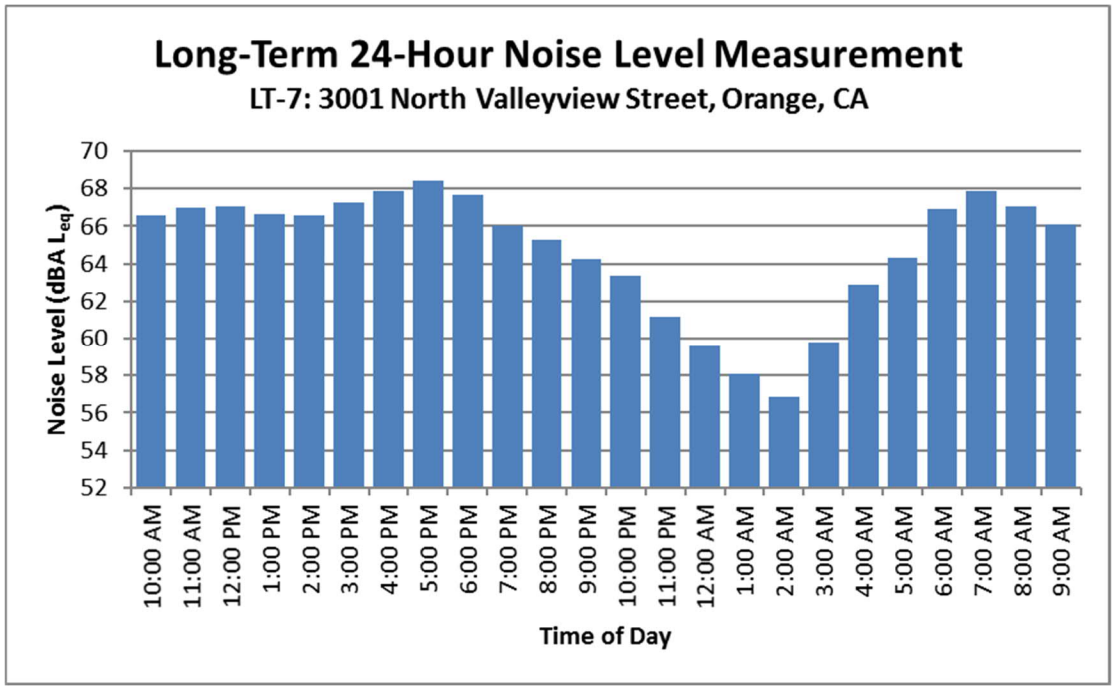

**Table 2.14-10: Long-Term 24-Hour Noise Level Measurement Results at 3001 North Valleyview Street, Orange, CA (LT-7)**

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 1 | 10:00 AM | 3/7/2018 | 67 |
| 2 | 11:00 AM | 3/7/2018 | 67 |
| 3 | 12:00 PM | 3/7/2018 | 67 |
| 4 | 1:00 PM | 3/7/2018 | 67 |
| 5 | 2:00 PM | 3/7/2018 | 67 |
| 6 | 3:00 PM | 3/7/2018 | 67 |
| 7 | 4:00 PM | 3/7/2018 | **68** [a] |
| 8 | 5:00 PM | 3/7/2018 | **68** [a] |
| 9 | 6:00 PM | 3/7/2018 | **68** [a] |
| 10 | 7:00 PM | 3/7/2018 | 66 |
| 11 | 8:00 PM | 3/7/2018 | 65 |
| 12 | 9:00 PM | 3/7/2018 | 64 |
| 13 | 10:00 PM | 3/7/2018 | 63 |
| 14 | 11:00 PM | 3/7/2018 | 61 |
| 15 | 12:00 AM | 3/8/2018 | 60 |
| 16 | 1:00 AM | 3/8/2018 | 58 |
| 17 | 2:00 AM | 3/8/2018 | 57 |
| 18 | 3:00 AM | 3/8/2018 | 60 |

| Hour of Day | Start Time | Date | Noise Level (dBA $L_{eq}$) |
|---|---|---|---|
| 19 | 4:00 AM | 3/8/2018 | 63 |
| 20 | 5:00 AM | 3/8/2018 | 64 |
| 21 | 6:00 AM | 3/8/2018 | 67 |
| 22 | 7:00 AM | 3/8/2018 | **68** [a] |
| 23 | 8:00 AM | 3/8/2018 | 67 |
| 24 | 9:00 AM | 3/8/2018 | 66 |

**Notes**: dBA $L_{eq}$: equivalent continuous sound level measured in A-weighted decibels
Figure 2.14-9, Sheet 21
Source: Compiled by LSA (2018).
[a] **Bold** numbers represent the peak traffic noise hours.

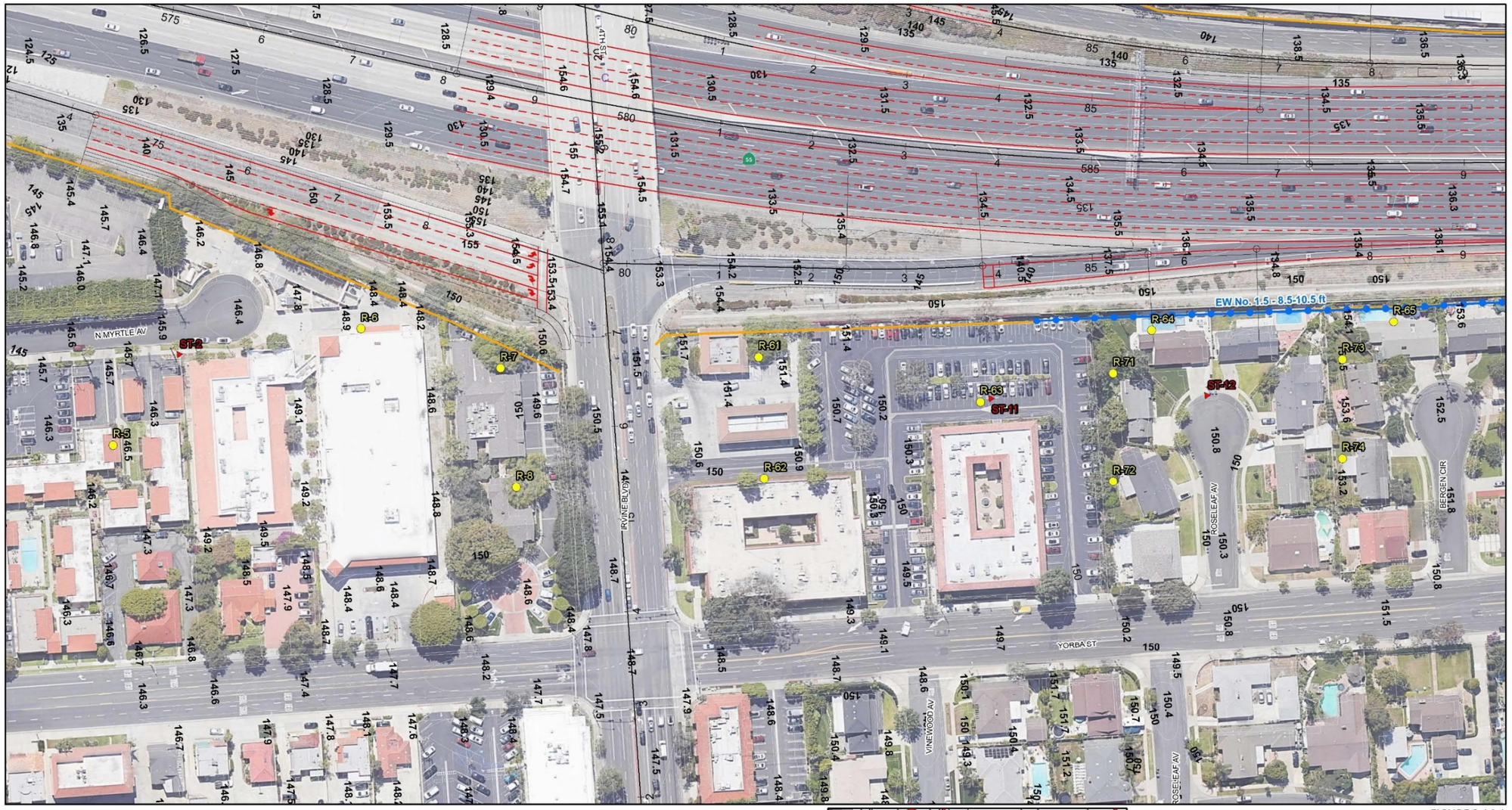
**Figure 2.14-8. Long-term 24-hour Noise Level Measurement at LT-7**




### 2.14.2.3 Existing Noise Levels

The existing and future 2055 traffic noise levels at all 327 receptor locations were modeled using either the worst-case traffic operations (prior to speed degradation) or peak-hour traffic volumes, whichever is lower. The worst-case traffic condition is generally loudest when vehicles on a given roadway travel at free-flowing traffic conditions and is assumed to be LOS C. Traffic volume assumptions are based on the maximum number of vehicles that can typically travel in a given lane under such conditions. The worst-case traffic volumes are assumed to be 1,950 vehicles per lane per hour (vplph) on the freeway mainline, 1,500 vplph on freeway HOV and auxiliary lanes, 1,000 vplph on freeway ramps, and 750 vplph on local roadways. The higher (a.m. or p.m.) peak-hour traffic volume was selected when the higher peak-hour traffic volume is lower than the worst-case traffic volume. The peak-hour traffic volumes for SR 55 were obtained from the Final Traffic Volume Report (February 2018).

