PHYSICAL ENVIRONMENT

2.8 Water Quality and Storm Water Runoff

2.8.1 Regulatory Setting

2.8.1.1 Federal Requirements: Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source[1] unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. This act and its amendments are known today as the Clean Water Act (CWA). Congress has amended the act several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. The following are important CWA sections:

- Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the state that the discharge will comply with other provisions of the act. This is most frequently required in tandem with a Section 404 permit request (see below).
- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCBs) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The USACE issues two types of 404 permits: General and Individual. There are two types of General permits: Regional and Nationwide. Regional permits are issued for a

[1] A point source is any discrete conveyance such as a pipe or a man-made ditch.

general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Regional or Nationwide Permit may be permitted under one of the USACE's Individual permits. There are two types of Individual permits: Standard permits and Letters of Permission. For Individual permits, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (U.S. EPA) Section 404 (b)(1) Guidelines (40 Code of Federal Regulations [CFR] Part 230), and whether the permit approval is in the public interest. The Section 404(b)(1) Guidelines (Guidelines) were developed by the U.S. EPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent[1] standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4. A discussion of the LEDPA determination, if any, for the document is included in the Wetlands and Other Waters section.

2.8.1.2 State Requirements

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the state. It predates the CWA and regulates discharges to waters of the state. Waters of the state include more than just waters of the U.S., like groundwater and surface waters not considered

[1] The U.S. EPA defines "effluent" as "wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall."

waters of the U.S. Additionally, it prohibits discharges of "waste" as defined, and this definition is broader than the CWA definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details about water quality standards in a project area are included in the applicable RWQCB Basin Plan. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect those uses. As a result, the water quality standards developed for particular water segments are based on the designated use and vary depending on that use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-point source controls (NPDES permits or WDRs), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWQCBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollutant Discharge Elimination System (NPDES) Program

Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water discharges, including Municipal Separate Storm Sewer Systems (MS4s). An MS4 is defined as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a

state, city, town, county, or other public body having jurisdiction over storm water, that is designed or used for collecting or conveying storm water." The SWRCB has identified Caltrans as an owner/operator of an MS4 under federal regulations. Caltrans' MS4 permit covers all Caltrans rights-of-way, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted.

Caltrans' MS4 Permit, Order No. 2012-0011-DWQ as amended by Order WQ 2014-0006-EXEC, Order WQ 2014-0077-DWQ, and Order WQ 2015-0036-EXEC, NPDES No. CAS000003, effective April 7, 2015, has three basic requirements:

1. Caltrans must comply with the requirements of the Construction General Permit (see below);
2. Caltrans must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and
3. Caltrans storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs), to the maximum extent practicable, and other measures as the SWRCB determines to be necessary to meet the water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs. The proposed project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

Construction General Permit

Construction General Permit, Order No. 2009-0009-DWQ (adopted on September 2, 2009 and effective on July 1, 2010), as amended by Order No. 2010-0014-DWQ

(effective February 14, 2011) and Order No. 2012-0006-DWQ (effective on July 17, 2012). The permit regulates storm water discharges from construction sites that result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least one acre must comply with the provisions of the General Construction Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop Storm Water Pollution Prevention Plans (SWPPPs); to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

The Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring, and before construction and after construction aquatic biological assessments during specified seasonal windows. For all projects subject to the permit, applicants are required to develop and implement an effective SWPPP. In accordance with the Caltrans SWMP and Standard Specifications, a Water Pollution Control Program (WPCP) is necessary for projects with DSA less than one acre.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the U.S. must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the USACE issues a 404 permit.

In some cases, the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as WDRs under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan

submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.8.2 Affected Environment

The information in this section is from the Water Quality Assessment Report prepared for the project (November 2017).

The proposed project is located in the San Gabriel River watershed, which is bound by the Santa Ana River watershed to the east and the Los Angeles River watershed to the west. Land uses within the watershed are diverse and range from open space near the San Gabriel River headwaters in the San Gabriel Mountains, and become more dense and urbanized in the south, wherein impaired water quality can be seen due to pollutants from dense areas of residential and commercial activities. The watershed is covered under two municipal storm water NPDES permits.[1] The project is also within the Lower San Gabriel Hydrologic Area (CalWater watershed hydrologic sub-area 405.15). When storm water falls on the existing State Highway system within the study area, it sheet flows where it is captured by Caltrans drains, culverts, curbs, and/or gutters. Underground pipes direct this flow directly to the local city and/or county flood control drainage network. Storm water that falls onto the study area will ultimately be discharged into Artesia-Norwalk Drain, Coyote Creek, and San Gabriel River Reach 1. From those drainage facilities, eventually the flow path leads to the Pacific Ocean. Within the study area for the proposed Westbound State Route 91 (SR-91) Improvement Project (project), runoff from SR-91 is not discharged directly or indirectly to an Area of Biological Significance.

Existing beneficial uses apply to the water bodies to which the proposed project discharges. Beneficial uses are defined in the Los Angeles RWQCB's Basin Plan as those necessary for the survival or well-being of humans, plants, and wildlife. Examples of beneficial uses include the following:

[1] State Water Resources Control Board (SWRCB). San Gabriel River Watershed. Website: https://www.waterboards.ca.gov/rwqcb4/water_issues/programs/regional_program/Water_Quality_and_Watersheds/san_gabriel_river_watershed/summary.shtml (accessed November 13, 2017).

- **Municipal and Domestic Supply:** Municipal and domestic supply waters are used for community, military, municipal, or individual water supply systems. These uses may include, but are not limited to, drinking water supply.
- **Industrial Service Supply:** Industrial service supply waters are used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
- **Industrial Process Supply:** Industrial process supply waters are used for industrial activities that depend primarily on water quality.
- **Navigation:** Navigation waters are used for shipping, travel, or other transportation by private, military, or commercial vessels.
- **Commercial and Sport Fishing:** Commercial and sport fishing waters are used for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
- **Warm Freshwater Habitat:** Warm freshwater habitat waters support warm-water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
- **Estuarine Habitat:** Estuarine habitat waters support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, and shorebirds).
- **Marine Habitat:** Marine habitat waters support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals and shorebirds).
- **Wildlife Habitat:** Wildlife habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife.
- **Rare, Threatened, or Endangered Species:** Rare, threatened, or endangered species waters include the uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal laws as rare, threatened, or endangered.
- **Migration of Aquatic Organisms:** Migration of aquatic organisms waters support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms (e.g., anadromous fish).

- **Spawning, Reproduction, and/or Early Development:** Spawning, reproduction, and/or early development waters support high-quality aquatic habitats suitable for the reproduction and early development of fish.
- **Shellfish Harvesting:** Shellfish harvesting waters support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption or commercial or sports purposes.
- **Water Contact Recreation:** Water contact recreation waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and using natural hot springs.
- **Non-Contact Water Recreation:** Non-contact water recreation waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

For Coyote Creek, beneficial uses identified include municipal and domestic supply; industrial service supply; industrial process supply; warm freshwater habitat; wildlife habitat; rare, threatened, or endangered species; water contact recreation; and non-contact water recreation. For the San Gabriel River Reach 1, beneficial uses include municipal and domestic supply, warm freshwater habitat, wildlife habitat, water contact recreation, and non-contact water recreation. For the San Gabriel River estuary, existing beneficial uses include industrial service supply; navigation; commercial and sport fishing; estuarine habitat; marine habitat; wildlife habitat; rare, threatened, or endangered species; migration of aquatic organisms; spawning, reproduction, and/or early development; shellfish harvesting; water contact recreation; and non-contact water recreation. No existing beneficial uses were identified for the Artesia-Norwalk Drain.

Some segments of the San Gabriel River and its tributaries within the watershed exceed water quality objectives for various pollutants and have been identified as impaired under Section 303(d) of the CWA. To address these impairments, TMDLs have been established for some pollutants. The Artesia-Norwalk Drain is a Section 303(d) list constituent and TMDL constituent for both indicator bacteria and selenium. Coyote Creek is a Section 303(d) list constituent for ammonia, dissolved copper, diazinon, indicator bacteria, lead, pH, and toxicity, and is a TMDL

constituent for lead, copper, and zinc. The San Gabriel River Reach 1 is a Section 303(d) list constituent for coliform bacteria and pH, and a TMDL constituent for copper. The San Gabriel River Estuary is a Section 303(d) list constituent for copper, dioxin, nickel, and dissolved oxygen, and is similarly a TMDL constituent for copper.

Previous corridor storm water management studies have estimated the depth to historically high groundwater in the vicinity of the study area to range from 8 feet (ft) below ground surface (bgs) to 35 ft bgs at various site locations where infiltration basins were the selected Treatment BMPs. Per the California Department of Water Resources (DWR) Water Data Library, the nearest groundwater wells with current groundwater level and quality data are located approximately 1.8 miles (mi) south of the southern boundary of the study area, adjacent to the Cerritos Regional County Park. In June 2017, depth to groundwater at various stations at the wells ranged from 24.55 ft bgs to 90.88 ft bgs. The Basin Plan also identifies beneficial uses for groundwater where the project is located, as follows:

- **Municipal and Domestic Supply:** Municipal and domestic supply waters are used for community, military, municipal, or individual water supply systems. These uses may include, but are not limited to, drinking water supply.
- **Agricultural Supply:** Agricultural supply waters are used for farming, horticulture, or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.
- **Industrial Service Supply:** Industrial service supply waters are used for industrial activities that do not depend primarily on water quality. These uses may include, but are not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well re-pressurization.
- **Industrial Process Supply:** Industrial process supply waters are used for industrial activities that depend primarily on water quality. These uses may include, but are not limited to, all uses of water related to product manufacture or food preparation.

Groundwater in the Coastal Plain of Los Angeles Groundwater Basin, Central Sub-Basin, in which the project is located, is characterized by the DWR as having Total Dissolved Solids (TDS) content in the sub-basin that range from 200 to 2,500 milligrams per liter (mg/l), according to data from 293 public supply wells. The average of these wells is 453 mg/l. The water quality impairments include inorganic

compounds, radiological constituents, nitrates, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs).

There are no drinking water reservoirs and recharge facilities that exist within the study area; however, several flood-control reservoirs are located within the upper part of the watershed.

2.8.3 Environmental Consequences

2.8.3.1 Temporary Impacts

Build Alternative (includes Design Options)

During construction of the Build Alternative, the proposed project's total DSA is estimated to be 29.25 ac. Work in this area will include the construction of mixed flow and auxiliary lanes, reconstruction of ramps and interchange improvements, widening of overhead bridge structures, construction of drainage structures, and creation of permanent water quality Treatment BMPs. Existing drainage facilities will be protected in place where possible and extended to the widening limits. During construction, sediment and sediment exposure are likely to occur while roadways are demolished and new structures are built. Other pollutants likely to occur during construction include metals, trash, petroleum products, wet and dry concrete waste, sanitary waste, and chemicals (e.g., gasoline, oils, grease, solvents, lubricants, and soap). Each of these pollutants on its own or in combination with others can have a detrimental effect on water quality.

Based on currently available information, the proposed project is classified as a Risk Level 1 project, which is considered low risk due to the project's location in an area with moderately erosive soils, but no sediment impairments. Under the Construction General Permit (CGP), the proposed project is required to prepare a SWPPP and implement erosion and sediment control BMPs during construction. When properly designed, implemented, and maintained, these BMPs serve as a project feature and avoid or minimize any temporary impacts to water quality. In addition, implementation of non-storm-water management and material management BMPs during construction would minimize the amount of chemical pollutants, such as concrete waste, and prevent them from entering surface waters. Non-storm-water management BMPs are source-control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharges, and also include procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance

operations to storm water drainage systems or watercourses. Furthermore, waste management BMPs consist of implementing procedural and structural BMPs for handling, storage, and disposal of waste generated by a construction project to prevent the release of waste materials and pollutants during storm water and non-storm-water discharges.

As described in the following project features (PF-WQ-1 and PF-WQ-2), construction activities would comply with the CGP and implementation of the SWPPP, Erosion Control Plan, the BMPs described above, and performance standards from Caltrans and the County of Los Angeles storm water ordinances would avoid and minimize the potential for temporary construction-related surface water pollution and ensure that water quality in the receiving water bodies would not be adversely impacted by erosion, sedimentation, or chemical pollutants during construction.

PF-WQ-1 Prior to commencement of construction activities, the proposed project shall comply with the provisions of the California Department of Transportation (Caltrans) National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit (Order No. 2012-0011-DWQ, as amended by Order WQ 2014-0006-EXEC, Order WQ 2014- 0077-DWQ, and Order WQ 2015-0036-EXEC, NPDES No. CAS000003) and the NPDES General Permit for Storm Water Discharges of Storm Water Runoff Associated with Construction Activities (Order No. 2009-0009-DWQ, as amended by 2012-0006-DWQ), and any subsequent permits in effect at the time of construction.

PF- WQ-2 Prior to commencement of construction activities, a Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and implemented to address all construction-related activities, equipment, and materials that have the potential to impact water quality. It shall be prepared per the requirements stated in the NPDES General Permit for Storm Water Discharges of Storm Water Runoff Associated with Construction Activities and any subsequent permit in effect at the time of construction. The SWPPP shall identify the sources of pollutants that may affect the quality of storm water and include the construction site Best Management Practices (BMPs) to control pollutants such as sediment control, catch basin inlet protection, construction materials management and non-storm-water BMPs. All construction site BMPs

shall follow the latest edition of the *Caltrans Project Planning and Design Guide* (PPDG) (2017) and Caltrans *Construction Manual* (2017). These include but are not limited to temporary sediment control, temporary soil stabilization, scheduling, waste management, materials handling, and other non-storm water BMPs.

Dewatering is not anticipated during construction. In the event that groundwater and any other non-storm-water dewatering activities become necessary, these activities would be subject to the requirements and permitting authority of the RWQCB.

Drainage features within the study area all have low aquatic values, primarily due to their concrete linings and lack of habitat. One drainage feature is earthen-bottomed with very little vegetation and almost no structural complexity, indicating a low aquatic habitat value. Therefore, no short-term impacts to the biological aquatic environment would occur. The BMPs outlined above identified as part of the SWPPP would avoid any impacts to aquatic species that may be present in existing downstream suitable habitat, if any.

No Build Alternative

Construction-related activities would not occur under the No Build Alternative; therefore, there would be no temporary impact to water quality or storm water runoff.

2.8.3.2 Permanent Impacts

Build Alternative (includes Design Options)

The Build Alternative represents a 5.83 ac increase in impervious surface over existing conditions due to new roadway area, interchanges, and bridges, as well as an alteration of drainage patterns on roadways. This permanent increase in impervious surface area will result in a permanent increase in runoff and pollutant loading by increasing peak loads and runoff volumes, in turn increasing the potential for erosion and sedimentation in surface waters. Contaminants in the runoff from the widened roadway could include sediments, oils, grease, and metals, similar to existing contaminants within the study area. Targeted Design Constituents are defined in the Caltrans NPDES Permit as pollutants that are expected to be generated by the proposed project and may "cause a condition of pollution or nuisance due to the discharge of excessive amounts, proximity to receiving waters," or their properties, or may cause the impairment of Section 303(d) listed receiving waters. Targeted Design Constituents anticipated to be generated by the proposed project include copper, lead, pesticides, and nutrients. As required by the Caltrans NPDES Permit, the proposed

project is required to prepare a Storm Water Data Report (SWDR) and evaluate the project for the feasibility of Treatment BMPs that will be implemented during construction to the maximum extent practicable.

As described in the following project feature (PF-WQ-3), the SWDR will document the Caltrans-approved Treatment BMPs that will treat the Targeted Design Constituents listed above. Also included as a project element is the incorporation of Design Pollution BMPs that include the preservation of existing vegetation and slope and surface protection systems (e.g., permanent soil stabilization), as well as the use of 4:1 or flatter slopes. A new substantial source of pollutants would not be introduced, as the project is proposed to accommodate existing uses. Turbidity in downstream water bodies may increase due to the increase in impervious surface area. Overall, once Treatment and Design Pollution BMPs are properly designed, implemented, and maintained, no permanent adverse water quality impacts would occur.

PF-WQ-3 Caltrans *Project Planning and Design Guide* (2017) Approved Treatment BMPs shall be implemented to the Maximum Extent Practicable (MEP) and documented in the Storm Water Data Report (SWDR), meeting requirements in the Caltrans NPDES Permit and any subsequent permits.

No Build Alternative

The No Build Alternative would not result in changes to existing drainage systems or an increase in impervious surface areas; therefore, no substantial adverse water quality-related impacts would occur.

2.8.4 Avoidance, Minimization, and/or Mitigation Measures

Because potential temporary and permanent adverse impacts to water quality would be addressed by construction and permanent BMPs included as project features, no avoidance, minimization, and/or mitigation measures are necessary.

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2.9 Geology/Soils/Seismic/Topography

2.9.1 Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act (CEQA).

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. Structures are designed using Caltrans' Seismic Design Criteria (SDC). The SDC provides the minimum seismic requirements for highway bridges designed in California. A bridge's category and classification will determine its seismic performance level and which methods are used for estimating the seismic demands and structural capabilities. For more information, please see Caltrans' Division of Engineering Services, Office of Earthquake Engineering, Seismic Design Criteria.

The City of Cerritos General Plan (January 2004) and City of Artesia General Plan (September 2010) both require new structures and alterations to existing structures to comply with the Los Angeles County Building Code and California Building Code in order to minimize seismic hazards.

2.9.2 Affected Environment

This section summarizes information provided in the *Preliminary Geotechnical Report* (2018) and *Preliminary Geotechnical Materials Report* (2017). This section discusses the existing geologic and soils conditions within the study area.

2.9.2.1 Regional Geology, Topography, and Soils

The study area is located within the Peninsular Ranges Geomorphic Province of California, which stretches from the Los Angeles Basin to the tip of Baja California. This province is characterized as a series of northwest-trending mountain ranges separated by subparallel fault zones and a coastal plain of subdued landforms. The mountain ranges are underlain primarily by Mesozoic metamorphic rocks that were intruded by plutonic rocks of the Southern California batholith, while the coastal plain is underlain by subsequently deposited marine and non-marine sedimentary formations.

The Los Angeles Basin is a large, relatively flat, low-lying coastal plain surrounded by mountains on the north, east, and southeast. The western margin of the Los Angeles Basin is bordered by the Pacific Ocean and the Palos Verdes Hills. The floor of the Los Angeles Basin slopes gradually southwesterly from approximately 300 to 600 feet (ft) in elevation along the margins of the surrounding hills to sea level along the coastline.

Based on regional geological maps, geologic materials within the vicinity of the study area consist of predominantly sands, silts and some clay associated with the thick alluvial fan, alluvial basin, and alluvial outwash deposits derived from the San Gabriel River. These deposits consist of moderately dense to dense, porous to very porous, massive to crudely layered, slightly silty, coarse to fine sand and gravels. Old and Very Old Alluvial Fan Deposits consist of moderately to well consolidated gravel and cobble deposits within a dirty sand matrix. These materials are over 3,000 ft thick and are underlain by Tertiary-age marine formations of the San Pedro, Fernando, and Puente Formations to depths on the order of 11,000 ft, which in turn are underlain by early Tertiary formations. Mesozoic-age crystalline basement rocks are at depths of about 15,000 ft.

2.9.2.2 Local Geology, Topography, and Soils

The study area is within an embayment on the central part of the Los Angeles Basin. Holocene to Late Pleistocene Young Alluvial Fan Deposits underlie the study area. The alluvial deposits are unconsolidated to slightly consolidated and are generally associated with the San Gabriel River. The State Route 91 (SR-91) elevations within the study area range from approximately 60–95 ft above mean sea level (amsl). According to the Log of Test Borings (LOTBs) for the study area, the upper 60 ft of the underlying soils generally consist of fine- to medium-grained, loose to medium dense, silty and clayey sand, sandy silt, poorly graded sand, and clayey silt. Interbeds of soft silt and clay and occasionally organic materials were also observed. Below 60 ft, the soils become generally fine to coarse, dense silty sand with varying amount of gravel.

2.9.2.3 Geologic Hazards

Geologic hazards relevant to the proposed project include seismic ground shaking, localized soil liquefaction, and seismic settlement. The following geologic hazards were reviewed and determined not to be relevant to the proposed project; therefore, they are not discussed later in 2.9.3, Environmental Consequences:

- **Tsunami and Seiches:** Seiches are large waves generated in enclosed bodies of waters, such as lakes, in response to ground shaking. Tsunamis are waves generated in large bodies of water as a result of fault displacement or major ground movement. There are no enclosed bodies of water near the study area and the Pacific Ocean is approximately 17.25 miles (mi) west of the study area. As a result, the existing potential risks related to tsunamis and seiches are considered negligible.
- **Seismically-induced Landslides:** The study area is not located within an earthquake-induced landslide zone (California Geological Survey 1999). Evidence of landslides was not observed during the site investigation and the study area topography is relatively flat. Additionally, according to the City of Cerritos General Plan Safety Element (January 2004), Cerritos does not have the potential for landslides. The City of Artesia General Plan Geology and Soils Element (September 2010) states that Artesia is not located within a mapped Earthquake-Induced Landslide Zone of Required Investigation and earthquake-induced landsliding is not anticipated to occur.
- **Rock Falls:** The City of Cerritos General Plan (January 2004) and the City of Artesia General Plan (September 2010) do not document rock fall areas. As discussed above, the study area consists of relatively flat topography, and geologic hazards (e.g., landslide areas as a result of steep slopes) have not been mapped in the project area. Therefore, rock fall hazards are unlikely to occur in the project area.
- **Slope Instability:** The existing embankment slopes along the proposed project alignment are generally inclined 1.5:1 (horizontal:vertical) or flatter and are generally vegetated. No sign of slope instability was observed during site investigation. No hazardous geologic structure exists near the surface that may cause instability of the existing embankments.
- **Scour:** Scour is not anticipated because no drainage channels or creeks cross the study area.
- **Soil Corrosion:** According to the *Preliminary Geotechnical Materials Report* (2017), due to a predominance of granular soils throughout the study area, the soils are not expected to be corrosive.
- **Volcanic Hazards:** There are no active, potentially active, or inactive volcanoes in Los Angeles County. Therefore, volcanic hazards would not affect the study area.

- **Economical Resources/Mineral Hazards:** The City of Cerritos and City of Artesia General Plans as well as the map of Aggregate Sustainability in California[1] do not identify economical resources/mineral resources in the study area.

Faulting and Seismicity

The study area is located in a seismically active region of Southern California. Historical epicenter maps show widespread seismicity throughout the Los Angeles Basin. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the Los Angeles Basin is underlain by several subsurface thrust faults (blind faults). Earthquakes in the region occur primarily as loose clusters along the Newport-Inglewood Structural Zone (NISZ), along the southern margin of the Santa Monica Mountains, the southern margin of the Santa Susana and San Gabriel Mountains, and in the Coyote Hills-Puente Hills area.

The study area is not located within an Alquist-Priolo Fault Zone. The closest significant active fault with Holocene surface rupture is the Newport-Inglewood-Rose Canyon Fault, crossing approximately 6.3 mi southwest of the Interstate 605 (I-605)/ SR-91 interchange. This fault zone is believed to be capable of producing a 7.2 magnitude earthquake. The closest mapped active fault with surface rupture is the late Quaternary Los Alamitos Fault, located approximately 3 mi southwest of the I-605/SR-91 interchange. In addition, the Anaheim Fault crosses SR-91 at the on-ramp of Bloomfield Avenue; however, the top of the rupture plane of this Holocene-age fault is approximately 2.4 mi below ground surface. The locations of these faults are shown on Figure 2.9-1.

The nearest substantial local sources of earthquakes and estimated peak ground acceleration (PGA) are summarized in Table 2.9.1.

[1] California Geological Survey. Aggregate Sustainability in California. 2012. Website: http://www.conservation.ca.gov/cgs/information/publications/ms/Documents/MS_52_2012.pdf (accessed December 18, 2017).

LEGEND

Project Location

Alquist-Priolo Earthquake Fault Zones

Quaternary Faults (>6 Magnitude in Last 1.6 Million Years)

N

0 2.5 5

MILES

SOURCE: Bing Maps (2015); Michael Baker (11/2017)

I:\RBF1601\GIS\MXD\ISEA\Faults.mxd (3/30/2018)

FIGURE 2.9-1

Westbound SR-91 Improvement Project

Active Fault Map

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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Table 2.9.1 Closest Active Faults Information

Controlling Deterministic Faults	Fault ID	Fault Type	Dip	Mmax	RRUP (km)	Factors Used	Basin Effect		PGA (g)		
							$Z_{1.0}$ (m)	$Z_{2.5}$ (m)	D	P	C
Puente Hills (Santa Fe Springs)	359	Rev	29°V	6.6	4.863	Basin, Near Fault	800	5.43	0.54	0.61	0.61
Puente Hills (Coyote Hills)	361	Rev	26°V	6.8	6.115	Basin Near Fault			0.51		
Compton	367	Rev	20°V	6.9	10.548	Basin Near Fault			0.55		

Source: *Preliminary Geotechnical Report* (2018).
°V = degrees vertical
C = Controlling
D = Deterministic
g = value of acceleration equal to 32 feet/second^2
km = kilometers
m = meters
Mmax = maximum magnitude
P = Probabilistic
PGA = peak ground acceleration
Rev = Reverse
RRUP = closest distance to a fault rupture plane
$Z_{1.0}$ = depth to a shear-wave velocity of 1.0 kilometer/second
$Z_{2.5}$ = depth to a shear-wave velocity of 2.5 kilometers/second

PGA is a measurement of maximum ground acceleration in a particular area and is an important factor for structural engineering against earthquake damage for things such as roads, bridges, and buildings. It can be described as how hard the ground may shake in a given geographic area based on several factors (e.g., the distance from an active fault, the maximum expected earthquake from that fault, and the underlying geologic units). The study area is likely to experience strong ground motion with an approximate PGA of 0.61 g.[1]

Groundwater

Neither SR-91 nor I-605 cross over a drainage channel or creek within the study area. Coyote Creek is located approximately 1.35 mi east of the SR-91/Shoemaker Avenue interchange, and the San Gabriel River is located approximately 1,500 ft west of the I-605/SR-91 interchange. Excavations and cut slopes from the proposed project are not anticipated to encounter seepage from these concrete-lined channels. Based on 1960s LOTBs, the groundwater elevation along SR-91 ranged from 38 ft amsl at the I-605 interchange to 53 ft amsl at Bloomfield Avenue. The groundwater elevation at I-605/Alondra Avenue was approximately 46 ft amsl. Per the GeoTracker database (2017), groundwater elevations are generally in the range of 49–53 ft amsl within the study area, or approximately 7 to 12 ft below the existing ground surface in the vicinity of SR-91 and approximately 20 ft below the existing ground surface at I-605/Alondra Boulevard. Based on available data, the historical high groundwater elevation appears to be higher than today.

[1] "g" is a common value of acceleration equal to 32 feet/second^2.

According to the California Water Science Center (2017), the study area is located within the Los Angeles/Santa Ana basin, which is known to be subject to subsidence due to groundwater pumping. Therefore, there is a potential for subsidence within the study area.

Liquefaction Potential and Seismic Settlement

Liquefaction occurs when loose, saturated, generally fine sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid, potentially resulting in large total and differential ground surface settlements as well as possible lateral spreading during an earthquake. Based on the California Geological Survey (CGS) Seismic Hazard Maps, the study area is located within a liquefaction study zone. Underlying soils within the study area are expected to consist of fine- to medium-grained, loose to medium dense sand. The groundwater table is relatively shallow, and the site is subject to strong ground motion. Therefore, liquefaction potential is high. The preliminary estimate for free-field liquefaction settlement ranges between 4 and 8 inches at different locations of the study area.

According to the City of Cerritos General Plan Safety Element (January 2004), the entire city of Cerritos is located within a Liquefaction Hazard Zone. According to the City of Artesia General Plan (September 2010), Artesia is located within a mapped Liquefaction Zone of Required Investigation.

2.9.3 Environmental Consequences

2.9.3.1 Temporary Impacts

Build Alternative (includes Design Options)

Soil Erosion

Construction of the Build Alternative would result in a total disturbed soil area (DSA) of approximately 29.25 acres (ac). Excavated soil in the construction areas would be exposed and, as a result, there would be an increased potential for soil erosion during construction compared to existing conditions. During a storm event, soil erosion could occur at an accelerated rate. Temporary cut slopes would follow the guidelines of the California Department of Transportation's (Caltrans) *Trenching and Shoring Manual* (Caltrans 2011), and the Occupational Safety and Hazard Administration (OSHA) 29 Code of Federal Regulations (CFR) 1926 Subpart P would be followed for temporary excavations.

During all construction activities for the Build Alternative, the construction contractor will be required to adhere to the requirements of the General Construction Permit and

to implement erosion and sediment control best management practices (BMPs) specifically identified in the project Storm Water Pollution Prevention Plan (SWPPP) to keep sediment from moving off site into receiving waters and impacting water quality. Refer to Section 2.8, Water Quality and Storm Water Runoff, for additional discussion regarding construction-related water quality issues and mitigation, including BMPs.

Worker safety hazards resulting from erosion during construction of the Build Alternative would be minimized based on implementation of the requirements in the General Construction Permit and erosion and sediment control BMPs in the SWPPP.

Ground Motion

Construction activities could be affected by ground motion from seismic activities. Possible ground rupture, liquefaction, and consolidation settlement could occur in the study area if an earthquake were to occur during construction. Implementation of safe construction practices and compliance with Caltrans and the California Division of Occupational Safety and Health Administration (Cal/OSHA) safety requirements would minimize the impacts to worker safety during construction activities.

No Build Alternative

Under the No Build Alternative, the temporary construction-related impacts discussed above for the Build Alternative would not occur because there would be no construction of the proposed project improvements under this alternative.

2.9.3.2 Permanent Impacts

Build Alternative (includes Design Options)

Local Geology, Topography, and Soils

The Build Alternative would not result in permanent substantive changes to the topography in the study area because the improvements would generally be constructed at or close to the same grade as the existing SR-91 and I-605.

The proposed grading is not anticipated to increase the potential for erosion within the study area because the proposed slopes would be flatter than the existing slopes. In addition, no excessive erosion was observed for the existing slopes. Caltrans requirements for erosion protection such as control of irrigation and surface runoff, surface soil compaction, and slope planting/paving would be followed. These measures would be sufficient to reduce erosion potential effectively.

As discussed in Section 2.9.2, soils within the study area are predominantly silty and clayey sand, sandy silt, poorly graded sand, and clayey silt. The sandy soils are primarily silty sand, which are not considered to be expansive. The clayey soils consist of sandy and clayey silt and silty clay; the corresponding expansion potential is considered to be moderate to high. Design and construction of the proposed improvements would comply with the Caltrans *Highway Design Manual* (HDM) (December 2016) and other required standards, and recommendations from the *Preliminary Geotechnical Report* (2018), as included in Project Feature PF-GEO-1.

PF-GEO-1 **Geotechnical Investigation.** During the Plans, Specifications, and Estimates (PS&E) phase, a detailed geotechnical investigation will be conducted by qualified geotechnical personnel to further assess the geotechnical conditions at the project area. The geotechnical investigation will include exploratory borings and cone penetration test soundings to investigate site-specific soils and conditions and to collect samples of subsurface soils for laboratory testing. Those soil samples will be tested to evaluate moisture content and dry density, grain-size distribution, percent passing No. 200 sieve, Atterberg limits, expansion index, corrosivity, consolidation, and direct shear. The project-specific findings and recommendations of the geotechnical investigation will be summarized in a structure foundation report and a geotechnical design report to be submitted to the California Department of Transportation (Caltrans) for review and approval. Those findings and recommendations will be incorporated in the final design of the selected Build Alternative.

Adherence to recommendations within these reports would substantially reduce substantial adverse effects from geologic hazards. In addition, surficial soils that are sandy can be susceptible to soil erosion produced by running water. The clayey surficial soils are expected to expand when wet and to crack upon drying. Cracking allows infiltration of water from storms and irrigation, ultimately causing loosening of the surficial soils. This results in an increase of soil erodibility. Proposed fill slopes are generally 4:1 (horizontal:vertical), which satisfies the Caltrans HDM requirements for side slopes. Other proposed grading requires 1.5:1 (horizontal:vertical) or flatter cut slopes. The revegetation and engineering of graded slopes specified in Project Feature PF-GEO-2 will be performed prior to construction to minimize the soil erodibility and slope stability.

PF-GEO-2 **Slope Protection.** Prior to construction, revegetation of graded slopes should be performed to minimize erosion. In addition, slopes along the northbound extent of the Pioneer Boulevard and Norwalk Boulevard undercrossings are recommended to either have slopes of at least 2:1 (horizontal:vertical) or the slopes should be benched or paved to have an adequate factor of safety. Alternatively, a slope stability analysis would be performed per the specifications listed in the Preliminary Geotechnical Report. An engineering geologist would observe all cut slopes during grading to ensure no unforeseen adverse conditions occur.

Additionally, Section 2.8, Water Quality and Storm Water Runoff, contains additional project features related to soil erosion, including BMPs; and Section 2.11, Hazardous Waste/Materials, contains additional project features related to hazardous wastes and materials.

Faulting and Seismicity, Settlement, Groundwater, and Liquefaction

The main geotechnical considerations for the study area are the presence of potentially compressible (shallow and deep) and liquefiable soils. Settlement is anticipated at the SR-91 crossing street on-/off-ramps where approach fills are required. Preliminary liquefaction settlement estimates indicate settlements between 4 inches and 8 inches could occur within the study area. As mentioned above, future subsidence of the site should also be expected. Recommendations to reduce the compressibility of soils and potential for liquefaction would be followed, as included in Project Feature PF-GEO-3.

PF-GEO-3 **Soil Settlement and Liquefaction.** Surcharge loading in combination with wick drains should be utilized in areas with compressible soils to reduce settlement potential. Embankment areas could also be over-excavated and backfilled with lightweight materials. Remedial grading beneath the walls foundation will be required if shallow foundations are considered. In addition, deep foundations may be recommended depending on the results of the site-specific geotechnical investigation (see project feature PF-GEO-1 above). The top 5 feet of existing soil will need to be excavated in areas that will receive embankment fill and retaining walls, and be recompacted to 95 percent relative compaction. All recommendations listed in the *Preliminary Geotechnical Report* (2018) and site-specific geotechnical

investigation related to remedial grading, foundations, and earth pressures would be implemented as included in the project specifications.

Although subsidence and liquefaction can be expected within the study area due to the presence of groundwater, no adverse effects to groundwater are expected to occur. This is because groundwater is expected to be at least 7 ft below the ground surface in the study area. Because the anticipated earthwork is minimal and mostly consists of fill placement rather than deep excavations, installation of dewatering systems and adverse effects to groundwater are not anticipated.

No Build Alternative

Under the No Build Alternative, the permanent impacts discussed above for the Build Alternative would not occur because none of the proposed permanent improvements provided in the Build Alternative would be implemented and operated under this alternative.

2.9.4 Avoidance, Minimization, and/or Mitigation Measures

Because the project will incorporate the project features described in Section 2.9.3.2, no substantial adverse impacts related to geology, soils, and seismicity would occur. Therefore, no avoidance, minimization, and/or mitigation measures are required.

2.10 Paleontology

This section is based on the *Paleontological Identification Report and Paleontological Evaluation Report* (PIR/PER) (2017 and 2018 Errata).

2.10.1 Regulatory Setting

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils.

A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized project.

- 23 United States Code (USC) 1.9(a) requires that the use of Federal-aid funds must be in conformity with all federal and state laws.
- 23 United States Code (USC) 305 authorizes the appropriation and use of federal highway funds for paleontological salvage as necessary by the highway department of any state, in compliance with 16 USC 431-433 above and state law.

Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA).

2.10.2 Affected Environment

A paleontological resource locality search for any known localities within and surrounding the study area was completed through the Natural History Museum of Los Angeles County (LACM) in May 2017. Relevant geologic maps and geological and paleontological literature were reviewed. A pedestrian survey of the study area was conducted on May 31, 2017.

The study area is within the northern Peninsular Ranges Geomorphic Province, a large structural block that extends from the Transverse Ranges in the north to the tip of Baja California. Within this larger region, the study area is located in the Los Angeles Basin, which is a broad alluvial plain bounded by mountains to the north and east and the Pacific Ocean to the west and south.

Geologic mapping indicates the entire study area is underlain by Holocene to late Pleistocene (less than 126,000 years ago) Alluvial Fan and Valley Deposits, Undivided. Although not mapped, Artificial Fill is likely present from the surface to varying depths throughout much of the study area where it was placed during construction of the existing freeways, streets, overcrossings, and undercrossings. Because of its disturbed context, Artificial Fill does not have the potential to contain

scientifically important paleontological resources. The upper 10 feet (ft) of the Young Alluvial Fan and Valley Deposits, Undivided are unlikely to contain scientifically important paleontological resources because of their young age (likely less than 4,200 years). However, the sediments of the Young Alluvial Fan and Valley Deposits, Undivided below a depth of 10 ft may be old enough to contain scientifically important paleontological resources.

The results of the locality search through the LACM indicated that the study area contains Younger Quaternary Alluvium overlain by Older Quaternary Alluvium (i.e., Young Alluvial Fan and Valley Deposits, Undivided). According to the locality search conducted by the LACM, there are no vertebrate fossil localities within the study area. However, LACM has records of several fossil localities near the project site from deposits similar to those found in the study area. The museum notes that these deposits are not usually paleontologically sensitive in the uppermost layers, but that scientifically important fossils may be encountered in the older deposits found at varying depths. The closest vertebrate fossil locality recorded by the LACM in these older deposits is located southwest of the study area on the northwest side of the Long Beach Airport, along Cover Street between Pixie Avenue and Paramount Boulevard. This locality, LACM 3660, produced a specimen of fossil mammoth (*Mammuthus*) at a depth of 19 ft below the surface. Farther southwest of the study area, near Bixby Road between Atlantic Avenue and Orange Avenue, locality LACM 6802 produced fossil specimens of undetermined vertebrates at a depth of 16 ft below the surface. South-southwest of the study area, near the intersection of Spring Street and Cherry Avenue south of the San Diego Freeway (Interstate 405 [I-405]), locality LACM 1021 produced fossil specimens of bird (Aves) and mammoth (*Mammuthus*) at an unknown depth. LACM 3347 is located where Older Quaternary deposits are mapped at the surface to the northeast of the project area, north of Leffingwell Road east of La Mirada Boulevard. This locality produced a fossil specimen of horse (*Equus*) at a depth of only 2 ft below the surface.

The pedestrian survey indicated that most of the study area is underlain by Artificial Fill. Other sediments observed are consistent with the Young Alluvial Fan and Valley Deposits, Undivided mapped in the study area.

2.10.3 Environmental Consequences

2.10.3.1 Temporary Impacts

Build Alternative (includes Design Options)

The construction of the Build Alternative would not result in temporary impacts to paleontological resources because the impacts to those types of resources during construction would be considered permanent as described in Section 2.10.3.2.

No Build Alternative

Under the No Build Alternative, none of the proposed improvements to State Route 91 (SR-91) and Interstate 605 (I-605) would be constructed. The No Build Alternative would maintain the existing conditions; therefore, the No Build Alternative would not result in temporary impacts related to paleontological resources as a result of construction activities.

2.10.3.2 Permanent Impacts

Build Alternative (includes Design Options)

Excavation that extends more than 10 ft below the original ground surface could result in impacts to paleontological resources. Construction of the Build Alternative requires a maximum depth of 20 ft for retaining wall and sound wall piles and 30 ft for piles for the Gridley Road overcrossing and Bloomfield Avenue overcrossing piers. As such, excavation for these construction activities may have the potential to impact paleontological resources. The potential impacts would be avoided or minimized through the following project feature:

PF-PAL-1 **Paleontological Mitigation Plan.** A Qualified Paleontologist shall prepare a Paleontological Mitigation Plan (PMP) following the guidelines in the California Department of Transportation (Caltrans) Standard Environmental Reference (SER), Environmental Handbook, Volume 1, Chapter 8 – Paleontology (June 2016 or more current) and guidelines developed by the Society of Vertebrate Paleontology (SVP 2010). The PMP shall be prepared concurrently with final design plans during the Plans, Specifications, and Estimates (PS&E) phase.

No Build Alternative

Under the No Build Alternative, none of the proposed improvements to SR-91 and I-605 would be constructed. The No Build Alternative would maintain the existing conditions; therefore, the No Build Alternative would not result in permanent adverse impacts related to paleontological resources as a result of construction activities.

2.10.4 Avoidance, Minimization, and/or Mitigation Measures

As the Build Alternative would not result in any temporary or permanent paleontological resources related impacts, no avoidance, minimization, or mitigation measures are required.

2.11 Hazardous Waste/Materials

2.11.1 Regulatory Setting

Hazardous materials, including hazardous substances and wastes are regulated by many state and federal laws. Statutes govern the generation, treatment, storage and disposal of hazardous materials, substances, and waste, and also the investigation and mitigation of waste releases, air and water quality, human health, and land use.

The primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 as amended, and the Resource Conservation and Recovery Act (RCRA) of 1976. The purpose of CERCLA, often referred to as "Superfund," is to identify and clean up abandoned contaminated sites so that public health and welfare are not compromised. The RCRA provides for "cradle to grave" regulation of hazardous waste generated by operating entities. Other federal laws include:

- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order (EO) 12088, *Federal Compliance with Pollution Control Standards*, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

California regulates hazardous materials, waste, and substances under the authority of the CA Health and Safety Code and is also authorized by the federal government to implement RCRA in the state. California law also addresses specific handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning of hazardous waste. The Porter-Cologne Water Quality Control Act also restricts disposal of wastes and requires cleanup of wastes that are below hazardous waste concentrations but could impact ground and surface water quality. California regulations that address waste management and prevention and cleanup of contamination include Title 22 Division 4.5 Environmental Health Standards for the Management of Hazardous Waste, Title 23 Waters, and Title 27 Environmental Protection.

Worker and public health and safety are key issues when addressing hazardous materials that may affect human health and the environment. Proper management and disposal of hazardous material is vital if it is found, disturbed, or generated during project construction.

2.11.2 Affected Environment

The information presented in this section is based on the *Phase I Initial Site Assessment* (ISA) (2018) prepared for the project.

2.11.2.1 Field Survey and Record Search Methodology

The following were conducted as part of the ISA:

- **Reconnaissance-Level Visit:** On July 14, 2017, October 12, 2017, January 12, 2018, and January 18, 2018, a site reconnaissance visit consisting of both the visual observation and photographic documentation of existing conditions and the nature of the development within the study area was conducted. The visit included observations of specific properties for evidence of release(s) and assessment of the potential for on-site releases of hazardous materials and petroleum products.
- **Environmental Database Review:** A regulatory database search of known potential hazardous materials on site, including federal and State environmental databases for the study area, was conducted on June 23, 2017 and October 10, 2017.
- **Agency Records Review:** The California Department of Toxic Substances Control (DTSC) Hazardous Materials Division and the Los Angeles Regional Water Quality Control Board (RWQCB) were contacted to obtain documentation for properties within and adjacent to the existing and proposed right-of-way (ROW) for the Build Alternative.
- **Historical Research:** Aerial photographs, Sanborn Fire Insurance Maps, and historical topographic maps of the study area were reviewed.
- **Aerially Deposited Lead Site Investigation Report Review:** Soil sampling results from an aerially deposited lead (ADL) site investigation within the study area were reviewed.
- **Interview:** Interviews were conducted with key site personnel, as available, regarding current and previous uses of the study area, particularly activities involving hazardous substances and petroleum products.

Based upon records searches and field surveys, issues include the potential occurrence of ADL, yellow traffic striping, asbestos-containing materials (ACM),

lead based paint (LBP), pesticides, treated wood waste (TWW), and polychlorinated biphenyls (PCBs) as presented in Table 2.11.1.

Table 2.11.1 Hazardous Waste/Materials of Concern

Hazardous Waste/Materials of Concern	Occurrence
Aerially Deposited Lead (ADL)	ADL contamination is generally found in unpaved soil due to historical use of lead-containing fuel.
Yellow Traffic Striping	Yellow traffic stripes that need to be removed may contain lead and chromium at concentrations that are considered hazardous.
Asbestos Containing Material (ACM)	ACMs were used in construction until the late 1970s.
Lead Based Paint (LBP)	Building materials used prior to 1978 may contain LBP.
Pesticides	The potential exists for persistent pesticides to be present in soil as a result of using pesticides for weed control. It is recommended that the soil be sampled and analyzed for organochlorine pesticides (OCPs).
Treated Wood Waste (TWW)	TWW comes from old wood that has been treated with chemical preservatives.
Polychlorinated Biphenyls (PCBs)	PCBs were used in the past as insulating oils in electrical transformers, fluorescent light ballasts, and/or as hydraulic oils in elevator equipment prior to the 1980s.

Source: *Phase I Initial Site Assessment* (2018).

2.11.3 Environmental Consequences

2.11.3.1 Temporary Impacts

Build Alternative (includes Design Options)

Temporary impacts related to hazardous waste/materials during project construction could occur within the maximum disturbance limits for the Build Alternative and design options on individual properties identified for full acquisition, as described in the following sections. No hazardous waste/materials concerns were observed or reported within parcels proposed for temporary construction easements (TCEs) and/or partial acquisitions under the Build Alternative and design options. The temporary impacts discussed below apply to the Build Alternative and all design options.

Aerially Deposited Lead

The *ADL Site Investigation Report* (2014) indicated that soil samples with concentrations of lead that exceed regulatory limits were taken at a majority of the on- and off-ramp locations along State Route 91 (SR-91) between Interstate 605 (I-605) and Shoemaker Road. Project Feature PF-HAZ-1 would minimize this effect.

Aerially deposited lead (ADL) from the historical use of leaded gasoline exists along roadways throughout California. There is the likely presence of soils with elevated concentrations of lead as a result of ADL on the state highway system right of way within the limits of the Build Alternative. Soil determined to contain lead

concentrations exceeding stipulated thresholds must be managed in a manner to determine whether such soils may be safely reused within the project limits.

PF-HAZ-1 During construction, excess aerially deposited lead (ADL) contaminated soils require special handling and waste management, especially when disturbed during earthmoving activities. California Department of Transportation (Caltrans) Office of Environmental Engineering will initiate a project-specific ADL site investigation to evaluate whether the excess ADL-contaminated soils generated can be reused within the project limits. If the excess ADL soils cannot be reused within the project limits, the site investigation will also determine whether they are classified as federal or State hazardous waste that requires off-site disposal at a permitted Class I California hazardous waste disposal facility or can be relinquished to the contractor with or without restrictions on use.

Pavement Marking Materials

Yellow traffic striping and pavement-marking materials (e.g., paint, thermoplastic, permanent tape, and temporary tape) that would be removed during construction of the Build Alternative may contain elevated concentrations of metals such as lead. Removal of these materials during construction could affect construction workers and the surrounding environment. Project Feature PF-HAZ-2 would minimize this effect.

PF-HAZ-2 During construction, yellow traffic striping and pavement marking materials will be tested for lead and lead chromate. If hazardous materials are discovered, the project specifications will direct the Construction Contractor to remove and properly dispose of any materials in accordance with the Caltrans *Construction Manual* (July 2017), Chapter 7, Section 7-107, Hazardous Waste and Contamination.

Asbestos-Containing Materials and Lead-Based Paint Related to Structures

The Build Alternative will require the relocation of 18 single-family residences and two commercial parcels located within the northern portion of Artesia, north of the project segment of SR-91. The Build Alternative would also require improvements to the following bridges: Studebaker Road (both the SR-91 mainline Undercrossing [Br. No. 53-1706] and the westbound SR-91 to I-605 Connector Undercrossing [Br. No. 53-1707F]), Gridley Road Overcrossing (Br. No. 53-1324), Pioneer Boulevard Undercrossing (Br. No. 53-1335), Norwalk Boulevard Undercrossing (Br. No. 53-

1334), and Bloomfield Avenue Overcrossing (Br. No. 53-1433). . The Pioneer Boulevard Westbound Ramps/168th Alignment Design Option would result in five residential displacements. Based on the construction dates of these structures, ACMs and LBP may be present in these bridges and structures. ACMs and LBP represent a concern during demolition of these bridges and structures. The acquired parcels are shown on Figure 2.11-1. Project Features PF-HAZ-3, PF-HAZ-4, PF-HAZ-5, PF-HAZ-6, and PF-HAZ-7 specifically require proper testing, monitoring, removal, disposal of ACMs and LBP, as well as focused ISAs and recommended site investigations.

PF-HAZ-3 After property acquisition and prior to demolition, structures and bridges that are proposed to be demolished and/or modified within State Route 91 (SR-91) right-of-way (ROW) will be assessed for the possible presence of asbestos-containing materials (ACMs) and lead-based paint (LBP). These studies will be conducted by trained and/or licensed professionals and will comply with the United States Environmental Protection Agency (EPA), the National Emission Standards for Hazardous Air Pollutants (NESHAPs), Title 40 of the Code of Federal Regulations (CFR), the Southern California Air Quality Management District (SCAQMD) Rule 1403, and guidelines from the Department of Housing and Urban Development (HUD) and California Department of Public Health (CDPH). The results of these studies will provide a description of the locations of the ACMs and LBP; their estimated quantities; and recommendations for their removal, containment, and off-site transportation and disposal.

PF-HAZ-4 Qualified Professionals will complete an ACM and LBP survey on the structures and bridges that were constructed before 1979 during the Plans, Specifications, and Estimates (PS&E) phase. The ACM and LBP study will be conducted by trained and/or licensed professionals and will comply with the EPA, HUD, and CDPH guidelines. The ACM and LBP study report will provide a description of the ACM and LBP locations; the estimated quantities of ACM and LBP; and specific requirements for the removal, containment, and off-site transport and disposal of materials containing ACM and LBP from the acquired properties. The requirements from that study will be included in the project specifications for implementation during project construction.

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LEGEND

Study Area Limits

Full Acquisition

Partial Acquisition

Potential Hazardous Materials Sites

0 525 1050

FEET

SOURCE: Bing Maps (2015); Michael Baker (11/2017)

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FIGURE 2.11-1

Westbound SR-91 Improvement Project

Potential Hazardous Materials Sites

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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PF-HAZ-5 The Construction Contractor will implement the requirements in the ACM and LBP survey report as included in the project specifications.

PF-HAZ-6 During Plans, Specifications, and Estimates (PS&E), a focused Initial Site Assessment (ISA) will be prepared for all commercial/industrial properties and, based on the focused ISA, a Phase II Site Investigation may be recommended. A Phase II Site Investigation shall be prepared for all commercial/industrial properties proposed for partial or full acquisition, including any necessary highway easements, utility easements, and/or temporary construction easements associated with the property.

PF-HAZ-7 During construction, the Construction Contractor will monitor soil excavation for visible soil staining, odor, and the possible presence of unknown hazardous material sources. If hazardous material contamination or sources are suspected or identified during project construction activities, the Construction Contractor will be required to cease work in the area and to have a Qualified Professional evaluate the soils and materials to determine the appropriate course of action required, consistent with the Unknown Hazards Procedures in Chapter 7 of the Caltrans *Construction Manual* (July 2017). Adequate protection for construction workers will be provided with the implementation of a Health and Safety Plan and Soil Management Plan.

Pesticide Use

Due to the historical use of many areas within or in the vicinity of the study area as agricultural land, soils within the study area may contain residue pesticide. However, it is likely that the previous construction of SR-91 and I-605 will have reduced the potential for pesticide contamination within the project limits. Project Features PF-HAZ-8 and PF-HAZ-9 require a site investigation be performed for any undeveloped areas that might contain elevated contaminations of pesticide to identify whether any residual contamination from the past agricultural uses is still present, and to determine if any potential hazards may occur during construction activities associated with residual contamination. As a result, the Build Alternative would not result in adverse impacts related to residual contamination from the past agricultural uses within the study area.

PF-HAZ-8 Soil sampling for pesticides on any former agricultural parcels will be completed during the PS&E phase. Samples will be collected and analyzed to evaluate the presence or absence of residual organochlorine pesticides and arsenical herbicides. The soil sampling will be conducted in general accordance with DTSC Interim Guidance for Sampling Agricultural Fields for School Sites (August 26, 2002). The performance standard of soil sampling for this measure complies with applicable federal, State, and local regulations regarding the removal, handling, transport, and disposal of soils contaminated with pesticides. The analytical results of the soil sampling will determine the appropriate handling and disposal of the soil.

PF-HAZ-9 During construction, the construction contractor will properly dispose of all soils exceeding the criteria for State or federal hazardous waste at an appropriate State-certified landfill facility.

Treated Wood Waste

Removal of sign posts and/or guard rails located along the SR-91 and I-605 ROW as well as at on/off ramps during construction of the Build Alternative would generate TWW. Removal of these materials during construction could affect construction workers and the surrounding environment. Project Feature PF-HAZ-10 would minimize this effect.

PF-HAZ-10 Caltrans follows regulations adopted by the California Department of Toxic Substances Control (DTSC) when managing treated wood waste (TWW) to prevent releases of hazardous chemical preservatives, scavenging, and harmful exposure to people, aquatic life and animals. During construction, TWW may be handled as a regulated solid waste. TWW may be disposed in a State Water Resources Control Board certified solid waste landfill, rather than a hazardous waste landfill.

PCBs

Polychlorinated biphenyls (PCBs) were used in the past as insulating oils in electrical transformers, fluorescent light ballast, and/or as hydraulic oils in elevator equipment prior to the 1980s. There are 21 electrical distribution transformers (both ground-mounted and utility pole-mounted) present within the project area along the north side of SR-91 and east side of I-605. Of these 21, 8 are located over bare soil and 1 is located partially over bare soil. Soil disturbance during construction activities may

affect construction workers and the surrounding environment. Project Feature PF-HAZ-11 would minimize this effect.

PF-HAZ-11 Prior to site disturbance activities, the soil beneath transformers that are located over bare soils shall be sampled for polychlorinated biphenyls (PCBs). Soil samples shall be collected using either hand auger or direct-push methodology. The samples will be collected from the upper 6 inches, followed by a 1-foot depth, and then 1-foot intervals thereafter to a total depth not to exceed 4 feet below surface grade (bsg). The soil samples will be analyzed for PCBs using United States Environmental Protection Agency (USEPA) Method 8082.

Potentially Contaminated Soil and/or Groundwater

Five properties that have contributed to known groundwater impacts are located in the vicinity of the maximum disturbance limits of the Build Alternative. These five properties are located at 16821 Norwalk Boulevard, 16604/16620 Pioneer Boulevard, 16632 Pioneer Boulevard, 10802 College Place, and 16809 Pioneer Boulevard. Due to the nature of the businesses and the proximity of these properties to the maximum disturbance limits for the Build Alternative, there is potential that contaminated groundwater originating at those parcels could be encountered during construction of the project. Project Feature PF-HAZ-12 specifically requires that a site investigation be performed on these parcels to identify potential hazards that may occur during project construction associated with contaminated soil and groundwater.

PF-HAZ-12 A preliminary site investigation will be initiated and completed during PS&E on the five properties that will not be fully or partially acquired or used during construction but are adjacent to the maximum disturbance limits. The preliminary site investigation will assess the presence or absence of impacts associated with the hazardous waste concerns.

The site investigation will provide the appropriate avoidance, minimization, or mitigation for those hazards. As a result, the Build Alternative would not result in adverse impacts related to contaminated soil and/or groundwater at these parcels.

Hazardous materials present in the study area or in the project vicinity based on the database search, historical records review, reconnaissance-level visit, and interviews are listed in Table 2.11.2 and shown on Figure 2.11-1.

Table 2.11.2 Hazardous Materials in the Study Area

Figure 2.11-1 ID	Property Name and Address	Description
1	Shell Gas Station 16821 Norwalk Boulevard	The property is listed as a previous leaking underground storage tank (LUST); the current status of the case is open with eligibility for closure. An enclosure is present with a National Fire Protection Association (NFPA) placard identifying a flammable hazardous material. The property appeared well-maintained and clean, with no obvious spills or leaks. The LUST site is considered a potential Recognized Environmental Condition (REC) and would be dependent on issuing of site closure by the regulatory agency.
2	Diamond Tire Center/Dae Lim Auto Repair 16604/16620 Pioneer Boulevard	The property is listed as an open LUST case. According to GeoTracker, the location has been under investigation for 28 years. Reconnaissance of the location revealed two monitoring wells and one grated drain location. Some type of runoff suggestive of motor oil was observed leaking around and onto a monitoring well box in the parking lot area, and staining from previous leaking was also observed; therefore, this property is considered a REC.
3	Artesia Building Materials 16632 Pioneer Boulevard	Site reconnaissance indicated the property was clean and well maintained with no obvious spills or leaks. However, this property is listed as a LUST case and is considered open and has been under site assessment as of 2012. The case cannot be closed until a secondary source of contamination has been removed; therefore, this property is considered a REC.
4	College Hospital 10802 College Place	Hazardous material and unmarked waste were observed during the site visit. No additional information was available. Based on the available information, this is considered a potential REC.
5	Arco Gas Station 16809 Pioneer Boulevard	According to the *Environmental Data Resources Corridor Report* (i.e., Appendix B of the *Phase I Initial Site Assessment*) this property was previously listed as a LUST site in 2002 and the case closed in 2012. According to GeoTracker, the property was previously listed as a LUST site with soil and groundwater fuel hydrocarbon contamination. Although the site has received LUST site closure, residual impact may remain in the soil and groundwater beneath the site. This property is considered a Historical Recognized Environmental Condition (HREC).

Source: *Phase I Initial Site Assessment* (2018).

No Build Alternative

The No Build Alternative would not result in the disturbance or removal of any soils, groundwater, or structures and therefore would not result in temporary impacts related to hazardous waste/materials.

2.11.3.2 Permanent Impacts

Build Alternative (includes Design Options)

Routine maintenance activities during operation of the Build Alternative would be required to follow applicable regulations with respect to the use, storage, handling, transport, and disposal of potentially hazardous materials. Therefore, the operation of the Build Alternative would not result in adverse impacts related to hazardous waste/materials.

No Build Alternative

The No Build Alternative would not change the existing physical environment, and therefore there would be no permanent impacts related to hazardous waste/materials under this alternative. Similar to the Build Alternatives, routine maintenance activities would continue under the No Build Alternative, including compliance with applicable regulations regarding the handling and disposal of potentially hazardous materials.

2.11.4 Avoidance, Minimization, and/or Mitigation Measures

Because the Build Alternative would not result in any temporary or permanent impacts related to hazardous materials, no avoidance, minimization, or mitigation measures are required.

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2.12 Air Quality

2.12.1 Regulatory Setting

The Federal Clean Air Act (FCAA) of 1970 (42 United States Code [USC] 7401 et seq.), as amended, is the primary Federal law that governs air quality while the California Clean Air Act (CCAA) is its companion State law. These laws, and related regulations by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB), set standards for the concentration of pollutants in the air. At the Federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and State ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), and sulfur dioxide (SO_2). In addition, national and State standards exist for lead (Pb), and State standards exist for visibility-reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and State standards are set at levels that protect public health with a margin of safety, and are subject to periodic review and revision. Both State and Federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics in their general definition.

Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA). In addition to this environmental analysis, a parallel "Conformity" requirement under the FCAA also applies.

2.12.1.1 Conformity

The conformity requirement is based on FCAA Section 176(c), which prohibits the U.S. Department of Transportation (USDOT) and other Federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to the State Implementation Plan (SIP) for attaining the NAAQS. "Transportation Conformity" applies to highway and transit projects and takes place on two levels: the regional (or planning and programming) level and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. EPA regulations at 40 Code of Federal Regulations (CFR) 93 govern

the conformity process. Conformity requirements do not apply in unclassifiable/ attainment areas for NAAQS and do not apply at all for State standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O_3, particulate matter (PM_{10} and $PM_{2.5}$), and in some areas (although not in California), SO_2. California has nonattainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for Pb; however, Pb is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on emission analysis of Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years (for the RTP), and four years (for the FTIP). RTP and FTIP conformity uses travel demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the FCAA and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA), make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept and scope and the "open-to-traffic" schedule of a proposed transportation project are the same as described in the RTP and FTIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and Transportation Improvement Program (TIP); the project has a design concept and scope[1] that has not changed significantly from those in the RTP and TIP; project analyses have used the latest planning assumptions and EPA-approved emissions models; and in PM areas, the project complies with any control measures in the SIP. Furthermore, additional analyses (known as hot-spot analyses)

[1] "Design concept" refers to the type of facility that is proposed, such as a freeway or arterial highway. "Design scope" refers to those aspects of the project that would clearly affect capacity and thus any regional emissions analysis, such as the number of lanes and the length of the project.

may be required for projects located in CO and PM nonattainment or maintenance areas to examine localized air quality impacts.

2.12.2 Affected Environment

This section is based on the *Air Quality Analysis* (2018) prepared for the project.

2.12.2.1 Climate

The project site is located within the South Coast Air Basin, which includes Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the Basin is administered by the South Coast Air Quality Management District (SCAQMD), a regional agency created for the Basin.

The South Coast Air Basin climate is determined by its terrain and geographical location. The Basin is a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern boundary, and high mountains surround the rest of the Basin. The region lies in the semipermanent high pressure zone of the eastern Pacific. The resulting climate is mild and tempered by cool ocean breezes. This climatological pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, and Santa Ana wind conditions do occur in the Basin.

The annual average temperature varies little throughout the South Coast Air Basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station closest to the site-monitoring temperature is the Anaheim Station.[1] The annual average maximum temperature recorded at this station is 77.4°F, and the annual average minimum is 55.4°F. January is typically the coldest month in this area of the Basin.

The majority of annual rainfall in the South Coast Air Basin occurs between November and April. Summer rainfall is minimal and is generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern portion of the Basin along the coastal side of the mountains. The climatological station closest to the site that monitors precipitation is the Anaheim Station. Average rainfall measured at this station varied from 3.47 inches in February to 0.72 inch or less

[1] Western Regional Climatic Center. Website: http://www.wrcc.dri.edu (accessed March 2018).

between May and October, with an average annual total of 14.09 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The South Coast Air Basin experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed from midafternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Inversion layers are important in determining O_3 formation. O_3 and its precursors will mix and react to produce higher concentrations under an inversion. The inversion will also simultaneously trap and hold directly emitted pollutants (e.g., CO). PM_{10} is both directly emitted and indirectly created in the atmosphere as a result of chemical reactions. Concentration levels of these pollutants are directly related to inversion layers due to the limitation of mixing space.

Surface or radiation inversions are formed when the ground surface becomes cooler than the air above it during the night. The ground goes through a radiative process on clear nights, when heat energy is transferred from the ground to a cooler night sky. As the ground cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air; this heating stimulates the ground level air to float up through the inversion layer.

The combination of stagnant wind conditions and low inversions produces the greatest concentration of pollutants. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas in Los Angeles and Orange Counties are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and oxides of nitrogen (NO_X) because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

2.12.2.2 Monitored Air Quality

The SCAQMD operates several air quality monitoring stations in the project area. The Compton Air Quality Monitoring Station at 700 North Bullis Road monitors four of the five criteria pollutants (CO, O_3, NO_2, and $PM_{2.5}$). The closest monitoring station with PM_{10} data is the Anaheim-Pampas Lane Station. Figure 2.12-1 shows the locations of the air quality monitoring stations near the project. Air quality trends identified from data collected at both air quality monitoring stations between 2011 and 2016 are listed in Table 2.12.1.

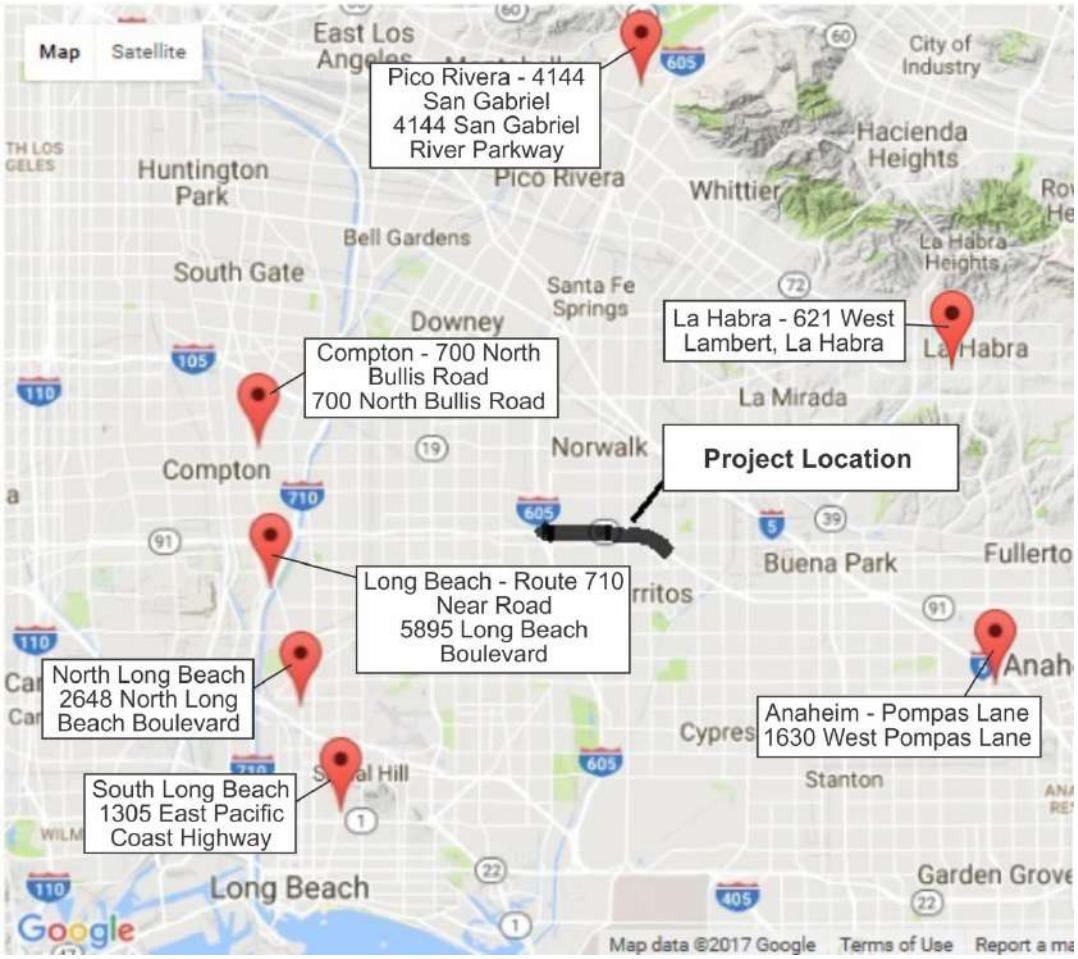


Figure 2.12-1: Air Quality Monitoring Stations in the Project Vicinity

Table 2.12.1 Ambient Air Quality Levels In Project Vicinity

Pollutant	Standard	2011	2012	2013	2014	2015	2016
Carbon Monoxide							
Max 1-hr concentration (ppm)		5.8	5.2	5.8	5.8	4.4	4.4
No. days exceeded: State	> 20 ppm/1-hr	0	0	0	0	0	0
Federal	> 35 ppm/1-hr	0	0	0	0	0	0
Max 8-hr concentration (ppm)		4.7	4.0	3.5	3.8	3.3	3.9
No. days exceeded: State	>9.1 ppm/8-hr	0	0	0	0	0	0
Federal	>9.5 ppm/8-hr	0	0	0	0	0	0
Ozone							
Max 1-hr concentration (ppm)		0.082	0.086	0.090	0.087	0.087	0.079
No. days exceeded: State	> 0.09 ppm/1-hr	0	0	0	0	0	0
Ozone							
Max 8-hr concentration (ppm)		0.065	0.070	0.069	0.063	0.066	0.059
No. days exceeded: State	> 0.07 ppm/8-hr	0	0	0	0	0	0
Federal	> 0.075 ppm/8-hr	0	0	0	0	0	0
Particulate matter less than 10 microns in size (PM_{10})							
Max 24-hr concentration (µg/m^3)		53.0	48.0	77.0	85.0	59.0	74.0
No. days exceeded: State	> 50 µg/m^3	2	0	1	2	2	N/A
Federal	> 150 µg/m^3	0	0	0	0	0	0
Annual avg. concentration (µg/m^3)		24.7	22.3	25.2	26.7	25.3	N/A
Exceeds Standard? State	> 20 µg/m^3	Yes	Yes	Yes	Yes	Yes	N/A
Particulate matter less than 2.5 microns in size ($PM_{2.5}$)							
Max 24-hr concentration (µg/m^3)		35.3	51.2	52.1	35.8	41.3	36.3
No. days exceeded: Federal	> 35 µg/m^3	2	1	1	1	3	1
Annual avg. concentration (µg/m^3)		13.0	11.7	N/A	N/A	N/A	N/A
Exceeds Standard?	> 12 µg/m^3	Yes	No	N/A	N/A	N/A	N/A
State	> 15 µg/m^3	No	No	N/A	N/A	N/A	N/A
Federal							
Nitrogen Dioxide							
Max 1-hr concentration: State	> 180 ppb	75.4	79.3	69.8	68.2	73.6	63.7
No. days exceeded		0	0	0	0	0	0
Annual avg. concentration: Federal	> 53 ppb	18	17	17	N/A	16	15
No. days exceeded		0	0	0	N/A	0	0

Source 1: United States Environmental Protection Agency. Air Quality Data. Website: https://www.epa.gov/outdoor-air-quality-data (accessed March 2018).
Source 2: California Air Resources Board, iADAM: Air Quality Data Statistics. Website: www.arb.ca.gov/adam/index.html (accessed March 2018).
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ppb = parts per billion
ppm = parts per million

2.12.2.3 Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered to be sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Land uses in the project area include residential, schools (i.e., John H. Niemes Elementary School, Tracy High School, Richard Gahr High School, Juarez Academy of Engineering & Technology), parks and community

centers, agriculture, office, utility, and vacant land. The majority of the sensitive receptors in or adjacent to the project area are residential uses and schools.

2.12.2.4 Criteria Pollutant Attainment/Nonattainment Status

As noted earlier, the six criteria pollutants are O_3, CO, PM (including both $PM_{2.5}$ and PM_{10}), NO_2, SO_2, and lead. The primary standards for these criteria pollutants are shown in Table 2.12.2 along with a brief description of the health effects associated with exposures to these pollutants and the typical sources of these pollutants. The NAAQS are two-tiered: primary, to protect public health, and secondary, to prevent degradation to the environment (e.g., impairment of visibility and damage to vegetation and property).

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the EPA to identify regions as "attainment," "nonattainment," or "maintenance," depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of nonattainment (e.g., marginal, moderate, serious, severe, and extreme) are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. The South Coast Air Basin's attainment status for each of the criteria pollutants is listed in Table 2.12.2.

2.12.3 Environmental Consequences

2.12.3.1 Short-Term Impacts

Build Alternatives (includes Design Options)

Construction Air Quality Conformity

Under the transportation conformity regulations (40 CFR 93.123(c)(5)), construction-related activities that cause temporary increases in emissions are not required in a hot-spot analysis. These temporary increases in emissions are those that occur only during the construction phase and last five years or less at any individual site. They typically fall into two main categories:

Table 2.12.2 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3]		Principal Health and Atmospheric Effects	Typical Sources
				California Standard	Federal Standard		
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m^3)	Revoked	Non-Attainment	Non-Attainment (Extreme)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from ROG or VOC and NO_X in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Non-Attainment	Non-Attainment (Extreme)		
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	150 µg/m^3	Non-Attainment	Attainment / Maintenance	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources (wind-blown dust, ocean spray).
	Annual	20 µg/m^3	---	Non-Attainment	---		
Fine Particulate Matter ($PM_{2.5}$)	24-hour	---	35 µg/m^3	---	Non-Attainment (Serious)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical (including photochemical) reactions involving other pollutants including NO_X, SO_X, ammonia, and ROG.
	Annual	12 µg/m^3	12.0 µg/m^3	Non-Attainment	Non-Attainment (Serious)		
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Attainment	Attainment / Maintenance	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical O_3.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.
	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Attainment	Attainment / Maintenance		

Table 2.12.2 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3]		Principal Health and Atmospheric Effects	Typical Sources
				California Standard	Federal Standard		
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 µg/m^3)	0.10 ppm (188 µg/m^3)	Attainment	Unclassifiable / Attainment	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain. Part of the "NO_X" group of O_3 precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.
	Annual	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Attainment	Attainment / Maintenance		
Lead (Pb)	30-day average	1.5 µg/m^3	---	Nonattainment (Los Angeles County only)	---	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from gasoline may exist in soils along major roads.
	Rolling 3-month average[6]	---	0.15 µg/m^3	---	Non-Attainment (Los Angeles County only)		
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	Attainment[5]	Attainment	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.
	3-hour[9]	---	0.5 ppm (1,300 µg/m^3)	---	Attainment		
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm	Attainment[5]	Attainment		
Hydrogen Sulfide (H_2S)	1-hour	0.03 ppm (42 µg/m^3)	---	Attainment	---	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m^3)	---	Attainment	---	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes
Sulfates	24-hour	25 µg/m^3	---	Attainment	---	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.

Table 2.12.2 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3]		Principal Health and Atmospheric Effects	Typical Sources
				California Standard	Federal Standard		
Visibility-Reducing Particles	---	Extinction coefficient of 0.23 per kilometer (visibility of 10 miles or more due to particles when relative humidity is less than 70%)	---	Attainment	---	Reduces visibility. Produces haze. Note: not related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other "Class I" areas.	See particulate matter above.

Source: *Air Quality Analysis* (2018).

[1] California standard levels obtained from CARB CAAQS webpage. Website: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm (accessed March 2018).

[2] Federal standard levels obtained from the EPA NAAQS table. Note that some Federal standards include a level (such as the concentrations shown in the table) and a form (often a statistical form or based on excluding a certain number of exceedances of the standard level over a given number of years). Exceedances of the standard level are not necessarily violations or exceedances of the standard. Website: https://www.epa.gov/criteria-air-pollutants/naaqs- table (accessed March 2018).

[3] Attainment status obtained from SCAQMD NAAQS and CAAQS Attainment Status for the South Coast Air Basin. Website: http://www.aqmd.gov/docs/default- source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf (accessed March 2018).

[4] Designation is pending; Non-Attainment (Extreme) classification is expected.

[5] Attainment status obtained from CARB Area Designation Maps. Website: http://www.arb.ca.gov/desig/adm/adm.htm (accessed March 2018).

[6] Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[7] According to the CARB website, the Los Angeles County portion of the South Coast Air Basin is designated "Nonattainment" only for near-source monitors. Expect to remain in attainment based on current monitoring data.

[8] Designation is pending; Unclassifiable/Attainment classification is expected.

[9] This is a secondary standard. Not to be exceeded more than once per year.

µg/m^3 = micrograms per cubic meter
CARB = California Air Resources Board
Basin = South Coast Air Basin
CAAQS = California ambient air quality standards
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
NAAQS = national ambient air quality standards
NO_X = oxides of nitrogen
ppm = parts per million
ROG = reactive organic gases
SCAQMD = South Coast Air Quality Management District
SO_X = oxides of sulfur
VOC = volatile organic compounds

- **Fugitive Dust:** A major emission from construction due to ground disturbance. All air districts and the California Health and Safety Code (Sections 41700-41701) prohibit "visible emissions" exceeding three minutes in one hour – this applies not only to dust but also to engine exhaust. In general, this is interpreted as visible emissions crossing the right-of-way line.

  Sources of fugitive dust include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site may deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions may vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

- **Construction Equipment Emissions:** Diesel exhaust particulate matter is a California-identified toxic air contaminant, and localized issues may exist if diesel-powered construction equipment is operated near sensitive receptors.

Construction activities will not last for more than 5 years at one general location, so construction-related emissions do not need to be included in regional and project-level conformity analysis.

Construction Emissions

During construction, short-term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other activities related to construction. Emissions from construction equipment also are anticipated and would include CO, NO_X, volatile organic compounds (VOCs), directly emitted PM ($PM_{2.5}$ and PM_{10}), and toxic air contaminants (TACs) (e.g., diesel exhaust PM).

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, and paving roadway surfaces. Construction-related effects on air quality from most roadway projects would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils to and from the site. If not properly controlled, these activities would temporarily generate $PM_{2.5}$, PM_{10}, CO, SO_2, NO_X, and VOCs. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying

uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could become an additional source of airborne dust after drying. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, the silt content of soil, wind speed, and the amount of equipment operating at the time. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Construction activities for large development projects are estimated by the EPA to add 1.2 tons of fugitive dust per acre of soil disturbed per month of activity. If water or other soil stabilizers are used to control dust, the emissions can be reduced by up to 50 percent. SCAQMD Rule 403 regarding fugitive dust minimization requirements would reduce potential dust emissions during construction. The following project features will be implemented during construction activities.

PF-AQ-1 During clearing, grading, earthmoving, or excavation operations, excessive fugitive dust emissions will be controlled by regular watering or other dust-preventive measures using the following procedures, as specified in the South Coast Air Quality Management District's (SCAQMD) Rule 403. All material excavated or graded will be sufficiently watered to prevent excessive amounts of dust. Watering will occur at least twice daily with complete coverage, preferably in the late morning and after work is done for the day. All material transported on site or off site will be either sufficiently watered or securely covered to prevent excessive amounts of dust. The area disturbed by clearing, grading, earthmoving, or excavation operations will be minimized so as to prevent excessive amounts of dust. These control techniques will be indicated in project specifications. Visible dust beyond the property line emanating from the project will be prevented to the maximum extent feasible. Trucks will be washed as they leave the right-of-way as necessary to control fugitive dust emissions. Track-out reduction measures, such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic, will be used. A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely revegetation of disturbed slopes as needed to minimize construction impacts to existing communities.

PF-AQ-2 Project grading plans will show the duration of construction. Ozone (O_3) precursor emissions from construction equipment vehicles will be controlled by maintaining equipment engines in good condition and in proper tune per manufacturers' specifications. All construction equipment will use low sulfur fuel as required by California Code of Regulations (CCR) Title 17, Section 93114.

PF-AQ-3 All trucks that are to haul excavated or graded material on site will comply with State Vehicle Code Section 23114, with special attention to Sections 23114(b)(F), (e)(2), and (e)(4), as amended, regarding the prevention of such material spilling onto public streets and roads. All transported loads of soils and wet materials will be covered before transport, or adequate freeboard (i.e., space from the top of the material to the top of the truck) will be provided to minimize dust emissions during transportation.

PF-AQ-4 The Construction Contractor will adhere to the California Department of Transportation (Caltrans) Standard Specifications for construction in Section 14-9 (2015). Section 14-9-02 specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including Air Pollution Control District and Air Quality Management District regulations and local ordinances.

PF- AQ-5 Should the project geologist determine that asbestos-containing materials (ACMs) are present at the project study area during final inspection prior to construction, the appropriate methods will be implemented to remove ACMs.

PF-AQ-6 All construction vehicles both on and off site shall be prohibited from idling in excess of 5 minutes. To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times. Environmentally sensitive areas will be established near sensitive air receptors. Within these areas, construction activities involving the extended idling of diesel equipment or vehicles will be prohibited to the extent feasible.

PF-AQ-7 The Construction Contractor will locate equipment and materials storage sites as far away from adjacent residential and park uses as practical. The Construction Contractor will keep construction areas clean and orderly.

If construction activities were to increase traffic congestion in the study area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. However, based on the amount of daily work trips required for project construction (between 26 and 56 daily trips, depending on the activities), construction worker trips are not anticipated to increase traffic congestion in the study area.

SO_2 is generated by oxidation during combustion of the organic sulfur compounds contained in diesel fuel. Under California law and CARB regulations, off-road diesel fuel used in California must meet the same sulfur and additional standards as on-road diesel fuel (not more than 15 parts per million [ppm] sulfur), and as such, SO_2-related issues due to diesel exhaust would be minimal.

The construction emissions were estimated for the project using the Sacramento Metropolitan Air Quality Management District's (AQMD) Road Construction Emissions Model, Version 8.1.0, which is consistent with the guidance provided by SCAQMD for evaluating construction impacts from roadway projects. The maximum amount of construction-related emissions during a peak construction day is presented in Table 2.12.3 (model data are provided in Appendix D of the *Air Quality Analysis* [2018]). The $PM_{2.5}$ and PM_{10} emissions assume a 50 percent control of fugitive dust as a result of watering and associated dust-control measures. The emissions presented below are based on the best information available at the time of calculations and specify that the schedule for the Build Alternative is anticipated to take approximately 37 months, beginning in May 2021 and ending in June 2024. California Department of Transportation (Caltrans) Standard Specifications for construction (Section 14-9.02 [Air Pollution Control] and Section 14-9.03 [Dust Control]) will be adhered to in order to reduce emissions generated by construction equipment. Additionally, SCAQMD has established rules for reducing fugitive dust emissions. With the implementation of standard construction measures (providing 50 percent effectiveness) such as frequent watering (e.g., a minimum of twice per day) as well as Project Features PF-AQ-1 through PF-AQ-6, fugitive dust and exhaust emissions from construction activities would not result in any adverse air quality impacts.