**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 1 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

I:\JCV1701\GIS\MXD\Noise Section\MonitoringModeledReceptorLocations_Noise Section.mxd (6/11/2019)


FIGURE 2.14-1
Sheet 1 of 21

*SR 55 Improvement Project (I-5 to SR 91)*
Monitoring and Modeled Receptor Locations
12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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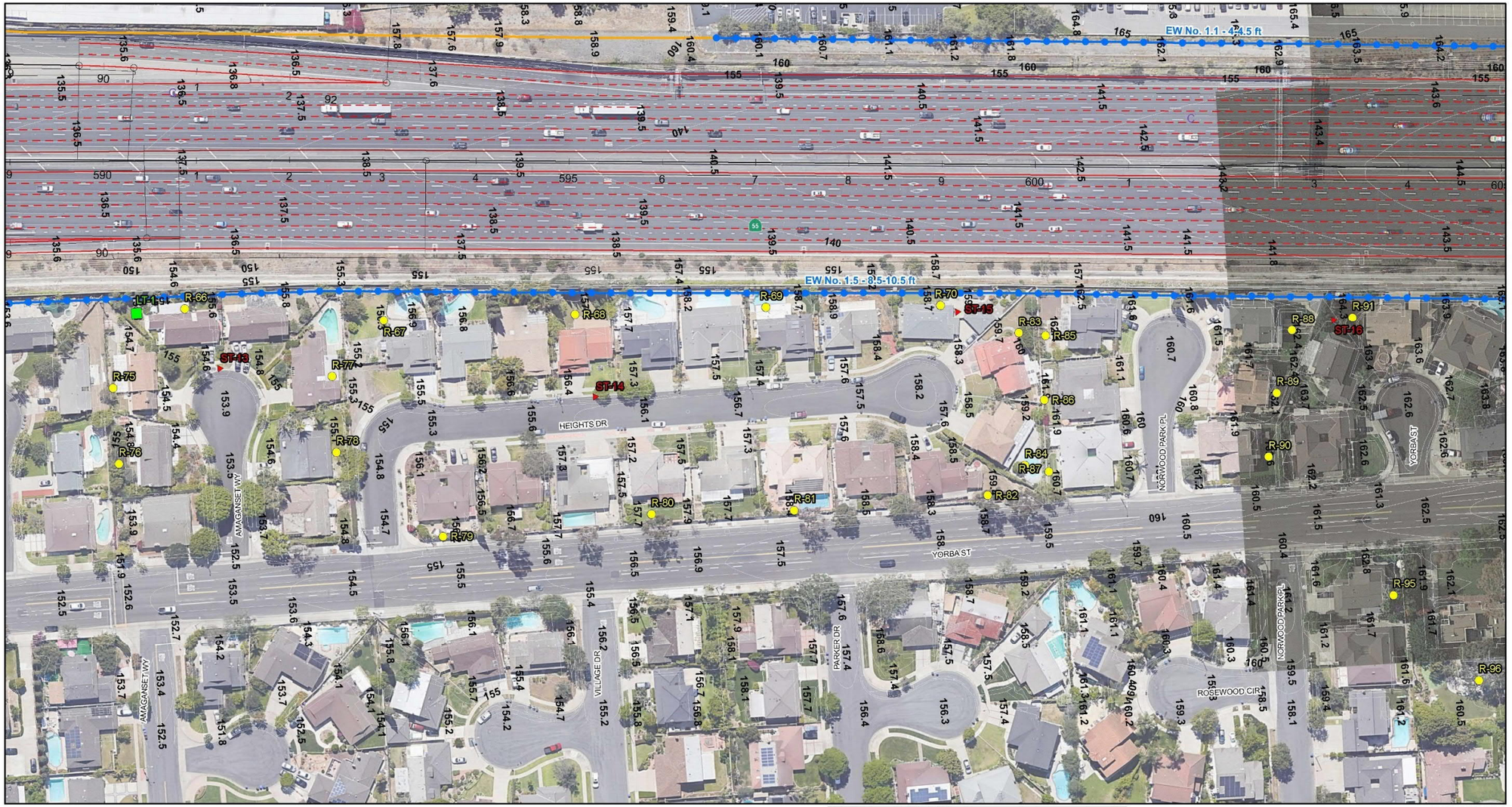
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 2 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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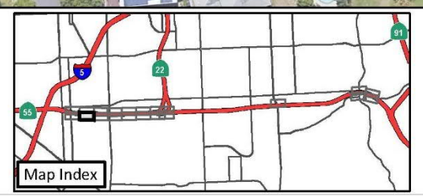


FIGURE 2.14-1
Sheet 2 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 3 of 21)**


LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 3 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 4 of 21)**

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 5 of 21)**


SOURCE: Bing (2015); Jacobs (2017)

I:\JCV1701\GIS\MXD\Noise Section\MonitoringModeledReceptorLocations_Noise Section.mxd (6/11/2019)

FIGURE 2.14-1
Sheet 5 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 6 of 21)**

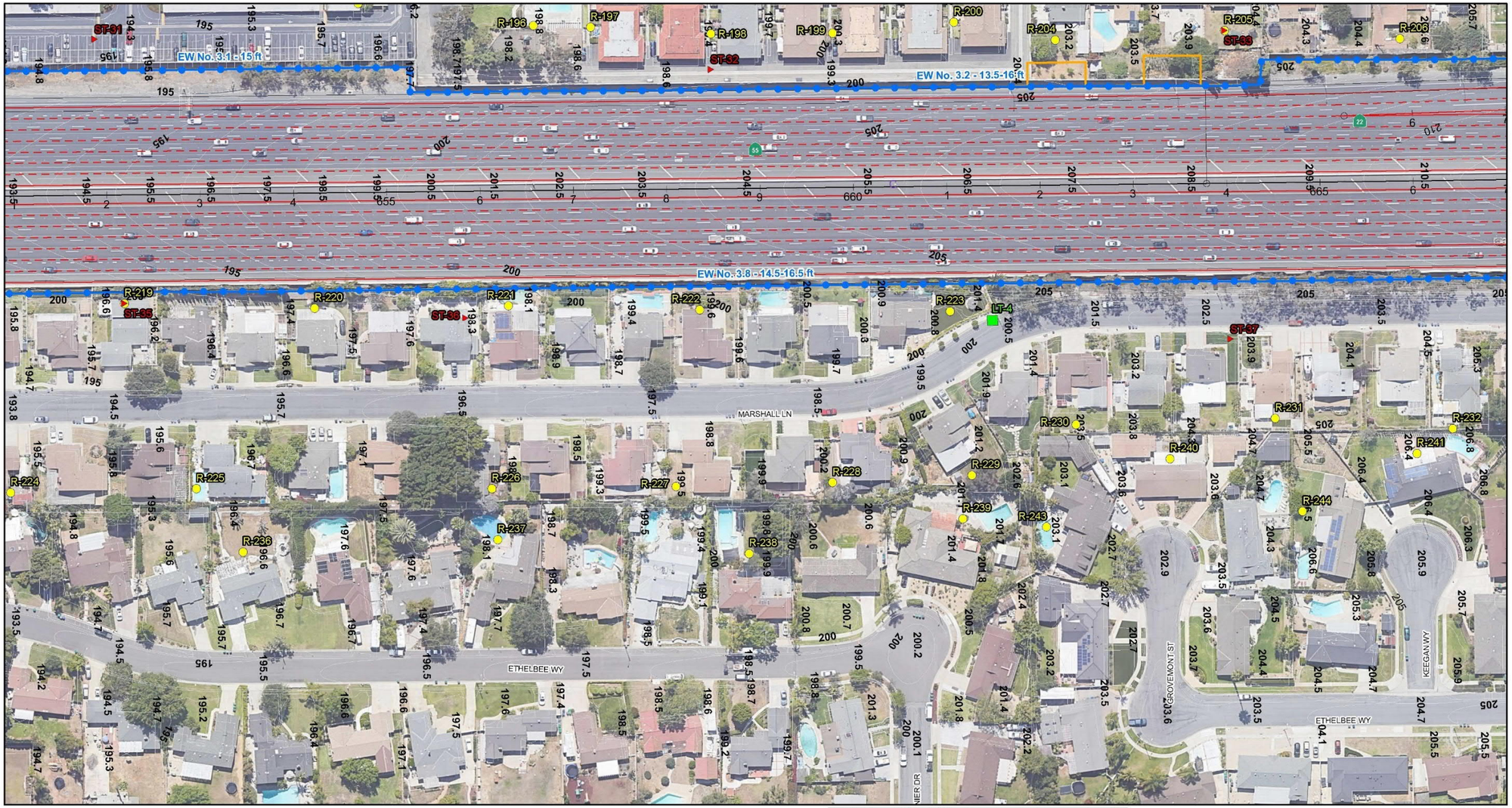


FIGURE 2.14-1
Sheet 6 of 21

*SR 55 Improvement Project (I-5 to SR 91)*
Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 7 of 21)**