Table 2.12.3 Estimated Daily Construction Emissions

Construction Phase	Pollutant[1] (lbs/day)				
	ROG	CO	NO_X	PM_{10}[2,3]	$PM_{2.5}$[2,3]
Grubbing/Land Clearing	1.50	12.55	14.05	50.63	10.96
Grading/Excavation	6.29	54.41	63.60	53.05	13.15
Drainage/Utilities/Sub-Grade	3.50	33.94	31.46	51.58	11.84
Paving	1.69	19.59	14.82	0.81	0.71
Maximum	*6.29*	*54.41*	*63.60*	*53.05*	*13.15*
Total (Tons/Construction Project)	**1.18**	**10.69**	**11.46**	**12.25**	**2.93**

Source: *Air Quality Analysis* (2018).
[1] Emissions were calculated using the Roadway Construction Emissions Model (RCEM) (Version 8.1.0) developed by the Sacramento Metropolitan Air Quality Management District.
[2] PM_{10} and $PM_{2.5}$ estimates assume control of fugitive dust from watering and associated dust control measures.
[3] Emissions include the sum of exhaust and fugitive dust.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases

Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving site(s). Such odors would quickly disperse to below detectable thresholds as distance from the site(s) increases.

The estimated peak-day construction emissions for the Build Alternative are summarized in Table 2.12.3.

Naturally Occurring Asbestos

The project is in Los Angeles County, which is among the counties listed as containing serpentine and ultramafic rock. However, the portion of Los Angeles County in which the project lies is not known to contain serpentine or ultramafic rock, according to the California Department of Conservation, Division of Mines and Geology (2000). Therefore, the impact from naturally occurring asbestos during project construction would be minimal to none. In the unlikely event that naturally occurring asbestos, serpentine, or ultramafic rock is discovered, SCAQMD will be notified per Section 93105, Title 17 of the California Code of Regulations (CCR).

No Build Alternative

The No Build Alternative would not result in construction related to the project and, therefore, would not result in temporary impacts to air quality.

2.12.3.2 Permanent Impacts

Build Alternatives (includes Design Options)

Regional Air Quality Conformity

The project is listed in Amendment #3 to the 2016 RTP/Sustainable Communities Strategy (SCS) with Project ID1163S012. Its description is as follows: "Improvements to the I-605/SR-91 interchange consist of adding an additional general purpose lane, adding auxiliary lanes, and on/ off ramp improvements. PM SR-91 16.9/19.8; I-605 PM 5.0/5.8" (Southern California Association of Governments 2016a). The 2016 RTP was approved by the Regional Council of the Southern California Association of Governments (SCAG) on April 7, 2016, and was adopted on September 6, 2018. The project is also in the 2017 FTIP, Amendment No. 17-22, which was approved by SCAG on July 31, 2018, and the FTA and FHWA approved the FTIP on December 17, 2018. A regional conformity analysis covering the designated Non-Attainment or Maintenance for ozone, PM2.5, and PM10 was carried out that includes this project, and all reasonably foreseeable and financially constrained regionally significant projects for at least 20 years from the date that the analysis was started. The analysis used the latest planning assumptions, and the most recent emission models and appropriate analysis methods, as determined by Interagency Consultation on September 25, 2018.

Based on this analysis, the region will be in conformity with the SIP, including this project, as described in 40 CFR 93.109(l). The design concept and scope of the proposed project is consistent with the project design concept and scope used in the regional conformity analysis. TCM Timely Implementation evaluation was reviewed and concurred with by Interagency Consultation on September 25, 2018. . The RTP/SCS and FTIP listings and FHWA's Project Level Conformity Determination are included in Chapter 4 of this document.

Project-Level Conformity

Because the project limits are within an attainment/maintenance area for CO and PM_{10} and a nonattainment area for $PM_{2.5}$ federal standards, local hot-spot analyses for CO, $PM_{2.5}$, and PM_{10} are required for conformity purposes. The results of these hot-spot analyses are provided below. Based on these analyses, FHWA made a project-level air quality conformity determination on January 9, 2019 that the project conforms with the State Implementation Plan (SIP) in accordance with 40 CFR Part 93.

Carbon Monoxide

The methodology required for a CO local analysis is summarized in the Caltrans Transportation Project-Level Carbon Monoxide Protocol (Protocol), Section 3 (Determination of Project Requirements) and Section 4 (Local Analysis). In Section 3, the Protocol provides two conformity requirement decision flowcharts designed to assist project sponsors in evaluating the requirements that apply to specific projects. The flowchart on Figure 1 (Appendix A of the *Air Quality Analysis*) of the Protocol applies to new projects and was used in this analysis. Below is a step-by-step explanation of the flowchart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the project (Caltrans 1998).

The flowchart begins with Section 3.1.1.

- **3.1.1. Is this project exempt from all emissions analyses?**
  NO.

  Table 1 of the Protocol is Table 2 of 40 CFR, Section 93.126. Section 3.1.1 is inquiring if the project is exempt. Such projects appear in Table 1 of the Protocol. The Build Alternative widens an existing highway, which is not one of the exempt projects listed in Table 1. Therefore, the project is not exempt from all emissions analyses.

- **3.1.2. Is the project exempt from regional emissions analyses?**
  NO.

  Table 2 of the Protocol is Table 3 of 40 CFR, Section 93.127. The question is attempting to determine whether the project is listed in Table 2. Projects that are included in Table 2 of the Protocol are exempt from regional conformity. Because the project would widen an existing highway, it is not exempt from regional emissions analysis.

- **3.1.3. Is the project locally defined as regionally significant?**
  YES.

  As mentioned above, the proposed project would widen an existing highway. Therefore, the project is potentially significant.

- **3.1.4. Is the project in a federal attainment area?**
  NO.

The project is in an attainment/maintenance area for the federal CO standard; therefore, the project is subject to a regional conformity determination.

- **3.1.5. Is there a currently conforming RTP and TIP?**
  YES.

- **3.1.6. Is the project included in the regional emissions analysis supporting the currently conforming RTP and TIP?**
  YES.

  The project is listed in Amendment #3 to the 2016 RTP/SCS with Project ID 1163S012. Its description is listed as: "Improvements to the I-605/SR-91 interchange consist of adding an additional general purpose lane, adding auxiliary lanes, and on/off ramp improvements. PM SR-91 16.9/19.8; I-605 PM 5.0/5.8". The proposed project is included in the Federal Transportation Improvement Program (FTIP) , Amendment #17-22, which was approved by the SCAG on July 31, 2018, and the FTA and FHWA approved the FTIP on December 17, 2018. The RTP/SCS and FTIP listings are included in Appendix B.

- **3.1.7. Has the project design concept and/or scope changed significantly from that in the regional analysis?**
  NO.

  As discussed in 3.1.6, regional conformity for the proposed project has been demonstrated for the RTP and the FTIP.

- **3.1.9. Examine local impacts.**
  Section 3.1.9 of the flowchart directs the project evaluation to Section 4 (Local Analysis) of the Protocol. This concludes Figure 1.

  Section 4 contains Figure 3 (Local CO Analysis [Appendix A]). This flowchart is used to determine the type of CO analysis required for the Build Alternative. Below is a step-by-step explanation of the flowchart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the Build Alternative. The flowchart begins at Level 1.

- **Level 1. Is the project in a CO non-attainment area?**
  NO.

  The project site is in an area that has demonstrated attainment with the federal CO standards.

- **Level 1 (cont.). Was the area redesignated as "attainment" after the 1990 Clean Air Act?**
  YES.

  The project is located in the South Coast Air Basin, under the jurisdiction of the SCAQMD, and was classified nonattainment after the 1990 CAA. The Basin was granted federal redesignation to attainment/maintenance on June 11, 2007.

- **Level 1 (cont.). Has "continued attainment" been verified with the local Air District, if appropriate?**
  YES.

  The South Coast Air Basin was designated as attainment/maintenance by the EPA on June 11, 2007. (Proceed to Level 7).

- **Level 7. Does the project worsen air quality?**
  YES.

  Because the proposed project would increase traffic volumes on the freeway by 5 percent or more, as well as on the local intersections, the project would potentially worsen air quality.

  a. *The project significantly increases the percentage of vehicles operating in cold start mode. Increasing the number of vehicles operating in cold start mode by as little as 2% should be considered potentially significant.*

     All vehicles on the freeway and in the intersections are assumed to be in a fully warmed-up mode. Therefore, this criterion is not met.

  b. *The project significantly increases traffic volumes. Increases in traffic volumes in excess of 5% should be considered potentially significant. Increasing the traffic volume by less than 5% may still be potentially significant if there is also a reduction in average speeds.*

The proposed project would improve State Route 91 (SR-91) by changing the existing highway. As shown in Tables 2.12.4 and 2.12.5, traffic volumes along SR-91 would exceed 125,000 average daily traffic (ADT). As shown, all roadway segments would have a 5 percent or lower total ADT increase, except for the two shaded roadway segments in each table. These segments are between two existing on-ramps. The Build Alternative would combine the southbound on-ramp with the northbound on-ramp, thus putting the combined traffic volumes onto these segments. This traffic volume combination would have a lesser effect on the corresponding roadway segments east of the intersections. As shown in Tables 2.12.6 and 2.12.7, the intersections affected by the project would not change substantially with the Build Alternative compared to the No Build Alternative.

Table 2.12.4 Opening Year (2024) Traffic Volumes

Roadway Segment	No Build (2024)			Build (2024) Both Without and With Diamond Ramps Design Option			Project Increase (Percent)	
	Total ADT	Truck ADT	Truck %	Total ADT	Truck ADT	Truck %	Total ADT	Truck ADT
Westbound SR-91								
East of Studebaker Road	106,700	11,240	10.5	109,700	11,590	10.6	2.8	3.1
West of Pioneer Boulevard	136,400	13,570	9.9	149,000	13,590	9.1	9.2	0.1
East of Pioneer Boulevard	132,400	13,120	9.9	139,300	13,880	10.0	5.2	5.8
West of Norwalk Boulevard	131,100	12,980	9.9	144,400	13,120	9.1	10	1.1
East of Norwalk Boulevard	128,500	12,820	10.0	135,200	12,340	9.1	5.2	-3.7
West of Bloomfield Avenue	124,800	12,410	9.9	130,200	13,020	10.0	4.3	4.9
East of Artesia Boulevard	116,800	11,530	9.9	119,500	11,840	9.9	2.3	2.7
West of 183rd Street	126,400	12,580	10.0	128,400	12,830	10.0	1.6	2.0
Northbound I-605								
North of Westbound SR-91 On-Ramp	153,900	11,790	7.7	155,200	11,880	7.7	0.8	0.8

Source: *Air Quality Analysis* (2018).
Note: = Roadway segments that are between two existing on-ramps.
ADT = average daily trips I-605 = Interstate 605 SR-91 = State Route 91

Table 2.12.5 Future Year (2044) Traffic Volumes

Roadway Segment	No Build (2044)			Build (2044) Both Without and With Diamond Ramps Design Option			Project Increase (Percent)	
	Total ADT	Truck ADT	Truck %	Total ADT	Truck ADT	Truck %	Total ADT	Truck ADT
Westbound SR-91								
East of Studebaker Road	108,500	14,960	13.8	111,200	15,250	13.7	2.5	1.9
West of Pioneer Boulevard	137,700	17,320	12.6	150,600	17,960	11.9	9.4	3.7
East of Pioneer Boulevard	133,600	17,140	12.8	140,300	17,570	12.5	5.0	2.5
West of Norwalk Boulevard	132,100	16,950	12.8	145,300	17,780	12.2	10.0	4.9
East of Norwalk Boulevard	129,400	17,390	13.4	135,900	18,390	13.5	5.0	5.8
West of Bloomfield Avenue	125,200	15,990	12.8	130,400	16,330	12.5	4.2	2.1
East of Artesia Boulevard	116,400	15,580	13.4	119,000	15,840	13.3	2.2	1.7
West of 183rd Street	126,700	16,040	12.7	128,800	16,310	12.7	1.7	1.7
Northbound I-605								
North of Westbound SR-91 On-Ramp	154,900	21,800	9.5	155,100	21,800	10.5	1.0	11

Source: *Air Quality Analysis* (2018).
Note: = Roadway segments that are between two existing on-ramps.
ADT = average daily trips I-605 = Interstate 605 SR-91 = State Route 91

Table 2.12.6 Existing (2016) and 2024 Intersection Turn Volumes

Intersections and Time of Day		Vehicles Per Hour											
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Existing (2016)													
Existing (2016) Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	863	0	0	544	0	572	0	188	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	99	0	232	0	1206	0	0	1098	0
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	102	0	130	16	873	0	0	1034	8
Studebaker Road & WB SR-91 Off-Ramp	AM	1	0	0	367	0	98	0	892	0	0	1012	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	38	1331	0	0	1510	8	302	48	284	1	0	115
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	875	0	0	697	0	485	0	79	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	69	0	152	0	919	0	0	1152	0
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	96	0	113	12	979	0	0	1069	4
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	165	0	60	0	1123	0	0	1097	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	79	1338	0	0	1645	10	414	153	391	3	0	92
2024													
No Build Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	778	0	0	507	0	410	0	134	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	88	0	204	0	973	0	0	1075	0
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	103	0	112	30	812	0	0	885	9
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	299	0	101	0	845	0	0	946	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	32	1292	0	0	1535	9	278	44	259	2	0	120
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	733	0	0	780	0	422	0	70	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	71	0	189	0	743	0	0	998	0
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	91	0	151	8	890	0	0	1019	4
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	173	0	57	0	969	0	0	949	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	72	1167	0	0	1571	14	325	92	345	4	0	70
Build Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	778	0	0	507	0	410	0	134	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	88	0	204	0	973	0	0	1075	0
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	103	0	112	30	812	0	0	885	9
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	299	0	101	0	845	0	0	946	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	32	1292	0	0	1535	9	278	44	259	2	0	120
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	733	0	0	780	0	422	0	70	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	71	0	189	0	743	0	0	998	0
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	91	0	151	8	890	0	0	1019	4
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	173	0	57	0	969	0	0	949	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	72	1167	0	0	1571	14	325	92	345	4	0	70
Diamond Ramps													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	786	0	0	431	0	360	0	128	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	88	0	188	192	974	0	0	1075	665
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	135	0	109	250	833	0	0	763	619
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	438	0	111	0	837	0	0	901	1

Table 2.12.6 Existing (2016) and 2024 Intersection Turn Volumes

Intersections and Time of Day		Vehicles Per Hour											
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NB I-605 Off-Ramp & Alondra Boulevard	AM	32	1294	0	0	1490	9	293	44	260	2	0	120
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	757	0	0	703	0	342	0	39	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	71	0	150	97	784	0	0	936	486
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	95	0	144	204	890	0	0	1050	447
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	273	0	103	0	951	0	0	910	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	72	1179	0	0	1459	14	343	92	355	4	0	70

Source: *Air Quality Analysis* (2018).
EBL = eastbound left
EBR = eastbound right
EBT = eastbound through
I-605 = Interstate 605
NB = northbound
NBL =northbound left
NBR =northbound right
NBT =northbound through
SBL = southbound left
SBR = southbound right
SBT = southbound through
SR-91 = State Route 91
WB = westbound
WBL = westbound left
WBR = westbound right
WBT = westbound through

Table 2.12.7 2044 Intersection Turn Volumes

Intersections and Time of Day		Vehicles per hour											
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2044													
No Build Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	794	0	0	517	0	418	0	136	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	90	0	208	0	992	0	0	1097	0
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	105	0	115	31	828	0	0	903	9
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	305	0	103	0	862	0	0	965	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	33	1318	0	0	1566	9	283	45	264	2	0	122
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	748	0	0	796	0	431	0	72	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	73	0	193	0	758	0	0	1018	0
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	92	0	154	8	908	0	0	1039	4
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	176	0	58	0	988	0	0	968	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	76	1190	0	0	1602	14	332	93	352	4	0	71
Build Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	797	0	0	481	0		0	132	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	90	0	192	0	993	209	655	1106	0
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	26	0	130	117	0	108	146	848	251	641	793	93
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	450	0	113	0	863	0	0	915	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	33	1314	0	0	1530	9	307	45	264	2	0	122
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	750	0	0	727	0	345	0	70	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	73	0	141	0	797	104	488	952	0
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	12	0	55	83	0	214	90	872	213	466	1073	50
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	279	0	83	0	984	0	0	919	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	73	1206	0	0	1487	14	350	93	356	4	0	71
Diamond Scenario													
WB SR-91 Off-Ramp & Artesia Boulevard	AM	0	797	0	0	481	0	399	0	132	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	90	0	192	209	993	0	0	1106	655
Pioneer Boulevard & WB SR-91 Off-Ramp	AM	0	0	0	117	0	108	251	848	0	0	793	641
Studebaker Road & WB SR-91 Off-Ramp	AM	3	0	2	450	0	113	0	863	0	0	915	1
NB I-605 Off-Ramp & Alondra Boulevard	AM	33	1314	0	0	1530	9	307	45	264	2	0	122
WB SR-91 Off-Ramp & Artesia Boulevard	PM	0	750	0	0	727	0	345	0	70	0	0	0
Norwalk Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	73	0	141	104	797	0	0	952	488
Pioneer Boulevard & WB SR-91 Off-Ramp	PM	0	0	0	83	0	214	213	872	0	0	1073	466
Studebaker Road & WB SR-91 Off-Ramp	PM	0	0	0	279	0	83	0	984	0	0	919	0
NB I-605 Off-Ramp & Alondra Boulevard	PM	73	1206	0	0	1487	14	350	93	356	4	0	71

Source: *Air Quality Analysis* (2018).

EBL = eastbound left
EBR = eastbound right
EBT = eastbound through
I-605 = Interstate 605
NB = northbound
NBL =northbound left
NBR =northbound right
NBT =northbound through
SBL = southbound left
SBR = southbound right
SBT = southbound through
SR-91 = State Route 91
WB = westbound
WBL = westbound left
WBR = westbound right
WBT = westbound through

As shown in Tables 2.12.8 and 2.12.9, the same ramp changes affect the change to the LOS of the freeway ramps and nearby arterials. However, for the unaffected ramps and nearby arterials, the LOS is unchanged with the Build Alternative compared to the No Build Alternative.

c. *The project worsens traffic flow. For uninterrupted roadway segments, a reduction in average speeds (within a range of 3 to 50 mph) should be regarded as worsening traffic flow. For intersection segments, a reduction in average speed or an increase in average delay should be considered as worsening traffic flow.*

   As Tables 2.12.8 and 2.12.9 show, the proposed project would increase delay and LOS for some of the affected intersections. Therefore, this criterion is not met.

- **Level 7 (cont.): Is the project suspected of resulting in higher CO concentrations than those existing within the region at the time of attainment demonstration?** NO.

  The following four intersections in the same region as the project location were evaluated in the 1997 CO Attainment Demonstration: Wilshire Boulevard at Veteran Avenue, Sunset Boulevard at Highland Avenue, La Cienega Boulevard at Century Boulevard, and Long Beach Boulevard at Imperial Highway. CO concentrations at the intersections under study would be lower than those reported for the maximum of the intersections analyzed in the CO attainment plan because all of the following conditions, listed in Section 4.7.2 of the Protocol, are satisfied:

  - The receptor locations at the intersections under study are at the same distance or farther from the traveled roadway than the receptor locations used in the intersections in the attainment plan. The attainment plan evaluates the CO concentrations at a distance of 10 feet (ft) from the edge of the roadways. The Protocol does not permit the modeling of receptor locations closer than this distance.
  - The project intersection traffic volumes and geometries are not substantially different from those included in the attainment plan. Also, the intersections under study have less total traffic and the same number of lanes or fewer than the intersections in the attainment plan.

Table 2.12.8 Intersection Level of Service (LOS) Analysis – AM Period

Intersection	Existing (2016)		2024 No Build		2024 Build		2024 Diamond Ramps		2044 No Build		2044 Build		2044 Diamond Ramps	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
WB SR-91 Off-Ramp & Artesia Boulevard	22.5	C	15.7	B	14.9	B	14.9	B	15.9	B	15.5	B	15.5	B
Norwalk Boulevard & WB SR-91 Off-Ramp	9.9	A	7.2	A	24.3	C	9.8	A	7.3	A	24.6	C	10.3	B
Pioneer Boulevard & WB SR-91 Off-Ramp	7.2	A	6.7	A	71.4	E	14.0	B	6.7	A	65.8	E	13.5	B
Studebaker Road & WB SR-91 Off-Ramp	16.5	B	15.2	B	20.5	C	20.5	C	15.8	B	21.2	C	21.2	C
NB I-605 Off-Ramp & Alondra Boulevard	25.1	C	22.9	C	24.5	C	24.5	C	23.6	C	26.2	C	26.2	C

Source: *Traffic Operations Analysis Report* (2018).
I-605 = Interstate 605 NB = northbound SR-91 = State Route 91
LOS = level of service sec/veh = seconds/vehicle WB = westbound

Table 2.12.9 Intersection Level of Service (LOS) Analysis – PM Period

Intersection	Existing (2016)		2024 No Build		2024 Build		2024 Diamond Ramps		2044 No Build		2044 Build		2044 Diamond Ramps	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
WB SR-91 Off-Ramp & Artesia Boulevard	19.0	B	15.2	B	13.0	B	13.0	B	15.6	B	13.2	B	13.2	B
Norwalk Boulevard & WB SR-91 Off-Ramp	6.9	A	6.9	A	16.4	B	6.9	A	6.9	A	16.0	B	6.8	A
Pioneer Boulevard & WB SR-91 Off-Ramp	6.4	A	6.5	A	34.3	C	9.7	A	6.4	A	34.8	C	10.5	B
Studebaker Road & WB SR-91 Off-Ramp	8.3	A	8.7	A	12.6	B	12.6	B	8.8	A	12.7	B	12.7	B
NB I-605 Off-Ramp & Alondra Boulevard	38.9	D	25.9	C	26.3	C	26.3	C	26.8	C	27.0	C	27.0	C

Source: *Traffic Operations Analysis Report* (2018).
I-605 = Interstate 605 NB = northbound SR-91 = State Route 91
LOS = level of service sec/veh = seconds/vehicle WB = westbound

- The assumed meteorology for the intersections under study is the same as the assumed meteorology for the intersections in the attainment plan. Both use the worst-case scenario meteorology settings in the California Line Source Dispersion Model, Version 4 (CALINE4) and/or the EPA's CO hot-spot analysis model (a combination of the California Line Source Dispersion Model, Version 3 [CALINE3] dispersion modeling and the queueing algorithms from the *Highway Capacity Manual* [HCM]) (CAL3QHC).
- As shown in Table 2.12.10, the intersection traffic lane volumes are similar to or lower for the intersections under study than those assumed for the Wilshire Boulevard/Veteran Avenue intersection (the intersection with the highest traffic volumes) in the attainment plan.
- The percentages of vehicles operating in cold-start mode are the same or lower for the intersections under study compared to those used for the intersections in the attainment plan. All vehicles in the intersection are assumed to be in a fully warmed-up mode.
- The percentage of heavy duty gas trucks in the intersections under study is the same or lower than the percentages used for the intersections in the attainment plan analysis. It is assumed that the traffic distribution at the intersections under study do not vary from the California Emission Factor Model (EMFAC) standards.
- The average delay and queue length for each approach are the same or less for the intersections under study compared to those found in the intersections in the attainment plan. The predicted LOS for the intersections under study range from A to F. The LOS for the intersections in the attainment plan are not listed; however, the traffic counts and intersection geometries correspond to LOS F for three out of four intersections in the attainment plan.
- The background CO concentrations in the vicinity of the project were 4.4 ppm for 1 hour and 3.9 ppm for 8 hours in 2016, which is lower than the background concentrations for the intersections in the attainment plan, which varied from 5.3 ppm to 13.2 ppm for 1 hour and 3.7 ppm to 9.9 ppm for 8 hours.

The project is not expected to result in any concentrations exceeding the 1-hour or 8-hour CO standards. Therefore, a detailed CALINE4 CO hot-spot analysis is not required.

Table 2.12.10 Comparison of Peak-Hour Intersection Departure Traffic Volumes

Intersection	Scenario Year	Average Peak-Hour Lane Volume (AM/PM)				Total Departure Intersection Volume and Percent Change[1]			
		Northbound	Southbound	Eastbound	Westbound	AM Peak-Hour		PM Peak-Hour	
						Volume	% Change	Volume	% Change
2003 AQMP									
Wilshire Blvd & Veteran Ave	N/A	362/507	178/328	1,188/477	559/1,035	2,285	N/A	2,347	N/A
EXISTING									
WB SR-91 Off-Ramp & Artesia Blvd	N/A	380/282	0/0	432/438	272/349	1,084	(-53%)	1,068	(-54%)
Norwalk Blvd & WB SR-91 Off-Ramp	N/A	603/460	549/576	0/0	166/111	1,318	(-42%)	1,146	(-51%)
Pioneer Blvd & WB SR-91 Off-Ramp	N/A	445/496	521/537	0/0	116/115	1,082	(-53%)	1,137	(-52%)
Studebaker Rd & WB SR-91 Off-Ramp	N/A	446/562	507/549	1/0	233/113	1,186	(-48%)	1,223	(-48%)
NB I-605 Off-Ramp & Alondra Blvd	N/A	317/479	58/48	456/472	506/552	1,337	(-41%)	1,551	(-34%)
PROPOSED PROJECT									
No Build Alternative									
WB SR-91 Off-Ramp & Artesia Blvd	2024	272/246	0/0	389/367	254/390	915	(-60%)	1,003	(-57%)
	2044	277/252	0/0	397/374	259/398	933	(-59%)	1,024	(-56%)
Norwalk Blvd & WB SR-91 Off-Ramp	2024	487/372	538/499	0/0	146/130	1170	(-49%)	1,001	(-57%)
	2044	496/379	549/509	0/0	149/133	1194	(-48%)	1,021	(-56%)
Pioneer Blvd & WB SR-91 Off-Ramp	2024	421/449	447/512	0/0	108/121	976	(-57%)	1,082	(-54%)
	2044	623/588	764/795	78/34	113/149	1,577	(-31%)	1,564	(-33%)
Studebaker Rd & WB SR-91 Off-Ramp	2024	423/485	474/475	3/0	200/115	1,099	(-52%)	1,074	(-54%)
	2044	431/494	483/484	3/0	52/29	968	(-58%)	1,007	(-57%)
NB I-605 Off-Ramp & Alondra Blvd	2024	291/381	61/37	441/413	515/528	1,308	(-43%)	1,359	(-42%)
	2044	296/389	61/38	450/422	525/539	1,332	(-42%)	1,387	(-41%)
Build Alternative									
WB SR-91 Off-Ramp & Artesia Blvd	2024	272/246	0/0	389/367	254/390	915	(-60%)	1,003	(-57%)
	2044	226/208	0/0	399/375	241/364	845	(-63%)	946	(-60%)
Norwalk Blvd & WB SR-91 Off-Ramp	2024	487/372	538/499	0/0	146/130	1,170	(-49%)	1,001	(-57%)
	2044	601/208	881/720	0/0	141/107	1,623	(-29%)	1,035	(-56%)
Pioneer Blvd & WB SR-91 Off-Ramp	2024	421/449	447/512	0/0	108/121	976	(-57%)	1,082	(-54%)
	2044	623/588	764/795	78/34	113/149	1,577	(-31%)	1,564	(-33%)
Studebaker Rd & WB SR-91 Off-Ramp	2024	423/485	474/475	3/0	200/115	1,099	(-52%)	1,074	(-54%)
	2044	432/492	458/460	3/0	282/181	1,174	(-49%)	1,133	(-52%)
NB I-605 Off-Ramp & Alondra Blvd	2024	291/381	61/37	441/413	515/528	1,308	(-43%)	1,359	(-42%)
	2044	308/400	62/38	449/426	513/500	1,332	(-42%)	1,364	(-42%)
Diamond Ramps Design Option									
WB SR-91 Off-Ramp & Artesia Blvd	2024	272/246	0/0	389/367	254/390	915	(-60%)	1,003	(-57%)
	2044	277/252	0/0	397/374	259/398	933	(-59%)	1,024	(-56%)
Norwalk Blvd & WB SR-91 Off-Ramp	2024	583/441	870/711	0/0	138/111	1,591	(-30%)	1,262	(-46%)
	2044	601/451	881/720	0/0	141/107	1,623	(-29%)	1,278	(-46%)
Pioneer Blvd & WB SR-91 Off-Ramp	2024	542/547	691/749	0/0	122/120	1,355	(-41%)	1,415	(-40%)
	2044	550/543	717/770	0/0	113/149	1,379	(-40%)	1,461	(-38%)

Table 2.12.10 Comparison of Peak-Hour Intersection Departure Traffic Volumes

Intersection	Scenario Year	Average Peak-Hour Lane Volume (AM/PM)				Total Departure Intersection Volume and Percent Change[1]			
		Northbound	Southbound	Eastbound	Westbound	AM Peak-Hour		PM Peak-Hour	
Studebaker Rd & WB SR-91 Off-Ramp	2024	419/476	451/455	3/0	275/188	1,147	(-50%)	1,119	(-52%)
	2044	432/492	458/460	3/0	282/181	1,174	(-49%)	1,133	(-52%)
NB I-605 Off-Ramp & Alondra Blvd	2024	299/395	61/37	442/417	500/491	1,301	(-43%)	1,340	(-43%)
	2044	308/400	62/38	449/426	513/500	1,332	(-42%)	1,364	(-42%)

Source 1: *Transportation Project-Level Carbon Monoxide Protocol User Workbook* (U.C. Davis, 1998)
Source 2: *Traffic Operations Analysis Report* (2018).
[1] Percent reduction is in comparison to the Wilshire Boulevard/Veteran Avenue intersection contained in the 2003 AQMP.
AQMP = Air Quality Management Plan
Ave = Avenue
Blvd = Boulevard
I-605 = Interstate 605
N/A = not applicable
NB = northbound
Rd = road
SR-91 = State Route 91
WB = westbound

Particulate Matter ($PM_{2.5}$ and PM_{10})

The proposed project is in a nonattainment area for federal $PM_{2.5}$ and is in an attainment/maintenance area for federal PM_{10} standards (South Coast Air Basin portion only). Therefore, per 40 CFR Part 93, analyses are required for conformity purposes. However, the EPA does not require hot-spot analyses (either qualitative or quantitative) for those that are not listed in Section 93.123(b)(1) as a project of air quality concern (POAQC). The EPA defines POAQCs as the following:

> (i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
>
> (ii) Projects affecting intersections that are LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
>
> (iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
>
> (iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; or
>
> (v) Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The project does not qualify as a POAQC for the following reasons:

- The proposed project would improve SR-91 by changing the existing highway. As Tables 2.12.4 and 2.12.5 show, while traffic volumes along SR-91 would exceed the 125,000 ADT criteria for a POAQC and the truck percentage exceeds 8 percent, the truck traffic volumes and percentages would not change substantially with the project. The two shaded roadway segments in each table are between two existing on-ramps. The Build Alternative would combine the southbound on-ramp with the northbound on-ramp, thus putting the combined traffic volumes onto these segments. Thus, while the project would result in

shifting some traffic (both truck and auto) from other routes to westbound SR-91 as a result of the increased capacity of the roadway and enhanced operating conditions, the project would not result in a higher proportion of trucks overall. While some segments could experience a very small increase in truck percentage (0.1 percent), other segments would experience a decrease in truck percentage due to a proportionally larger increase in shifted auto volumes as compared to truck volumes. Finally, the trucks that would operate on the improved corridor under the Build Alternative would experience much less congestion, higher speeds, less delay, and lower travel times in the corridor.

- The proposed project does not affect intersections that are at LOS D, E, or F that have a significant number of diesel vehicles. Based on the *Traffic Operations Analysis Report* (2018), the proposed project would reduce delay and improve the LOS at intersections in the project vicinity. Tables 2.12.8 and 2.12.9 show the LOS conditions in the project vicinity with and without the proposed project. While some of the road segments show a worsening of LOS, all of the segments where the LOS worsens are outside the area where the project results in physical changes (improvements) to the roadway network. These locations are either to the east or west of the area of improvement. The improvements themselves, by adding capacity (due to the new freeway lane and other measures which improve operating conditions), attract traffic to the westbound corridor. The attraction of trips extends beyond the limits of the physical improvements themselves because these improvements alleviate a major bottleneck in the corridor. Each of the segments that show a degradation in LOS are forecast to experience an increase in travel demand of approximately 5 percent to 7.5 percent. In these segments, without a physical or operational improvement to go along with the increase in traffic flow, the HCM analysis will result in a degraded LOS (higher traffic flow, but the same capacity). However, the HCM does not account for upstream or downstream improvements that would occur as a result of the project. The traffic microsimulation model that was developed to assess the project area showed improvements in traffic flow, increased speeds, and decreased delay in the study area and outside the study area, which is not captured by the HCM results. Thus, while the HCM shows a slight worsening of LOS for these segments, the microsimulation model demonstrates that they will likely improve in operation conditions in the future.
- The proposed project does not include the construction of a new bus or rail terminal.
- The proposed project does not expand an existing bus or rail terminal.

- The proposed project is not in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

On July 25, 2017, the Transportation Conformity Working Group (TCWG) determined that the project is not a POAQC. Per the transportation conformity rules and regulations, all nonexempt projects must go through review by the TCWG. This project was approved and concurred upon by interagency consultation at the TCWG meeting as a project not having adverse impacts on air quality, and this project meets the requirements of the federal Clean Air Act (CAA) and 40 CFR, Section 93.116. A copy of the TCWG finding is included in Appendix C of the *Air Quality Analysis* (2018).

Therefore, the proposed Build Alternative meets the CAA requirements and 40 CFR, Section 93.116, without any explicit hot-spot analysis. As shown in Table 2.12.11, the $PM_{2.5}$ and PM_{10} exhaust emissions would be lower under the Build and No Build Alternatives than they are in the Existing (2016) condition. Exhaust emissions are the same under the Build and No Build Alternatives. Thus, the proposed Build Alternative would not create a new violation of the federal standards for $PM_{2.5}$ or PM_{10}.

The South Coast Air Basin region is in nonattainment for the State $PM_{2.5}$ and PM_{10} air quality standards. As Table 2.12.1 shows, the background PM_{10} concentrations currently exceed the State 24-hour and annual standards. Therefore, the increased emissions listed in Table 2.12.11 would likely contribute to violations of the State PM_{10} ambient air quality standards (CAAQS) in the Basin region. Similarly, the increase in $PM_{2.5}$ emissions from the project as listed in Table 2.12.11 would likely worsen the existing violation of the $PM_{2.5}$ CAAQS in the Basin region. However, as listed in Table 2.12.11 for both $PM_{2.5}$ and PM_{10} the future emissions would be less than the existing condition.

As shown in Tables 2.12.4 and 2.12.5, an overall increase in total ADT and truck ADT is expected with the project. The primary reason for increases in either auto or truck traffic along SR-91 is the increase in capacity due to the proposed additional westbound traffic lane as well as the improved traffic operating conditions that will occur along SR-91 in the project area. The improved freeway operations and increased capacity will attract trips that are currently being made on parallel routes,

including arterial roadways and other freeways. Because the length of the project is relatively short, it is not expected that new travel would be induced or new automobile or truck trips would be made as a result of the project, but some trips will divert to ST-91 to take advantage of the improved operations as a result of the higher peak-hour speeds and also as a result of the expected reduction in delay. The forecasted increases in truck traffic along SR-91 are generally equal to or less than the forecasted increases in overall traffic, and range in 2024 from a reduction of 3.7 percent on one segment up to an increase of 4.9 percent, and in 2044 from a 1.7 percent increase to a 5.8 percent increase (varies by segment). The projected truck traffic increases along SR-91 are generally lower than the overall traffic increases predicted along SR-91 due to the project. These effects are reflected in the emissions changes shown in Table 2.12.11

Mobile-Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories and refineries).

Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby Congress mandated the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Volume 73, No. 201, page 61,358; October 16, 2008) and identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (IRIS). In addition, the EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from its 2011 National Air Toxics Assessment. These are acrolein, benzene, 1,3-butadiene, acetaldehyde, diesel PM, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While the FHWA considers these the priority Mobile Source Air Toxics (MSAT), the list is subject to change and may be adjusted in consideration of future EPA rules.

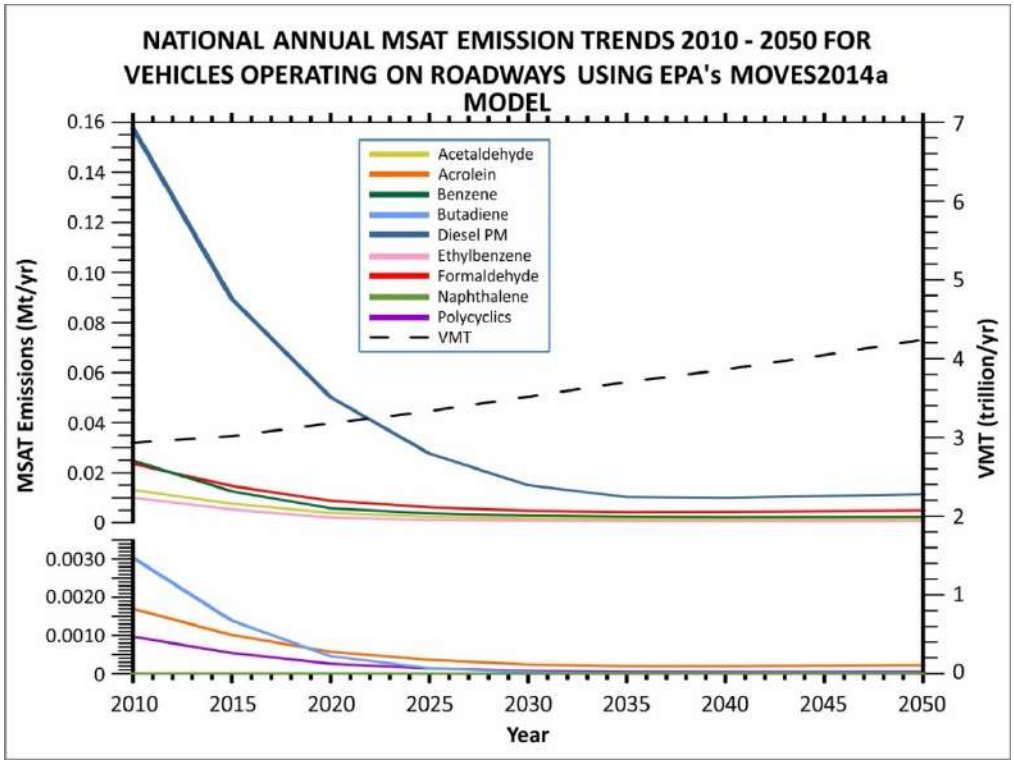
The 2008 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

Table 2.12.11 2024 Opening Year and 2044 Horizon Year Regional Vehicle Emissions

Alternative	2024 Opening Year (lbs/day)							2044 Horizon Year (lbs/day)						
	CO	ROG	NO_X	PM_{10}		$PM_{2.5}$		CO	ROG	NO_X	PM_{10}		$PM_{2.5}$	
				Exhaust	Tire Wear & Brake Dust	Exhaust	Tire Wear & Brake Dust				Exhaust	Tire Wear & Brake Dust	Exhaust	Tire Wear & Brake Dust
Existing (2016)	1,018	36	384	5.0	41.7	4.7	16.6	1,018	36	384	5.0	41.7	4.7	16.6
No Build Alternative	441	16	101	1.4	34.4	1.3	13.6	242	11	46	0.6	34.2	0.6	13.5
Change from Existing (2016)	*-577*	*-20*	*-283*	*-3.6*	*-7.4*	*-3.5*	*-3.0*	*-776*	*-25*	*-339*	*-4.4*	*-7.6*	*-4.2*	*-3.1*
Build Alternatives (Both Without and With Diamond Ramps Design Option)	435	16	99	1.4	36.1	1.3	14.3	238	11	41	0.6	35.9	0.6	14.2
Change from Existing (2016)	*-583*	*-21*	*-285*	*-3.6*	*-5.6*	*-3.5*	*-2.3*	*-780*	*-26*	*-343*	*-4.4*	*-5.9*	*-4.2*	*-2.4*
Change from No Build Alternative	*-6*	*0.3*	*-2.2*	*0.0*	*1.7*	*0.0*	*0.7*	*-3.9*	*-0.4*	*-4.7*	*0.0*	*1.7*	*0.0*	*0.7*

Source: Compiled using CT-EMFAC Version 6 (2017).
Note: Totals may not appear to sum correctly due to rounding.
Caltrans = California Department of Transportation
CO = carbon monoxide
CT-EMFAC = Caltrans Emission Factors Model
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases

Based on an FHWA analysis using the EPA's Motor Vehicle Emission Simulator, Version 2014a (MOVES2014a) (Figure 2.12-2), even if vehicle miles traveled (VMT) increases by 45 percent as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period. The projected reduction in MSAT emissions would be slightly different in California due to the use of the EMFAC in place of the MOVES model.



Source: Federal Highway Administration (2016).

Diesel PM = diesel particulate matter
EPA = United States Environmental Protection Agency
MOVES2014a = Motor Vehicle Emission Simulator, version 2014a
MSAT = Mobile Source Air Toxics
Mt/yr = million tons per year
trillion/yr = trillion per year
VMT = vehicle miles traveled

Figure 2.12-2 National Mobile Source Air Toxics Emission Trends

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making in the context of NEPA.

Nonetheless, air toxics concerns continue to be raised regarding highway projects during the NEPA process. Even as the science emerges, transportation agencies are

duly expected by the public and other agencies to address MSAT impacts in environmental documents. The FHWA, the EPA, the Health Effects Institute (HEI), and others have funded and conducted research studies in order to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the federal government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. NEPA requires, and the FHWA is committed to, the examination and avoidance of potential impacts to the natural and human environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, Caltrans must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest. The FHWA policies and procedures for implementing NEPA are contained in regulations in 23 CFR, Part 771.

On October 18, 2016, the FHWA issued guidance to advise FHWA division offices as to when and how to analyze MSAT in the NEPA process for highways. That document is an update to the guidance released in February 2006, September 2009, and December 2012. The guidance is described as interim because MSAT science is still evolving. As the science progresses, FHWA will update the guidance. This analysis follows the FHWA guidance.

Information that is Incomplete or Unavailable

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. The EPA is the lead authority for administering the CAA and its amendments and has specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual

process of assessing human health effects, exposures, and risks posed by air pollutants. The agency maintains the IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects."[1] Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the HEI. Two HEI studies are summarized in Appendix D of the FHWA *Updated Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (2016). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious are the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts; each step in the process builds on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, because such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways, to determine the portion of time that people are actually exposed at a specific location, and to establish the extent

[1] United States Environmental Protection Agency (EPA). Volatile Organic Compounds' Impact on Indoor Air Quality. Website: https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality (accessed March 2018).

attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT because of factors including low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by the HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA and the HEI have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also a lack of national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards (e.g., benzene emissions from refineries). The decision framework is a two-step process. The first step requires the EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in 1 million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in 1 million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in 1 million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in 1 million. In a June 2008 decision, the United States Court of Appeals for the District of Columbia Circuit upheld the EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against project benefits such as reducing traffic congestion, accident rates, and fatalities plus

improved access for emergency response, which are better suited for quantitative analysis.

Quantitative Project-Level MSAT Analysis

Emissions factors for each of the MSAT were obtained for the project area using emission rates generated by the Caltrans Emission Factors Model (CT-EMFAC), Version 6, and the VMT associated with each of the project alternatives. Results of the analyses are tabulated in Table 2.12.12 for the Existing (2016), 2024, and 2044 conditions.

The analysis indicates that a substantial decrease in MSAT emissions can be expected between the Existing (2016) and future (2024 and 2044) No Build Alternative conditions. This decrease is prevalent throughout the highest priority MSAT and the analyzed alternatives. This decrease is also consistent with the aforementioned EPA study that projects a substantial reduction in on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde between 2000 and 2050. Based on the analysis for this project, between the Existing (2016) and No Build Alternative (2044) conditions, the expected reductions in MSAT are 92 percent of diesel PM, 65 percent of benzene, 65 percent of 1,3 butadiene, 63 percent of naphthalene, 74 percent of polycyclic organic matter, 65 percent of acrolein, and 66 percent of formaldehyde. These projected reductions are achieved while the total VMT in the project area increases by 17 percent.

As Table 2.12.12 shows, the Build Alternative (2024 and 2044) conditions MSAT emissions are lower than the Existing (2016) condition emissions. All of the Build Alternative (2024 and 2044) conditions MSAT emissions are equal to or less than the corresponding No Build Alternative conditions emissions. In addition to the Build Alternative resulting in a decrease in localized MSAT emissions, the EPA's vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause region-wide MSAT levels to be substantially lower than under the Existing (2016) conditions.

As shown in Tables 2.12.4 and 1.12.5, an overall increase in total ADT and truck ADT is expected with the project. The primary reason for increases in either auto or truck traffic along SR-91 is the increase in capacity due to the proposed additional westbound traffic lane as well as the improved traffic operating conditions that will occur along SR-91 in the project area. The improved freeway

operations and increased capacity will attract trips that are currently being made on parallel routes including arterial roadways and other freeways. Because the length of the project is relatively short, it is not expected that new travel would be induced or new auto or truck trips would be made as a result of the project, but some trips will divert to SR-91 to take advantage of the improved operations as a result of the higher peak-hour speeds and also as a result of the expected reduction in delay. These effects are reflected in the emissions changes shown in Table 2.12.12.

Long-Term Regional Vehicle Emissions Impacts

The potential impact of the proposed project on regional vehicle emissions was calculated using traffic data for the project region and emission rates from the CT-EMFAC, Version 6, which uses emission factors developed by the CARB in its Emission Factor Model, Version 2014 (EMFAC2014).

The regional VMTs for Existing (2016), the No Build Alternative, and the Build Alternative were estimated using the daily traffic volumes included in the *Traffic Operations Analysis Report* (2018). The VMT calculations include SR-91 westbound traffic between Carmenita Road on the east and I-605 on the west. These roadway segments represent areas where the traffic volumes would be affected by the proposed project. The VMT data, along with the CT-EMFAC (based on EMFAC2014) emission rates, were used to calculate the CO, reactive organic gases (ROGs), NO_X, $PM_{2.5}$, and PM_{10} emissions for the Existing (2016), 2024, and 2044 conditions. The modeling results are summarized in Table 2.12.11.

As Table 2.12.11 shows, both the No Build and Build Alternative criteria pollutant emissions are all lower than the Existing (2016) condition emissions. With the exception of $PM_{2.5}$ and PM_{10}, the Build Alternative criteria pollutant emissions are all less than the No Build Alternative emissions. The increased $PM_{2.5}$ and PM_{10} emissions are due to the increase in re-entrained dust emissions (modeled as tire wear and brake dust) associated with the increased regional VMT.

No Build Alternative

The No Build Alternative does not include any planned improvements to the westbound SR-91 corridor. Under the No Build Alternative, there would be no reconstruction or improvements to the SR-91 corridor. As shown in Table 2.12.11, with the exception of $PM_{2.5}$ and PM_{10}, the Build Alternative criteria pollutant emissions are all less than the No Build Alternative emissions.

Table 2.12.12 Existing (2016), 2024 Opening Year, and 2044 Horizon Year Mobile Source Air Toxics Emissions (lbs/day)

Scenario	Diesel PM	Benzene	1,3-Butadiene	Naphthalene	POM	Acrolein	Formaldehyde	Ethyl benzene	Acetaldehyde
Existing (2016)	3.96	1.20	0.24	0.03	0.06	0.05	2.30	10.8	0.97
2024 Opening Year									
No Build Alternative	0.46	0.53	0.11	0.02	0.02	0.02	1.04	0.05	0.44
Change from Existing (2016)	*-3.51*	*-0.66*	*-0.14*	*-0.02*	*-0.03*	*-0.03*	*-1.26*	*-10.75*	*-0.53*
Build Alternative	0.46	0.53	0.11	0.02	0.02	0.02	0.95	0.04	0.39
Change from Existing (2016)	*-3.50*	*-0.67*	*-0.14*	*-0.02*	*-0.03*	*-0.03*	*-1.34*	*-10.76*	*-0.58*
Change from No Build	*0.00*	*-0.01*	*0.00*	*0.00*	*-0.001*	*0.00*	*-0.08*	*-0.01*	*-0.04*
2044 Horizon Year									
No Build Alternative	0.25	0.37	0.07	0.01	0.01	0.02	0.78	0.04	0.34
Change from Existing (2016)	*-3.72*	*-0.83*	*-0.17*	*-0.02*	*-0.04*	*-0.04*	*-1.51*	*-10.76*	*-0.63*
Build Alternative	0.25	0.36	0.07	0.01	0.01	0.02	0.69	0.03	0.29
Change from Existing (2016)	*-3.72*	*-0.84*	*-0.17*	*-0.02*	*-0.04*	*-0.04*	*-1.61*	*-10.77*	*-0.68*
Change from No Build	*0.00*	*-0.01*	*-0.001*	*-0.001*	*-0.001*	*0.00*	*-0.09*	*-0.01*	*-0.05*

Source: Compiled using CT-EMFAC Version 6 (2017).
Note: Totals may not appear to sum correctly due to rounding.
Caltrans = California Department of Transportation
CT-EMFAC = Caltrans Emission Factors Model
Diesel PM = diesel particulate matter
lbs/day = pounds per day
POM = polycyclic organic matter

2.12.4 Avoidance, Minimization, and/or Mitigation Measures

Because the project will incorporate the project features as outlined above in Section 2.12.3, no adverse impacts to air quality would occur. Therefore, no avoidance, minimization, and/or mitigation measures are required.

2.12.5 Climate Change

Neither the EPA nor the FHWA has issued explicit guidance or methods to conduct project-level greenhouse gas analysis. The FHWA emphasizes concepts of resilience and sustainability in highway planning, project development, design, operations, and maintenance. Because there have been requirements set forth in California legislation and executive orders on climate change, the issue is addressed in the California Environmental Quality Act (CEQA) chapter of this document. The CEQA analysis may be used to inform the NEPA determination for the project.

2.13 Noise

2.13.1 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.

2.13.1.1 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 Code of Federal Regulations Part 772 (23 CFR 772) noise analysis; please see Chapter 3 of this document for further information on noise analysis under CEQA.

2.13.1.2 National Environmental Policy Act and 23 CFR 772

For highway transportation projects with the Federal Highway Administration (FHWA) involvement (and 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 dBA) is lower than the NAC for commercial areas (72 dBA). Table 2.13.1 lists the noise abatement criteria for use in the NEPA/23 CFR 772 analysis.

Figure 2.13-1 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.

Table 2.13.1 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.
B1	67 (Exterior)	Residential.
C1	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 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
$L_{eq}(h)$ = one-hour A-weighted equivalent continuous sound level
NAC = Noise Abatement Criteria

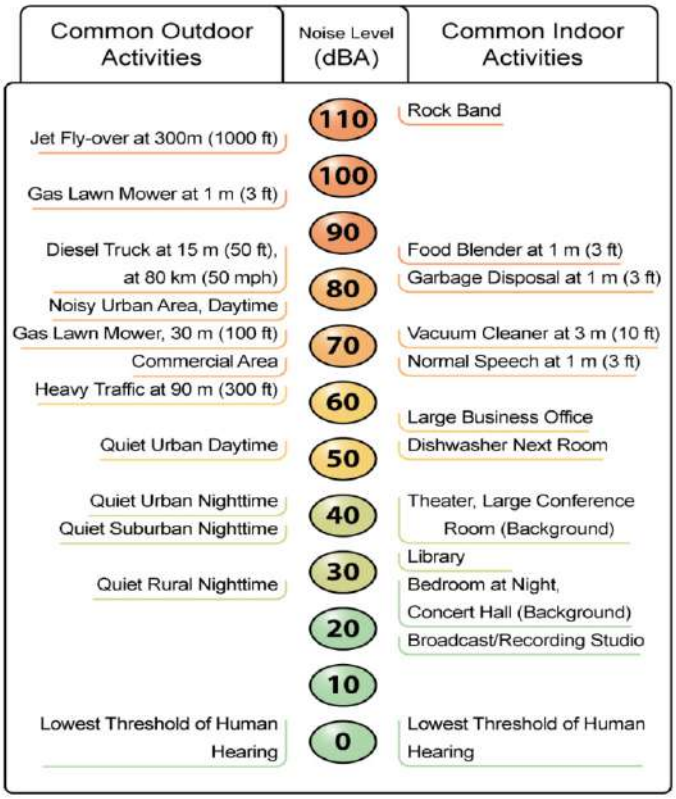


Figure 2.13-1 Noise Levels of Common Activities

According to the Caltrans *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 incorporated into 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 concern. A minimum 5 dBA reduction for all impacted receptors in the future noise levels must be achieved for an abatement to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. Additionally, a noise reduction of at least 7 dBA must be achieved at one or more benefited receptors for an abatement measure to be considered reasonable. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents' acceptance and the cost per benefited residence.

2.13.2 Affected Environment

This section is based on the May 2018 *Noise Study Report* (NSR) and the June 2018 *Noise Abatement Decision Report* (NADR) prepared for the proposed project. The NSR followed Caltrans 2011 *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects* (Noise Protocol) and the 2013 Caltrans *Technical Noise Supplement*.

2.13.2.1 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 study area include single- and multifamily residences, schools, a hospital, a day-care facility, a community center, parks, sports areas, a golf course, recreational areas, a hotel, restaurants, vacant land,

retail, office, utility, commercial, and light industrial uses. Existing land uses in the study area are described below in further detail.

- **Northbound Side of Interstate 605 (I-605) Between Alondra Boulevard and State Route 91 (SR-91):** Land uses in this area include single-family residences, a park, a hospital, a restaurant, and retail. Land uses in this area are from 14 feet (ft) lower to 22 ft higher in elevation than I-605. Currently, existing 5.6 to 8.3 ft high walls shield the single-family residences and park from traffic noise generated by I-605 and SR-91. Single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq} (equivalent continuous sound level measured in A-weighted decibels). Areas of frequent human use in the park were evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. Other areas of the park, which have no frequent human use areas, were classified under Activity Category C for reporting purposes. The interior area of the hospital was evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}. The restaurants with outdoor seating were evaluated under Activity Category E, which has an exterior NAC of 72 dBA L_{eq}. Retail uses were classified under Activity Category F for reporting purposes.
- **Southbound Side of I-605 Between Alondra Boulevard and SR-91:** Land uses in this area include a golf course, a sanitation facility, a gas station, retail, and light industry. Land uses in this area are from 19 ft lower to 4 ft higher in elevation than I-605. Currently, no existing walls shield these uses from traffic noise. The golf course was classified as Activity Category C for reporting purposes. The sanitation facility, the gas station, retail, and light industrial uses were classified as Activity Category F for reporting purposes.
- **Westbound Side of SR-91 Between I-605 and Gridley Road:** Land uses in this area include single-family residences. Land uses in this area are from 1 to 17 ft lower in elevation than SR-91. Currently, a 3 to 11 ft high existing wall shields these residences from traffic noise. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}.
- **Eastbound Side of SR-91 Between I-605 and Gridley Road:** Land uses in this area include single-family residences, a school and associated active sports areas, and a park. Land uses in this area are 3 to 19 ft lower in elevation than SR-91. Currently, a combination of a 16.8 ft high existing wall at the edge of the shoulder, a 13.5 ft high existing wall at the property line, and a 6.2 to 6.9 ft high wall at the property line shields the school and associated outdoor sports areas

from traffic noise. An existing 8.9 to 12.7 ft high wall shields the residences and the park. Single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. The active sports areas associated with the school and the outdoor frequent human use areas associated with the park were evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. The classrooms were evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}.

- **Westbound Side of SR-91 Between Gridley Road and Pioneer Boulevard:** Land uses in this area include single- and multifamily residences, a park, a hotel, restaurants, gas stations, and light industry. Land uses in this area are 3 to 21 ft lower in elevation than SR-91. Currently, an existing 8.8 to 15.7 ft high wall and an existing 5 to 6.1 ft high wall located along the State right-of-way (ROW), the edge of the shoulder, and the private property line shield some of these uses 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 park was evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. The hotel swimming pool was evaluated under Activity Category E, which has an exterior NAC of 72 dBA L_{eq}. Restaurants that have no outdoor eating areas and retail uses were classified under Activity Category E for reporting purposes. Light industrial uses were classified under Activity Category F for reporting purposes.
- **Eastbound Side of SR-91 Between Gridley Road and Pioneer Boulevard:** Land uses in this area include single-family residences, a park, and light industry. Land uses in this area are 1 to 20 ft lower in elevation than SR-91. Currently, an existing 5.6 to 18.1 ft high wall shields the park and single-family 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 park was evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. Light industrial uses were classified under Activity Category F for reporting purposes.
- **Westbound Side of SR-91 Between Pioneer Boulevard and Norwalk Boulevard:** Land uses in this area include single-family residences, a day-care center, a park, a community center, a gas station, vacant land, and light industrial uses. Land uses in this area are 4 to 24 ft lower in elevation than SR-91. Currently, an existing 15.8 to 16.2 ft high wall along the State ROW and an 11.3 to 13.4 ft high wall along the edge of the shoulder shield the residences, park, community center, day-care center, and some of the light industrial uses. The single-family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. The park was evaluated under Activity Category C,

which has an exterior NAC of 67 dBA L_{eq}. The community center and day-care center were evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}. The gas station and light industrial uses were classified under Activity Category F for reporting purposes. Vacant uses were classified under Activity Category G for reporting purposes.

- **Eastbound Side of SR-91 Between Pioneer Boulevard and Norwalk Boulevard:** Land uses in this area include single- and multifamily residences, a school, a restaurant, and an office building that includes a school. Land uses in this area are 3 to 22 ft lower in elevation than SR-91. Currently, an existing 15 ft high wall along the edge of the shoulder shields the offices and schools from traffic noise. Existing 5.9 to 10 ft high walls along the edge of the shoulder and the private property line shield the residences. The single- and multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. The school playground was evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. The classrooms were evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}. The restaurant, with an outdoor eating area, was evaluated under Activity Category E, which has an exterior NAC of 72 dBA L_{eq}. The office has no outdoor active use areas and was evaluated under Activity Category E for reporting purposes.
- **Westbound Side of SR-91 Between Norwalk Boulevard and Bloomfield Avenue:** Land uses in this area include multifamily residences, schools, a school playground, and an active sports area associated with a school. Land uses in this area are 5 to 20 ft lower in elevation than SR-91. Currently, an existing 10.8 to 14.7 ft high wall along the State ROW shields the school from traffic noise, and existing 6.9 to 13.5 ft high walls along the edge of the shoulder shield the residences. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. The active sports areas associated with the schools were evaluated under Activity Category C, which has an exterior NAC of 67 dBA L_{eq}. The classrooms were evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}.
- **Eastbound Side of SR-91 Between Norwalk Boulevard and Bloomfield Avenue:** Land uses in this area include single-family residences and an office building that includes a school. Land uses in this area are 3 to 18 ft lower in elevation than SR-91. Currently, an existing 5.4 to 7.3 ft high wall along the edge of the shoulder and the private property line shields the residences from traffic noise. An existing 6 ft high wall along the State ROW and the private property line shields the office building and the school from traffic noise. The single-

family residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. The classrooms were evaluated under Activity Category D, which has an interior NAC of 52 dBA L_{eq}. Offices that have no outdoor frequent human use areas were classified under Activity Category E for reporting purposes.

- **Westbound Side of SR-91 Between Bloomfield Avenue and South of Artesia Boulevard:** Land uses in this area include single-family residences. Land uses in this area are from 4 ft lower in elevation than SR-91 to 4 ft higher in elevation than SR-91. Currently, an existing 8.3 to 8.7 ft high wall along the private property line shields some of the residences from traffic noise. An existing 7 to 8.5 ft high wall along the State ROW shields some of 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}.
- **Eastbound Side of SR-91 Between Bloomfield Avenue and South of Artesia Boulevard:** Land uses in this area include multifamily residences and retail. Land uses in this area are from 5 ft lower in elevation than SR-91 to elevations similar to SR-91. Currently, no existing walls shield these uses from traffic noise. A field inspection was conducted for the multifamily residential complex representing the Aria and Sage Apartments on June 25, 2017. Tables and chairs were observed and documented on the ground floor patios and upper floor balconies for the two apartment complexes and were determined to be outdoor frequent human use areas. The multifamily residences were evaluated under Activity Category B, which has an exterior NAC of 67 dBA L_{eq}. Outdoor frequent human use areas associated with retail uses were evaluated under Activity Category E, which has an exterior NAC of 72 dBA L_{eq}. Retail uses that have no outdoor frequent human use areas were classified under Activity Category F for reporting purposes.

2.13.2.2 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 the traffic on SR-91, I-605, Alondra Boulevard, Studebaker Road, Pioneer Boulevard, Norwalk Boulevard, Bloomfield Avenue, and Artesia Boulevard. Short-term (10-minute) noise measurements were conducted to document existing noise levels at 61 representative receptor locations in the study area. Short-term noise level measurements were conducted using Larson

Davis Models 831, 824, 820 Type 1 sound level meters and a Larson Davis Model 720 Type 2 sound level meter. Table 2.13.2 contains the results of the short-term noise level measurements and a description of the noise-monitoring locations. These short-term (ST) noise measurements were used to calibrate the noise model and to predict the noise levels at all 362 modeled receptors in the study area. The short-term monitoring locations are shown on Figure 2.13-2.

Long-Term Monitoring

Long-term (LT) traffic noise level measurements were conducted to document the peak traffic noise hour. Long-term ambient noise monitoring was conducted using two dosimeters at six representative locations in the study area. The following is a summary of those measurements:

- The long-term noise level measurement at LT-1 was performed at 16311 Monica Circle from 9:00 a.m. on Tuesday, June 27, 2017 to 9:00 a.m. on Wednesday, June 28, 2017. Traffic noise peaks at 66 dBA L_{eq} during the 5:00 a.m., 6:00 a.m., 7:00 a.m., 8:00 a.m., 6:00 p.m., 7:00 p.m., and 8:00 p.m. hours at LT-1.
- The long-term noise level measurement at LT-2 was performed at 16923 Eric Avenue from 10:00 a.m. on Tuesday, June 27, 2017 to 10:00 a.m. on Wednesday, June 28, 2017. Traffic noise peaks at 66 dBA L_{eq} during the 6:00 a.m. and 7:00 a.m. hours at LT-2.
- The long-term noise level measurement at LT-3 was performed at 11622 169th Street from 9:00 a.m. on Wednesday, June 28, 2017 to 9:00 a.m. on Thursday, June 29, 2017. Traffic noise peaks at 68 dBA L_{eq} during the 5:00 a.m. hour at LT-3.
- The long-term noise level measurement at LT-4 was performed at 12023 Palm Street from 9:00 a.m. on Wednesday, June 28, 2017 to 9:00 a.m. on Thursday, June 29, 2017. Traffic noise peaks at 64 dBA L_{eq} during the 5:00 a.m. and 6:00 a.m. hours at LT-4.
- The long-term noise level measurement at LT-5 was performed at 12331 Palm Street from 9:00 a.m. on Thursday, June 29, 2017 to 9:00 a.m. on Friday, June 30, 2017. Traffic noise peaks at 63 dBA L_{eq} during the 5:00 a.m., 6:00 a.m., and 7:00 a.m. hours at LT-5.
- The long-term noise level measurement at LT-6 was performed at 17201 Michaels Avenue from 10:00 a.m. on Thursday, June 29, 2017 to 10:00 a.m. on Friday, June 30, 2017. Traffic noise peaks at 62 dBA L_{eq} during the 5:00 a.m., 6:00 a.m., and 7:00 p.m. hours at LT-6.

Table 2.13.2 Short-Term Ambient Noise Monitoring Results

Monitor No.	Date	Start Time	Duration	dBA L_{eq}	Location Description	Land Use	Noise Sources
ST-1	6/27/2017	9:28 AM	10 minutes	64.7	10808 Alondra Boulevard. In front of the Frantone's Pizza, near an outdoor patio area.	Restaurant/Retail	Traffic on I-605, off- and on-ramps, and parking lot
ST-2	6/27/2017	9:28 AM	10 minutes	74.6	10802 College Place. West side of the hospital, northeast of dumpster.	Hospital	Traffic on I-605
ST-3	6/27/2017	10:30 AM	10 minutes	64.1	16311 Monica Circle. In the backyard.	Residential	Traffic on I-605
ST-4	6/27/2017	10:30 AM	10 minutes	59.8	10814 Petula Place. In the backyard.	Residential	Traffic on I-605
ST-5	6/27/2017	11:07 AM	10 minutes	56.4	Directly next to 16643 Estella Avenue, in line with the backyard.	Residential	Traffic on I-605
ST-6	6/27/2017	11:07 AM	10 minutes	63.4	16733 Studebaker Road. In Reservoir Hill Park, at the top of the hill.	Park	Traffic on I-605 and SR-91
ST-7	6/27/2017	9:28 AM	10 minutes	71.4	10710 Alondra Boulevard. Northwest corner of the Shell gas station.	Gas Station	Traffic on Piuma Avenue, Alondra Boulevard, and I-605
ST-8	6/27/2017	9:28 AM	10 minutes	73.3	16121 Piuma Avenue. In the parking lot.	Park	Traffic on I-605 and Piuma Avenue
ST-9	6/27/2017	10:30 AM	10 minutes	76.1	16449 Piuma Avenue. Northeast corner of The City of Cerritos Iron-Wood Nine Golf Course.	Golf Course	Traffic on I-605 and occasional traffic on Piuma Avenue
ST-10	6/27/2017	10:30 AM	10 minutes	71.7	16599 Piuma Avenue. In the parking lot. Receptor placed equidistant between the facility and I-605.	Golf Course	Traffic on I-605
ST-11	6/27/2017	12:53 PM	10 minutes	61.5	16825 Leeward Avenue. Next to the backyard.	Residential	Traffic on SR-91 and SR-91/ I-605 connector
ST-12	6/27/2017	12:53 PM	10 minutes	63.8	16835 Outrigger Circle. In the front yard.	Residential	Traffic on SR-91 and SR-91/ I-605 connector and occasional traffic on Windjammer Road and Outrigger Circle
ST-13	6/27/2017	1:44 PM	10 minutes	64.4	16923 Eric Avenue. In the backyard.	Residential	Traffic on SR-91
ST-14	6/27/2017	1:44 PM	10 minutes	59.9	11238 Lucas Street. In the backyard.	Residential	Traffic on SR-91
ST-15	6/27/2017	1:44 PM	10 minutes	65.1	11221 Beach Street. On the driveway.	Residential	Traffic on SR-91
ST-16	6/27/2017	2:35 PM	10 minutes	60.1	16826 Sunny Ridge Court. In the backyard.	Residential	Traffic on SR-91
ST-17	8/3/2017	9:46 AM	10 minutes	68.3	11111 Artesia Boulevard. Adjacent to the football field of Gahr High School.	Playground	Traffic on SR-91, I-605 and Studebaker Road

Table 2.13.2 Short-Term Ambient Noise Monitoring Results

Monitor No.	Date	Start Time	Duration	dBA L_{eq}	Location Description	Land Use	Noise Sources
ST-18	6/27/2017	1:44 PM	10 minutes	55.9	11111 Artesia Boulevard. In the second baseball field from the west at Gahr High School.	Playground	Traffic on SR-91
ST-19	6/27/2017	2:35 PM	10 minutes	55.5	11111 Artesia Boulevard. Northeast corner of Gahr High School.	School	Traffic on SR-91
ST-20	6/27/2017	2:35 PM	10 minutes	61.4	11307 Palm Street. In the backyard.	Residential	Traffic on SR-91
ST-21	6/28/2017	9:16 AM	10 minutes	74.2	11441 Beach Street. In front of the building.	Retail	Traffic on SR-91
ST-22	6/28/2017	9:16 AM	10 minutes	64.6	Next to the Hyde Park Court park.	Park	Traffic on SR-91
ST-23	6/28/2017	9:54 AM	10 minutes	61.5	11523 Hyde Park Court. In front of the residence.	Residential	Traffic on SR-91
ST-24	6/28/2017	9:54 AM	10 minutes	54.4	Walkway between 11510 and 11508 Belvedere Court. At south side of the two residences.	Residential	Traffic on SR-91
ST-25	8/3/2017	9:46 AM	10 minutes	65.3	11554 169th Street. In the backyard.	Residential	Traffic on SR-91
ST-26	6/28/2017	10:27 AM	10 minutes	63.3	11644 169th Street. In the backyard.	Residential	Traffic on SR-91
ST-27	6/28/2017	10:27 AM	10 minutes	67.0	16905 Pioneer Boulevard. Artesia Inn and Suites. Southeast of the pool.	Hotel	Traffic on SR-91
ST-28	6/28/2017	11:04 AM	10 minutes	59.1	16707 Pioneer Boulevard. In the parking lot of El Pollo Loco.	Restaurant	Traffic on Pioneer Boulevard and parking lot
ST-29	6/28/2017	9:16 AM	10 minutes	65.5	11431 Jenkins Street. In the backyard.	Residential	Traffic on SR-91
ST-30	6/28/2017	9:16 AM	10 minutes	58.8	Between 17102 and 17106 Gard Avenue. Outside of backyard gate of 17102 Gard Avenue.	Residential	Traffic on SR-91
ST-31	8/3/2017	9:47 AM	10 minutes	71.0	17027 Roseton Avenue. In front of the building, in the cul-de-sac of Roseton Avenue.	Offices	Traffic on SR-91
ST-32	6/28/2017	10:27 AM	10 minutes	69.2	Between 17004 and 17105 Alburtis Avenue. Outside of the property gate of 17105 Alburtis Avenue.	Light Industrial	Traffic on SR-91
ST-33	6/28/2017	11:05 AM	10 minutes	53.4	16646 Pioneer Boulevard. In the backyard.	Residential	Traffic on Pioneer Boulevard and SR-91
ST-34	8/3/2017	10:49 AM	10 minutes	62.9	11814 168th Street. In the vacant land, in line with residential backyards.	Vacant Land	Traffic on SR-91 and Pioneer Boulevard
ST-35	6/28/2017	11:05 AM	10 minutes	54.7	11832 168th Street. In the backyard.	Residential	Traffic on SR-91
ST-36	6/28/2017	9:54 AM	10 minutes	60.3	11864 169th street. In the backyard.	Residential	Traffic on SR-91

Table 2.13.2 Short-Term Ambient Noise Monitoring Results

Monitor No.	Date	Start Time	Duration	dBA L_{eq}	Location Description	Land Use	Noise Sources
ST-37	6/28/2017	1:45 PM	10 minutes	63.5	In the park. Directly south of the backyard of 11936 169th Street.	Park	Traffic on SR-91
ST-38	6/28/2017	1:45 PM	10 minutes	58.4	11951 170th Street. In the backyard.	Residential	Traffic on SR-91
ST-39	6/28/2017	1:45 PM	10 minutes	59.6	Directly south of the backyard of 12021 170th Street. In the parking lot.	Residential	Traffic on SR-91
ST-40	6/28/2017	2:26 PM	10 minutes	61.8	In the parking lot of 16741 Parkside Avenue. Next to the backyard of 12058 169th Street.	Residential	Traffic on SR-91
ST-41	6/29/2017	9:15 AM	10 minutes	70.6	16821 Norwalk Boulevard. Southeast corner of the Shell gas station.	Gas Station	Traffic on Norwalk Avenue, SR-91, and the westbound SR-91 off-ramp
ST-42	8/3/2017	10:50 AM	10 minutes	67.7	17100 Pioneer Boulevard. Next to the Angeles Institute building.	School	Traffic on SR-91 and the eastbound SR-91 on-ramp from Pioneer Boulevard
ST-43	6/28/2017	12:49 PM	10 minutes	62.3	11939 Aclare Street. Juarez Academy of Engineering and Technology. At the northwest corner of the building.	School	Traffic on SR-91
ST-44	8/3/2017	10:49 AM	10 minutes	66.3	12029 Palm Street. In the backyard.	Residential	Traffic on SR-91
ST-45	6/28/2017	2:26 PM	10 minutes	57.5	17203 Ibex Avenue. On the driveway.	Residential	Traffic on SR-91
ST-46	6/29/2017	9:15 AM	10 minutes	65.8	Next to the SR-91 eastbound off-ramp to Norwalk Boulevard. North of the residence at 17200 Monaco Drive.	Residential	Traffic on SR-91, the eastbound SR-91 on-ramp, and Norwalk Boulevard
ST-47	6/29/2017	9:54 AM	10 minutes	63.3	12222 Cuesta Drive. ABC Adult School. Near room “N” at the southeast corner of the property.	School	Traffic on SR-91
ST-48	6/29/2017	10:36 AM	10 minutes	62.3	12418 Rancho Vista Drive. In the alley behind the residences.	Residential	Traffic on SR-91
ST-49	6/29/2017	10:36 AM	10 minutes	61.4	Between the balconies of 12456 and 12454 Ranch Vista Drive.	Residential	Traffic on SR-91
ST-50	6/29/2017	11:11 AM	10 minutes	57.3	16948 Sierra Vista Drive. In the alley behind the residences and in line with the upstairs patio.	Residential	Traffic on SR-91
ST-51	8/3/2017	11:40 AM	10 minutes	58.9	16938 Sierra Vista Way. Behind the buildings at a similar distance from the roadway as the balconies.	Residential	Traffic on SR-91 and the westbound SR-91 on-ramp from Bloomfield Avenue

Table 2.13.2 Short-Term Ambient Noise Monitoring Results

Monitor No.	Date	Start Time	Duration	dBA L_{eq}	Location Description	Land Use	Noise Sources
ST-52	6/29/2017	9:54 AM	10 minutes	65.6	Between 17100 and 17150 Norwalk Boulevard. In the parking lot.	Offices	Traffic on SR-91
ST-53	6/29/2017	9:54 AM	10 minutes	63.8	12305 Palm Street. In the backyard.	Residential	Traffic on SR-91
ST-54	6/29/2017	10:36 AM	10 minutes	64.2	12361 Palm Street. In the backyard.	Residential	Traffic on SR-91
ST-55	6/29/2017	10:36 AM	10 minutes	64.5	12477 Autumn Breeze Street. In the backyard.	Residential	Traffic on SR-91
ST-56	8/3/2017	11:40 AM	10 minutes	55.6	12533 Springsnow Circle. In the backyard.	Residential	Traffic on SR-91 and the eastbound SR-91 off-ramp to Bloomfield Avenue
ST-57	6/29/2017	11:48 AM	10 minutes	58.9	17113 Michaels Avenue. In the backyard.	Residential	Traffic on SR-91
ST-58	6/29/2017	11:48 AM	10 minutes	57.4	17227 Michaels Avenue. Outside wooden backyard gate.	Residential	Traffic on SR-91
ST-59	6/29/2017	11:48 AM	10 minutes	54.7	17343 De Groot Place. Next to the backyard.	Residential	Traffic on SR-91 and the westbound SR-91 on-ramp from Artesia Boulevard
ST-60	6/29/2017	1:24 PM	10 minutes	75.6	12611 Artesia Boulevard. Aria Apartment Homes, in line with the north facade of the second building from the west.	Residential	Traffic on SR-91
ST-61	6/29/2017	1:24 PM	10 minutes	71.0	At the northwest corner of 12741 Towne Center Drive. In the parking lot of Cerritos Towne Center.	Retail	Traffic on SR-91 and the parking lot

Source: *Noise Study Report* (2018).
dBA = A-weighted decibels
I-605 = Interstate 605
L_{eq} = equivalent continuous sound level
SR-91 = State Route 91

Melissa St
Joanna Ave
Debra Ln
College Pl
Elena St
Roberta St
Estella Ave
Carla Pl
Petula Pl
166th St
Leibacher Ave
Alondra Blvd
Dumont Ave
Monica Cir
EW No. 1.3 - 8.3 ft
EW No. 1.2 - 7.6 ft
EW No.1.1 - 5.6 - 8.1 ft
R-1
ST-1
R-2
R-3
ST-2
R-4
R-5
LT-1
R-6
ST-3
R-7
R-8
R-9
R-10
R-11
R-12
R-13
R-14
R-15
R-16
R-17
R-18
R-19
R-20
R-21
R-22
R-23
R-24
ST-4
R-25
R-26
R-27
R-31
R-32
605
Study Area Limit
ST-9
R-37
R-38
R-39
R-40
R-41
R-42
ST-10
Piuma Ave
R-35
R-36
ST-8
Midway St
R-34
ST-7

LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

0 100 200
FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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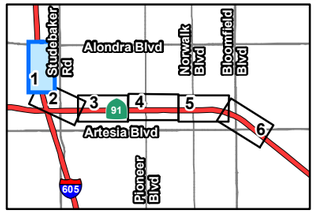

FIGURE 2.13-2
Sheet 1 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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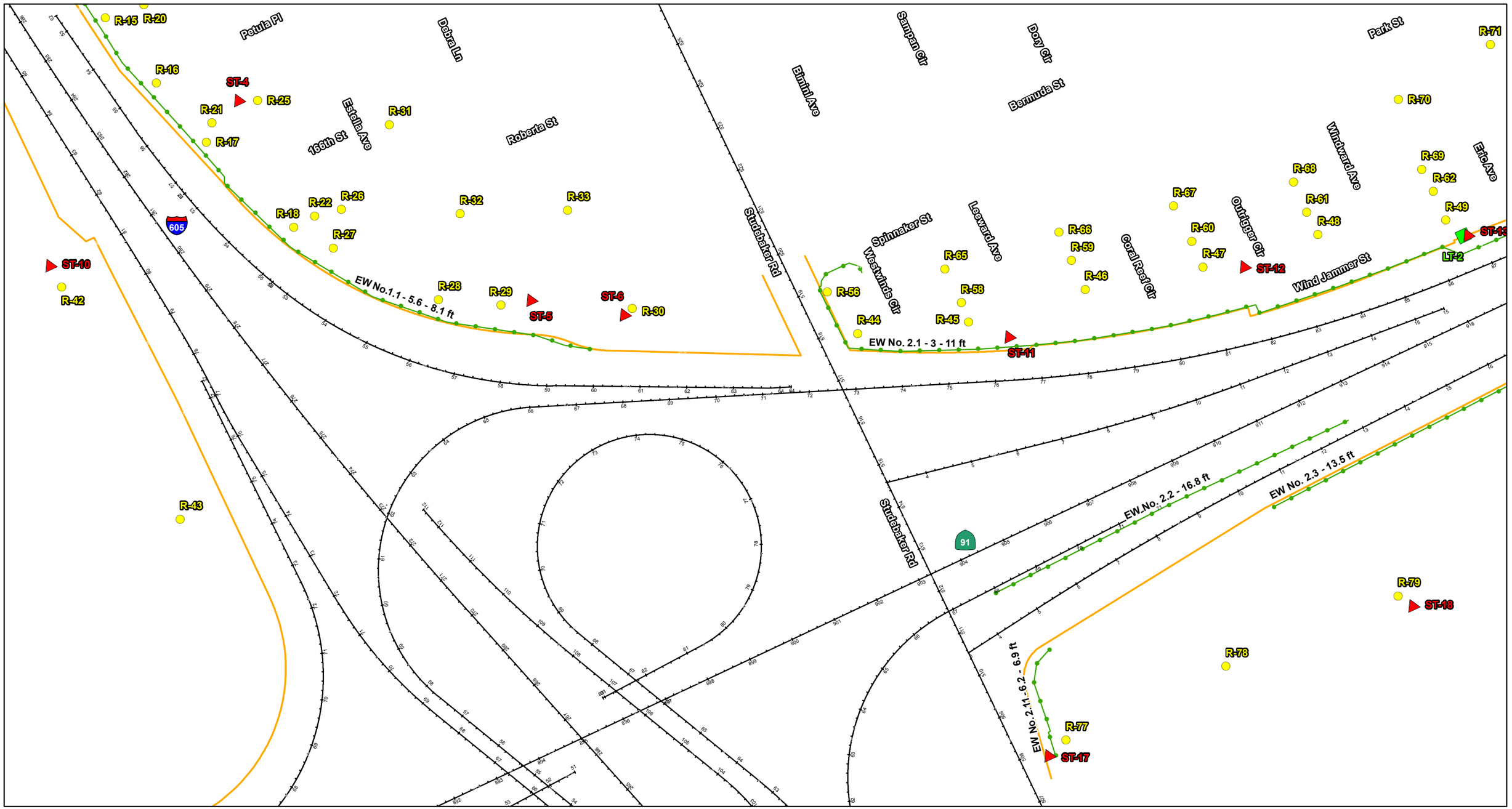

LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

0 100 200
FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-2
Sheet 2 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