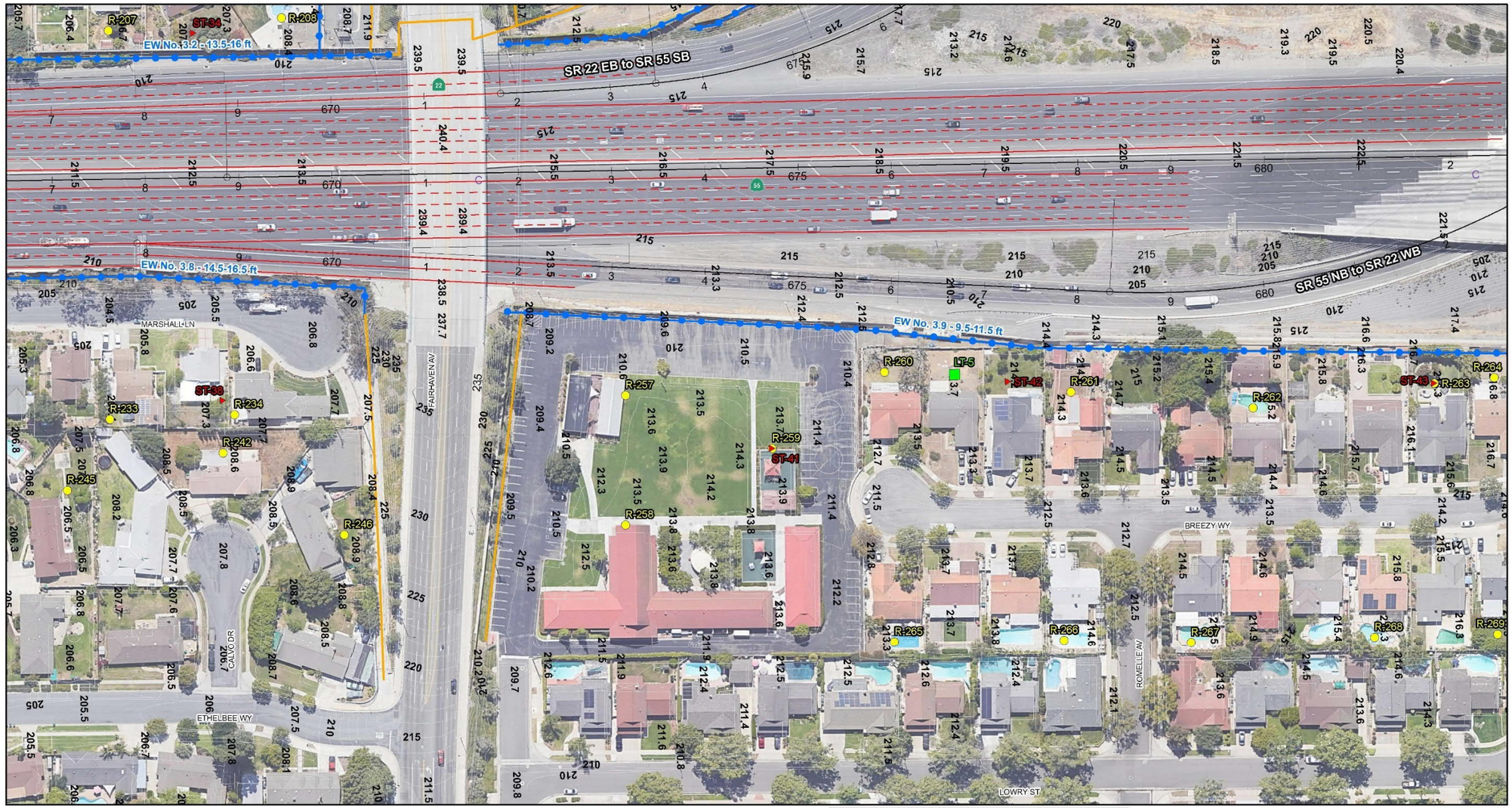


FIGURE 2.14-1
Sheet 7 of 21

*SR 55 Improvement Project (I-5 to SR 91)*
Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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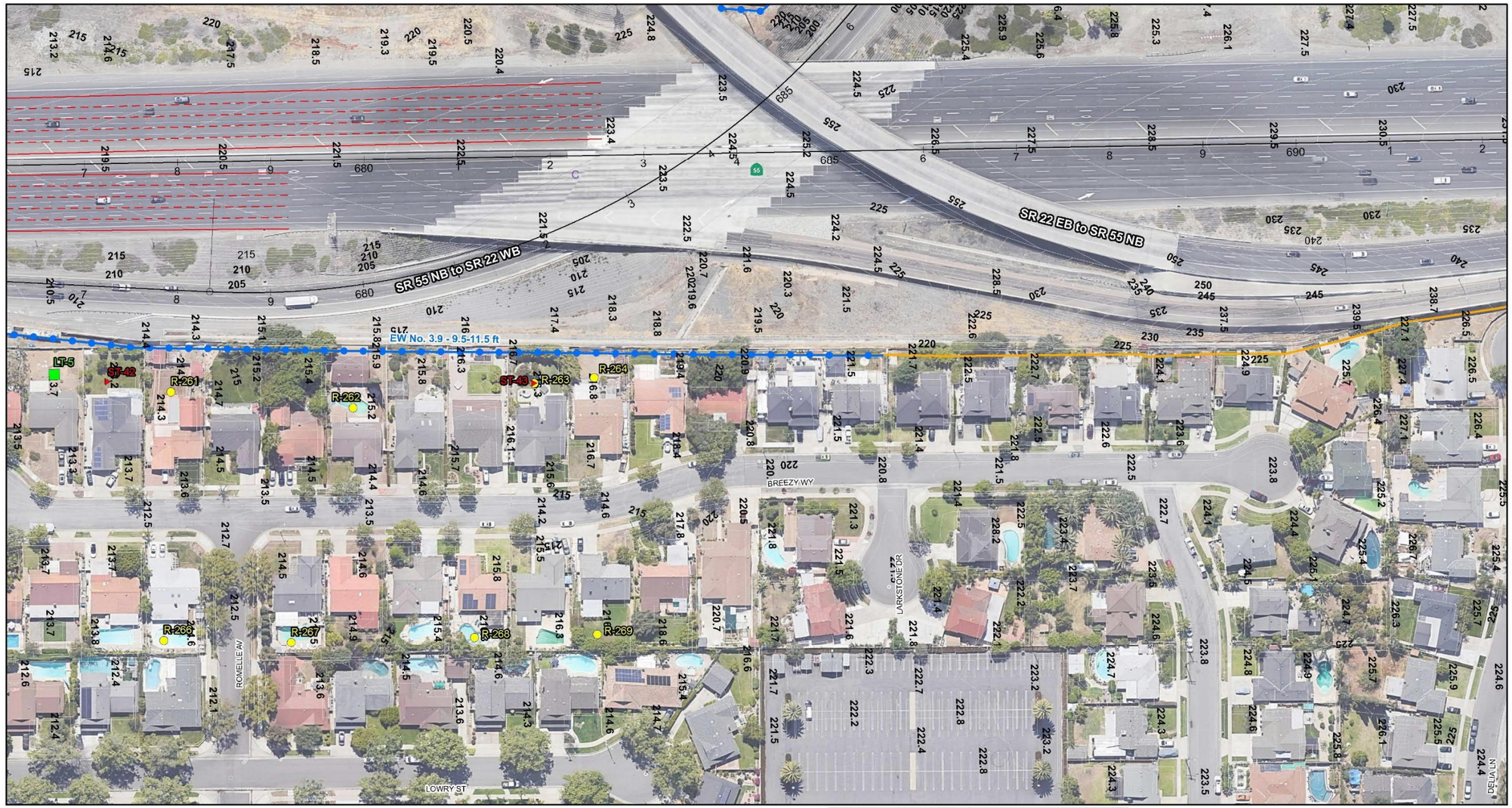
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 8 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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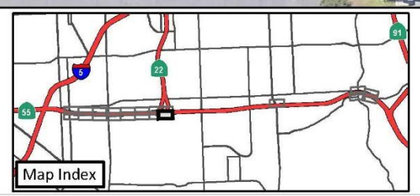


FIGURE 2.14-1
Sheet 8 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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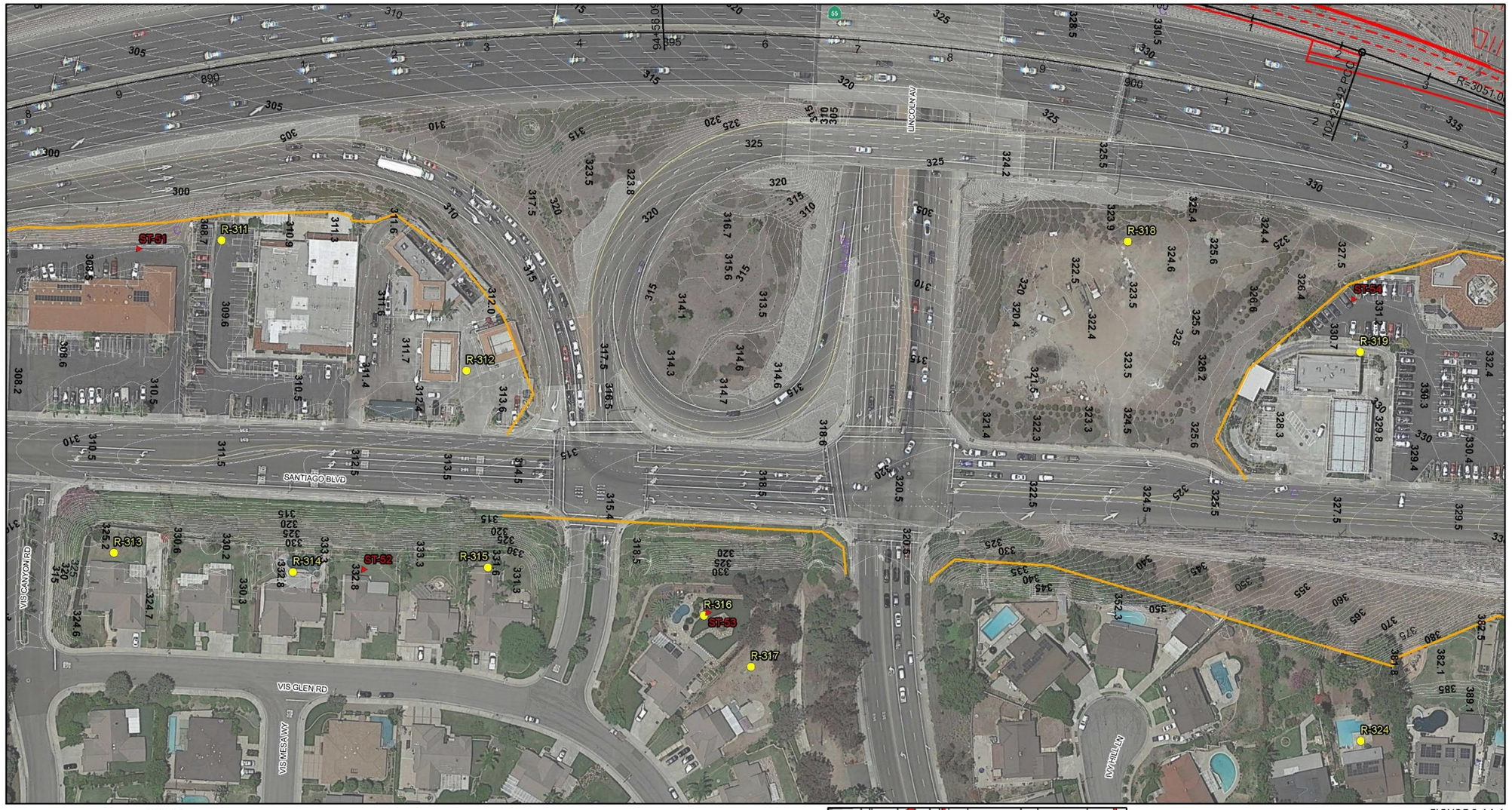
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 9 of 21)**




SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 9 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 10 of 21)**


LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 10 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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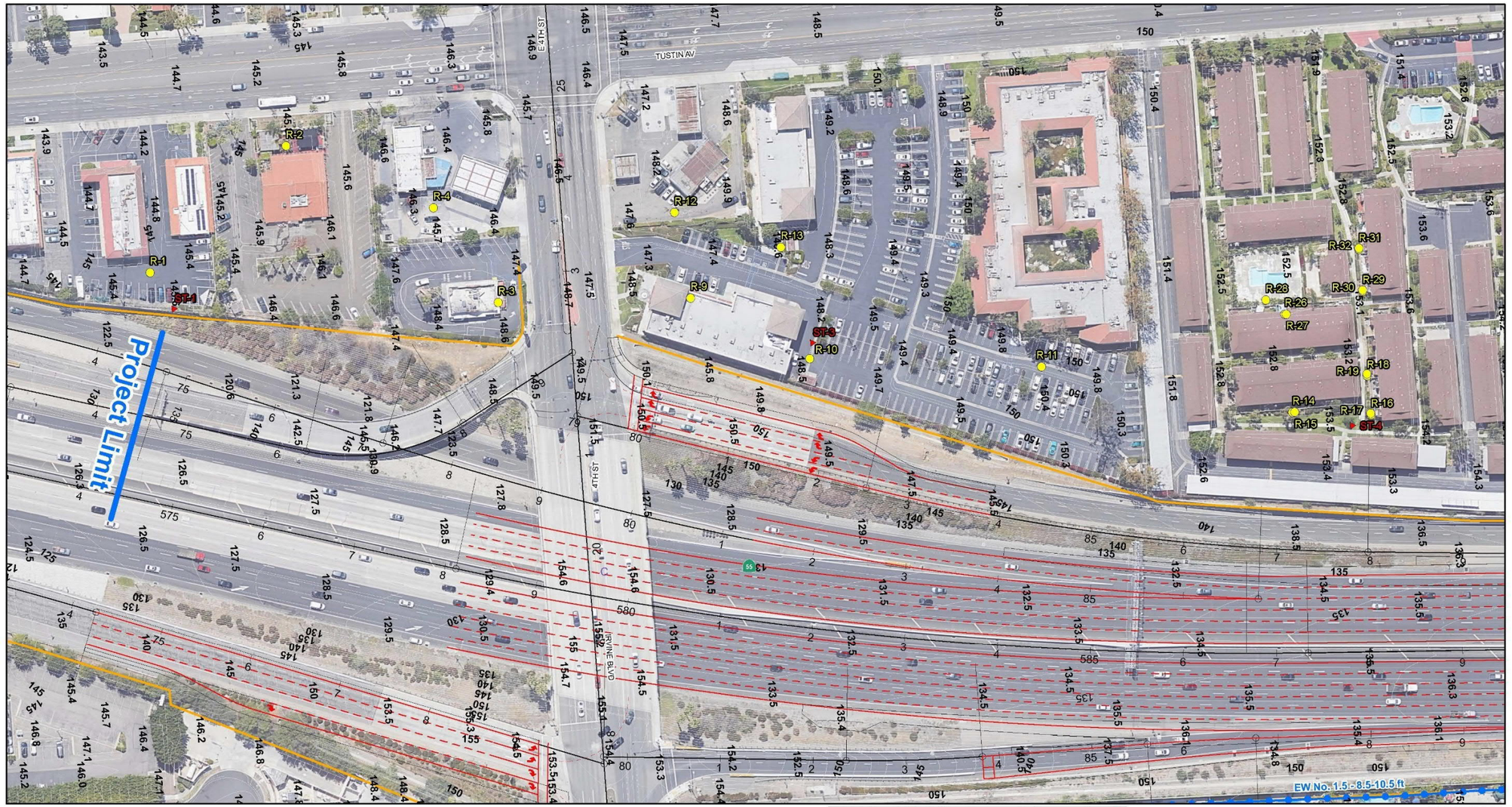
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 11 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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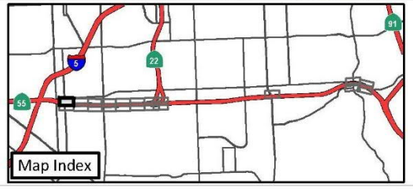


FIGURE 2.14-1
Sheet 11 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 12 of 21)**

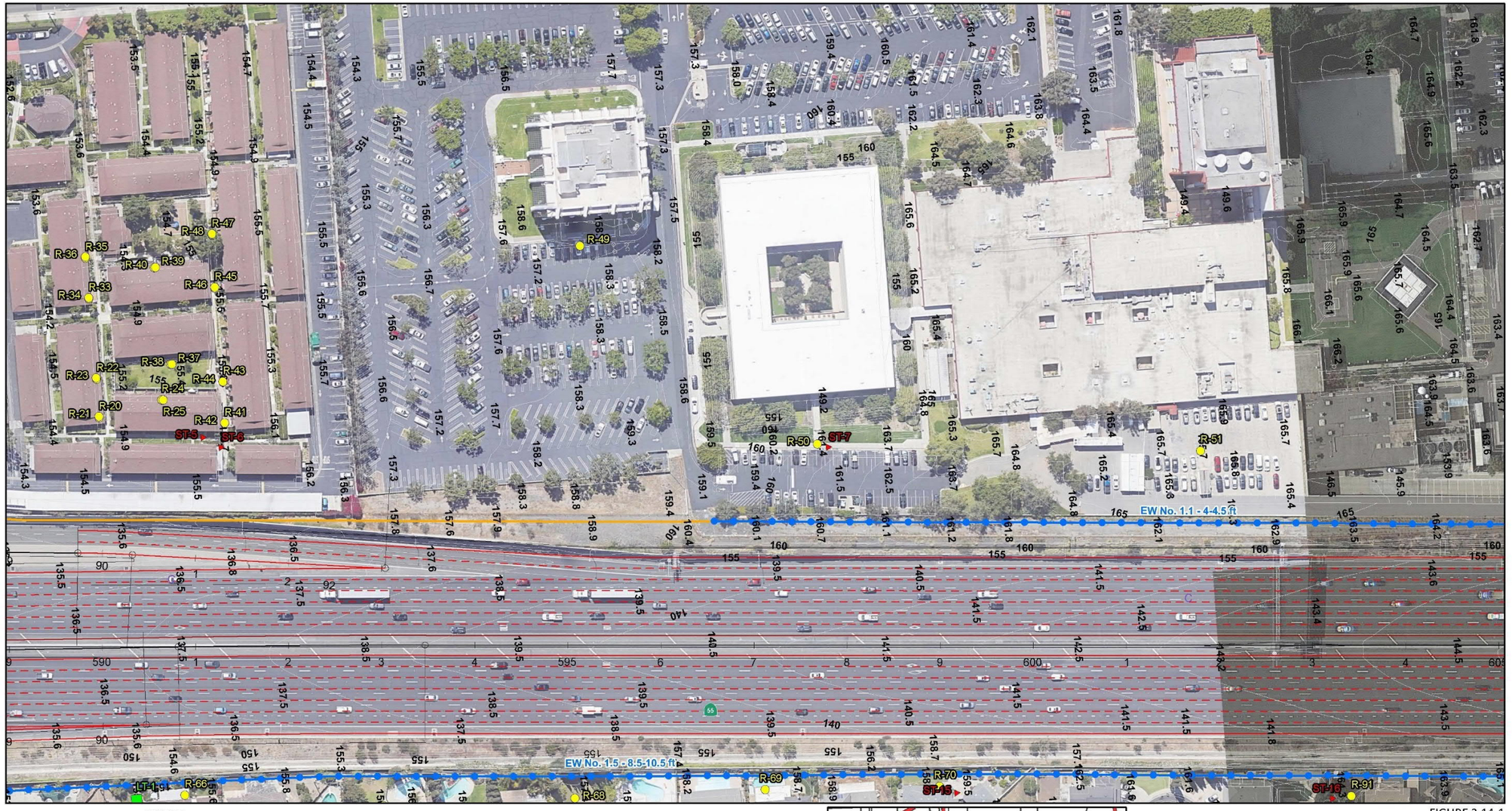


FIGURE 2.14-1
Sheet 12 of 21

*SR 55 Improvement Project (I-5 to SR 91)*
Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 13 of 21)**