EFIS 0716000284; EA 29811

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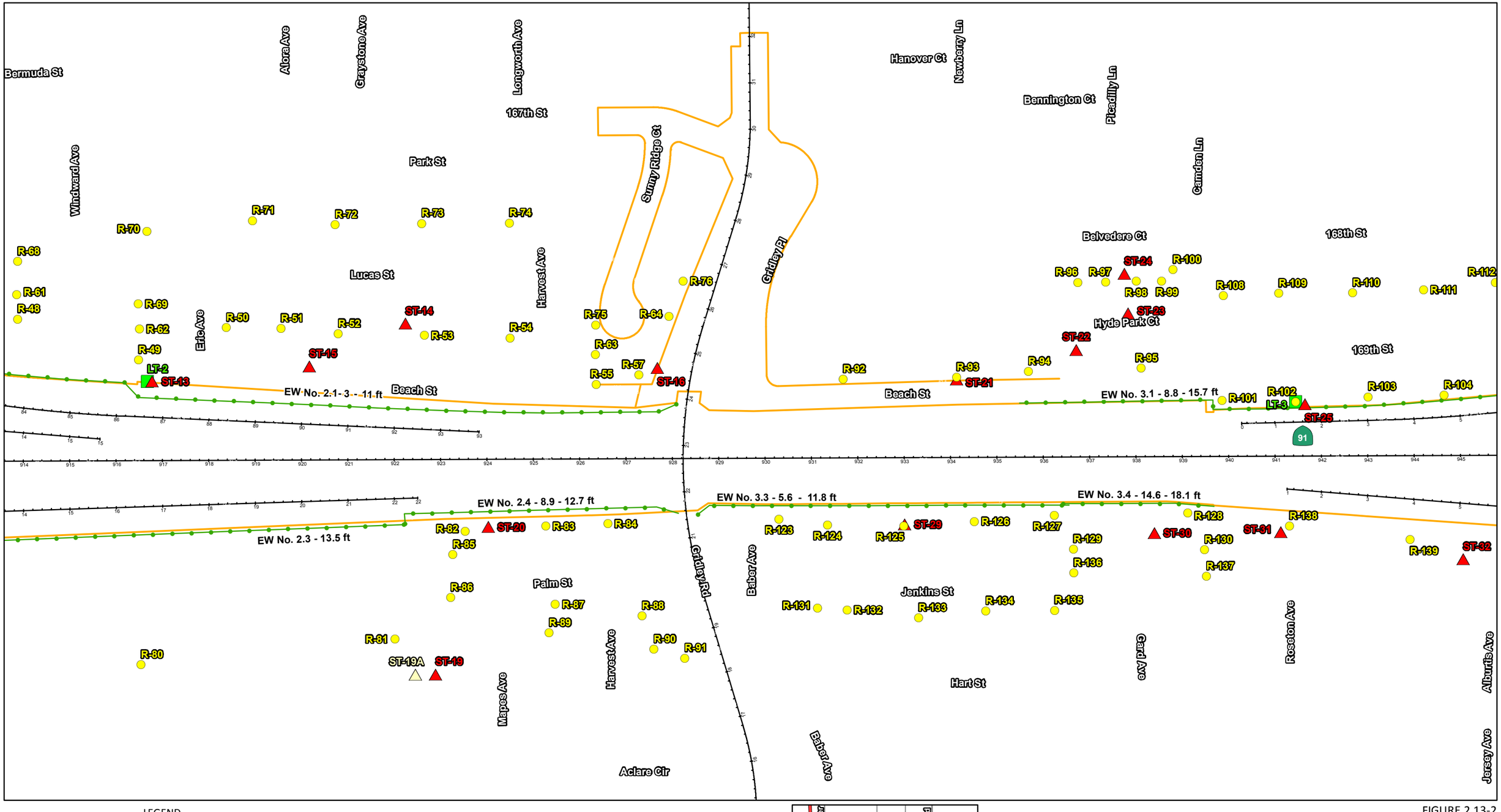
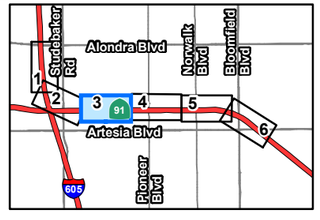


LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

0 100 200
FEET



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-2
Sheet 3 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

EFIS 0716000284; EA 29811

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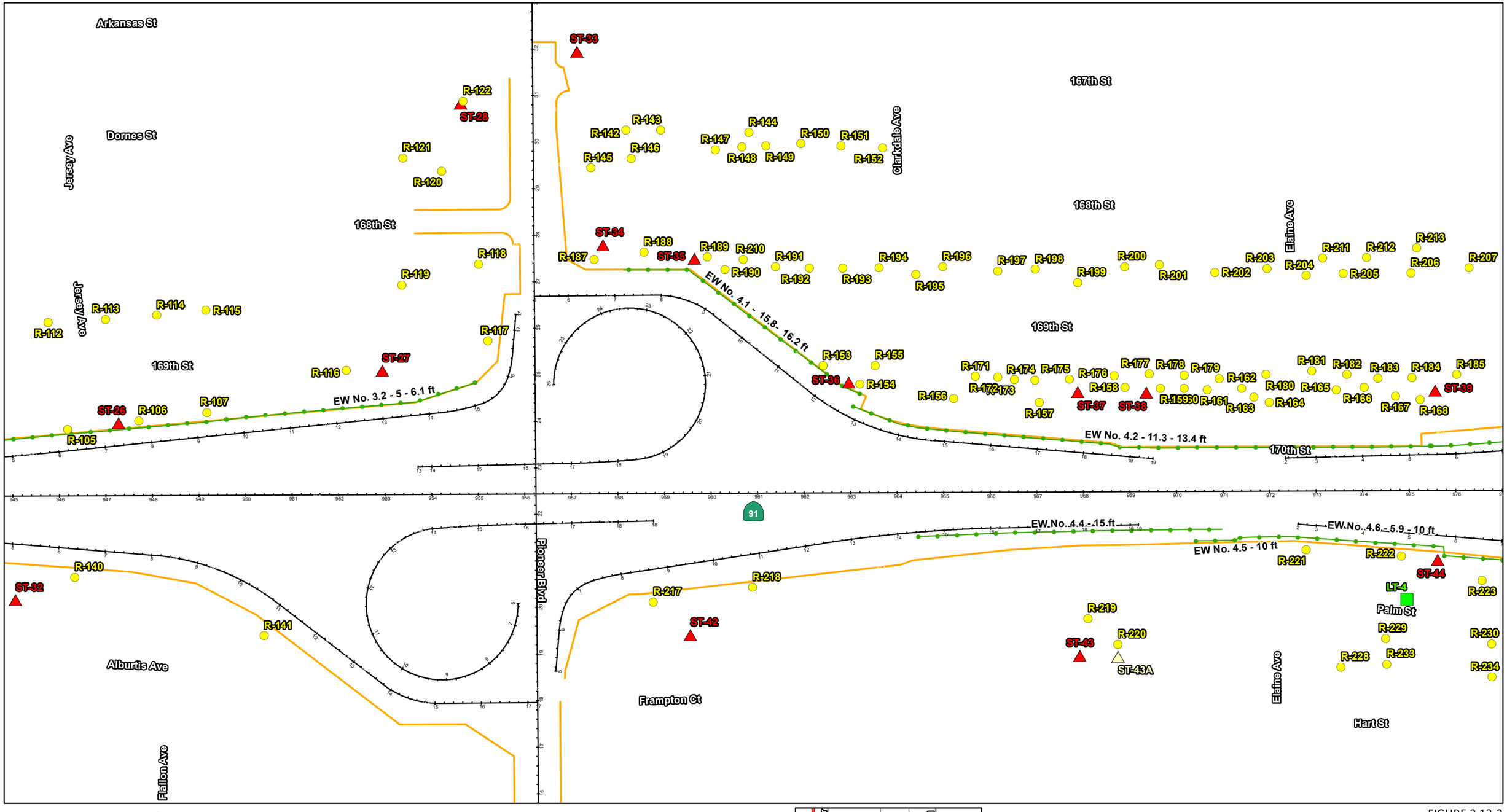

LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

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FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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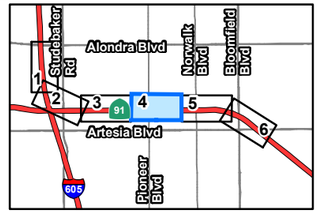

FIGURE 2.13-2
Sheet 4 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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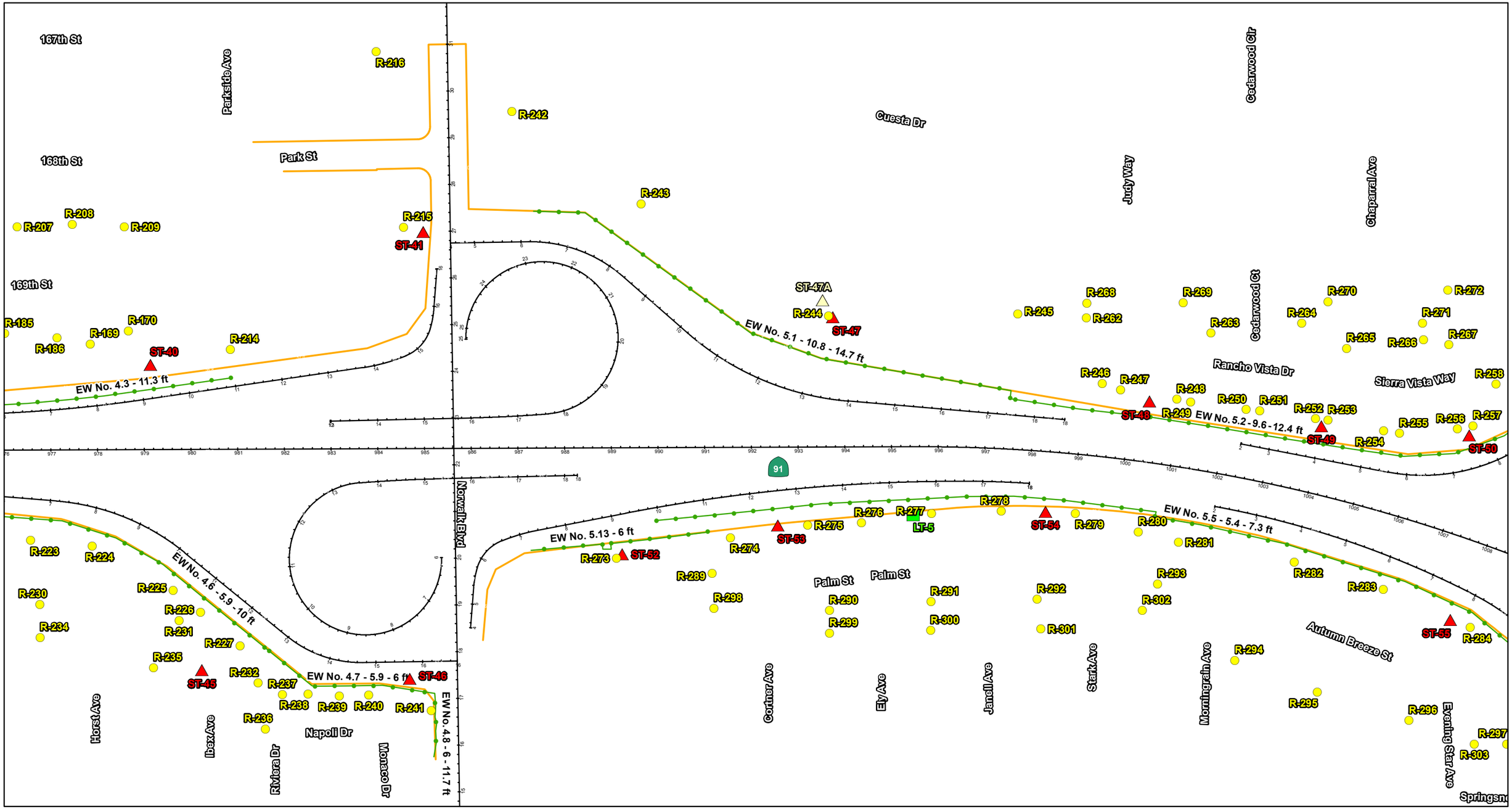
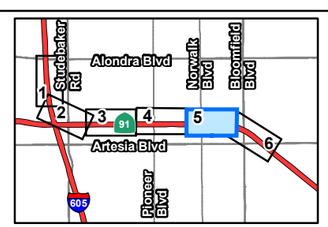


LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

0 100 200
FEET



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-2
Sheet 5 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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LEGEND

- Long-Term Monitoring Locations
- Short-Term Monitoring Locations
- Short-Term Interior Monitoring Locations
- Modeled Receptors
- Existing Right-of-Way
- Existing Wall

0 100 200
FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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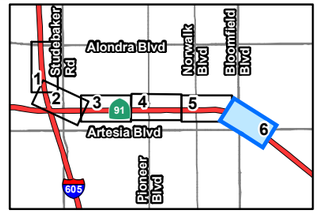

FIGURE 2.13-2
Sheet 6 of 6

Westbound SR-91 Improvement Project

Monitoring and Modeled Receptor Locations

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

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2.13.2.3 Existing Noise Levels

Traffic volume counts and vehicle speeds measured during the ambient noise monitoring were coded into Traffic Noise Model (TNM) 2.5 with existing roadway conditions to calibrate the modeling result. The results of the existing traffic noise modeling are shown in Table 2.13.6 in Section 2.13.3.2, Permanent Impacts. Currently, of the 362 modeled receptor locations, 33 receptors would approach or exceed the NAC. Figure 2.13-2 shows the locations of the modeled receptors.

2.13.3 Environmental Consequences

The proposed project is considered a Type 1 project because it would use federal aid to add a mixed-flow lane and auxiliary lanes in the westbound direction of the existing SR-91. A noise analysis is required for all Type 1 projects. Therefore, noise impacts of the Build Alternative and design options are analyzed below.

2.13.3.1 Temporary Impacts

Build Alternative (includes Design Options)

Construction Noise

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 the 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 maximum instantaneous noise level (L_{max}) from trucks passing at 50 ft from the noise receptor would exist. However, the projected construction traffic would be minimal when compared to existing traffic volumes on SR-91 and other affected streets, and its associated long-term noise level change would not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would have no effect on ambient noise levels.

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 study 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 2.13.3 lists typical construction

Table 2.13.3 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

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

equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor.

With the exception of the impact pile driver and jackhammer, typical noise levels at 50 ft 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. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings.

The construction of the proposed project is expected to require the use of earthmovers, bulldozers, water trucks, and pickup trucks. Noise associated with the use of construction equipment is estimated to be between 75 and 84 dBA L_{max} at a distance of 50 ft from the active construction area for the grading phase. As seen in Table 2.13.3, the maximum noise level generated by each scraper is assumed to be approximately 84 dBA L_{max} at 50 ft from the scraper in operation. Each bulldozer would generate approximately 82 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks and pickup trucks is approximately 75

dBA L_{max} at 50 ft 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 ft from an active construction area).

In addition to standard construction equipment, the proposed project may require the use of pile drivers. As shown in Table 2.13.3, pile driving generates noise levels of approximately 101 dBA L_{max} at 50 ft.

The closest sensitive receptors are within 50 ft of project construction areas and would be approximately 180 ft from pile driving activities. Sensitive receptor locations may be subject to short-term noise higher than 92 dBA L_{max} generated by construction activities along the project alignment. Project Feature N-1 requires compliance with Caltrans Standard Specifications Section 14-8.02 (2015) and would minimize construction noise impacts on sensitive land uses adjacent to the project site. 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 ft and contractors will not operate an internal combustion engine on the job site without the appropriate manufacturer-recommended muffler.

PF-N-1 The control of noise from construction activities shall 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., shall not exceed 86 dBA $L_{eq}(h)$ (1-hour A-weighted equivalent continuous sound level) at a distance of 50 feet. In addition, the contractor shall equip all internal combustion engines with a manufacturer-recommended muffler and shall not operate any internal combustion engine on the job site without the appropriate muffler.

PF-N-2 During all project site excavation and grading, construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

PF-N-3 The construction contractor shall locate construction staging areas away from off-site sensitive uses during the later phases of project development.

PF-N-4 The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

Construction Vibration

Vibration generated by construction equipment can result in varying degrees of ground vibration, depending on the equipment. The operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings situated on soil near the active construction area respond to these vibrations, which range from imperceptible to low rumbling sounds with perceptible vibrations and slight damage at the highest vibration levels. Typically, construction-related vibrations do not reach vibration levels that would result in damage to nearby structures. However, old and fragile structures would require special consideration to avoid damage. The two types of short-term vibration impacts that would occur during project construction are evaluated below.

Short-term vibration impacts would be from construction equipment associated with the construction. The proposed project would require the use of loaded trucks, bulldozers, and pile driving. Based on the Federal Transit Administration *Transit Noise and Vibration Assessment* (2006), a loaded truck, a large bulldozer, and pile driving would generate a vibration level of 0.076 peak particle velocity (PPV) (inches per second [in/sec]) (86 vibration velocity decibels [VdB]), 0.089 PPV (in/sec) (87 VdB), and 0.644 PPV (in/sec) (104 VdB) when measured at 25 ft. The closest residential structure is located approximately 50 ft from the construction boundary and 180 ft from pile driving. The closest residential structure would be exposed to a vibration level of up to 0.033 PPV (in/sec) (78 VdB). As shown in Table 2.13.4, a vibration level of 87 VdB at the closest residence would result in community annoyance. However, Table 2.13.5 shows that this vibration level would not damage residential structures or other structures associated with residential land uses within the project area because these structures are constructed with non-engineered timber and the vibration damage threshold of 0.2 PPV (in/sec) (94 VdB) would not be exceeded.

No Build Alternative

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

Table 2.13.4 Groundborne Vibration Impact General Assessment

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µin/sec)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB	65 VdB	65 VdB
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

Source: *Transit Noise and Vibration Impact Assessment* (FTA 2006).
[1] Frequent Events are defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
[2] Occasional Events are defined as between 30 and 70 vibration events of the same kind per day. This category includes most commuter rail branch lines.
[3] Infrequent Events are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
µin/sec = microinches per second
FTA = Federal Transit Administration
VdB = vibration velocity decibels

Table 2.13.5 Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximately L_v
Reinforced concrete, steel, or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: *Transit Noise and Vibration Impact Assessment* (FTA 2006).
FTA = Federal Transit Administration
in/sec = inches per second
L_V = root-mean-square (RMS) velocity in decibels (VdB) re 1 microinch per second
PPV = peak particle velocity

2.13.3.2 Permanent Impacts

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 topographic maps, a total of 362 receptor locations associated with existing single- and multifamily residences, schools, a hospital, a day-care facility, a community center, parks, sports areas, a golf course, recreational areas, a hotel, restaurants, vacant land, retail, office, utility, commercial, and light industrial uses were evaluated in the noise model.

Build Alternative (Includes Design Options)

Future traffic noise levels for all 362 receptor locations were determined with existing walls using the worst-case traffic operations (prior to speed degradation) or the future (2044) peak-

hour traffic volumes obtained from the *Traffic Operations Analysis Report* (2018), whichever was lower. Table 2.13.6 along with Tables 2.13.7 and 2.13.8 show the traffic noise level results for the existing (2017), Future No Build, and Future Build (Build Alternative) conditions. Table 2.13.9 along with Tables 2.13.10 and 2.13.11 show the traffic noise level results for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width). Tables 2.13.12 through 2.13.15 show the traffic noise level results for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing), the Build Alternative with Design Option 2 (Pioneer Boulevard L-9), the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment), and the Build Alternative with Design Option 4 (Diamond Ramps), respectively.

The modeled future noise levels with the project were compared to the modeled existing noise levels (after calibration) from TNM 2.5 to determine whether a substantial noise increase would occur. The modeled future noise levels were also compared to the NACs 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 (i.e., be within 1 dBA or higher) 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 362 modeled receptors, 56 receptors under the Build Alternative would approach or exceed the NAC. No additional impacts would occur under the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing), Design Option 2 (Pioneer Boulevard L-9), or Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment). The Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width) would have 10 fewer impacted receptors compared to the Build Alternative (Receptors R-107, R-177 through R-183, R-248, and R-249). The Build Alternative with Design Option 4 (Diamond Ramps) would have two fewer impacted receptors compared to the Build Alternative (Receptors R-248 and R-249). No receptor would experience a substantial noise increase of 12 dBA or more over its corresponding existing noise levels under any scenario.

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																					
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)															
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-1			Alondra Boulevard	Restaurant/Retail	1	64	65	66	1	2	E(72)	--	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-2			Alondra Boulevard	Commercial	0	66	66	66	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-3			College Place	Hospital	1	74 / 49[3]	75 / 50[3]	75 / 50[3]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-4	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	2	64	65	65	0	1	B(67)	--	--[4]	--	--	--	--	--	64	1	0	63	2	0	63	2	0	62	3	0
R-5	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	2	**66**[5]	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	65	1	0	65	1	0	64	2	0	63	3	0
R-6	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	3	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0	63	3	0
R-7	EW No. 1.1	NB No. 1.1	Elena Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0	63	3	0
R-8	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	62	1	0	62	1	0	62	1	0	62	1	0
R-9	EW No. 1.1	NB No. 1.1	Elena Street	Residential	1	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	62	1	0	62	1	0	61	2	0	61	2	0
R-10	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0	60	1	0
R-11	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	2	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	57	1	0	58	0	0	57	1	0	57	1	0
R-12	EW No. 1.1	NB No. 1.1	Monica Circle	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	58	0	0	58	0	0	58	0	0	58	0	0
R-13	EW No. 1.1	NB No. 1.1	Elena Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0	59	2	0
R-14	EW No. 1.1	NB No. 1.1	Carla Place	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	65	0	0	64	1	0	63	2	0	62	3	0
R-15	EW No. 1.1	NB No. 1.1	Carla Place	Residential	1	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	65	1	0	64	2	0	63	3	0	62	4	0
R-16	EW No. 1.1	NB No. 1.1	Petula Place	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	65	1	0	64	2	0	63	3	0	62	4	0
R-17	EW No. 1.1	NB No. 1.1	166th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	63	0	0	63	0	0	63	0	0	63	0	0
R-18	EW No. 1.1		166th Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-19	EW No. 1.1	NB No. 1.1	Carla Place	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	61	1	0	60	2	0	60	2	0
R-20	EW No. 1.1	NB No. 1.1	Carla Place	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	63	0	0	62	1	0	61	2	0	61	2	0
R-21	EW No. 1.1	NB No. 1.1	166th Street	Residential	2	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	62	1	0	63	0	0	62	1	0	62	1	0
R-22	EW No. 1.1		166th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-23	EW No. 1.1	NB No. 1.1	Carla Place	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	59	0	0	58	1	0	58	1	0	58	1	0
R-24	EW No. 1.1	NB No. 1.1	Carla Place	Residential	1	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	58	1	0	58	1	0	58	1	0	57	2	0
R-25	EW No. 1.1	NB No. 1.1	166th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0	60	1	0
R-26	EW No. 1.1		Estella Avenue	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
R-27	EW No. 1.1		Estella Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-28	EW No. 1.1		Estella Avenue	Residential	3	58	58	59	1	1	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-29	EW No. 1.1		Estella Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-30			Studebaker Road	Park	0	65	65	66	1	1	C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-31	EW No. 1.1		Roberta Street	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-32	EW No. 1.1		Roberta Street	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-33	EW No. 1.1		Studebaker Road	Park	1	57	57	58	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-34			Piuma Avenue	Gas Station	0	71	72	72	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-35			Piuma Avenue	Retail	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-36			Piuma Avenue	Light Industrial	0	73	74	74	0	1		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-37			Piuma Avenue	Light Industrial	0	74	74	74	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-38			Piuma Avenue	Golf Course	0	74	75	75	0	1	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-39			Piuma Avenue	Golf Course	0	70	70	70	0	0	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-40			Piuma Avenue	Golf Course	0	71	72	72	0	1	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-41			Piuma Avenue	Golf Course	0	71	72	72	0	1	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-42			Piuma Avenue	Golf Course	0	73	73	73	0	0	C[6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-43			Piuma Avenue	Utility	0	70	71	71	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-44	EW No. 2.1	NB No. 2.1	Westwinds Circle	Residential	1	64	65	**66**	1	2	B(67)	A/E	--	--	--	--	--	--	63	3	0	63	3	0	60	6'	1	59	7	1
R-45	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	64	1	0	61	4	0	60	5	2
R-46	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	62	62	64	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-47	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0
R-48	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-49	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	1	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	65	0	0	65	0	0	64	1	0	64	1	0
R-50	EW No. 2.1*	NB No. 2.1	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0
R-51	EW No. 2.1*	NB No. 2.1	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	62	0	0

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-52	EW No. 2.1*		Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-53	EW No. 2.1*		Beach Street	Residential	6	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-54	EW No. 2.1*		Beach Street	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-55	EW No. 2.1*		Harvest Avenue	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-56	EW No. 2.1	NB No. 2.1	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	61	3	0	61	3	0
R-57	EW No. 2.1*		Sunny Ridge Court	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-58	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	63	2	0	61	4	0	60	5	1
R-59	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-60	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	64	2	0
R-61	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-62	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	64	0	0	64	0	0	63	1	0	63	1	0
R-63	EW No. 2.1*		Harvest Avenue	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-64	EW No. 2.1*		Sunny Ridge Court	Residential	1	58	59	58	-1	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-65	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0	61	3	0
R-66	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	61	2	0	61	2	0
R-67	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	63	3	0
R-68	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-69	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	63	0	0	63	0	0	62	1	0	62	1	0
R-70	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	61	0	0	61	0	0	60	1	0	60	1	0
R-71	EW No. 2.1*	NB No. 2.1	Lucas Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	57	0	0	57	0	0
R-72	EW No. 2.1*		Lucas Street	Residential	3	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-73	EW No. 2.1*		Lucas Street	Residential	3	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-74	EW No. 2.1*		Lucas Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-75	EW No. 2.1*		Harvest Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-76	EW No. 2.1*		Sunny Ridge Court	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-77	EW No. 2.2	NB No. 2.3	Artesia Boulevard	Playground	1	**67**	**67**	**67**	0	0	C(67)	A/E	--	--	--	**66**	1	0	65	2	0	65	2	0	64	3	0	64	3	0
R-78	EW No. 2.2	NB No. 2.3	Artesia Boulevard	Playground	1	64	64	64	0	0	C(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-79	EW No. 2.3	NB No. 2.3	Artesia Boulevard	Playground	2	57	57	57	0	0	C(67)	--	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0
R-80	EW No. 2.3		Artesia Boulevard	Playground	2	62	62	62	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-81	EW No. 2.3		Artesia Boulevard	School Classroom	1	61 / 40 [8]	61 / 40 [8]	61 / 40 [8]	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-82	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-83	EW No. 2.4		Palm Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-84	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-85	EW No. 2.4		Maples Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-86	EW No. 2.4		Maples Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-87	EW No. 2.4		Harvest Avenue	Residential	2	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-88	EW No. 2.4		Harvest Avenue	Residential	1	58	58	57	-1	-1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-89	EW No. 2.4		Maples Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-90	EW No. 2.4		Harvest Avenue	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-91	EW No. 2.4		Gridley Road	Park	1	58	58	58	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	51	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-101	EW No. 3.1*	NB No. 3.1	169th Street	Residential	2	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-102	EW No. 3.1*	NB No. 3.1	169th Street	Residential	3	**66**	**67**	**68**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-103	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**68**	0	0	**66**	2	0
R-104	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-105	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0
R-106	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	65	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0
R-107	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0
R-108	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0
R-109	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0
R-110	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-112	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0
R-113	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0
R-114	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-115	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0
R-116	EW No. 3.1		Pioneer Boulevard	Hotel	1	64	65	65	0	1	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-117			Pioneer Boulevard	Restaurant	0	67	67	67	0	0	E [6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-118			Pioneer Boulevard	Gas Station	0	65	65	0	--	--	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-119	EW No. 3.1		168th Street	Residential	1	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-120			Pioneer Boulevard	Gas Station	0	62	62	63	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-121			168th Street	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-122			Pioneer Boulevard	Light Industrial	0	59	59	59	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0	62	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	63	3	0	63	3	0	62	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	64	1	0	64	1	0	63	2	0	62	3	0	62	3	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	62	5	3
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	64	0	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	59	-1	0	B(67)	--	60	-1	0	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	61	1	0	60	2	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	61	2	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0
R-138			Roseton Avenue	Office	0	73	74	73	-1	0	E [5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-139			Jersey Avenue	Light Industrial	0	73	74	74	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-140			Alburtis Avenue	Light Industrial	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-141			Alburtis Avenue	Office	0	65	66	66	0	1	E [6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	57	0	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-143	EW No. 4.1		167th Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-144	EW No. 4.1		167th Street	Residential	2	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	61	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-146	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-147	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-148	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-149	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-150	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-151	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	61	0	1	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																					
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)															
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	62	1	0	62	1	0	62	1	0	62	1	0	62	1	0	62	1	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**	1	1	C(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	65	1	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46 [9]	67 / 47 [9]	68 / 48 [9]	1	2	D(52)	--	--	--	--	--	--	--	--	--	--	66	2	0	66	2	0	66	2	0
R-157	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	64	65	65	0	1	C(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	65	0	0	65	0	0
R-158	EW No. 4.2*		170th Street	Residential	2	65	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-159	EW No. 4.2*		170th Street	Residential	2	60	60	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-160	EW No. 4.2*		170th Street	Residential	2	59	59	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-161	EW No. 4.2*		170th Street	Residential	2	58	58	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-162	EW No. 4.2*		170th Street	Residential	2	62	63	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-163	EW No. 4.2*		170th Street	Residential	1	62	62	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-164	EW No. 4.2*		170th Street	Residential	1	63	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-165	EW No. 4.2*		170th Street	Residential	1	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-166	EW No. 4.2*		170th Street	Residential	2	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-167	EW No. 4.2*		170th Street	Residential	2	64	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-168	EW No. 4.2*		170th Street	Light Industrial	0	61	61	0	--	--	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-169	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0	63	0	0
R-170	EW No. 4.3	NB No. 4.1	169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0	63	1	0
R-172	EW No. 4.2	NB No. 4.1	169th Street	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-173	EW No. 4.2	NB No. 4.1	169th Street	Day Care Center	1	63 / 43 [9]	64 / 44 [9]	64 / 44 [9]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-174	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-175	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-176	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0
R-177	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-178	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	**67**	4	5	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-179	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-180	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	64	**67**	3	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-181	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-182	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	0	0	**67**	0	0
R-183	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	0	0	**67**	0	0
R-184	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	61	61	64	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-185	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0	63	1	0
R-186	EW No. 4.3*		169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-187			168th Street	Vacant Land	0	65	65	67	2	2	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-188	EW No. 4.1		168th Street	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-189	EW No. 4.1		168th Street	Residential	3	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-190	EW No. 4.1		169th Street	Residential	1	55	56	57	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-191	EW No. 4.1		169th Street	Residential	2	56	57	58	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	58	0	1	B(67)	--	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	59	1	1	B(67)	--	59	0	0	58	1	0	58	1	0	58	1	0	58	1	0	58	1	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	57	2	0	57	2	0	57	2	0
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	2	0	60	2	0	60	2	0
R-197	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-198	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	59	2	0	59	2	0	59	2	0
R-199	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	58	2	0	58	2	0	58	2	0
R-200	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-201	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-202	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-203	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-204	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																					
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)															
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-205	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-206	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	2	0	63	2	0
R-207	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-208	EW No. 4.3	NB No. 4.1	169th Street	Residential	3	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-209	EW No. 4.3		169th Street	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-210	EW No. 4.1	NB No. 4.1	168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	57	0	0	57	0	0
R-211	EW No. 4.2*	NB No. 4.1	168th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-212	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-213	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	66	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-217			Pioneer Boulevard	Restaurant	0	71	71	71	0	0	E [3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-218			Pioneer Boulevard	Office/Classroom	0	70 / 45 [3]	71 / 46 [3]	71 / 46 [3]	0	1	E/D(52) [6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-219	EW No. 4.1		Aclare Street	School Playground	1	63	63	63	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-220	EW No. 4.1		Aclare Street	School Classroom	1	62 / 47 [8]	62 / 47 [8]	62 / 47 [8]	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-221	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0	**66**	1	0
R-222	EW No. 4.6	NB No. 4.2	Palm Street	Residential	3	**66**	**67**	**67**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0	65	2	0
R-223	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**67**	2	0	**66**	3	0	65	4	0	65	4	0
R-224	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	3	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**67**	2	0	**66**	3	0	65	4	0	64	5	3
R-225	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	64	3	0	63	4	0	63	4	0
R-226	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	61	62	62	0	1	B(67)	--	62	0	0	61	1	0	60	2	0	59	3	0	58	4	0	58	4	0
R-227	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-228	EW No. 4.6	NB No. 4.2	Hart Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	2	0	63	2	0	63	2	0
R-229	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	1	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	63	3	0	63	3	0
R-230	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**68**	**68**	**68**	0	0	B(67)	A/E	**68**	0	0	**67**	1	0	**66**	2	0	64	4	0	64	4	0	63	5	2
R-231	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-232	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-233	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	3	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0	62	2	0
R-234	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	62	4	0	62	4	0	62	4	0
R-235	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	2	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	60	3	0	59	4	0
R-236	EW No. 4.6		Ibex Ave	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-237	EW No. 4.7		Napoli Drive	Residential	2	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-238	EW No. 4.7		Napoli Drive	Residential	2	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-239	EW No. 4.7		Napoli Drive	Residential	1	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-240	EW No. 4.7		Napoli Drive	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-241	EW No. 4.7		Napoli Drive	Residential	1	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-242		NB No. 5.1	Cuesta Drive	School Playground	1	**67**	**67**	**67**	0	0	C(67)	A/E	64	3	0	64	3	0	63	4	0	63	4	0	62	5	1	61	6	1
R-243	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	62 / 42 [9]	62 / 42 [9]	63 / 43 [9]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0
R-244	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	64 / 37 [8]	64 / 37 [8]	65 / 38 [8]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0
R-245	EW No. 5.2*	NB No. 5.2	Cuesta Drive	School Sports Area	1	63	63	65	2	2	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	2	0
R-246	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	63	3	0	61	5	1
R-247	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	65	**66**	**67**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	3	0	63	4	0	62	5	1
R-248	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	63	3	0	62	4	0	60	6	1
R-249	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	63	3	0	62	4	0	60	6	1
R-250	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	2	0	61	4	0	61	4	0
R-251	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	2	0	61	4	0	60	5	1
R-252	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-253	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0	61	2	0
R-254	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0	62	1	0
R-255	EW No. 5.2	NB No. 5.2	Sierra Vista Way	Residential	1	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-256	EW No. 5.2		Sierra Vista Way	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-257	EW No. 5.2		Sierra Vista Way	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-258	EW No. 5.2		Sierra Vista Way	Residential	0	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-259	EW No. 5.2		Sierra Vista Way	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-260	EW No. 5.2		Sierra Vista Way	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-261	EW No. 5.2		Sierra Vista Way	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-262	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	64	2	0
R-263	EW No. 5.2*	NB No. 5.2	Cedarwood Court	Residential	1	61	62	62	0	1	B(67)	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-264	EW No. 5.2	NB No. 5.2	Cedarwood Court	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-265	EW No. 5.2	NB No. 5.2	Chapparal Ave	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	58	0	0	57	1	0	57	1	0
R-266	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-267	EW No. 5.2		Sierra Vista Way	Residential	1	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-268	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	65	0	0	65	0	0	64	1	0
R-269	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	61	1	0
R-270	EW No. 5.2	NB No. 5.2	Chapparal Ave	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-271	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-272	EW No. 5.2		Sierra Vista Way	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-273	EW No. 5.13		Norwalk Boulevard	Office/Classroom	0	66 / 41 [3]	66 / 41 [3]	66 / 41 [3]	0	0	E/D(52) [6]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-274	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	64	1	0	64	1	0
R-275	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	64	1	0	64	1	0
R-276	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	**66**	0	0	65	1	0	65	1	0	65	1	0	65	1	0
R-277	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	**66**	1	0	**66**	1	0	**66**	1	0
R-278	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	64	64	64	0	0	B(67)	--	--	--	--	64	0	0	63	1	0	63	1	0	63	1	0	63	1	0
R-279	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	65	1	0	64	2	0	64	2	0	64	2	0	64	2	0
R-280	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	64	1	0	64	1	0
R-281	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	64	1	0	63	2	0	63	2	0	62	3	0	61	4	0
R-282	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**68**	**69**	**69**	0	1	B(67)	A/E	**68**	1	0	**67**	2	0	**67**	2	0	**66**	3	0	65	4	0	65	4	0
R-283	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	**66**	1	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-284	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0	63	3	0
R-285	EW No. 5.5	NB No. 5.3	Evening Star Avenue	Residential	2	59	59	60	1	1	B(67)	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0	57	3	0
R-286	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	2	57	57	58	1	1	B(67)	--	58	0	0	57	1	0	57	1	0	57	1	0	57	1	0	57	1	0
R-287	EW No. 5.5		Springsnow Circle	Residential	1	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-288	EW No. 5.5		Summerwind Street	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-289	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-290	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	63	0	0	63	0	0	63	0	0	62	1	0	61	2	0
R-291	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0	61	1	0
R-292	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	60	0	0	59	1	0	59	1	0	58	2	0
R-293	EW No. 5.5	NB No. 5.3	Morningrain Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	61	1	0	60	2	0	60	2	0	59	3	0
R-294	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	60	60	61	1	1	B(67)	--	60	1	0	60	1	0	59	2	0	60	1	0	59	2	0	59	2	0
R-295	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	59	60	60	0	1	B(67)	--	60	0	0	59	1	0	60	0	0	59	1	0	59	1	0	59	1	0
R-296	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	60	0	0	60	0	0	60	0	0	60	0	0	59	1	0
R-297	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	54	54	54	0	0	B(67)	--	54	0	0	53	1	0	53	1	0	53	1	0	53	1	0	53	1	0
R-298	EW No. 5.5	NB No. 5.3	Cortner Avenue	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	65	0	0	64	1	0	63	2	0	63	2	0
R-299	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	61	1	0	61	1	0	60	2	0	60	2	0
R-300	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	60	61	61	0	1	B(67)	--	--	--	--	61	0	0	60	1	0	60	1	0	59	2	0	59	2	0
R-301	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	58	0	0	58	0	0	57	1	0	57	1	0	56	2	0
R-302	EW No. 5.5	NB No. 5.3	Stark Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0
R-303	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	53	54	53	-1	0	B(67)	--	53	0	0	53	0	0	53	0	0	53	0	0	52	1	0	52	1	0
R-304			Beach Street	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-305			Beach Street	Residential	2	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-306			Palm Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-307			Palm Street	Residential	2	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-308	EW No. 6.2		Palm Street	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-309	EW No. 6.2		Palm Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-310	EW No. 6.2		Michael Avenue	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-311	EW No. 6.2		Michael Avenue	Residential	3	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-312	EW No. 6.2		Michael Avenue	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-313	EW No. 6.2		Michael Avenue	Residential	3	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-314	EW No. 6.2		Michael Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-315	EW No. 6.2		Maria Avenue	Residential	1	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-316	EW No. 6.2		Alfred Avenue	Residential	2	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-317	EW No. 6.2		De Groot Place	Residential	2	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-318	EW No. 6.2		De Groot Place	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-319	EW No. 6.2		Yvette Avenue	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-320	EW No. 6.2		Palm Street	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-321	EW No. 6.2		Michaels Avenue	Residential	1	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-322	EW No. 6.2		Brian Court	Residential	1	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-323	EW No. 6.2		Michael Avenue	Residential	2	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-324	EW No. 6.2		Michael Avenue	Residential	3	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-325	EW No. 6.2		Maria Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-326	EW No. 6.2		Alfred Avenue	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-327	EW No. 6.2		De Groot Place	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-328	EW No. 6.2		De Groot Place	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-329	EW No. 6.2		Palm Street	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-330	EW No. 6.2		Palm Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-331	EW No. 6.2		Brian Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-332	EW No. 6.2		Brian Court	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-333	EW No. 6.2		Maria Avenue	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-334	EW No. 6.2		Maria Avenue	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-335	EW No. 6.2		Alfred Avenue	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-336	EW No. 6.2		De Groot Place	Residential	2	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-337	EW No. 6.2		De Groot Place	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-338	EW No. 6.2		Yvette Avenue	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-339	EW No. 6.5		Glenda Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-340	EW No. 6.5		Glenda Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-341	EW No. 6.5		Glenda Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-342			Artesia Boulevard	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-343			Artesia Boulevard	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-344		NB No. 6.1	Artesia Boulevard	Residential	1	**74**	**74**	**74**	0	0	B(67)	A/E	**69**	5	1	**67**	7	1	64	10	1	62	12	1	61	13	1	60	14	1
R-345		NB No. 6.1	Artesia Boulevard	Residential	2	**75**	**75**	**75**	0	0	B(67)	A/E	**75**	0	0	**75**	0	0	**74**	1	0	**72**	3	0	**69**	6	2	65	10	2
R-346		NB No. 6.1	Artesia Boulevard	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	63	3	0	61	5	2	58	8	2	57	9	2	56	10	2	55	11	2
R-347		NB No. 6.1	Artesia Boulevard	Residential	2	**69**	**69**	**70**	1	1	B(67)	A/E	**70**	0	0	**70**	0	0	**67**	3	0	**66**	4	0	63	7	2	60	10	2
R-348			Artesia Boulevard	Residential	4	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-349			Artesia Boulevard	Residential	4	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-350		NB No. 6.1	Artesia Boulevard	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	59	4	0	56	7	2	55	8	2	54	9	2
R-351		NB No. 6.1	Artesia Boulevard	Residential	2	**68**	**69**	**69**	0	1	B(67)	A/E	**68**	1	0	**67**	2	0	**66**	3	0	63	6	2	62	7	2	59	10	2
R-352		NB No. 6.1	Artesia Boulevard	Residential	2	62	62	62	0	0	B(67)	--	60	2	0	59	3	0	57	5	2	55	7	2	54	8	2	54	8	2
R-353		NB No. 6.1	Artesia Boulevard	Residential	3	57	57	58	1	1	B(67)	--	58	0	0	55	3	0	54	4	0	53	5	3	52	6	3	50	8	3
R-354			Artesia Boulevard	Residential	1	**67**	**67**	**68**[10]	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-355			Artesia Boulevard	Residential	1	**68**	**68**	**68**[10]	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-356		NB No. 6.1	Artesia Boulevard	Residential	2	58	58	59	1	1	B(67)	--	57	2	0	57	2	0	56	3	0	53	6	2	53	6	2	52	7	2
R-357		NB No. 6.1	Artesia Boulevard	Residential	2	65	65	65	0	0	B(67)	--	64	1	0	62	3	0	61	4	0	59	6	2	58	7	2	56	9	2

Table 2.13.6 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type [4]	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-358		NB No. 6.1	Artesia Boulevard	Residential	2	49	49	49	0	0	B(67)	--	49	0	0	49	0	0	49	0	0	49	0	0	49	0	0	49	0	0
R-359		NB No. 6.1	Artesia Boulevard	Residential	2	51	51	51	0	0	B(67)	--	51	0	0	51	0	0	51	0	0	51	0	0	51	0	0	51	0	0
R-360			Towne Center Drive	Retail	0	68	69	69	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-361			Towne Center Drive	Retail	0	71	72	72	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-362			Towne Center Drive	Retail	1	60	61	61	0	1	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

[3] The exterior-to-interior noise level reduction was assumed to be 25 dBA lower because the building type is light frame with storm windows or masonry with single glazed windows.

[4] Shaded cells indicate the approximate existing wall heights.

[5] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[6] Activity Categories without outdoor frequent human use areas were not evaluated against the Noise Abatement Criteria (NAC).

[7] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

[8] The exterior-to-interior noise level reduction was based on simultaneous exterior and interior measurements.

[9] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.

[10] No noise barriers were evaluated at this location because Table B-11 shows that this receptor approaches or exceeds the NAC due to traffic on Bloomfield Avenue and not from traffic on SR-91.

A/E = Approach or Exceed
dBA = A-weighted decibels
dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

Table 2.13.7 Predicted Future Noise Level and Alternate Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																					
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)															
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-44	EW No. 2.1	NB No. 2.2	Westwinds Circle	Residential	1	64	65	**66**[2]	1	2	B(67)	A/E	65	1	0	65	1	0	65	1	0	65	1	0	65	1	0	65	1	0
R-45	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	62	3	0	61	4	0	60	5[3]	2	60	5	2	60	5	2
R-46	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	62	62	64	2	2	B(67)	--	63	1	0	62	2	0	61	3	0	60	4	0	59	5	2	59	5	2
R-47	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	64	2	0	63	3	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	62	2	0	62	2	0
R-49	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	1	64	65	65	0	1	B(67)	--	--[4]	--	--	--	--	--	65	0	0	64	1	0	63	2	0	63	2	0
R-50	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	61	1	0	61	1	0
R-51	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	62	0	0
R-52	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	62	0	0
R-53	EW No. 2.1*		Beach Street	Residential	6	60	60	60	0	0	B(67)	--	--[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-54	EW No. 2.1*		Beach Street	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-55	EW No. 2.1*		Harvest Avenue	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-56	EW No. 2.1	NB No. 2.2	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	63	1	0	63	1	0	63	1	0	63	1	0	63	1	0	63	1	0
R-57	EW No. 2.1*		Sunny Ridge Court	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-58	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	62	3	0	60	5	1	60	5	1	60	5	1	59	6	1
R-59	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	60	4	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	64	0	0	63	1	0	63	1	0	62	2	0	62	2	0
R-62	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0	62	2	0
R-63	EW No. 2.1*		Harvest Avenue	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-64	EW No. 2.1*		Sunny Ridge Court	Residential	1	58	59	58	-1	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-65	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	62	2	0	61	3	0	61	3	0	60	4	0	60	4	0	60	4	0
R-66	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	62	2	0	62	2	0	61	3	0	61	3	0
R-69	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0	62	1	0
R-70	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	60	1	0	60	1	0	59	2	0	59	2	0
R-71	EW No. 2.1*	NB No. 2.2	Lucas Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	56	1	0	56	1	0
R-72	EW No. 2.1*	NB No. 2.2	Lucas Street	Residential	3	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	56	1	0	56	1	0
R-101	EW No. 3.1*	NB No. 3.3	169th Street	Residential	2	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**68**	0	0	**66**	2	0	**66**	2	0
R-102	EW No. 3.1*	NB No. 3.3	169th Street	Residential	3	**66**	**67**	**68**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	**68**	0	0	**67**	1	0	**66**	2	0
R-103	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	**68**	0	0	**68**	0	0	**68**	0	0	**67**	1	0	**66**	2	0	**66**	2	0
R-104	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	65	65	**67**	2	2	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	63	4	0	61	6	3	61	6	3
R-105	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	63	63	64	1	1	B(67)	--	63	1	0	62	2	0	61	3	0	59	5	3	58	6	3	58	6	3
R-106	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	63	63	65	2	2	B(67)	--	62	3	0	61	4	0	60	5	3	59	6	3	59	6	3	58	7	3
R-107	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	64	64	**66**	2	2	B(67)	A/E	64	2	0	63	3	0	62	4	0	62	4	0	62	4	0	62	4	0
R-108	EW No. 3.1	NB No. 3.3	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-109	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-110	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	62	62	63	1	1	B(67)	--	63	0	0	62	1	0	62	1	0	61	2	0	61	2	0	61	2	0
R-111	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	63	63	63	0	0	B(67)	--	63	0	0	63	0	0	62	1	0	61	2	0	61	2	0	61	2	0
R-112	EW No. 3.1	NB No. 3.3	169th Street	Residential	1	62	63	63	0	1	B(67)	--	63	0	0	63	0	0	62	1	0	61	2	0	61	2	0	60	3	0
R-113	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	62	3	0	62	3	0	62	3	0
R-114	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	62	62	63	1	1	B(67)	--	62	1	0	62	1	0	62	1	0	61	2	0	61	2	0	61	2	0
R-115	EW No. 3.1	NB No. 3.3	169th Street	Residential	1	61	61	62	1	1	B(67)	--	61	1	0	61	1	0	60	2	0	59	3	0	59	3	0	59	3	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[3] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

[4] Shaded cells indicate the approximate existing wall heights.

[5] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

A/E = Approach or Exceed
dBA = A-weighted decibels
dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

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Table 2.13.8 Predicted Future Noise Level and Reduced Noise Barrier Analysis for the Build Alternative

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)																							
							2044 Noise Level				Activity Category (NAC)	Impact Type	Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions			L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
R-44	EW No. 2.1	NB No. 2.1a	Westwinds Circle	Residential	1	64	65	**66**[2]	1	2	B(67)	A/E	--[3]	--	--	--	--	--	63	3	0	62	4	0	60	6[4]	1	59	7	1
R-45	EW No. 2.1	NB No. 2.1a	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	62	3	0	61	4	0	60	5	2
R-46	EW No. 2.1	NB No. 2.1a	Coral Reef Circle	Residential	2	62	64	64	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-47	EW No. 2.1	NB No. 2.1a	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	65	1	0
R-48	EW No. 2.1	NB No. 2.1a	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.1a	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	61	3	0	61	3	0
R-58	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	63	2	0	61	4	0	60	5	1
R-59	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-60	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	64	2	0
R-61	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-65	EW No. 2.1	NB No. 2.1a	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0	61	3	0
R-66	EW No. 2.1	NB No. 2.1a	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	61	2	0	61	2	0
R-67	EW No. 2.1	NB No. 2.1a	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	63	3	0
R-68	EW No. 2.1	NB No. 2.1a	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	63	1	0
R-44	EW No. 2.1	NB No. 2.2a	Westwinds Circle	Residential	1	64	65	**66**	1	2	B(67)	A/E	65	1	0	65	1	0	64	2	0	64	2	0	64	2	0	63	3	0
R-45	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	63	2	0	61	4	0	60	5	2	60	5	2	59	6	2
R-46	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	62	62	64	2	2	B(67)	--	62	1	0	62	2	0	61	3	0	60	4	0	62	2	0	62	2	0
R-47	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.2a	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-58	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	62	3	0	60	5	1	60	5	1	60	5	1	59	6	1
R-59	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	61	3	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	64	0	0	64	0	0	63	1	0	63	1	0	63	1	0
R-65	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	62	2	0	61	3	0	61	3	0	60	4	0	60	4	0	59	5	2
R-66	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-44	EW No. 2.1	NB No. 2.2b	Westwinds Circle	Residential	1	64	65	**66**	1	2	B(67)	A/E	64	2	0	63	3	0	62	4	0	62	4	0	62	4	0	62	4	0
R-45	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	62	3	0	60	5	2	60	5	2	59	6	2	59	6	2
R-46	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	62	62	64	2	2	B(67)	--	63	1	0	62	2	0	61	3	0	60	4	0	59	5	2	59	5	2
R-47	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.2b	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	61	3	0	61	3	0	60	4	0	60	4	0
R-58	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	62	3	0	60	5	1	59	6	1	59	6	1	58	7	1
R-59	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	60	4	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	64	0	0	64	0	0	63	1	0	63	1	0	63	1	0
R-65	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	61	3	0	61	3	0	60	4	0	59	5	2	59	5	2	59	5	2
R-66	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[3] Shaded cells indicate the approximate existing wall heights.

[4] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

A/E = Approach or Exceed

dBA = A-weighted decibels

dBA L_{eq}(h) = equivalent continuous sound level measured per hour in A-weighted decibels

IL = Insertion Loss

NAC = Noise Abatement Criteria

NBR = Number of Benefited Receptors

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Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-18	EW No. 1.1		166th Street	Residential	1	61	61	61	0	0	B(67)	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-22	EW No. 1.1		166th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-26	EW No. 1.1		Estella Avenue	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
R-27	EW No. 1.1		Estella Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-28	EW No. 1.1		Estella Avenue	Residential	3	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-29	EW No. 1.1		Estella Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-30			Studebaker Road	Park	0	65	65	66	1	1	C[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-31	EW No. 1.1		Roberta Street	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-32	EW No. 1.1		Roberta Street	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-33	EW No. 1.1		Studebaker Road	Park	1	57	57	57	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-43			Piuma Avenue	Utility	0	70	71	71	0	1	F	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-44	EW No. 2.1	NB No. 2.1	Westwinds Circle	Residential	1	64	65	**66**[4]	1	2	B(67)	A/E	--[5]	--	--	--	--	--	63	3	0	62	4	0	60	6[6]	1	59	7	1
R-45	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	62	3	0	61	4	0	60	5	2
R-46	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-47	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0
R-48	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-49	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	1	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	65	0	0	64	1	0	64	1	0	63	2	0
R-50	EW No. 2.1*	NB No. 2.1	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0
R-51	EW No. 2.1*	NB No. 2.1	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	62	0	0
R-52	EW No. 2.1*		Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-53	EW No. 2.1*		Beach Street	Residential	6	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-54	EW No. 2.1*		Beach Street	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-55	EW No. 2.1		Harvest Avenue	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-56	EW No. 2.1	NB No. 2.1	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	61	3	0	61	3	0
R-57	EW No. 2.1		Sunny Ridge Court	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-58	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	63	2	0	63	2	0	61	4	0	60	5	1
R-59	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-60	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	64	2	0
R-61	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0	62	2	0
R-62	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	64	0	0	64	0	0	63	1	0	63	1	0
R-63	EW No. 2.1		Harvest Avenue	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-64	EW No. 2.1		Sunny Ridge Court	Residential	1	58	59	58	-1	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-65	EW No. 2.1	NB No. 2.1	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0	61	3	0
R-66	EW No. 2.1	NB No. 2.1	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	61	2	0	61	2	0
R-67	EW No. 2.1	NB No. 2.1	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	64	2	0	63	3	0
R-68	EW No. 2.1	NB No. 2.1	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-69	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	63	0	0	63	0	0	62	1	0	62	1	0
R-70	EW No. 2.1*	NB No. 2.1	Eric Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	61	0	0	61	0	0	60	1	0	60	1	0
R-71	EW No. 2.1*	NB No. 2.1	Lucas Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	57	0	0	57	0	0
R-72	EW No. 2.1*		Lucas Street	Residential	3	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-73	EW No. 2.1*		Lucas Street	Residential	3	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-74	EW No. 2.1*		Lucas Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-75	EW No. 2.1		Harvest Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-76	EW No. 2.1		Sunny Ridge Court	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-77	EW No. 2.2	NB No. 2.3	Artesia Boulevard	Playground	1	**67**	**67**	**67**	0	0	C(67)	A/E	--	--	--	**66**	1	0	65	2	0	65	2	0	64	3	0	64	3	0
R-78	EW No. 2.2	NB No. 2.3	Artesia Boulevard	Playground	1	64	64	64	0	0	C(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-79	EW No. 2.3	NB No. 2.3	Artesia Boulevard	Playground	2	57	57	57	0	0	C(67)	--	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0	57	0	0
R-80	EW No. 2.3		Artesia Boulevard	Playground	2	62	62	62	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-81	EW No. 2.3		Artesia Boulevard	School Classroom	1	61 / 40′	61 / 40′	61 / 40′	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-82	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-83	EW No. 2.4		Palm Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-84	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-85	EW No. 2.4		Maples Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-86	EW No. 2.4		Maples Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-87	EW No. 2.4		Harvest Avenue	Residential	2	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-88	EW No. 2.4		Harvest Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-89	EW No. 2.4		Maples Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-90	EW No. 2.4		Harvest Avenue	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-91	EW No. 2.4		Gridley Road	Park	1	58	58	58	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	50	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-101	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	--	**67**	0	0	65	2	0
R-102	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**66**	**67**	**67**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	--	**67**	0	0	**66**	1	0
R-103	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-104	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0
R-105	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0
R-106	EW No. 3.1		169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-107	EW No. 3.1		169th Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-108	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0
R-109	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0
R-110	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0
R-112	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0
R-113	EW No. 3.1		169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-114	EW No. 3.1		169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-115	EW No. 3.1		169th Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-116	EW No. 3.1		Pioneer Boulevard	Hotel	1	64	65	65	0	1	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-117			Pioneer Boulevard	Restaurant	0	67	67	67	0	0	E[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-119	EW No. 3.1		168th Street	Residential	1	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-120			Pioneer Boulevard	Gas Station	0	62	62	62	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-121			168th Street	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-122			Pioneer Boulevard	Light Industrial	0	59	59	59	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	63	3	0	63	3	0	62	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	64	1	0	64	1	0	63	2	0	62	3	0	62	3	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	63	4	0
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	64	0	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	60	0	1	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	62	0	0	60	2	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	62	1	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-138			Roseton Avenue	Office	0	73	74	74	0	1	E[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-139			Jersey Avenue	Light Industrial	0	73	74	74	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-140			Alburtis Avenue	Light Industrial	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-141			Alburtis Avenue	Office	0	65	66	66	0	1	E[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	57	0	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-143	EW No. 4.1		167th Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-144	EW No. 4.1		167th Street	Residential	2	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	61	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-146	EW No. 4.1		168th Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-147	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-148	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-149	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-150	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-151	EW No. 4.1		168th Street	Residential	3	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	61	0	1	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	59	2	0	59	2	0
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	62	0	1	B(67)	--	61	1	0	61	1	0	61	1	0	61	1	0	60	2	0	59	3	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**	1	1	C(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46[8]	67 / 47[8]	67 / 47[8]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	67	0	0	67	0	0	66	1	0
R-157	EW No. 4.2		169th Street	Playground	1	64	65	64	-1	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-158	EW No. 4.2		170th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-159	EW No. 4.2		170th Street	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-160	EW No. 4.2		170th Street	Residential	2	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-161	EW No. 4.2		170th Street	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-162	EW No. 4.2		170th Street	Residential	2	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-163	EW No. 4.2		170th Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-164	EW No. 4.2		170th Street	Residential	1	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-165	EW No. 4.2		170th Street	Residential	1	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-166	EW No. 4.2		170th Street	Residential	2	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-167	EW No. 4.2		170th Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-168	EW No. 4.2		170th Street	Light Industrial	0	61	61	61	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-169	EW No. 4.3		169th Street	Residential	2	61	62	62	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-170	EW No. 4.3		169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0	62	1	0
R-172	EW No. 4.2		169th Street	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-173	EW No. 4.2		169th Street	Day Care Center	1	63 / 43[8]	64 / 44[8]	64 / 44[8]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-174	EW No. 4.2		169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-175	EW No. 4.2		169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-176	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-177	EW No. 4.2		169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-178	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-179	EW No. 4.2		169th Street	Residential	3	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-180	EW No. 4.2		169th Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-181	EW No. 4.2		169th Street	Residential	2	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-182	EW No. 4.2		169th Street	Residential	2	64	65	65	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-183	EW No. 4.2		169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-184	EW No. 4.2		169th Street	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-185	EW No. 4.3		169th Street	Residential	3	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-186	EW No. 4.3		169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-187			168th Street	Vacant Land	0	65	65	66	1	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-188	EW No. 4.1		168th Street	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-189	EW No. 4.1		168th Street	Residential	3	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-190	EW No. 4.1		169th Street	Residential	1	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-191	EW No. 4.1		169th Street	Residential	2	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	58	0	1	B(67)	--	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	58	0	0	B(67)	--	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	58	1	0	58	1	0	57	2	0
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	60	2	0	60	2	0
R-197	EW No. 4.2		169th Street	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-198	EW No. 4.2		169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-199	EW No. 4.2		169th Street	Residential	3	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-200	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-201	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-202	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-203	EW No. 4.2		169th Street	Residential	2	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-204	EW No. 4.2		169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-205	EW No. 4.2		169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-206	EW No. 4.2		169th Street	Residential	3	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-207	EW No. 4.3		169th Street	Residential	3	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-208	EW No. 4.3		169th Street	Residential	3	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-209	EW No. 4.3		169th Street	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-210	EW No.4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-211	EW No. 4.2		168th Street	Residential	2	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-212	EW No. 4.2		168th Street	Residential	3	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-213	EW No. 4.2		168th Street	Residential	3	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	66	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-217			Pioneer Boulevard	Restaurant	0	71	71	71	0	0	E[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-218			Pioneer Boulevard	Office/Classroom	0	70 / 45[9]	71 / 46[9]	71 / 46[9]	0	1	E/D(52)[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-219	EW No.4.1		Aclare Street	School Playground	1	63	63	63	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-220	EW No.4.1		Aclare Street	School Classroom	1	62 / 47[7]	62 / 47[7]	62 / 47[7]	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-221	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**67**	0	0	**66**	1	0	**66**	1	0
R-222	EW No. 4.6	NB No. 4.2	Palm Street	Residential	3	**66**	**67**	**67**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0	65	2	0
R-223	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**67**	2	0	**66**	3	0	**66**	3	0	65	4	0
R-224	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	3	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**67**	2	0	**66**	3	0	65	4	0	64	5	3
R-225	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	64	3	0	63	4	0	63	4	0
R-226	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	61	62	62	0	1	B(67)	--	62	0	0	61	1	0	60	2	0	59	3	0	58	4	0	58	4	0
R-227	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-228	EW No. 4.6	NB No. 4.2	Hart Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0	63	2	0
R-229	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	1	65	66	66	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	64	2	0	63	3	0
R-230	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**68**	**68**	**68**	0	0	B(67)	A/E	**68**	0	0	**67**	1	0	**66**	2	0	65	3	0	64	4	0	63	5	2
R-231	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-232	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-233	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	3	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-234	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	**66**	0	0	64	2	0	62	4	0	62	4	0	62	4	0
R-235	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	2	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	60	3	0	59	4	0
R-236	EW No. 4.6		Ibex Ave	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-237	EW No. 4.7		Napoli Drive	Residential	2	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-238	EW No. 4.7		Napoli Drive	Residential	2	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-239	EW No. 4.7		Napoli Drive	Residential	1	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-240	EW No. 4.7		Napoli Drive	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-241	EW No. 4.7		Napoli Drive	Residential	1	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-242		NB No. 5.1	Cuesta Drive	School Playground	1	**67**	**67**	**67**	0	0	C(67)	A/E	64	3	0	64	3	0	63	4	0	63	4	0	62	5	1	61	6	1
R-243	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	62 / 42[8]	62 / 42[8]	63 / 43[8]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0
R-244	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	64 / 37[7]	64 / 37[7]	65 / 38[7]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0
R-245	EW No. 5.2	NB No. 5.2	Cuesta Drive	School Sports Area	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0
R-246	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	65	65	66	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	63	3	0	62	4	0
R-247	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	65	66	66	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	63	3	0	62	4	0
R-248	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0	63	2	0
R-249	EW No. 5.2	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0	62	3	0
R-250	EW No. 5.2		Rancho Vista Drive	Residential	1	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-251	EW No. 5.2		Rancho Vista Drive	Residential	1	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-252	EW No. 5.2		Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-253	EW No. 5.2		Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-254	EW No. 5.2		Rancho Vista Drive	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-255	EW No. 5.2		Sierra Vista Way	Residential	1	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-256	EW No. 5.2		Sierra Vista Way	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-257	EW No. 5.2		Sierra Vista Way	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-258	EW No. 5.2		Sierra Vista Way	Residential	0	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-259	EW No. 5.2		Sierra Vista Way	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-260	EW No. 5.2		Sierra Vista Way	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-261	EW No. 5.2		Sierra Vista Way	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-262	EW No. 5.2	NB No. 5.2	Judy Way	Residential	1	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	65	1	0
R-263	EW No. 5.2	NB No. 5.2	Cedarwood Court	Residential	1	61	62	62	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-264	EW No. 5.2		Cedarwood Court	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-265	EW No. 5.2		Chapparal Ave	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-266	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-267	EW No. 5.2		Sierra Vista Way	Residential	1	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-268	EW No. 5.2	NB No. 5.2	Judy Way	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	65	0	0	65	0	0
R-269	EW No. 5.2	NB No. 5.2	Judy Way	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-270	EW No. 5.2		Chapparal Ave	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-271	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-272	EW No. 5.2		Sierra Vista Way	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-273	EW No. 5.13		Norwalk Boulevard	Office/Classroom	0	66 / 41[9]	66 / 41[9]	66 / 41[9]	0	0	E/D(52)[3]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-274	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	64	1	0	63	2	0
R-275	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	63	2	0	63	2	0
R-276	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	**66**	0	0	65	1	0	65	1	0	64	2	0	64	2	0
R-277	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	67	67	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-278	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	64	64	64	0	0	B(67)	--	--	--	--	64	0	0	63	1	0	62	2	0	62	2	0	61	3	0
R-279	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	65	1	0	64	2	0	64	2	0	63	3	0	62	4	0
R-280	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	63	2	0	63	2	0	62	3	0
R-281	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	64	1	0	63	2	0	63	2	0	62	3	0	62	3	0
R-282	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**68**	**69**	**69**	0	1	B(67)	A/E	**68**	1	0	**67**	2	0	**67**	2	0	**66**	3	0	65	4	0	65	4	0
R-283	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	**67**	1	0	**66**	2	0	**66**	2	0	65	3	0	65	3	0	64	4	0
R-284	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	66	0	0	65	1	0	64	2	0	64	2	0	63	3	0	63	3	0
R-285	EW No. 5.5	NB No. 5.3	Evening Star Avenue	Residential	2	59	59	60	1	1	B(67)	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0	58	2	0
R-286	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	2	57	57	58	1	1	B(67)	--	58	0	0	57	1	0	57	1	0	57	1	0	57	1	0	57	1	0
R-287	EW No. 5.5		Springsnow Circle	Residential	1	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-288	EW No. 5.5		Summerwind Street	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-289	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-290	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	63	1	0	63	1	0	63	1	0	62	2	0	61	3	0
R-291	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0	61	1	0
R-292	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	60	0	0	59	1	0	59	1	0	58	2	0
R-293	EW No. 5.5	NB No. 5.3	Morningrain Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	61	1	0	60	2	0	60	2	0	59	3	0

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-294	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	60	60	61	1	1	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	59	2	0	59	2	0
R-295	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	59	60	60	0	1	B(67)	--	60	0	0	60	0	0	60	0	0	59	1	0	59	1	0	59	1	0
R-296	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	60	0	0	60	0	0	60	0	0	60	0	0	59	1	0
R-297	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	54	54	54	0	0	B(67)	--	54	0	0	54	0	0	54	0	0	53	1	0	53	1	0	53	1	0
R-298	EW No. 5.5	NB No. 5.3	Cortner Avenue	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	65	0	0	64	1	0	63	2	0	63	2	0
R-299	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	62	0	0	61	1	0	60	2	0	60	2	0
R-300	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	60	61	61	0	1	B(67)	--	--	--	--	61	0	0	60	1	0	60	1	0	59	2	0	59	2	0
R-301	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	58	0	0	58	0	0	57	1	0	57	1	0	56	2	0
R-302	EW No. 5.5	NB No. 5.3	Stark Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0
R-303	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	53	54	54	0	1	B(67)	--	54	0	0	53	1	0	53	1	0	53	1	0	53	1	0	53	1	0
R-304			Beach Street	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-305			Beach Street	Residential	2	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-306			Palm Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-307			Palm Street	Residential	2	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-308	EW No. 6.2		Palm Street	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-309	EW No. 6.2		Palm Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-310	EW No. 6.2		Michael Avenue	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-311	EW No. 6.2		Michael Avenue	Residential	3	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-312	EW No. 6.2		Michael Avenue	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-313	EW No. 6.2		Michael Avenue	Residential	3	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-314	EW No. 6.2		Michael Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-315	EW No. 6.2		Maria Avenue	Residential	1	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-316	EW No. 6.2		Alfred Avenue	Residential	2	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-317	EW No. 6.2		De Groot Place	Residential	2	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-318	EW No. 6.2		De Groot Place	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-319	EW No. 6.2		Yvette Avenue	Residential	1	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-320	EW No. 6.2		Palm Street	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-321	EW No. 6.2		Michaels Avenue	Residential	1	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-322	EW No. 6.2		Brian Court	Residential	1	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-323	EW No. 6.2		Michael Avenue	Residential	2	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-324	EW No. 6.2		Michael Avenue	Residential	3	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-325	EW No. 6.2		Maria Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-326	EW No. 6.2		Alfred Avenue	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-327	EW No. 6.2		De Groot Place	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-328	EW No. 6.2		De Groot Place	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-329	EW No. 6.2		Palm Street	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-330	EW No. 6.2		Palm Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-331	EW No. 6.2		Brian Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-332	EW No. 6.2		Brian Court	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-333	EW No. 6.2		Maria Avenue	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-334	EW No. 6.2		Maria Avenue	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-335	EW No. 6.2		Alfred Avenue	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-336	EW No. 6.2		De Groot Place	Residential	2	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-337	EW No. 6.2		De Groot Place	Residential	1	57	57	58	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-338	EW No. 6.2		Yvette Avenue	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-339	EW No. 6.5		Glenda Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-340	EW No. 6.5		Glenda Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-341	EW No. 6.5		Glenda Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-342			Artesia Boulevard	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-343			Artesia Boulevard	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-344		NB No. 6.1	Artesia Boulevard	Residential	1	**74**	**74**	**74**	0	0	B(67)	A/E	**69**	5	1	**67**	7	1	64	10	1	63	11	1	61	13	1	60	14	1
R-345		NB No. 6.1	Artesia Boulevard	Residential	2	**75**	**75**	**75**	0	0	B(67)	A/E	**75**	0	0	**75**	0	0	**74**	1	0	**72**	3	0	**69**	6	2	64	11	2

Table 2.13.9 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
R-346		NB No. 6.1	Artesia Boulevard	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	63	3	0	61	5	2	59	7	2	57	9	2	56	10	2	55	11	2
R-347		NB No. 6.1	Artesia Boulevard	Residential	2	**69**	**69**	**70**	1	1	B(67)	A/E	**70**	0	0	**70**	0	0	**67**	3	0	**66**	4	0	63	7	2	60	10	2
R-348			Artesia Boulevard	Residential	4	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-349			Artesia Boulevard	Residential	4	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-350		NB No. 6.1	Artesia Boulevard	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	58	5	2	56	7	2	54	9	2	53	10	2
R-351		NB No. 6.1	Artesia Boulevard	Residential	2	**68**	**69**	**69**	0	1	B(67)	A/E	**68**	1	0	**66**	3	0	65	4	0	63	6	2	61	8	2	58	11	2
R-352		NB No. 6.1	Artesia Boulevard	Residential	2	62	62	62	0	0	B(67)	--	60	2	0	59	3	0	57	5	2	55	7	2	54	8	2	53	9	2
R-353		NB No. 6.1	Artesia Boulevard	Residential	3	57	57	58	1	1	B(67)	--	58	0	0	55	3	0	54	4	0	53	5	3	52	6	3	50	8	3
R-354			Artesia Boulevard	Residential	1	67	67	68	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-355			Artesia Boulevard	Residential	1	68	68	68	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-356		NB No. 6.1	Artesia Boulevard	Residential	2	58	58	59	1	1	B(67)	--	57	2	0	56	3	0	56	3	0	53	6	2	52	7	2	52	7	2
R-357		NB No. 6.1	Artesia Boulevard	Residential	2	65	65	65	0	0	B(67)	--	64	1	0	62	3	0	60	5	2	59	6	2	58	7	2	55	10	2
R-358		NB No. 6.1	Artesia Boulevard	Residential	2	49	49	49	0	0	B(67)	--	49	0	0	49	0	0	49	0	0	49	0	0	49	0	0	49	0	0
R-359		NB No. 6.1	Artesia Boulevard	Residential	2	51	51	51	0	0	B(67)	--	51	0	0	51	0	0	51	0	0	51	0	0	51	0	0	51	0	0
R-360			Towne Center Drive	Retail	0	68	69	69	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-361			Towne Center Drive	Retail	0	71	72	72	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-362			Towne Center Drive	Retail	1	60	61	61	0	1	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Source: Compiled by LSA Associates, Inc. (2018).
[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.
[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.
[3] Activity Categories without outdoor frequent human use areas were not evaluated against the Noise Abatement Criteria (NAC).
[4] Numbers in **bold** represent noise levels that approach or exceed the NAC.
[5] Shaded cells indicate the approximate existing wall heights.
[6] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).
[7] The exterior-to-interior noise level reduction was based on simultaneous exterior and interior measurements.
[8] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.
[9] The exterior-to-interior noise level reduction was assumed to be 25 dBA lower because the building type is light frame with storm windows or masonry with single glazed windows.
A/E = Approach or Exceed
dBA = A-weighted decibels
dBA L_{eq}(h) = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

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Table 2.13.10 Predicted Future Noise Level and Alternate Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)[3]	Impact Type	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
R-44	EW No. 2.1	NB No. 2.2	Westwinds Circle	Residential	1	64	65	**66**[2]	1	2	B(67)	A/E	65	1	0	65	1	0	65	1	0	65	1	0	65	1	0	65	1	0
R-45	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	63	2	0	61	4	0	60	5[3]	2	60	5	2	60	5	2
R-46	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	62	62	63	1	1	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-47	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	65	1	0	65	1	0	64	2	0	63	3	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	63	1	0	62	2	0	62	2	0
R-49	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	1	64	65	65	0	1	B(67)	--	--[4]	--	--	--	--	--	64	1	0	64	1	0	63	2	0	62	3	0
R-50	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	61	1	0	61	1	0
R-51	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0
R-52	EW No. 2.1*	NB No. 2.2	Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0
R-56	EW No. 2.1	NB No. 2.2	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	63	1	0	63	1	0	63	1	0	63	1	0	63	1	0	63	1	0
R-58	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	62	3	0	60	5	1	60	5	1	60	5	1	59	6	1
R-59	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	60	4	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	65	66	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	63	1	0	63	1	0	63	1	0	63	1	0	62	2	0
R-62	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	63	1	0	63	1	0	62	2	0	62	2	0
R-65	EW No. 2.1	NB No. 2.2	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	62	2	0	61	3	0	61	3	0	60	4	0	60	4	0	60	4	0
R-66	EW No. 2.1	NB No. 2.2	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	62	2	0	62	2	0	61	3	0	61	3	0
R-69	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	63	0	0	62	1	0	61	2	0	61	2	0
R-70	EW No. 2.1*	NB No. 2.2	Eric Avenue	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	60	1	0	60	1	0	59	2	0	59	2	0
R-71	EW No. 2.1*	NB No. 2.2	Lucas Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	56	1	0	56	1	0
R-72	EW No. 2.1*	NB No. 2.2	Lucas Street	Residential	3	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	57	0	0	57	0	0	56	1	0	56	1	0
R-101	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	1	0	62	5	2	62	5	2
R-102	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	**66**	**67**	**67**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	2	0	62	5	3	61	6	3
R-103	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	**68**	0	0	**68**	0	0	**67**	1	0	65	3	0	62	6	3	62	6	3
R-104	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	63	3	0	61	5	3	61	5	3
R-105	EW No. 3.1	NB No. 3.3	169th Street	Residential	3	63	63	64	1	1	B(67)	--	64	0	0	63	1	0	63	1	0	63	1	0	63	1	0	63	1	0
R-108	EW No. 3.1	NB No. 3.3	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0
R-109	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-110	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	62	62	63	1	1	B(67)	--	62	1	0	62	1	0	62	1	0	62	1	0	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.3	169th Street	Residential	2	63	63	63	0	0	B(67)	--	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0
R-112	EW No. 3.1	NB No. 3.3	169th Street	Residential	1	62	63	63	0	1	B(67)	--	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[3] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

[4] Shaded cells indicate the approximate existing wall heights.

A/E = Approach or Exceed

dBA = A-weighted decibels

dBA L_{eq}(h) = equivalent continuous sound level measured per hour in A-weighted decibels

IL = Insertion Loss

NAC = Noise Abatement Criteria

NBR = Number of Benefited Receptors

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Table 2.13.11 Predicted Future Noise Level and Reduced Noise Barrier Analysis for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level				Activity Category (NAC)[3]	Impact Type	Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions			$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-44	EW No. 2.1	NB No. 2.1a	Westwinds Circle	Residential	1	64	65	**66**[2]	1	2	B(67)	A/E	--[3]	--	--	--	--	--	63	3	0	62	4	0	60	5[4]	1	59	7	1
R-45	EW No. 2.1	NB No. 2.1a	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	64	1	0	62	3	0	61	4	0	60	5	2
R-46	EW No. 2.1	NB No. 2.1a	Coral Reef Circle	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-47	EW No. 2.1	NB No. 2.1a	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	65	1	0
R-48	EW No. 2.1	NB No. 2.1a	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.1a	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	61	3	0	61	3	0
R-58	EW No. 2.1	NB No. 2.1a	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	63	2	0	63	2	0	61	4	0	60	5	1
R-59	EW No. 2.1	NB No. 2.1a	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-60	EW No. 2.1	NB No. 2.1a	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	64	2	0
R-61	EW No. 2.1	NB No. 2.1a	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	64	0	0	63	1	0
R-65	EW No. 2.1	NB No. 2.1a	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0	61	3	0
R-66	EW No. 2.1	NB No. 2.1a	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	61	2	0	61	2	0
R-67	EW No. 2.1	NB No. 2.1a	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	0	0	65	1	0	63	3	0
R-68	EW No. 2.1	NB No. 2.1a	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	63	1	0
R-44	EW No. 2.1	NB No. 2.2a	Westwinds Circle	Residential	1	64	65	**66**	1	2	B(67)	A/E	65	1	0	65	1	0	64	2	0	64	2	0	64	2	0	63	3	0
R-45	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	63	2	0	61	4	0	60	5	2	60	5	2	59	6	2
R-46	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	62	62	63	1	1	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-47	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.2a	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-58	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	62	3	0	62	2	0	62	2	0	61	3	0	62	2	0
R-59	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	61	3	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	64	0	0	64	0	0	63	1	0	63	1	0	63	1	0
R-65	EW No. 2.1	NB No. 2.2a	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	62	2	0	61	3	0	61	3	0	60	4	0	60	4	0	59	5	2
R-66	EW No. 2.1	NB No. 2.2a	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2a	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2a	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0	62	2	0
R-44	EW No. 2.1	NB No. 2.2b	Westwinds Circle	Residential	1	64	65	**66**	1	2	B(67)	A/E	64	2	0	63	3	0	62	4	0	62	4	0	62	4	0	62	4	0
R-45	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	2	63	64	65	1	2	B(67)	--	63	2	0	62	3	0	60	5	2	60	5	2	59	6	2	59	6	2
R-46	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	62	62	63	1	1	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-47	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	65	65	**66**	1	1	B(67)	A/E	**66**	0	0	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0
R-48	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	2	64	64	64	0	0	B(67)	--	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0	64	0	0
R-56	EW No. 2.1	NB No. 2.2b	Westwinds Circle	Residential	1	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	61	3	0	61	3	0	60	4	0	60	4	0
R-58	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	1	63	64	65	1	2	B(67)	--	62	3	0	61	4	0	60	5	1	59	6	1	59	6	1	58	7	1
R-59	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	63	63	64	1	1	B(67)	--	62	2	0	61	3	0	60	4	0	59	5	2	58	6	2	58	6	2
R-60	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	65	1	0	65	1	0	64	2	0	63	3	0	62	4	0	62	4	0
R-61	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	1	63	64	64	0	1	B(67)	--	64	0	0	64	0	0	64	0	0	63	1	0	63	1	0	63	1	0
R-65	EW No. 2.1	NB No. 2.2b	Leeward Avenue	Residential	2	64	64	64	0	0	B(67)	--	61	3	0	61	3	0	60	4	0	59	5	2	59	5	2	59	5	2
R-66	EW No. 2.1	NB No. 2.2b	Coral Reef Circle	Residential	2	63	63	63	0	0	B(67)	--	61	2	0	60	3	0	60	3	0	58	5	2	58	5	2	57	6	2
R-67	EW No. 2.1	NB No. 2.2b	Outrigger Circle	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	61	5	2	61	5	2
R-68	EW No. 2.1	NB No. 2.2b	Windward Avenue	Residential	2	63	64	64	0	1	B(67)	--	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0	62	2	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[3] Shaded cells indicate the approximate existing wall heights.