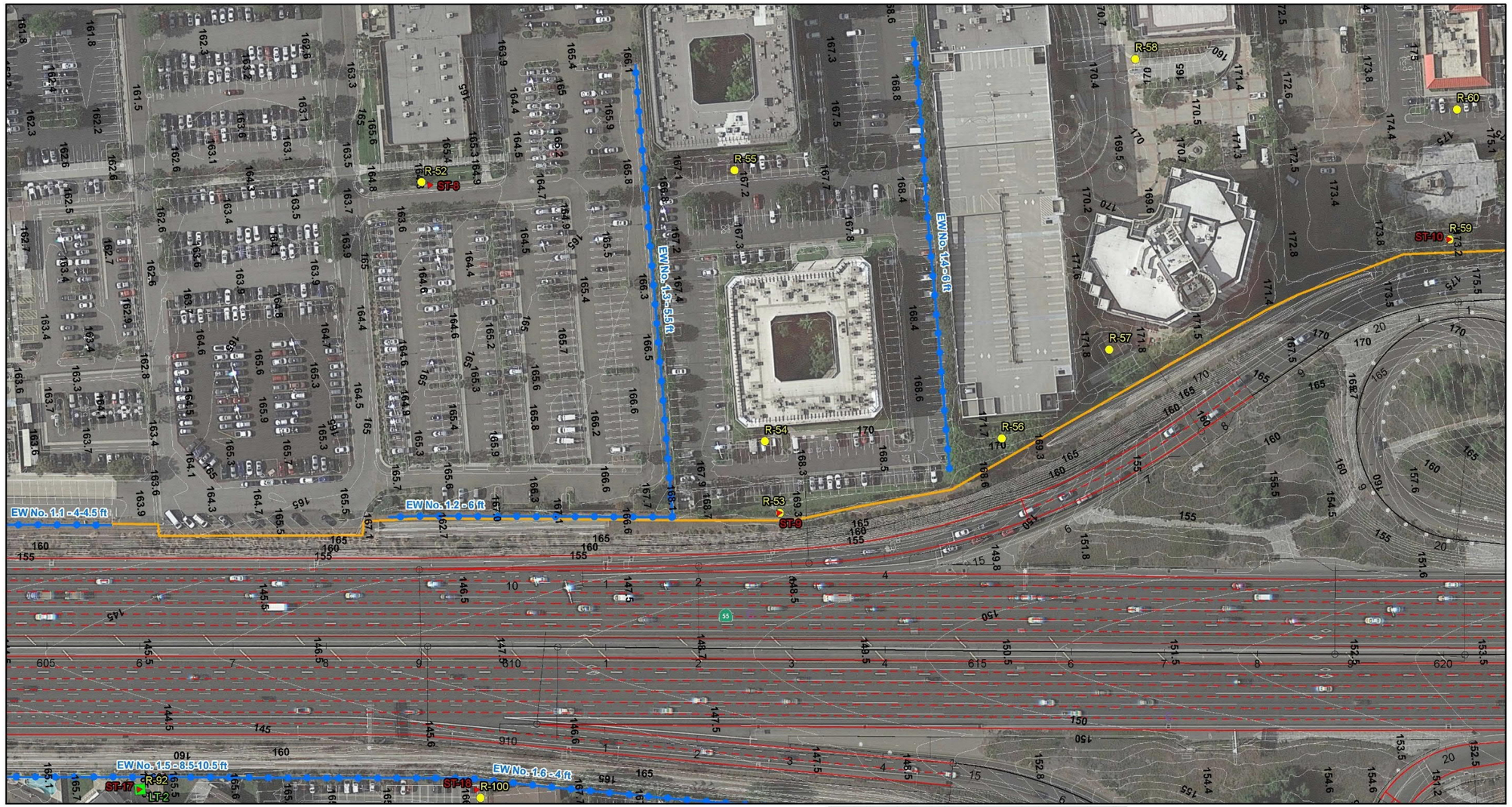


FIGURE 2.14-1
Sheet 13 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 14 of 21)**


LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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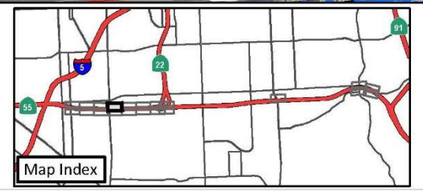


FIGURE 2.14-1
Sheet 14 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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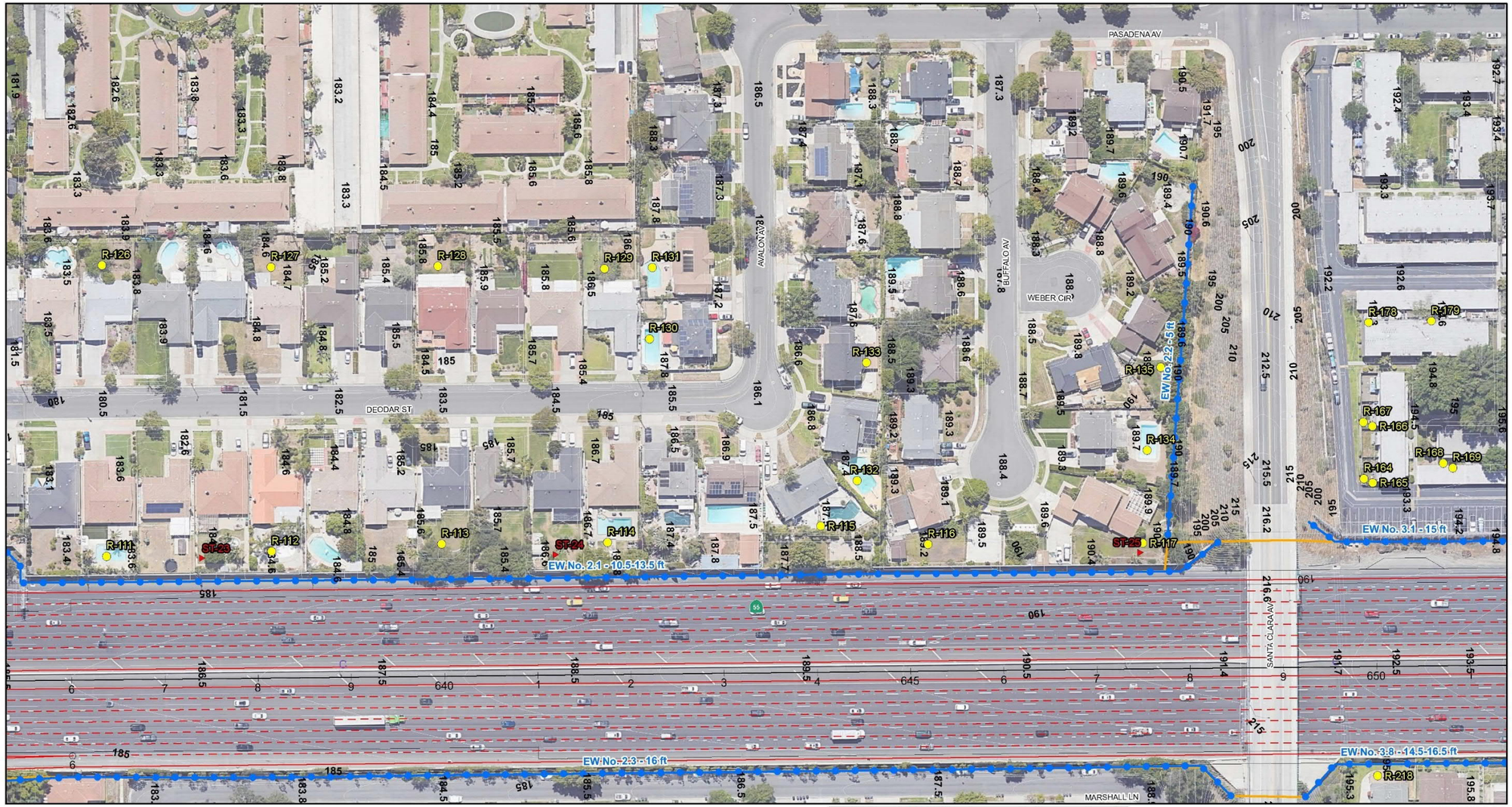
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 15 of 21)**




SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 15 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 16 of 21)**


SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 16 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 17 of 21)**


FIGURE 2.14-1
Sheet 17 of 21

*SR 55 Improvement Project (I-5 to SR 91)*
Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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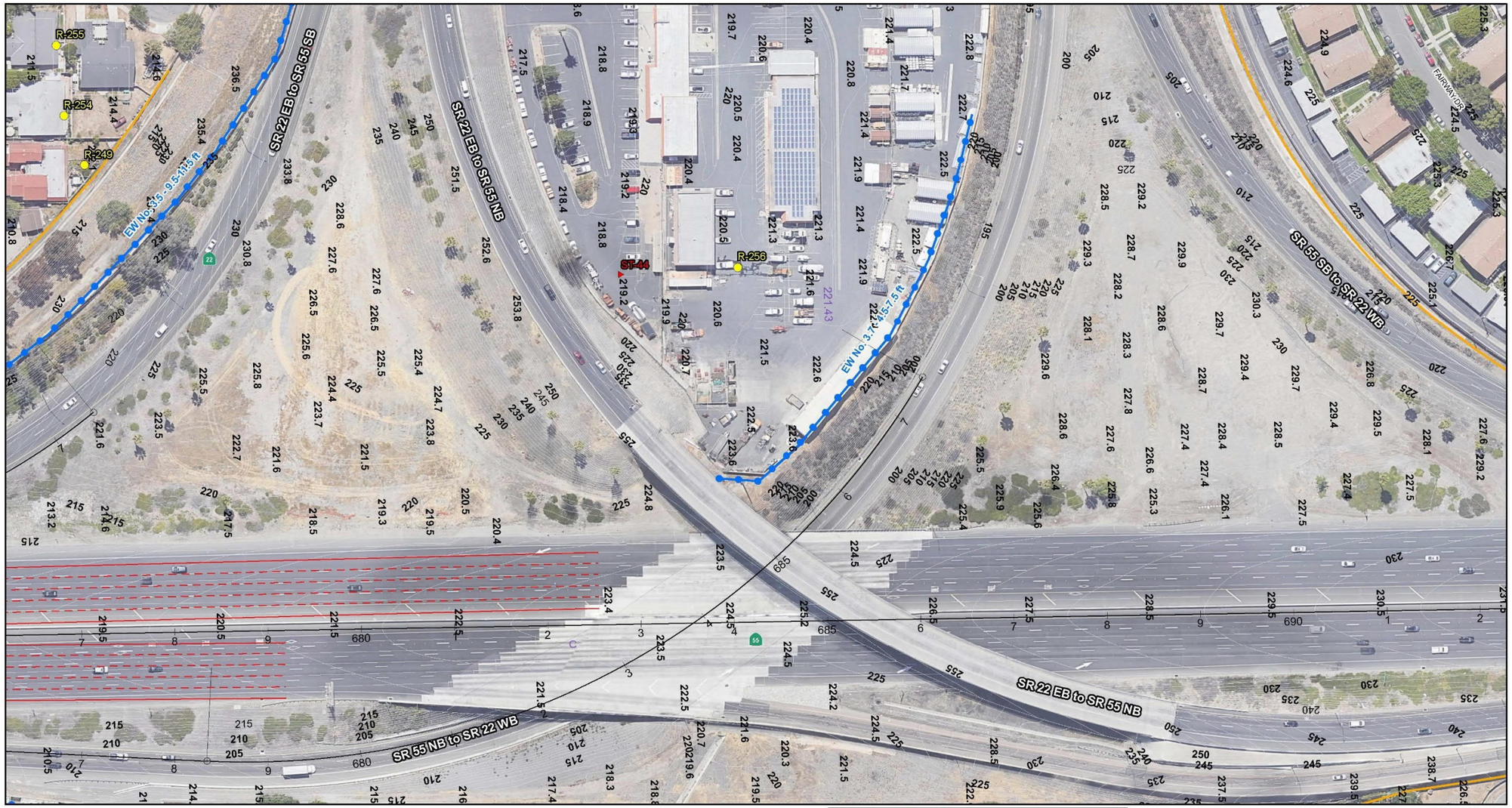
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 18 of 21)**




SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 18 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 19 of 21)**

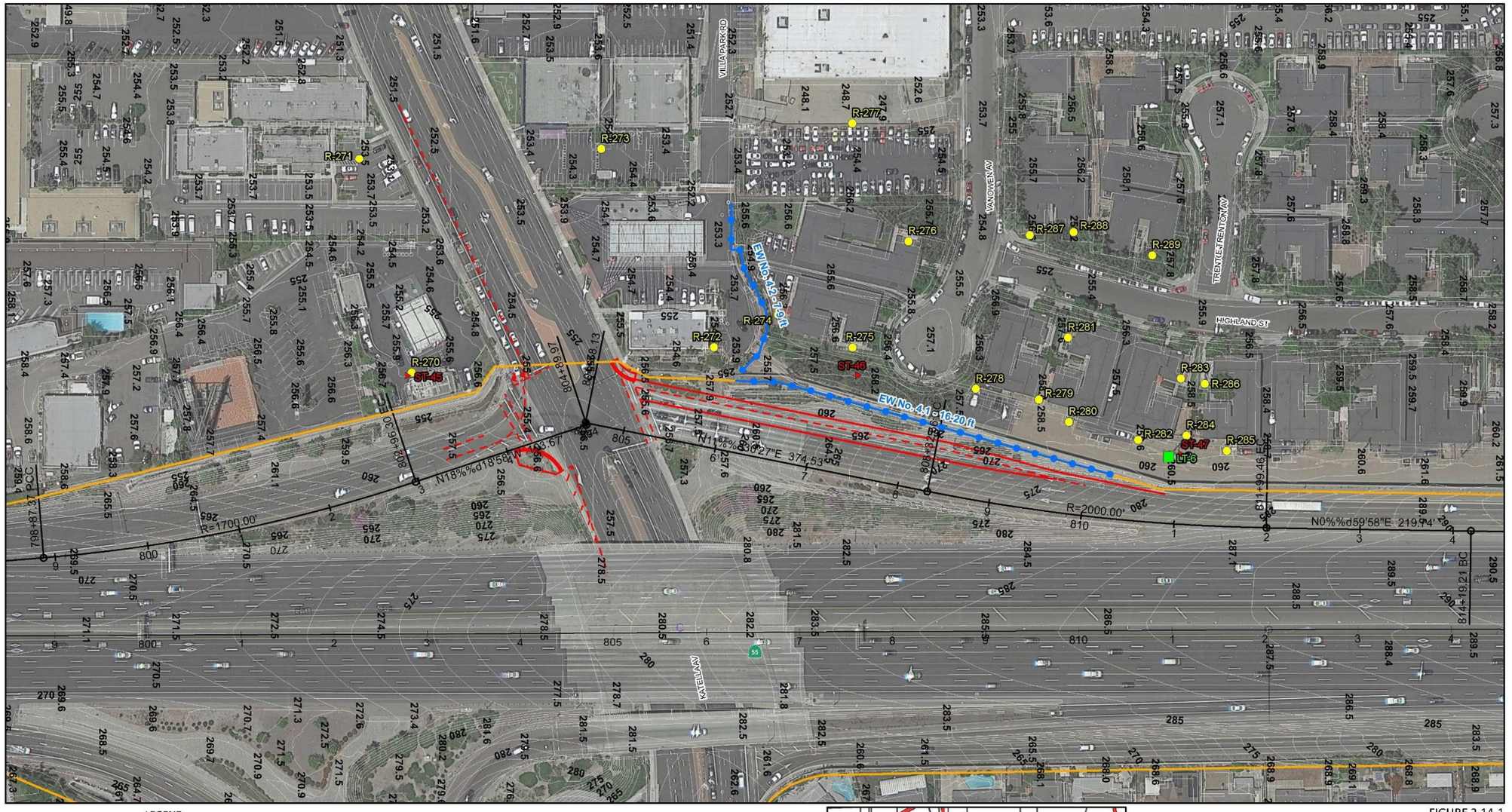


FIGURE 2.14-1
Sheet 19 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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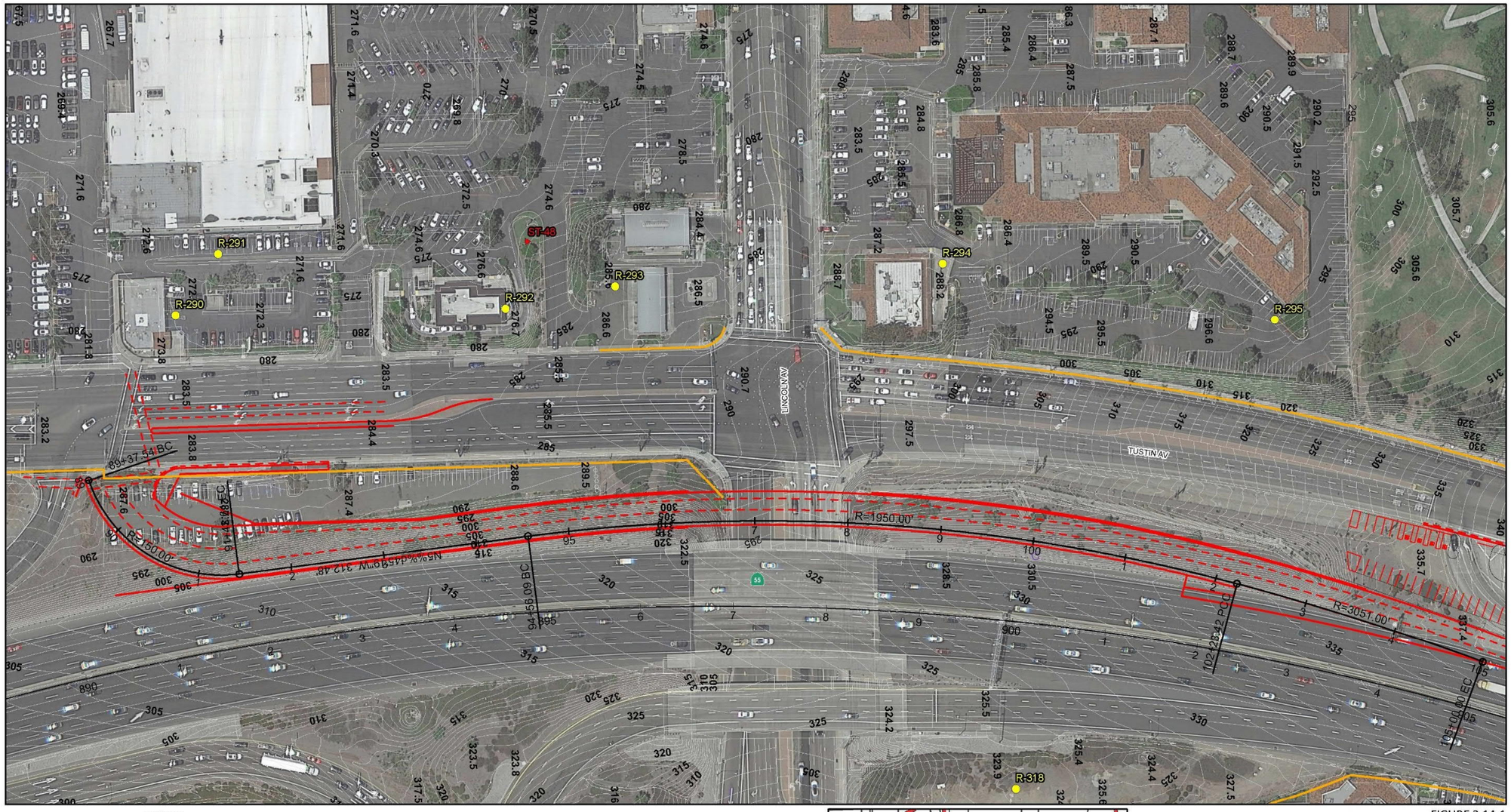
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 20 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way

0 50 100
FEET

SOURCE: Bing (2015); Jacobs (2017)

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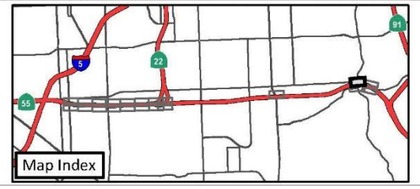