[4] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

A/E = Approach or Exceed

dBA = A-weighted decibels

dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels

IL = Insertion Loss

NAC = Noise Abatement Criteria

NBR = Number of Benefited Receptors

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Table 2.13.12 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
R-50	EW No. 2.1*		Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-51	EW No. 2.1*		Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-52	EW No. 2.1*		Beach Street	Residential	4	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-53	EW No. 2.1*		Beach Street	Residential	6	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-54	EW No. 2.1*		Beach Street	Residential	2	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-55	EW No. 2.1*		Harvest Avenue	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-57	EW No. 2.1*		Sunny Ridge Court	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-63	EW No. 2.1*		Harvest Avenue	Residential	1	59	60	60	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-64	EW No. 2.1*		Sunny Ridge Court	Residential	1	58	59	58	-1	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-71	EW No. 2.1*		Lucas Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-72	EW No. 2.1*		Lucas Street	Residential	3	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-73	EW No. 2.1*		Lucas Street	Residential	3	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-74	EW No. 2.1*		Lucas Street	Residential	2	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-75	EW No. 2.1*		Harvest Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-76	EW No. 2.1*		Sunny Ridge Court	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-81	EW No. 2.3		Artesia Boulevard	School Classroom	1	61 / 40[3]	61 / 40[3]	61 / 40[3]	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-82	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-83	EW No. 2.4		Palm Street	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-84	EW No. 2.4		Palm Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-85	EW No. 2.4		Maples Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-86	EW No. 2.4		Maples Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-87	EW No. 2.4		Harvest Avenue	Residential	2	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-88	EW No. 2.4		Harvest Avenue	Residential	1	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-89	EW No. 2.4		Maples Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-90	EW No. 2.4		Harvest Avenue	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-91	EW No. 2.4		Gridley Road	Park	1	58	58	59	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	51	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**[4]	**66**	**67**	1	1	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	64	3	0	64	3	0	63	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**67**	1	1	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	64	3	0	64	3	0	63	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	65	0	0	64	1	0	63	2	0	62	3	0	62	3	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5[5]	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	62	5	3
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	60	0	1	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0

Table 2.13.12 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	61	1	0	60	2	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	62	1	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0

Source: Compiled by LSA Associates, Inc. (2018).
[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.
[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.
[3] The exterior-to-interior noise level reduction was based on simultaneous exterior and interior measurements.
[4] Numbers in **bold** represent noise levels that approach or exceed the NAC.
[5] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).
A/E = Approach or Exceed
dBA = A-weighted decibels
dBA L_{eq}(h) = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

Table 2.13.13 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level				Activity Category (NAC)	Impact Type	Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions			$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	51	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-101	EW No. 3.1*	NB No. 3.1	169th Street		2	**67**[3]	**67**	**68**	1	1	B(67)	A/E	--[4]	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-102	EW No. 3.1*	NB No. 3.1	169th Street	Residential	3	**66**	**67**	**68**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-103	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**68**	0	0	**66**	2	0
R-104	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-105	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0
R-106	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0
R-107	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0
R-108	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0
R-109	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0
R-110	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-112	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-113	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0
R-114	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-115	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0
R-116	EW No. 3.1		Pioneer Boulevard	Hotel	1	64	65	66	1	2	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-117			Pioneer Boulevard	Restaurant	0	67	67	67	0	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-118			Pioneer Boulevard	Gas Station	0	65	65	66	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-119	EW No. 3.1		168th Street	Residential	1	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-120			Pioneer Boulevard	Gas Station	0	62	62	63	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-121			168th Street	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-122			Pioneer Boulevard	Light Industrial	0	59	59	60	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0	62	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	63	3	0	63	3	0	62	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	64	1	0	64	1	0	63	2	0	62	3	0	62	3	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5[6]	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	62	5	3
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	59	-1	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	61	1	0	60	2	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	61	2	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0
R-138			Roseton Avenue	Office	0	73	74	73	-1	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-139			Jersey Avenue	Light Industrial	0	73	74	74	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-140			Alburtis Avenue	Light Industrial	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-141			Alburtis Avenue	Office	0	65	66	65	-1	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	57	0	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-143	EW No. 4.1		167th Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-144	EW No. 4.1		167th Street	Residential	2	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.13 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level				Activity Category (NAC)	Impact Type	Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions			$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	62	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-146	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-147	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-148	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-149	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-150	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-151	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	61	0	1	B(67)	--	61	0	0	60	1	0	60	1	0	60	1	0	60	1	0	59	2	0
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	62	1	0	61	2	0	61	2	0	61	2	0	60	3	0	60	3	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**	1	1	C(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46[7]	67 / 47[7]	68 / 48[7]	1	2	D(52)	--	--	--	--	--	--	--	--	--	--	67	1	0	66	2	0	66	2	0
R-157	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	64	65	65	0	1	C(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0	63	2	0
R-158	EW No. 4.2*		170th Street	Residential	2	65	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-159	EW No. 4.2*		170th Street	Residential	2	60	60	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-160	EW No. 4.2*		170th Street	Residential	2	59	59	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-161	EW No. 4.2*		170th Street	Residential	2	58	58	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-162	EW No. 4.2*		170th Street	Residential	2	62	63	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-163	EW No. 4.2*		170th Street	Residential	1	62	62	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-164	EW No. 4.2*		170th Street	Residential	1	63	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-165	EW No. 4.2*		170th Street	Residential	1	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-166	EW No. 4.2*		170th Street	Residential	2	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-167	EW No. 4.2*		170th Street	Residential	2	64	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-168	EW No. 4.2*		170th Street	Light Industrial	0	61	61	0	--	--	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-169	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-170	EW No. 4.3	NB No. 4.1	169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	61	1	0
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-172	EW No. 4.2	NB No. 4.1	169th Street	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-173	EW No. 4.2	NB No. 4.1	169th Street	Day Care Center	1	63 / 43[7]	64 / 44[7]	64 / 44[7]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-174	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-175	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-176	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-177	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-178	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	**67**	4	5	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-179	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-180	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	64	**67**	3	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-181	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-182	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-183	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-184	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	61	61	64	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-185	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0	62	2	0
R-186	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-187			168th Street	Vacant Land	0	65	65	66	1	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-188	EW No. 4.1		168th Street	Residential	2	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-189	EW No. 4.1		168th Street	Residential	3	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-190	EW No. 4.1		169th Street	Residential	1	55	56	57	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-191	EW No. 4.1		169th Street	Residential	2	56	57	58	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	58	0	1	B(67)	--	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0	58	0	0
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	59	1	1	B(67)	--	59	0	0	58	1	0	58	1	0	58	1	0	58	1	0	58	1	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	58	1	0	57	2	0	57	2	0
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	60	2	0	60	2	0
R-197	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0

Table 2.13.13 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																					
							2044 Noise Level				Activity Category (NAC)	Impact Type	Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)															
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions			$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-198	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	59	2	0
R-199	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	59	0	0	58	1	0	58	1	0
R-200	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-201	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-202	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-203	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-204	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-205	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-206	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0
R-207	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0
R-208	EW No. 4.3	NB No. 4.1	169th Street	Residential	3	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-209	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-210	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-211	EW No. 4.2*	NB No. 4.1	168th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-212	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-213	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	66	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

[3] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[4] Shaded cells indicate the approximate existing wall heights.

[5] Activity Categories without outdoor frequent human use areas were not evaluated against the Noise Abatement Criteria (NAC).

[6] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

[7] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.

A/E = Approach or Exceed
dBA = A-weighted decibels
dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

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Table 2.13.14 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	50	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-101	EW No. 3.1*	NB No. 3.1	169th Street	Residential	2	**67**	**67**[3]	**68**	1	1	B(67)	A/E	--[4]	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**67**	1	0
R-102	EW No. 3.1*	NB No. 3.1	169th Street	Residential	3	**66**	**67**	**68**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**67**	1	0
R-103	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**68**	0	0	**68**	0	0
R-104	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-105	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0
R-106	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	65	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0
R-107	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0
R-108	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0
R-109	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0
R-110	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-112	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-113	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0
R-114	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-115	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0
R-116	EW No. 3.1		Pioneer Boulevard	Hotel	1	64	65	66	1	2	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-117			Pioneer Boulevard	Restaurant	0	67	67	67	0	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-118			Pioneer Boulevard	Gas Station	0	65	65	66	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-119	EW No. 3.1		168th Street	Residential	1	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-120			Pioneer Boulevard	Gas Station	0	62	62	63	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-121			168th Street	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-122			Pioneer Boulevard	Light Industrial	0	59	59	60	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	**66**	0	0	**66**	0	0	**66**	0	0	**66**	0	0	62	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	**66**	0	0	**66**	0	0	**66**	0	0	**66**	0	0	62	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	65	0	0	65	0	0	65	0	0	65	0	0	62	3	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5[6]	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	62	5	3
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	59	-1	0	B(67)	--	59	0	0	59	0	0	58	1	0	58	1	0	58	1	0	58	1	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	61	1	0	61	1	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	61	2	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0
R-138			Roseton Avenue	Office	0	73	74	73	-1	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-139			Jersey Avenue	Light Industrial	0	73	74	74	0	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-140			Alburtis Avenue	Light Industrial	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-141			Alburtis Avenue	Office	0	65	66	65	-1	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	58	1	2	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-143	EW No. 4.1		167th Street	Residential	3	57	57	59	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-144	EW No. 4.1		167th Street	Residential	2	56	57	59	2	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.14 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	63	2	2	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-146	EW No. 4.1		168th Street	Residential	2	56	56	59	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-147	EW No. 4.1		168th Street	Residential	2	56	56	59	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-148	EW No. 4.1		168th Street	Residential	3	56	56	59	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-149	EW No. 4.1		168th Street	Residential	2	56	56	58	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-150	EW No. 4.1		168th Street	Residential	3	56	56	58	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-151	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	62	1	2	B(67)	--	61	1	0	60	2	0	60	2	0	60	2	0	60	2	0	60	2	0
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	62	1	0	62	1	0	61	2	0	61	2	0	60	3	0	60	3	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**[7]	1	1	C(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46[7]	67 / 47[7]	68 / 48[7]	1	2	D(52)	--	--	--	--	--	--	--	--	--	--	67	1	0	66	2	0	66	2	0
R-157	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	64	65	65	0	1	C(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0	63	2	0
R-158	EW No. 4.2*		170th Street	Residential	2	65	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-159	EW No. 4.2*		170th Street	Residential	2	60	60	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-160	EW No. 4.2*		170th Street	Residential	2	59	59	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-161	EW No. 4.2*		170th Street	Residential	2	58	58	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-162	EW No. 4.2*		170th Street	Residential	2	62	63	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-163	EW No. 4.2*		170th Street	Residential	1	62	62	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-164	EW No. 4.2*		170th Street	Residential	1	63	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-165	EW No. 4.2*		170th Street	Residential	1	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-166	EW No. 4.2*		170th Street	Residential	2	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-167	EW No. 4.2*		170th Street	Residential	2	64	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-168	EW No. 4.2*		170th Street	Light Industrial	0	61	61	0	--	--	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-169	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-170	EW No. 4.3	NB No. 4.1	169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	61	1	0
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-172	EW No. 4.2	NB No. 4.1	169th Street	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-173	EW No. 4.2	NB No. 4.1	169th Street	Day Care Center	1	63 / 43[7]	64 / 44[7]	64 / 44[7]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-174	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-175	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-176	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-177	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-178	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	**67**	4	5	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-179	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-180	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	64	**67**	3	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-181	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-182	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-183	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	**66**	1	0
R-184	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	61	61	64	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-185	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0	62	2	0
R-186	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	4	4	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-187			168th Street	Vacant Land	0	65	65	NA	NA	NA	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-188	EW No. 4.1		168th Street	Residential	2	59	59	NA	NA	NA	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-189	EW No. 4.1		168th Street	Residential	3	55	56	NA	NA	NA	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-190	EW No. 4.1		169th Street	Residential	1	55	56	63	7	8	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-191	EW No. 4.1		169th Street	Residential	2	56	57	59	2	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	59	1	2	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	59	1	1	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	58	1	0	58	1	0	58	1	0
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	1	0	61	2	0	61	2	0
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	60	2	0
R-197	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	1	0	60	2	0	60	2	0

Table 2.13.14 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																				
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)														
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-198	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	0	0	60	1	0	60	1	0
R-199	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	59	1	0	59	1	0	58	2	0
R-200	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-201	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	2	0	62	2	0
R-202	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-203	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-204	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-205	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-206	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0
R-207	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0
R-208	EW No. 4.3	NB No. 4.1	169th Street	Residential	3	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-209	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-210	EW No. 4.1		168th Street	Residential	2	56	56	61	5	5	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-211	EW No. 4.2*	NB No. 4.1	168th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-212	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-213	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	66	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Source: Compiled by LSA Associates, Inc. (2018).
[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.
[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.
[3] Numbers in **bold** represent noise levels that approach or exceed the NAC.
[4] Shaded cells indicate the approximate existing wall heights.
[5] Activity Categories without outdoor frequent human use areas were not evaluated against the Noise Abatement Criteria (NAC).
[6] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).
[7] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.
A/E = Approach or Exceed
dBA = A-weighted decibels
dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

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Table 2.13.15 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 4 (Diamond Ramps)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-92			Beach Street	Light Industrial	0	74	74	75	1	1	F	--[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-93			Beach Street	Light Industrial	0	74	74	75	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-94	EW No. 3.1		Beach Street	Light Industrial	0	70	70	71	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-95	EW No. 3.1		Hyde Park Court	Park	1	63	63	64	1	1	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-96	EW No. 3.1		Hyde Park Court	Residential	2	50	51	51	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-97	EW No. 3.1		Hyde Park Court	Residential	2	49	49	49	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-98	EW No. 3.1		Hyde Park Court	Residential	2	49	50	50	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-99	EW No. 3.1		Hyde Park Court	Residential	2	50	50	50	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-100	EW No. 3.1		Belvedere Court	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-101	EW No. 3.1*	NB No. 3.1	169th Street	Residential	2	**67**[3]	**67**	**68**	1	1	B(67)	A/E	--[4]	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-102	EW No. 3.1*	NB No. 3.1	169th Street	Residential	3	**66**	**67**	**68**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**67**	1	0	**66**	2	0
R-103	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	**67**	**67**	**68**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**68**	0	0	**66**	2	0
R-104	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-105	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0
R-106	EW No. 3.1	NB No. 3.1	169th Street	Residential	3	63	63	65	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	63	2	0
R-107	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	64	64	**66**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0
R-108	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0
R-109	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0
R-110	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-111	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-112	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	63	0	0
R-113	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0
R-114	EW No. 3.1	NB No. 3.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-115	EW No. 3.1	NB No. 3.1	169th Street	Residential	1	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0
R-116	EW No. 3.1		Pioneer Boulevard	Hotel	1	64	65	66	1	2	E(72)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-117			Pioneer Boulevard	Restaurant	0	67	67	67	0	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-118			Pioneer Boulevard	Gas Station	0	65	65	65	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-119	EW No. 3.1		168th Street	Residential	1	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-120			Pioneer Boulevard	Gas Station	0	62	62	63	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-121			168th Street	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-122			Pioneer Boulevard	Light Industrial	0	59	59	60	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-123	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0	62	4	0
R-124	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	63	3	0	63	3	0	62	4	0
R-125	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	65	65	65	0	0	B(67)	--	65	0	0	64	1	0	64	1	0	63	2	0	62	3	0	61	4	0
R-126	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	64	3	0	63	4	0	63	4	0	62	5[6]	3
R-127	EW No. 3.3	NB No. 3.2	Jenkins Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	65	2	0	65	2	0	64	3	0	63	4	0	62	5	3
R-128	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	63	3	0	63	3	0
R-129	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	64	64	64	0	0	B(67)	--	63	1	0	63	1	0	63	1	0	62	2	0	62	2	0	62	2	0
R-130	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	65	65	65	0	0	B(67)	--	64	1	0	64	1	0	63	2	0	63	2	0	63	2	0	63	2	0
R-131	EW No. 3.3	NB No. 3.2	Baber Avenue	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-132	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	60	59	-1	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0
R-133	EW No. 3.3	NB No. 3.2	Hart Street	Residential	3	61	61	61	0	0	B(67)	--	61	0	0	60	1	0	59	2	0	59	2	0	59	2	0	58	3	0
R-134	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	59	59	59	0	0	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-135	EW No. 3.3	NB No. 3.2	Hart Street	Residential	2	61	61	62	1	1	B(67)	--	61	1	0	60	2	0	60	2	0	59	3	0	59	3	0	59	3	0
R-136	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	62	1	0	62	1	0	61	2	0	61	2	0
R-137	EW No. 3.4	NB No. 3.2	Gard Avenue	Residential	1	61	61	61	0	0	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0	60	1	0
R-138			Roseton Avenue	Office	0	73	74	73	-1	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-139			Jersey Avenue	Light Industrial	0	73	74	73	-1	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-140			Alburtis Avenue	Light Industrial	0	71	71	71	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-141			Alburtis Avenue	Office	0	65	66	66	0	1	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	57	0	1	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.13.15 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 4 (Diamond Ramps)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-143	EW No. 4.1		167th Street	Residential	3	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-144	EW No. 4.1		167th Street	Residential	2	56	57	57	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	61	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-146	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-147	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-148	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-149	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-150	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-151	EW No. 4.1		168th Street	Residential	3	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	62	1	2	B(67)	--	61	1	0	60	2	0	60	2	0	60	2	0	59	3	0	59	3	0
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	63	1	2	B(67)	--	62	1	0	61	2	0	61	2	0	61	2	0	60	3	0	59	4	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**	1	1	C(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	64	2	0	64	2	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46[7]	67 / 47[7]	68 / 48[7]	1	2	D(52)	--	--	--	--	--	--	--	--	--	--	67	1	0	66	2	0	66	2	0
R-157	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	64	65	65	0	1	C(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	64	1	0	63	2	0
R-158	EW No. 4.2*		170th Street	Residential	2	65	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-159	EW No. 4.2*		170th Street	Residential	2	60	60	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-160	EW No. 4.2*		170th Street	Residential	2	59	59	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-161	EW No. 4.2*		170th Street	Residential	2	58	58	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-162	EW No. 4.2*		170th Street	Residential	2	62	63	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-163	EW No. 4.2*		170th Street	Residential	1	62	62	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-164	EW No. 4.2*		170th Street	Residential	1	63	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-165	EW No. 4.2*		170th Street	Residential	1	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-166	EW No. 4.2*		170th Street	Residential	2	64	65	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-167	EW No. 4.2*		170th Street	Residential	2	64	64	0	--	--	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-168	EW No. 4.2*		170th Street	Light Industrial	0	61	61	0	--	--	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-169	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	62	62	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	61	1	0	61	1	0
R-170	EW No. 4.3	NB No. 4.1	169th Street	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-172	EW No. 4.2	NB No. 4.1	169th Street	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-173	EW No. 4.2	NB No. 4.1	169th Street	Day Care Center	1	63 / 43[7]	64 / 44[7]	64 / 44[7]	0	1	D(52)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-174	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-175	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	0	0	63	1	0	62	2	0
R-176	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-177	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-178	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	**67**	4	5	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-179	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	4	4	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-180	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	64	**67**	3	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-181	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-182	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	2	3	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-183	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	65	65	**67**	2	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0
R-184	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	61	61	63	2	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0	62	1	0
R-185	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	63	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-186	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	63	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-187			168th Street	Vacant Land	0	65	65	65	0	0	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-188	EW No. 4.1		168th Street	Residential	2	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-189	EW No. 4.1		168th Street	Residential	3	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-190	EW No. 4.1		169th Street	Residential	1	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-191	EW No. 4.1		169th Street	Residential	2	56	57	58	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	59	1	2	B(67)	--	59	0	0	59	0	0	59	0	0	59	0	0	59	0	0	58	1	0
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	60	2	2	B(67)	--	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0	59	1	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	59	0	0	59	0	0	58	1	0

Table 2.13.15 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 4 (Diamond Ramps)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0	62	1	0
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	61	1	0
R-197	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	61	61	62	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	61	1	0	61	1	0	60	2	0
R-198	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	61	0	0	60	1	0	60	1	0
R-199	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	59	59	60	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	59	1	0	59	1	0	59	1	0
R-200	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-201	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-202	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	0	0	62	1	0
R-203	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-204	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-205	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-206	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	64	65	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0
R-207	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	60	1	0	60	1	0	60	1	0	60	1	0
R-208	EW No. 4.3	NB No. 4.1	169th Street	Residential	3	60	61	61	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0	61	0	0
R-209	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	61	0	0	61	0	0	61	0	0	61	0	0
R-210	EW No. 4.1		168th Street	Residential	2	56	56	57	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-211	EW No. 4.2*	NB No. 4.1	168th Street	Residential	2	62	63	64	1	2	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0
R-212	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	1	0	63	1	0
R-213	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	67	1	1	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	0	0	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-217			Pioneer Boulevard	Restaurant	0	71	71	71	0	0	E[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-218			Pioneer Boulevard	Office/Classroom	0	70 / 45[8]	71 / 46[8]	71 / 46[8]	0	1	E/D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-219	EW No. 4.1		Aclare Street	School Playground	1	63	63	63	0	0	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-220	EW No. 4.1		Aclare Street	School Classroom	1	62 / 47[9]	62 / 47[9]	62 / 47[9]	0	0	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-221	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	--	--	--	--	--	--	**67**	0	0	**66**	1	0	**66**	1	0
R-222	EW No. 4.6	NB No. 4.2	Palm Street	Residential	3	**66**	**67**	**67**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	**66**	1	0	65	2	0	65	2	0
R-223	EW No. 4.6	NB No. 4.2	Palm Street	Residential	2	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**67**	2	0	**66**	3	0	**66**	3	0	65	4	0
R-224	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	3	**69**	**69**	**69**	0	0	B(67)	A/E	**69**	0	0	**68**	1	0	**66**	3	0	**66**	3	0	65	4	0	64	5	3
R-225	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	**66**	1	0	65	2	0	64	3	0	63	4	0	63	4	0
R-226	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	61	62	62	0	1	B(67)	--	62	0	0	61	1	0	60	2	0	59	3	0	58	4	0	58	4	0
R-227	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-228	EW No. 4.6	NB No. 4.2	Hart Street	Residential	2	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	2	0	63	2	0	63	2	0
R-229	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	1	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	64	2	0	63	3	0
R-230	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**68**	**68**	**68**	0	0	B(67)	A/E	**68**	0	0	**67**	1	0	**66**	2	0	64	4	0	64	4	0	63	5	2
R-231	EW No. 4.6	NB No. 4.2	Ibex Ave	Residential	1	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	59	4	0	59	4	0
R-232	EW No. 4.6		Ibex Ave	Residential	1	59	59	59	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-233	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	3	63	64	64	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	63	1	0	62	2	0	62	2	0
R-234	EW No. 4.6	NB No. 4.2	Grayland Avenue	Residential	2	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	62	4	0	62	4	0	62	4	0
R-235	EW No. 4.6	NB No. 4.2	Horst Avenue	Residential	2	63	63	63	0	0	B(67)	--	63	0	0	62	1	0	61	2	0	60	3	0	60	3	0	59	4	0
R-236	EW No. 4.6		Ibex Ave	Residential	1	57	57	57	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-237	EW No. 4.7		Napoli Drive	Residential	2	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-238	EW No. 4.7		Napoli Drive	Residential	2	55	56	56	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-239	EW No. 4.7		Napoli Drive	Residential	1	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-240	EW No. 4.7		Napoli Drive	Residential	2	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-241	EW No. 4.7		Napoli Drive	Residential	1	55	55	55	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-242		NB No. 5.1	Cuesta Drive	School Playground	1	**67**	**67**	**67**	0	0	C(67)	A/E	65	2	0	65	2	0	64	3	0	63	4	0	62	5	1	61	6	1
R-243	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	62 / 42[7]	62 / 42[7]	63 / 43[7]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	62	1	0
R-244	EW No. 5.1	NB No. 5.1	Cuesta Drive	School Classroom	1	64 / 37[9]	64 / 37[9]	65 / 38[9]	1	1	D(52)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65	0	0
R-245	EW No. 5.2*	NB No. 5.2	Cuesta Drive	School Sports Area	1	63	63	65	2	2	C(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	1	0
R-246	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	64	2	0	63	3	0	62	4	0

Table 2.13.15 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 4 (Diamond Ramps)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																						
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-247	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	65	**66**	**67**	1	2	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	2	0	64	3	0	63	4	0
R-248	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0	64	1	0
R-249	EW No. 5.2*	NB No. 5.2	Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	64	1	0	64	1	0	64	1	0
R-250	EW No. 5.2*		Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-251	EW No. 5.2*		Rancho Vista Drive	Residential	1	64	64	65	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-252	EW No. 5.2		Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-253	EW No. 5.2		Rancho Vista Drive	Residential	1	62	63	63	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-254	EW No. 5.2		Rancho Vista Drive	Residential	1	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-255	EW No. 5.2		Sierra Vista Way	Residential	1	62	62	63	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-256	EW No. 5.2		Sierra Vista Way	Residential	1	59	59	62	3	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-257	EW No. 5.2		Sierra Vista Way	Residential	1	59	60	62	2	3	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-258	EW No. 5.2		Sierra Vista Way	Residential	0	54	54	55	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-259	EW No. 5.2		Sierra Vista Way	Residential	1	61	61	61	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-260	EW No. 5.2		Sierra Vista Way	Residential	1	63	63	64	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-261	EW No. 5.2		Sierra Vista Way	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-262	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	65	65	**66**	1	1	B(67)	A/E	--	--	--	--	--	--	--	--	--	65	1	0	65	1	0	65	1	0
R-263	EW No. 5.2*	NB No. 5.2	Cedarwood Court	Residential	1	61	62	62	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-264	EW No. 5.2		Cedarwood Court	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-265	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-266	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-267	EW No. 5.2		Sierra Vista Way	Residential	1	58	59	59	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-268	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	65	0	0	65	0	0	65	0	0
R-269	EW No. 5.2*	NB No. 5.2	Judy Way	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	62	0	0	62	0	0	62	0	0
R-270	EW No. 5.2		Chapparal Ave	Residential	1	60	60	61	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-271	EW No. 5.2		Chapparal Ave	Residential	1	58	58	59	1	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-272	EW No. 5.2		Sierra Vista Way	Residential	1	57	58	58	0	1	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-273	EW No. 5.13		Norwalk Boulevard	Office/Classroom	0	66 / 41[8]	66 / 41[8]	66 / 41[8]	0	0	E/D(52)[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-274	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	63	2	0	63	2	0
R-275	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	63	2	0	63	2	0
R-276	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	--	--	--	**66**	0	0	65	1	0	65	1	0	64	2	0	64	2	0
R-277	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-278	EW No. 5.5	NB No. 5.3	Palm Street	Residential	3	64	64	64	0	0	B(67)	--	--	--	--	64	0	0	63	1	0	62	2	0	62	2	0	61	3	0
R-279	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	**66**	**66**	0	1	B(67)	A/E	--	--	--	65	1	0	64	2	0	64	2	0	63	3	0	62	4	0
R-280	EW No. 5.5	NB No. 5.3	Palm Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	63	2	0	62	3	0	62	3	0
R-281	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	65	65	65	0	0	B(67)	--	--	--	--	64	1	0	63	2	0	63	2	0	62	3	0	61	4	0
R-282	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**68**	**69**	**69**	0	1	B(67)	A/E	**68**	1	0	**67**	2	0	**67**	2	0	**66**	3	0	65	4	0	65	4	0
R-283	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**67**	**67**	**67**	0	0	B(67)	A/E	**67**	0	0	**66**	1	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-284	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	**66**	**66**	**66**	0	0	B(67)	A/E	**66**	0	0	65	1	0	64	2	0	64	2	0	63	3	0	63	3	0
R-285	EW No. 5.5	NB No. 5.3	Evening Star Avenue	Residential	2	59	59	60	1	1	B(67)	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0	58	2	0
R-286	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	2	57	57	58	1	1	B(67)	--	58	0	0	57	1	0	57	1	0	57	1	0	57	1	0	57	1	0
R-287	EW No. 5.5		Springsnow Circle	Residential	1	56	56	56	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-288	EW No. 5.5		Summerwind Street	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-289	EW No. 5.5	NB No. 5.3	Palm Street	Residential	1	**67**	**67**	**67**	0	0	B(67)	A/E	--	--	--	**67**	0	0	**66**	1	0	65	2	0	65	2	0	64	3	0
R-290	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	63	63	63	0	0	B(67)	--	--	--	--	63	0	0	63	0	0	63	0	0	62	1	0	61	2	0
R-291	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	62	0	0	62	0	0	61	1	0	61	1	0
R-292	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	60	0	0	59	1	0	59	1	0	58	2	0
R-293	EW No. 5.5	NB No. 5.3	Morningrain Avenue	Residential	1	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	61	1	0	60	2	0	60	2	0	59	3	0
R-294	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	2	60	60	61	1	1	B(67)	--	60	1	0	60	1	0	60	1	0	60	1	0	59	2	0	59	2	0
R-295	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	3	59	60	60	0	1	B(67)	--	60	0	0	60	0	0	60	0	0	59	1	0	59	1	0	59	1	0
R-296	EW No. 5.5	NB No. 5.3	Autumn Breeze Street	Residential	1	60	60	60	0	0	B(67)	--	60	0	0	60	0	0	60	0	0	60	0	0	60	0	0	59	1	0
R-297	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	54	54	54	0	0	B(67)	--	54	0	0	54	0	0	53	1	0	53	1	0	53	1	0	53	1	0
R-298	EW No. 5.5	NB No. 5.3	Cortner Avenue	Residential	1	65	65	65	0	0	B(67)	--	--	--	--	65	0	0	64	1	0	64	1	0	63	2	0	63	2	0

Table 2.13.15 Predicted Future Noise Level and Noise Barrier Analysis for the Build Alternative with Design Option 4 (Diamond Ramps)

Receptor No.	Existing Wall No. [1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$																							
							2044 Noise Level						Noise Prediction With Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
													6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
							Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	Activity Category (NAC)	Impact Type	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
R-299	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	62	62	62	0	0	B(67)	--	--	--	--	62	0	0	61	1	0	61	1	0	60	2	0	60	2	0
R-300	EW No. 5.5	NB No. 5.3	Ely Avenue	Residential	2	60	61	61	0	1	B(67)	--	--	--	--	61	0	0	60	1	0	60	1	0	59	2	0	59	2	0
R-301	EW No. 5.5	NB No. 5.3	Janell Avenue	Residential	2	58	58	58	0	0	B(67)	--	--	--	--	58	0	0	58	0	0	57	1	0	57	1	0	56	2	0
R-302	EW No. 5.5	NB No. 5.3	Stark Avenue	Residential	1	60	60	60	0	0	B(67)	--	--	--	--	60	0	0	59	1	0	59	1	0	58	2	0	58	2	0
R-303	EW No. 5.5	NB No. 5.3	Springsnow Circle	Residential	1	53	54	53	-1	0	B(67)	--	53	0	0	53	0	0	53	0	0	53	0	0	53	0	0	53	0	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] A dash (–) indicates that no barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

[3] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[4] Shaded cells indicate the approximate existing wall heights.

[5] Activity Categories without outdoor frequent human use areas were not evaluated against the Noise Abatement Criteria (NAC).

[6] Underlined numbers have been attenuated by at least 5 dBA (i.e., feasible wall height).

[7] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.

[8] The exterior-to-interior noise level reduction was assumed to be 25 dBA lower because the building type is light frame with storm windows or masonry with single glazed windows.

[9] The exterior-to-interior noise level reduction was based on simultaneous exterior and interior measurements.

A/E = Approach or Exceed
dBA = A-weighted decibels
dBA $L_{eq}(h)$ = equivalent continuous sound level measured per hour in A-weighted decibels
IL = Insertion Loss
NAC = Noise Abatement Criteria
NBR = Number of Benefited Receptors

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Build Alternative

The following receptor locations would be or would continue to be exposed to noise levels that approach or exceed the NAC under the Build Alternative.

- **Receptors R-5 through R-7, R-15, and R-16:** These receptor locations represent existing single-family residences located along Monica Circle, Carla Plaza, and Petula Place on the northbound side of I-605, between Alondra Boulevard and SR-91. Currently, an existing 8.1 ft high private property wall shields these residences. One noise barrier (Noise Barrier [NB] No. 1.1) was modeled along the property line to shield these residences.
- **Receptors R-44, R-47, R-60, and R-67:** These receptor locations represent existing single-family residences located along Westwinds Circle and Coral Reef Circle on the westbound side of SR-91, near the SR-91 westbound connector to I-605. Currently, an existing 6 to 11 ft high State ROW wall shields the residences. Five noise barrier locations were evaluated separately for their ability to shield these receptors and to compare their effectiveness. NB No. 2.1 was modeled along the State ROW on the westbound side of SR-91 to shield these residences. NB No. 2.2 was modeled at an alternate location along the edge of the shoulder on the westbound side of SR-91 to shield these residences. NB No. 2.1a was modeled as a reduced version of NB No. 2.1 along the State ROW. NB No. 2.2a was modeled as a reduced version of NB No. 2.2 along the edge of the shoulder and private property line on the westbound side of SR-91 to shield these residences. NB No. 2.2b was modeled as an alternate version of NB No. 2.2a along the edge of shoulder.
- **Receptor R-77:** This receptor location represents an active sport area of a school located along Studebaker Road on the eastbound side of SR-91, near the SR-91 eastbound on-ramp from Studebaker Road. Currently, an existing 6.2 to 6.9 ft high private property wall shields the playground. One noise barrier (NB No. 2.3) was modeled along the private property line to shield the active sports area.
- **Receptors R-101 through R-104 and R-107:** These receptor locations represent existing single-family residences along 169th Street on the westbound side of SR-91, near the SR-91 westbound on-ramp from Pioneer Boulevard. Currently, an existing 12.4 to 13.1 ft high private property wall shields these residences. Two noise barrier locations were evaluated separately to shield these receptors and to compare the effectiveness of the two barriers. NB No. 3.1 was modeled along the private property line to shield these residences. NB No. 3.3 was

modeled at an alternate location along the edge of the shoulder on the westbound side of SR-91 to shield these residences.

- **Receptors R-123, R-124, and R-126 through R-128:** These receptor locations represent existing single-family residences located along Jenkins Street and Gard Avenue on the eastbound side of SR-91, between Gridley Road and Pioneer Boulevard. Currently, a combination of an existing 5.6 to 11.8 ft high private property wall and an existing 14.6 to 18.1 ft high private property wall shields these residences. One noise barrier (NB No. 3.2) was modeled along the private property line to shield these residences.
- **Receptors R-155 and R-177 through R-183:** These receptor locations represent existing single-family residences along 169th Street on the westbound side of SR-91, near the SR-91 westbound off-ramp to Pioneer Boulevard. Currently, a combination of an existing 15.8 to 16.2 ft high private property wall and an existing 11.3 to 13.4 ft high edge-of-shoulder wall shield these residences. Two noise barrier locations were evaluated separately to shield these receptors and to compare the effectiveness of the two barriers. NB No. 4.1 was modeled along the State ROW on the westbound side of SR-91 to shield these residences.
- **Receptors R-221 through R-225, R-229, R-230, and R-234:** These receptor locations represent existing single-family residences located along Palm Street, Grayland Avenue, and Horst Avenue on the eastbound side of SR-91, near the SR-91 eastbound off-ramp to Norwalk Boulevard. Currently, an existing 5.9 to 10 ft high private property wall shields these residences. One noise barrier (NB No. 4.2) was modeled along the private property line to shield these residences.
- **Receptor R-242:** This receptor location represents the playground of a school located along Norwalk Boulevard and Cuesta Drive on the westbound side of SR-91, near the SR-91 westbound off-ramp to Norwalk Boulevard. Currently, an existing 10.8 to 14.7 ft high private property wall shields the playground. One noise barrier (NB No. 5.1) was modeled along the private property line to shield the playground.
- **Receptors R-246 through R-249 and R-262:** These receptor locations represent existing multifamily residences along Rancho Vista Drive and Judy Way on the westbound side of SR-91, between Norwalk Boulevard and Bloomfield Avenue. Currently, an existing 9.6 to 12.4 ft high State ROW wall shields these residences. One noise barrier (NB No. 5.2) was modeled along the State ROW on the westbound side of SR-91 to shield these residences.
- **Receptors R-276, R-277, R-279, R-282 through R-284, and R-389:** These receptor locations represent existing single-family residences located along Palm

Street and Autumn Breeze Street on the eastbound side of SR-91, between Norwalk Boulevard and Bloomfield Avenue. Currently, an existing 5.4 to 7.3 ft high State ROW wall shields these residences. One noise barrier (NB No. 5.3) was modeled along the State ROW on the eastbound side of SR-91 to shield the residences.

- **Receptors R-344 through R-347, R-351, R-354, and R-355:** These receptor locations represent existing multifamily residences located along Bloomfield Avenue and Artesia Boulevard on the eastbound side of SR-91. Currently, no existing walls shield these residences. One noise barrier (NB No. 6.1) was modeled along the edge of the shoulder on the eastbound side of SR-91 to shield Receptors R-344 through R-347 and R-351. Noise barriers were not modeled for R-354 and R-355 because these receptors approach or exceed the NAC due to traffic on Bloomfield Avenue and not from traffic on SR-91, as shown in Table 2.13.16.

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, D, and E (67, 67, 52, 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 16 ft were analyzed at 2 ft increments.

Build Alternative

The Build Alternative proposes standard lane and shoulder widths and a 2 ft wide HOV lane buffer, and includes a Type L-7 westbound ramp configuration at Pioneer Boulevard. Within the project limits, westbound SR-91 would have five 12 ft wide mixed-flow lanes, a 10 ft wide left median shoulder, one 12 ft wide HOV lane with a 2 ft wide HOV buffer between the HOV and mixed-flow lanes, and one 12 ft wide auxiliary lane between certain successive on- and off-ramps. The locations of the modeled noise barriers for the Build Alternative are shown on Figure 2.13-3. The locations of the alternate noise barriers (NB Nos. 2.2 and 3.3) for the Build Alternative are shown on Figure 2.13-4. The locations of the reduced noise barriers (NB Nos. 2.1a and 2.2a) for the Build Alternative are shown on Figure 2.13-5. The location of NB No. 2.2b is shown on Figure 2.13-6. The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels

approaching or exceeding the NAC for the Build Alternative and are summarized in Tables 2.13.6 through 2.13.8.