FIGURE 2.14-1
Sheet 20 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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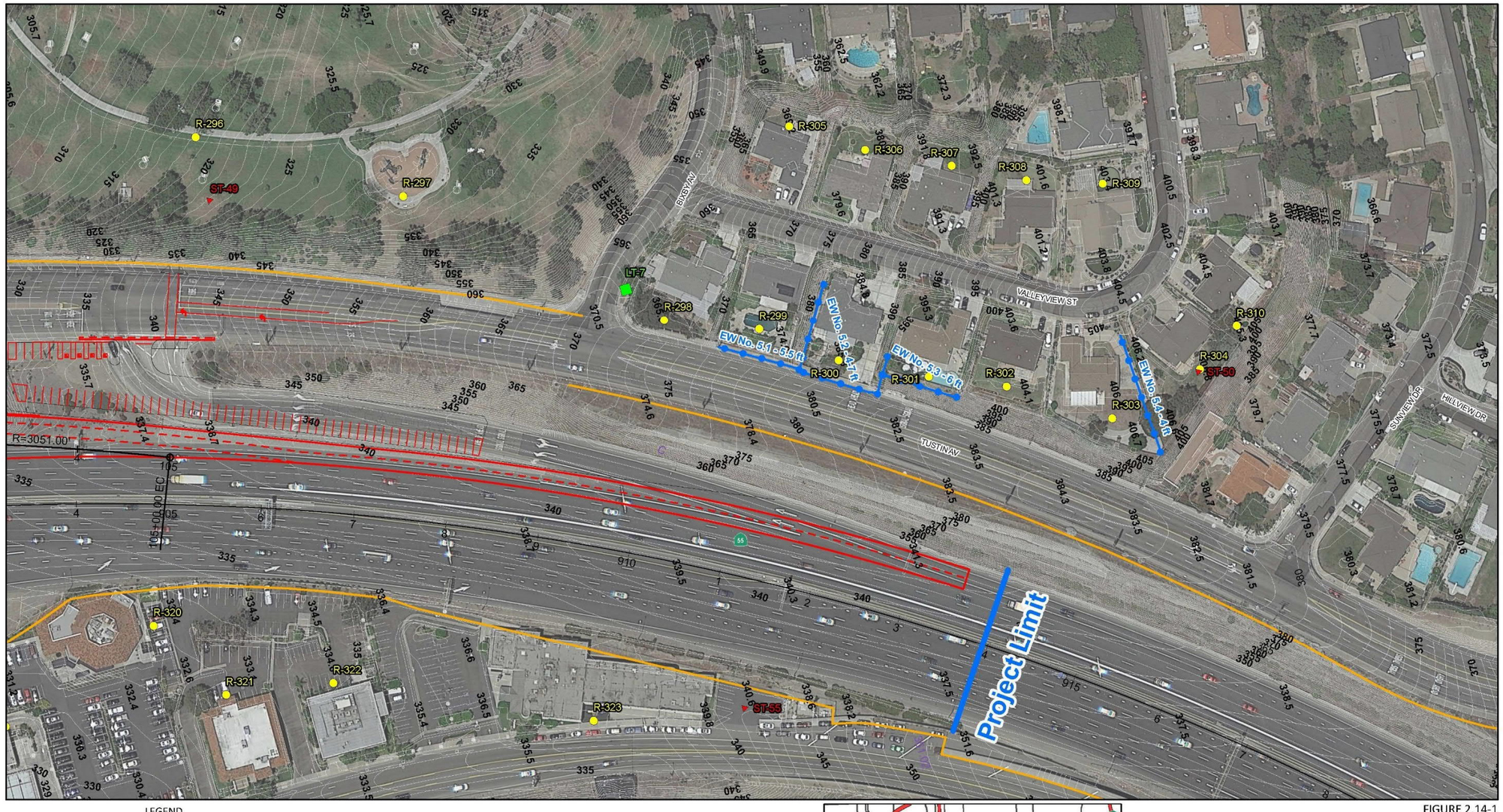
**Figure 2.14-9. Monitoring and Modeled Receptor Locations (Sheet 21 of 21)**




LEGEND

- Long-Term Modeling Locations
- Short-Term Modeling Locations
- Modeled Receptors
- Proposed Improvements
- Proposed Lane Striping
- Existing Right of Way
- Existing Wall

0 50 100 FEET

SOURCE: Bing (2015); Jacobs (2017)

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FIGURE 2.14-1
Sheet 21 of 21

*SR 55 Improvement Project (I-5 to SR 91)*

Monitoring and Modeled Receptor Locations

12-ORG-55 PM 10.4/R17.9
EA No. 0K720K

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## 2.14.3 Environmental Consequences

The proposed project is considered a Type 1 project because it would use federal aid to add a through-traffic lane in each direction to the existing SR 55. A noise analysis is required for all Type 1 projects. Therefore, noise impacts of the Build Alternative are analyzed below.

### 2.14.3.1 Temporary Impacts

Build Alternative

Two types of short-term noise impacts would occur during project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site and would incrementally raise noise levels on access roads leading to the site. The pieces of heavy equipment for grading and construction activities would be moved on site, would remain for the duration of each construction phase, and would not add to the daily traffic volume in the project vicinity. A high single-event noise exposure potential at a maximum level of 75 dBA $L_{max}$ from trucks passing at 50 feet would exist. However, the projected construction traffic would be minimal when compared to existing traffic volumes on SR 55 and other affected streets, and its associated long-term noise level change would not be perceptible and not cause long-term direct or indirect impacts. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would be less than substantial.

The second type of short-term noise impact is related to noise generated during roadway construction. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated and the noise levels in the project area as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 2.14-11 lists typical construction equipment noise levels ($L_{max}$) recommended for noise impact assessments based on a distance of 50 feet between the equipment and a noise receptor.

Noise from construction activities may directly affect areas in the immediate vicinity of construction. Typical noise levels at 50 feet from an active construction area range up to 86 dBA $L_{max}$ during the noisiest construction phases. The site preparation phase, which includes grading and paving, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery (e.g., backfillers, bulldozers, and front loaders). Earthmoving and compacting equipment includes compactors, scrapers, and graders.

**Table 2.14-11: Typical Construction Equipment Noise Levels**

| Type of Equipment | Actual Maximum Sound Levels at 50 ft (dBA) |
|---|---|
| Backhoe | 78 |
| Crane | 81 |
| Dozer | 82 |
| Drill Rig Truck | 79 |
| Dump Truck | 76 |
| Excavator | 81 |
| Flat Bed Truck | 74 |
| Front End Loader | 79 |
| Generator | 81 |
| Impact Pile Driver | 101 |
| Jackhammer | 89 |
| Pickup Truck | 75 |
| Pneumatic Tools | 85 |
| Pumps | 81 |
| Roller | 80 |
| Scraper | 84 |

**Notes**: dBA: A-weighted decibels; FHWA: Federal Highway Administration; ft: foot/feet
Source: Roadway Construction Noise Model (FHWA 2006).

The construction of the proposed project is expected to require the use of scrapers, bulldozers, and water trucks/pickup trucks. Noise associated with the use of construction equipment is estimated between 75 dBA $L_{max}$ and 84 dBA $L_{max}$ at a distance of 50 feet from the active construction area for the grading phase. As shown in Table 2.14-11, the maximum noise level generated by each scraper is assumed to be approximately 84 dBA $L_{max}$ at 50 feet from the scraper in operation. Each bulldozer would generate approximately 82 dBA $L_{max}$ at 50 feet. The maximum noise level generated by water trucks and pickup trucks is approximately 75 dBA $L_{max}$ at 50 feet from these vehicles. Each doubling of the sound source with equal strength increases the noise level by 3 dBA. Each piece of construction equipment operates as an individual point source. The worst-case composite noise level at the nearest residence during this phase of construction would be 86 dBA $L_{max}$ (at a distance of 50 feet from an active construction area).

The closest sensitive receptors are within 50 feet of project construction areas. Sensitive receptor locations may be subject to short-term noise higher than 86 dBA $L_{max}$ that is generated by construction activities along the project alignment, thus subject to temporary direct noise impacts. Project Feature PF-N-1 requires compliance with Caltrans Standard Specifications Section 14-8.02 (Caltrans 2015d) and would minimize construction noise impacts on sensitive land uses adjacent to the project site. Construction noise 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) one-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 will not operate any internal combustion engine on the job site without the appropriate muffler.

No Build Alternative

The No Build Alternative would not result in the construction of improvements within the project area and, therefore, would not result in temporary noise effects.

### 2.14.3.2 Permanent Impacts

The Noise Study Report (September 2018) was conducted to determine the future traffic noise impacts at receptors along SR 55. Potential long-term noise impacts associated with project operations are solely from traffic noise. Traffic noise was evaluated for the worst-case traffic condition. Using coordinates obtained from the topographic maps, a total of 327 receptor locations associated with existing single- and multifamily residences, pools associated with multifamily residences, churches, playgrounds associated with churches, a classroom associated with a church, hospitals, restaurants, gas stations, a park, a maintenance facility, vacant land, offices, commercial, and retail uses were evaluated in the noise model. Implementation of this Project is not anticipated to result in permanent indirect or direct impacts.

Build Alternative

Future traffic noise levels for all 327 receptor locations were determined with existing walls using the worst-case traffic operations (prior to speed degradation) or the future (2055) peak-hour traffic volumes, whichever is lower. Future traffic volumes on SR 55 and local roadways were obtained from the Final Traffic Volume Report (February 2018). Table B-1 and B-2 in Appendix B of the Noise Study Report summarizes the traffic noise modeling results for the Existing, Future No Build, and Build Alternatives. The modeled future noise levels with the project were compared to the modeled existing noise levels (after calibration) from Traffic Noise Model (TNM) version 2.5 to determine whether a substantial noise increase would occur. The modeled future noise levels were also compared to the NAC under Activity Categories B, C, D, and E to determine whether a traffic noise impact would occur.

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 or exceed" the NAC or (2) if the predicted traffic noise level is 12 dBA or more over 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 327 modeled receptors, three receptors under the Build Alternative would approach or exceed the NAC. No receptor would experience a substantial noise increase of 12 dBA or more over its corresponding existing noise levels. The receptor locations listed below would be or would continue to be exposed to noise levels that approach or exceed the NAC under the Build Alternative:

- **Receptor R-3**: This receptor location represents the outdoor seating area of a restaurant located along 4th Street on the southbound side of SR 55, between First Street and 4th

Street. Currently, no existing wall shields the outdoor seating area. **Noise barriers were not modeled to shield the outdoor seating area of the restaurant because a barrier would not be feasible due to the driveway access onto 4th Street. No permanent direct noise impacts are anticipated.**

- **Receptor R-53**: This receptor location represents an outdoor seating area of an office building located along Tustin Avenue on the southbound side of SR 55 between 4th Street and 17th Street. Currently, no existing wall shields the outdoor seating area. **One noise barrier (Noise Barrier No. 1.1) was modeled along the State right-of-way on the southbound side of SR 55 to shield the seating area, therefore minimizing direct and indirect noise impacts.**
- **Receptor R-82**: This receptor location represents an existing single-family residence located along Heights Drive on the northbound side of SR 55 between Irvine Boulevard and 17th Street. Currently, an 8.5- to 10.5-foot-high existing wall shields the residence. **Noise barriers were not modeled to shield this residence because this receptor approaches the NAC due to traffic on Yorba Street and not from traffic on SR 55, as shown in Appendix B Table B-1 in Noise Study Report. The existing wall is anticipated to minimize any direct or indirect impacts to noise.**

Feasibility and Reasonable Allowance

Section 3 of the 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.

Table 2.14-12 summarizes the feasibility of Noise Barrier No. 1.1 and lists the noise barrier heights, approximate lengths, the noise attenuation, the number of benefited units/receptors, the total reasonable allowance, beginning and ending station number, and the beginning and ending top of wall elevation under the Build Alternative. Table 2.14-12 shows that Noise Barrier No. 1.1 is feasible starting at 6 feet. Table 2.14-12 also shows predicted noise levels, insertion loss, and the number of benefited receptors at analyzed barrier heights for the Build Alternative.

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 residence/receptor 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.

Noise Barrier No. 1.1 was found to be acoustically feasible; reasonable cost allowances were calculated by multiplying the number of benefited receptors by $95,000. Table 2.14-12 summarizes the results at receptor location for the noise barrier evaluated in detail for this project.

## Table 2.14-12: Summary of Feasible Noise Barriers from the Noise Study Report

| Noise Barrier No. | Height (ft) | Approximate Length (ft) | Noise Attenuation (dBA) | Number of Benefited Receptors/ Units[1] | Total Reasonable Allowance[2] | Noise Barrier Location | Noise Barrier Station Number Begin | Noise Barrier Station Number End | Top of Wall Elevation (ft) Begin | Top of Wall Elevation (ft) End |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | 6 | 34 | 5.3 | 1 | $95,000 | ROW | 612+67 | 613+01 | 174 | 174 |
| 1.1 | 8[3] | 34 | 6.5 | 1 | $95,000 | ROW | 612+67 | 613+01 | 176 | 176 |
| 1.1 | 10 | 34 | 6.9 | 1 | $95,000 | ROW | 612+67 | 613+01 | 178 | 178 |
| 1.1 | 12 | 34 | 7.1 | 1 | $95,000 | ROW | 612+67 | 613+01 | 180 | 180 |
| 1.1 | 14 | 34 | 7.2 | 1 | $95,000 | ROW | 612+67 | 613+01 | 182 | 182 |
| 1.1 | 16 | 34 | 7.2 | 1 | $95,000 | ROW | 612+67 | 613+01 | 184 | 184 |
| 1.1 | 18 | 34 | 7.3 | 1 | $95,000 | ROW | 612+67 | 613+01 | 186 | 186 |
| 1.1 | 20 | 34 | 7.3 | 1 | $95,000 | ROW | 612+67 | 613+01 | 188 | 188 |
| 1.1 | 22 | 34 | 7.3 | 1 | $95,000 | ROW | 612+67 | 613+01 | 190 | 190 |

**Notes**: dBA: A-weighted decibels; ft: foot/feet; ROW: right-of-way
Source: LSA Associates, Inc. (September 2018a).
[1] Number of receptors/units that are attenuated by5 dBA or more by the modeled barrier.
[2] Calculated by multiplying the number of benefited receptors by $95,000 (the dollar amount per benefited receptor/unit).
[3] Denotes the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack.

The design of noise barriers presented is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the project. Preliminary information on the physical location, length, and height of noise barriers is provided below. If pertinent parameters change substantially during the final project design, preliminary noise barrier design may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the project design.

Based on the studies completed to date, Caltrans intends to incorporate noise abatement in the form of barriers. The feasible and reasonable noise barrier for Build Alternative is shown in Table 2.14-12. The location of the proposed barrier is shown on Figure 2.14-10. These measures may change based on input received from the public. If conditions have substantially changed during final design, noise abatement may not be necessary. The final decision on noise abatement will be made upon completion of project design.

The following is a discussion of the noise abatement measures considered for the Build Alternative where traffic noise impacts are predicted.

Noise Barrier No. 1.1

A 34-foot-long barrier along the State right-of-way on the southbound side of SR 55 was analyzed to shield Receptor R-53. Table 2.14-12 shows the results of the analysis. Noise Barrier No. 1.1 is composed of a new barrier and was evaluated from 6 feet to 22 feet high in 2-foot increments.

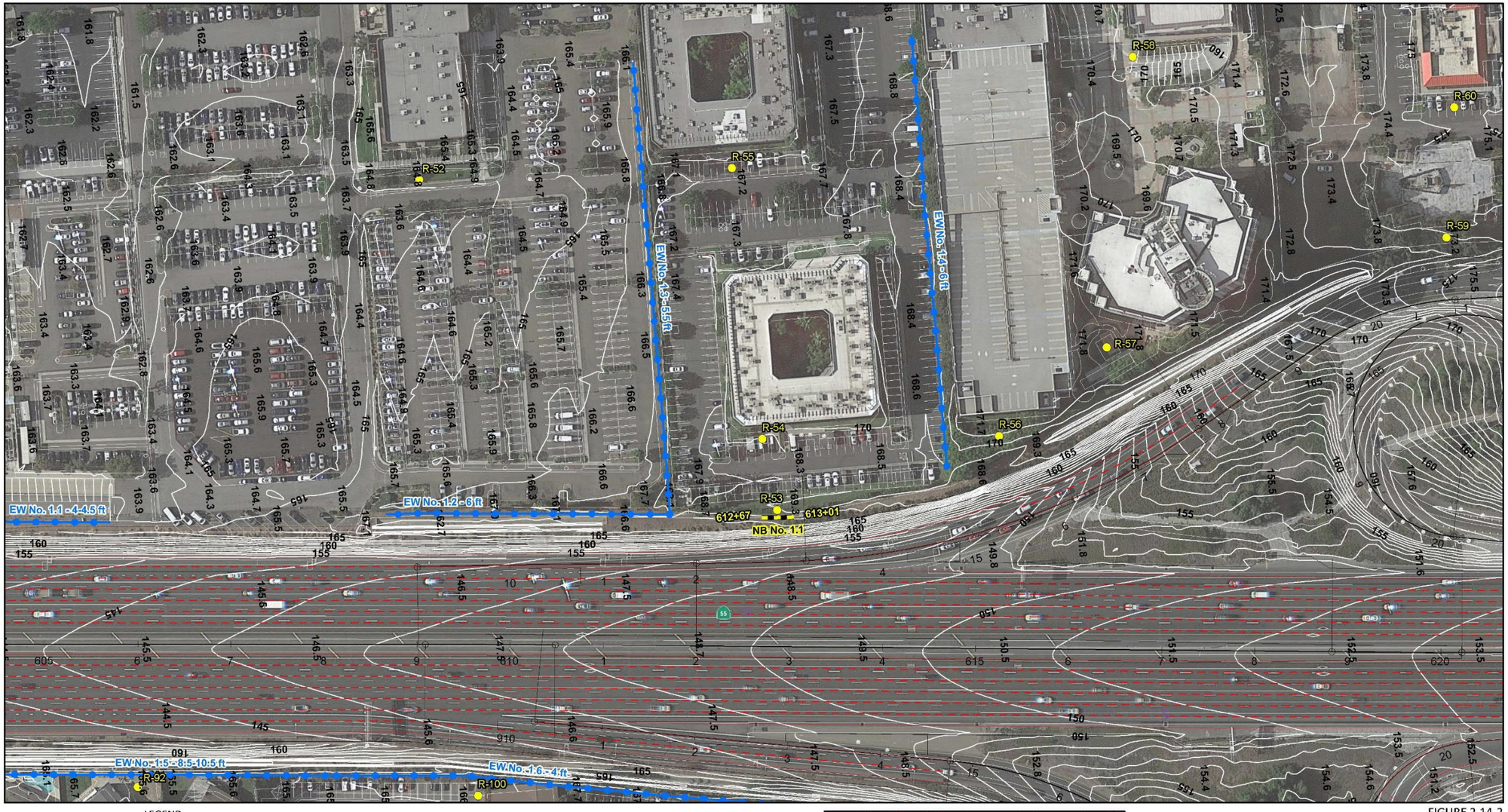
Figure 2.14-3 shows the location of Noise Barrier No. 1.1. Table 2.14-12 lists the highest noise barrier reduction, the number of benefited receptors, the reasonable allowance per benefited receptor, and the total reasonable allowance for each barrier height.

Noise Barrier No. 1.1 was determined to be reasonable. Mitigation measure PF-NOI-1 requires noise abatement in the form of a noise barrier and would minimize direct and indirect operational noise impacts on the sensitive land use at R-53.

**PF-N-2** Noise Barrier No. 1.1 was determined to be feasible and reasonable. This noise barrier will be considered for construction. The final decision on construction of the noise barrier will be made during final design.

Before completion of final design, coordination with the affected property would be conducted in order to determine if they are in favor of the noise barrier and if they are will to donate the right-of-way to the State for construction of the noise barrier.

**Figure 2.14-10. Location of Noise Barrier No. 1.1**




SOURCE: Bing (2015); Jacobs (2017)

I:\JCV1701\GIS\MXD\Noise Section\ModeledNoiseBarriers_ReceptorLocations_Noise Section.mxd (6/11/2019)

FIGURE 2.14-2

*SR 55 Improvement Project (I-5 to SR 91)*

Modeled Noise Barriers and Receptor Locations

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Nonacoustical Factors

Nonacoustical factors relating to feasibility that must be considered during the construction of noise barriers include: geometric standards, safety, maintenance, security, drainage, geotechnical considerations, and utility relocations.

The nonacoustical factors relating to feasibility of Noise Barrier No. 1.1 are:

- Geometric Standards: Noise Barrier No. 1.1 would not affect the geometric standards of adjacent roadways.
- Safety: Noise Barrier No. 1.1 would not affect sight distance for vehicular or pedestrian traffic.
- Maintenance: No temporary construction easements would be required for Noise Barrier No. 1.1. In addition, Caltrans would be responsible for maintenance of Noise Barrier No. 1.1.
- Security: Noise Barrier No. 1.1 would be in the same alignment as an existing fence and would not change the security conditions of the site. The existing fence will remain or will be replaced in kind.
- Drainage: Noise Barrier No. 1.1 would not affect the existing and proposed drainage system.
- Geotechnical Considerations: Noise Barrier No. 1.1 would be constructed at a similar grade to the existing condition. In addition, it would be partially constructed in native soil and partially in engineered fill.
- Utility Relocations: No utility impacts are anticipated as a result of Noise Barrier No. 1.1.

No Build Alternative

Potential long term direct and indirect noise effects under the No Build Alternative would be solely from traffic noise. Future No Build noise levels are shown in Appendix B of the Noise Study Report. Of the 327 modeled receptor locations, one receptor (R-53) would continue to approach or exceed the NAC under the future No Build condition.

### 2.14.4 Avoidance, Minimization, and or Mitigation Measures

The project will incorporate the Project Features PF-N-1 and PF-N-2, outlined above in Section 2.14.3, to help avoid and/or minimize potential impacts. No additional avoidance, minimization, and/or mitigation measures other than the Standard Project Features are required.