Table 2.13.16 Bloomfield Avenue Noise Level Analysis

Receptor No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)						
					2044 Noise Level						Activity Category (NAC)
					Without Project, dBA L_{eq}	With Project, dBA L_{eq}	With Project Minus No Project Conditions	With Project Minus Existing Conditions	SR-91 Without Bloomfield Avenue, dBA L_{eq}[1]	Bloomfield Avenue Without SR-91, dBA L_{eq}[2]	
R-342	Artesia Boulevard	Residential	2	63	63	64	1	1	62	58	B(67)
R-343	Artesia Boulevard	Residential	2	62	62	62	0	0	56	61	B(67)
R-348	Artesia Boulevard	Residential	4	63	63	63	0	0	51	63	B(67)
R-349	Artesia Boulevard	Residential	4	67	64	64	0	0	53	64	B(67)
R-354	Artesia Boulevard	Residential	1	**67**[3]	**67**	**68**	1	1	58	**67**	B(67)
R-355	Artesia Boulevard	Residential	1	**68**	**68**	**68**	0	0	61	**67**	B(67)

Source: Compiled by LSA Associates, Inc. (2018).
[1] Noise levels modeled with no traffic volumes on Bloomfield Avenue.
[2] Noise levels modeled with no traffic volumes on SR-91.
[3] Numbers in bold represent noise levels that approach or exceed the NAC.
dBA = A-weighted decibels
dBA L_{eq}(h) = equivalent continuous sound level measured per hour in A-weighted decibels
NAC = Noise Abatement Criteria
SR-91 = State Route 91

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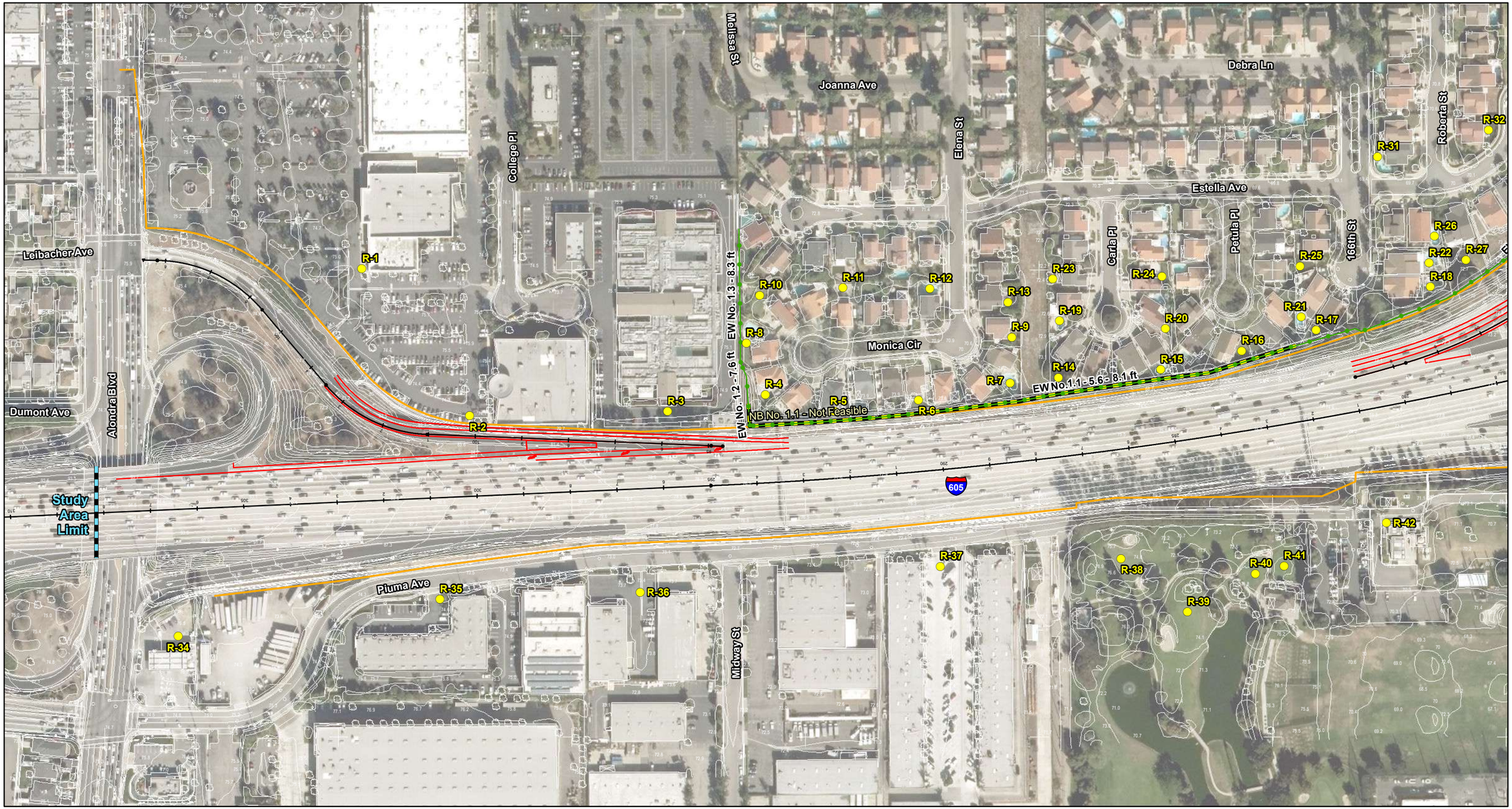
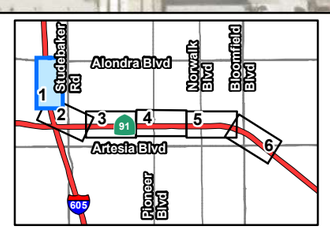


LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-3
Sheet 1 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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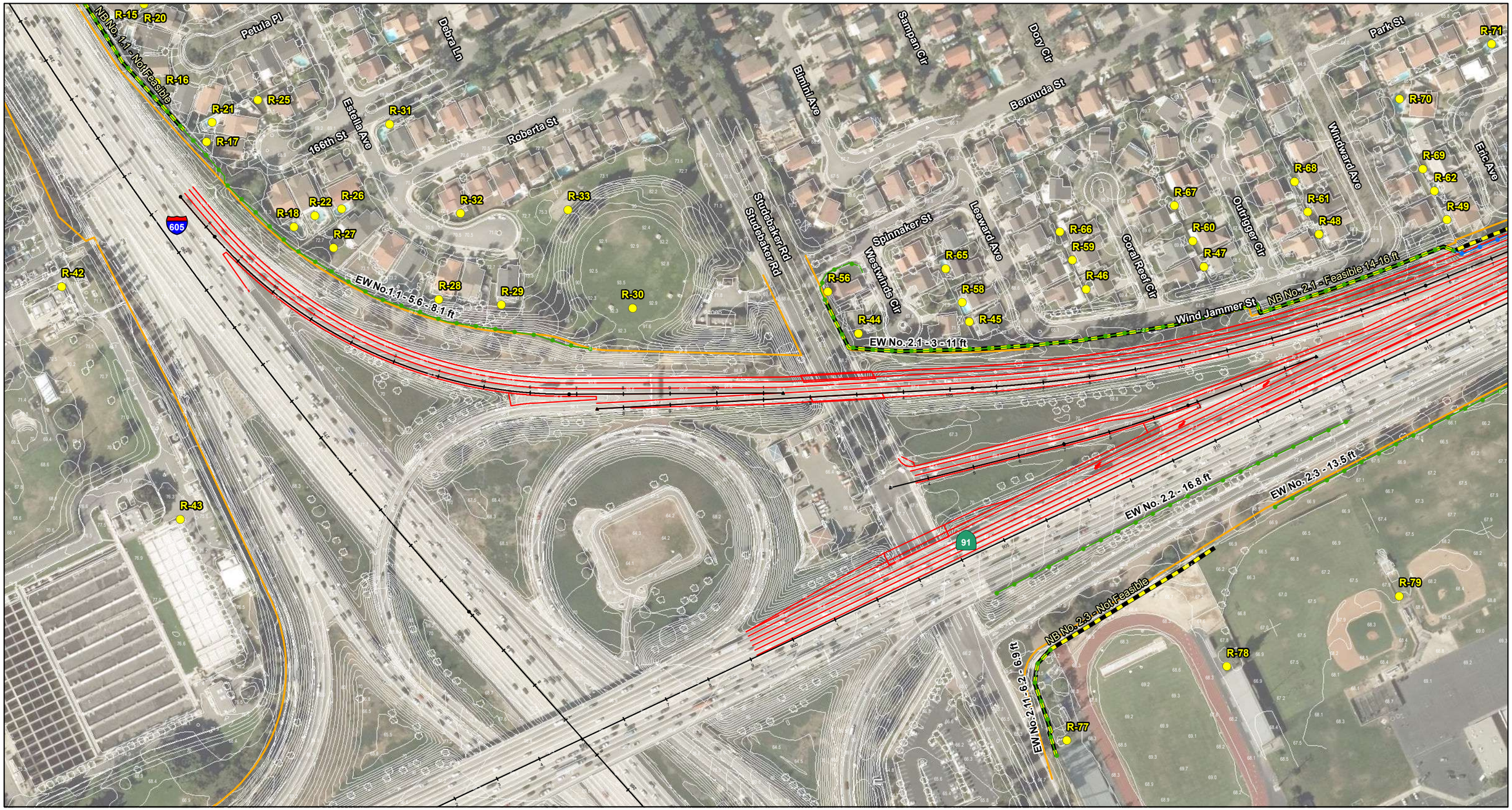
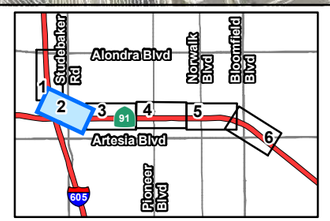


LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200
FEET

*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-3
Sheet 2 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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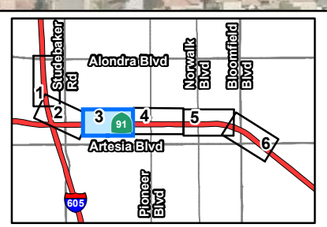
LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-3
Sheet 3 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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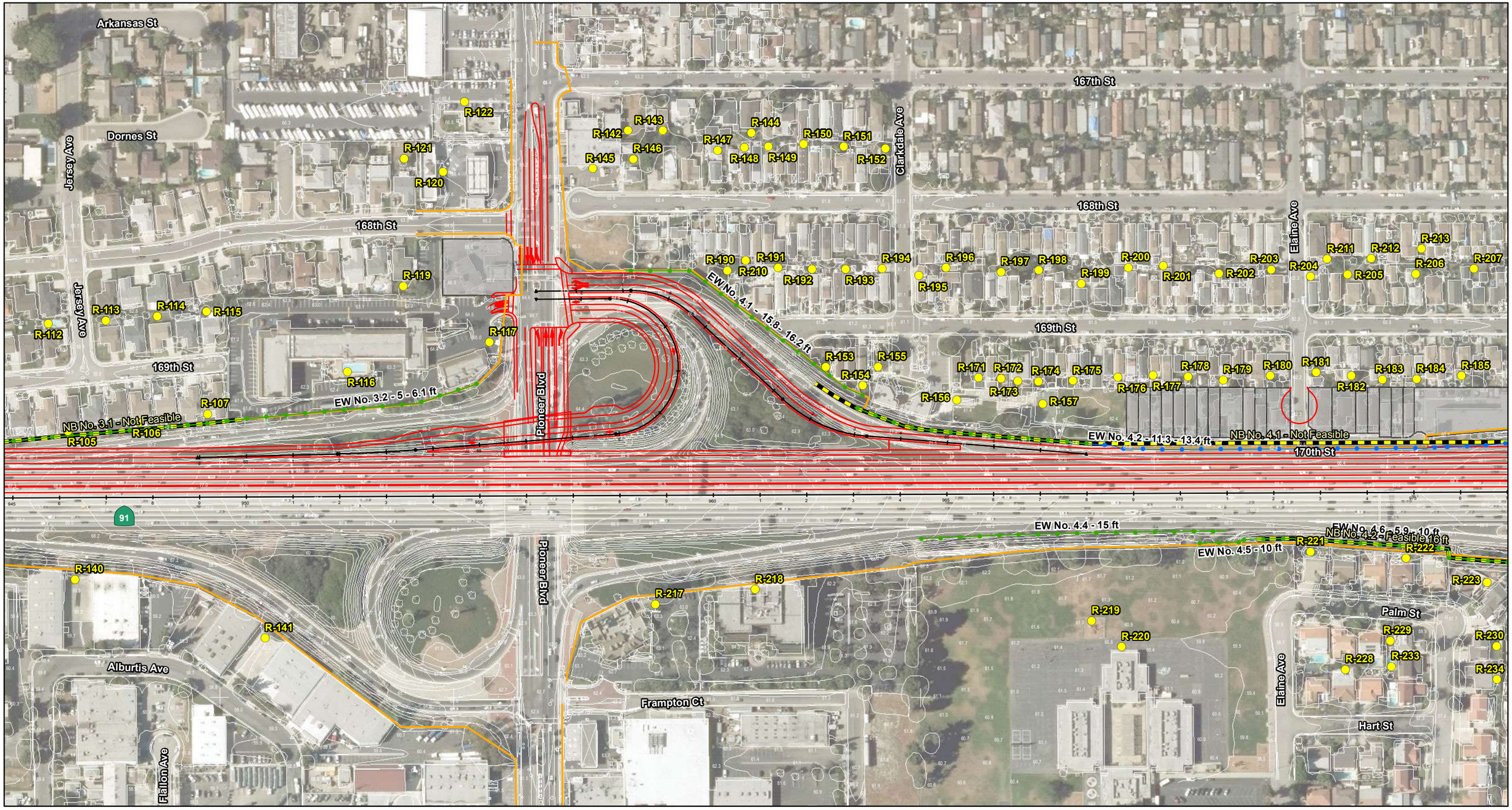

LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.

**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

FIGURE 2.13-3
Sheet 4 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-3
Sheet 5 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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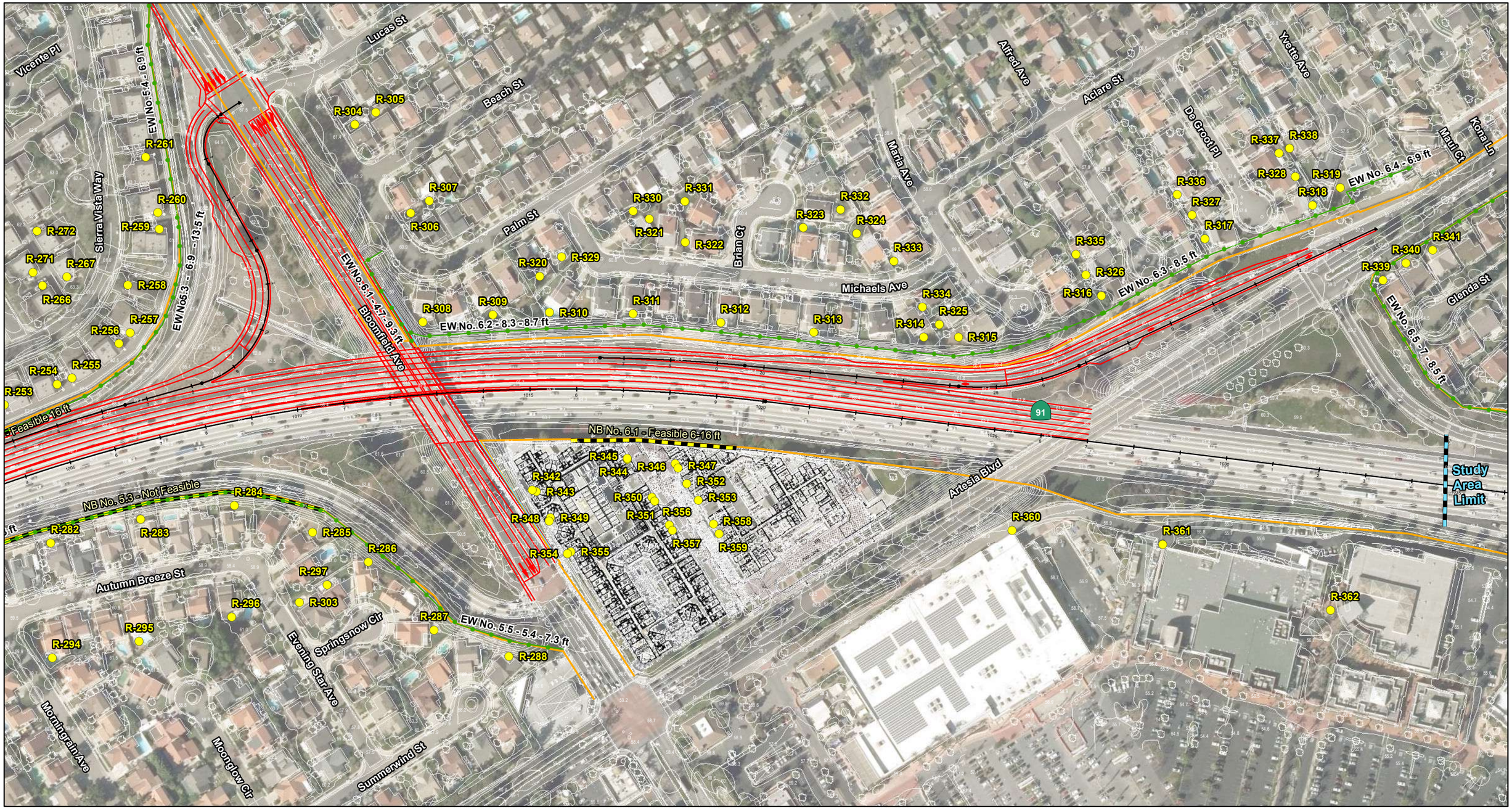
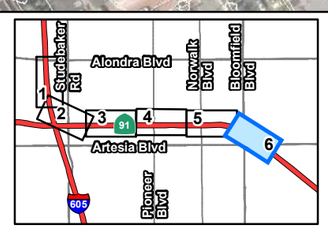


LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200
FEET

*Receptors R-118 and R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-3
Sheet 6 of 6

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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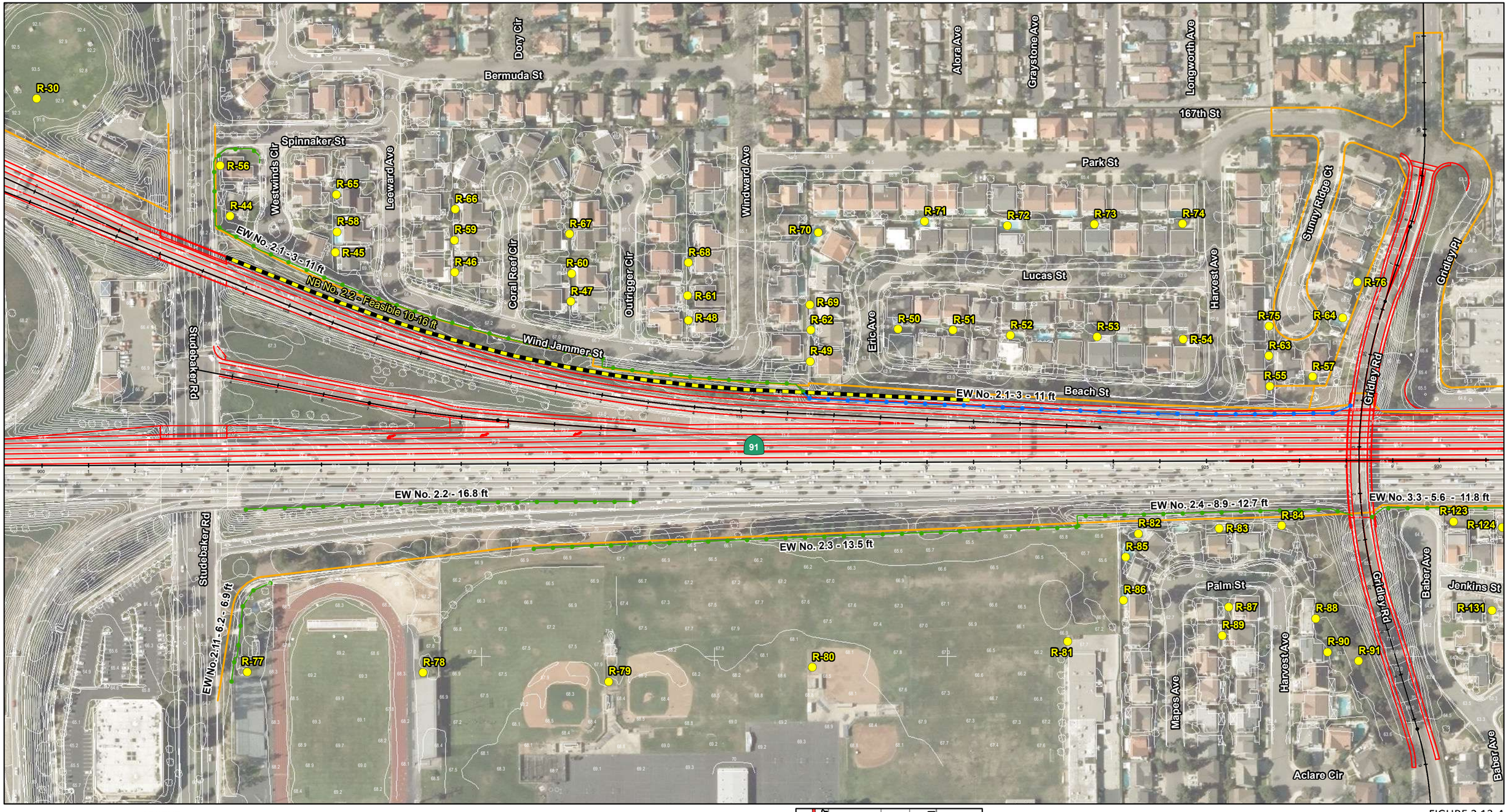

LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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*Receptor R-118 is not shown because the property would be acquired.

**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

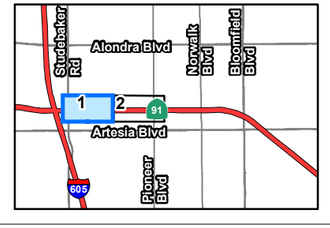

FIGURE 2.13-4
Sheet 1 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations
Build Alternative - Alternate Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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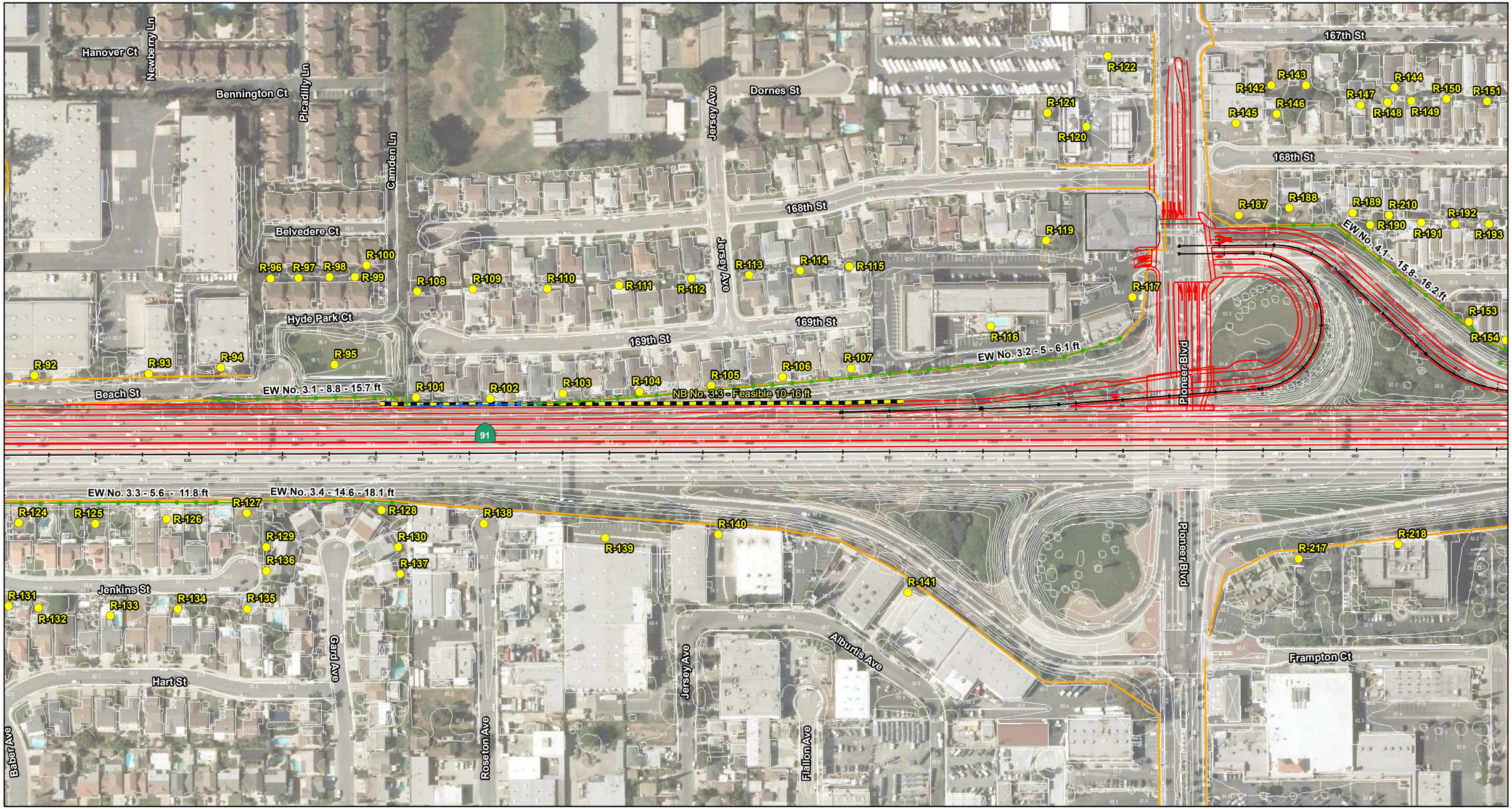
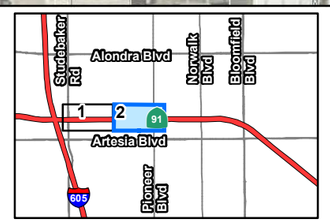


LEGEND

- Modeled Receptors*
- Build Alternative
- Existing Right-of-Way
- Proposed Right-of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-4
Sheet 2 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations
Build Alternative - Alternate Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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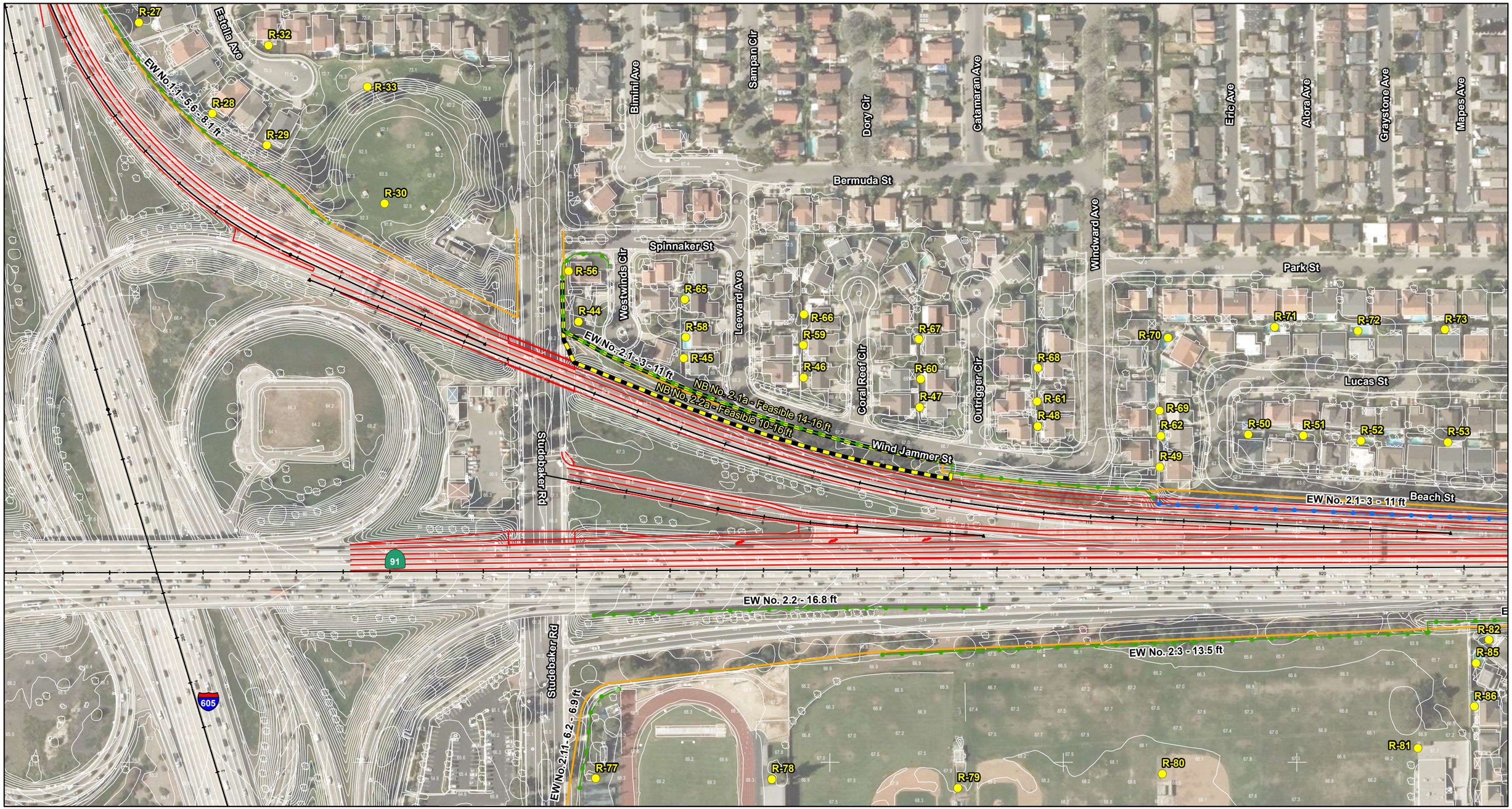

LEGEND

- Modeled Receptors
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)*
- Modeled Noise Barriers

0 100 200
FEET

*The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

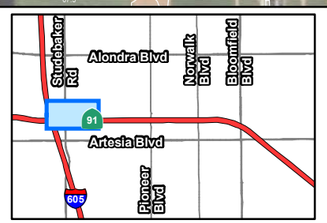

FIGURE 2.13-5

Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations
Build Alternative - Reduced Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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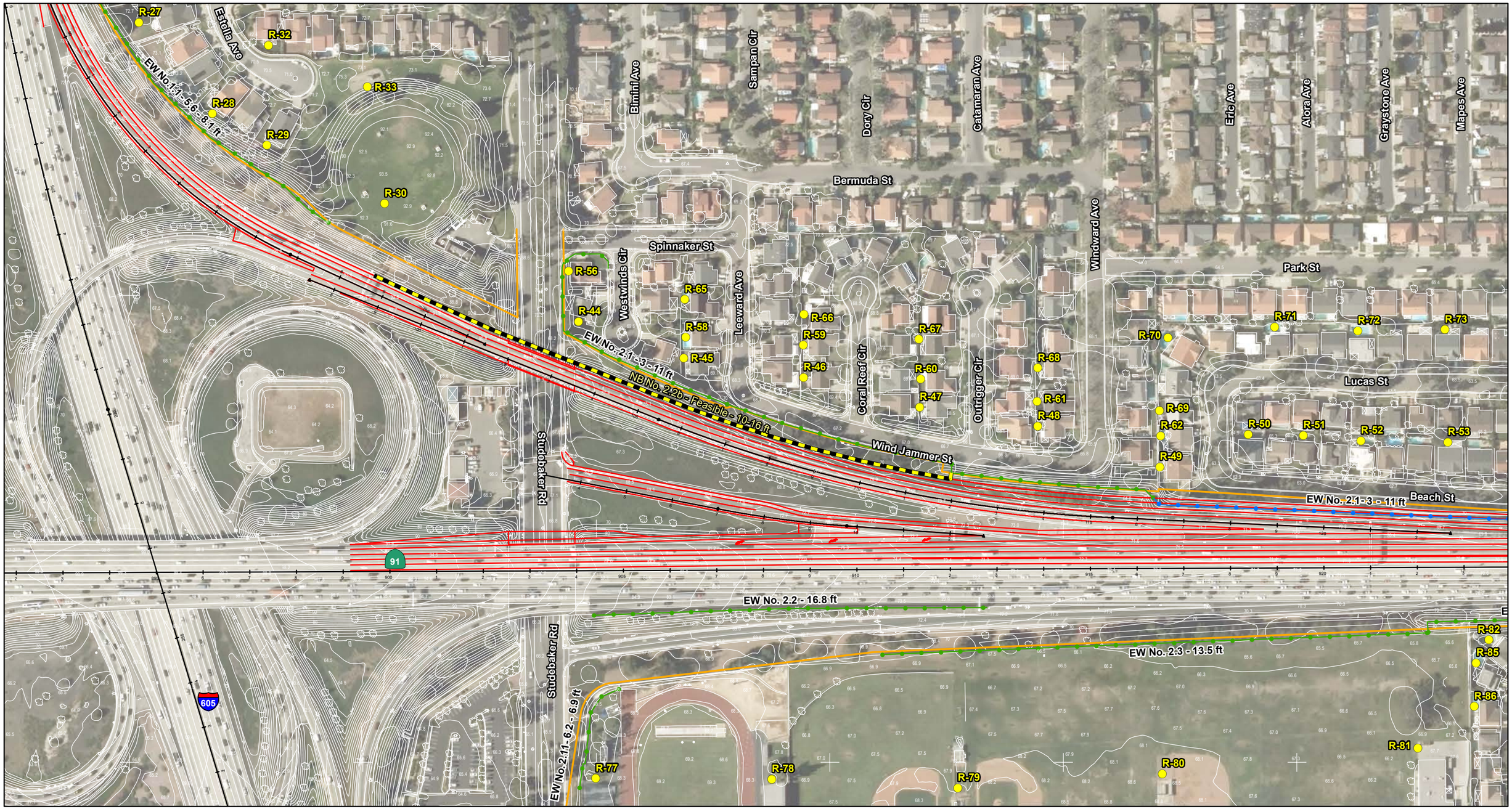

LEGEND

- Modeled Receptors
- Build Alternative
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)*
- Modeled Noise Barrier

0 100 200
FEET

*The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-6

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative - Noise Barrier No. 2.2b

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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- **NB No. 1.1:** A 1,234 ft long barrier along the private property line on the northbound side of I-605 was analyzed to shield Receptors R-5 through R-7, R-15 and R-16.
- **NB No. 2.1:** A 1,697 ft long barrier along the private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2:** A 1,639 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.1a:** A 991 ft long barrier along the private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2a:** A 932 ft long barrier along the edge of the shoulder and private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2b:** A 1,330 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.3:** A 664 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptor R-77.
- **NB No. 3.1:** A 1,051 ft long barrier along the private property line and State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104 and R-107.
- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123 through R-128.
- **NB No. 3.3:** A 1,122 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104 and R-107.
- **NB No. 4.1:** A 1,671 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-155 and R-177 through R-183.
- **NB No. 4.2:** A 971 ft long barrier along the private property line and State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-221 through R-225, R-229, R-230, and R-234.
- **NB No. 5.1:** A 1,028 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptor R-242.
- **NB No. 5.2:** A 1,078 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-246 through R-249 and R-262.

- **NB No. 5.3:** A 2,008 ft long barrier along the State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-276, R-277, R-279, R-282 through R-284, and R-289.
- **NB No. 6.1:** A 355 ft long barrier along the edge of the shoulder on the eastbound side of SR-91 was analyzed to shield Receptors R-344 through R-347 and R-351.

Design Option 1: Reduced Lane/Shoulder Width

Design Option 1 (Reduced Lane/Shoulder Width) of the Build Alternative proposes non-standard lane and shoulder widths and no HOV lane buffer. Within the project limits, westbound SR-91 would have three 11 ft wide and two 12 ft wide mixed-flow lanes, a 2 ft wide left median shoulder, one 12 ft wide HOV lane with no HOV buffer in between the HOV and mixed-flow lanes, and one 12 ft wide auxiliary lane between certain successive on- and off-ramps. The locations of the modeled noise barriers for Design Option 1 (Reduced Lane/Shoulder Width) are shown on Figure 2.13-7. The locations of the alternate noise barriers (NB Nos. 2.2 and 3.3) for Design Option 1 (Reduced Lane/Shoulder Width) are shown on Figure 2.13-8. The locations of the reduced noise barriers (NB Nos. 2.1a and 2.2a) for Design Option 1 (Reduced Lane/Shoulder Width) are shown on Figure 2.13-9. The location of NB No. 2.2b is shown on Figure 2.13-10. The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Design Option 1 (Reduced Lane/Shoulder Width) and are summarized in Tables 2.13.9 through 2.13.11:

- **NB No. 2.1:** A 1,700 ft long barrier along the private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2:** A 1,639 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.1a:** A 991 ft long barrier along the private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2a:** A 936 ft long barrier along the edge of the shoulder and private property line on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.
- **NB No. 2.2b:** A 1,330 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-44, R-47, R-60, and R-67.

- **NB No. 2.3:** A 664 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptor R-77.
- **NB No. 3.1:** A 581 ft long barrier along the private property line and State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104.

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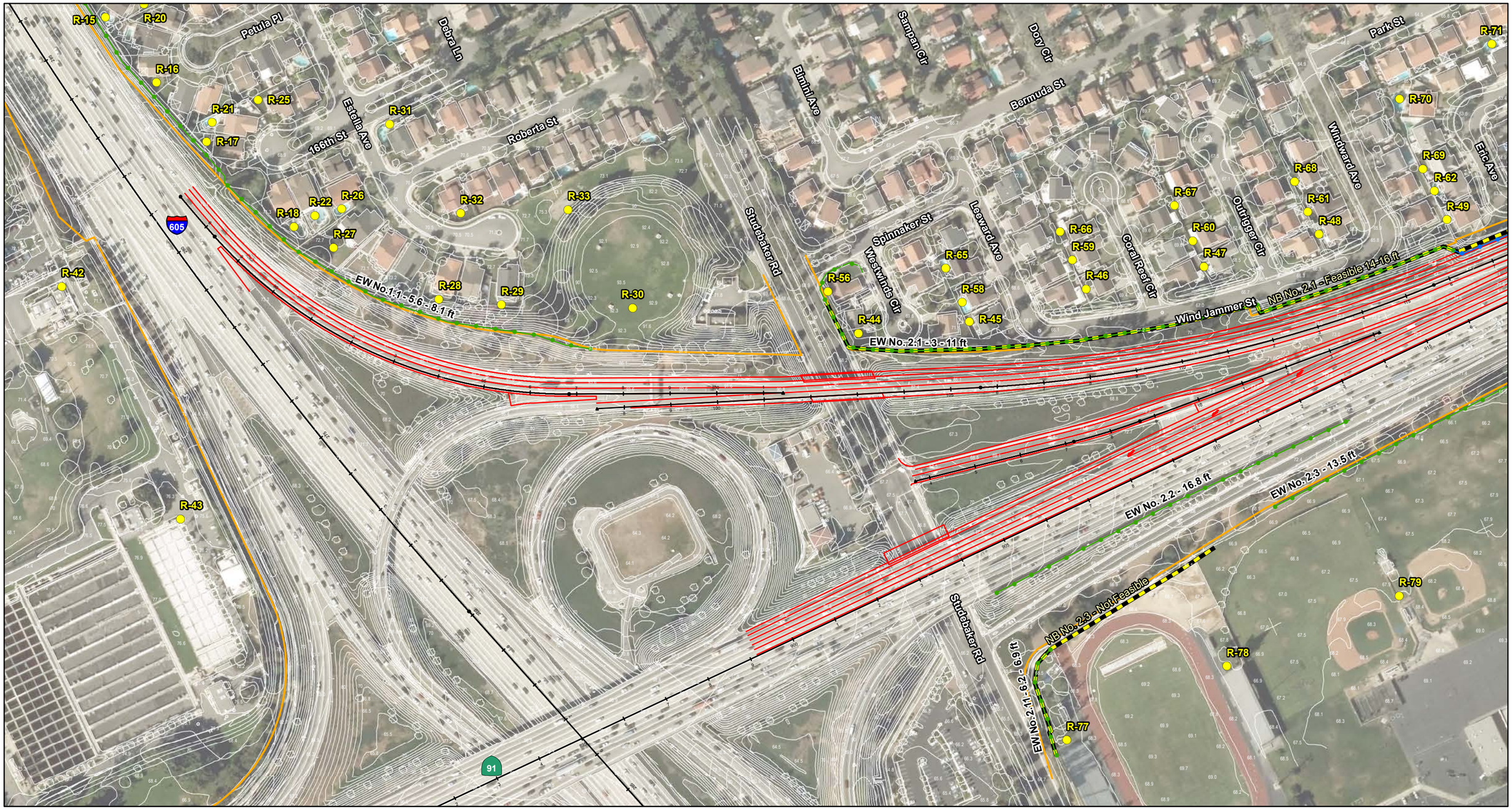
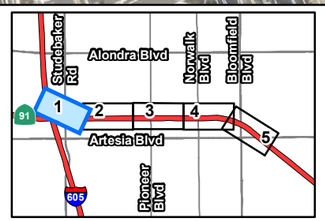


LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-7
Sheet 1 of 5

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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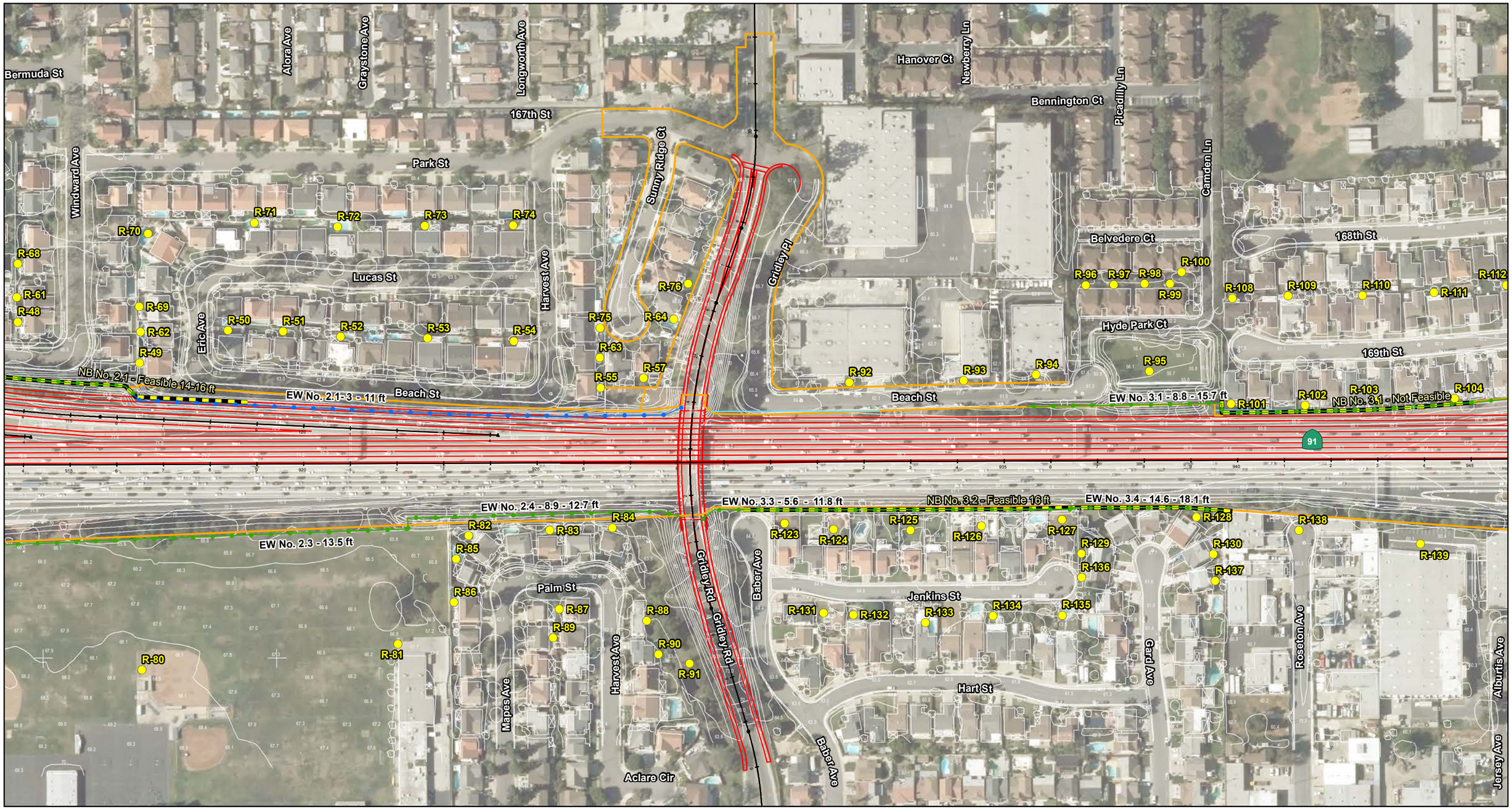

LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

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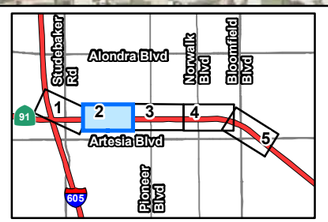

SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-7
Sheet 2 of 5

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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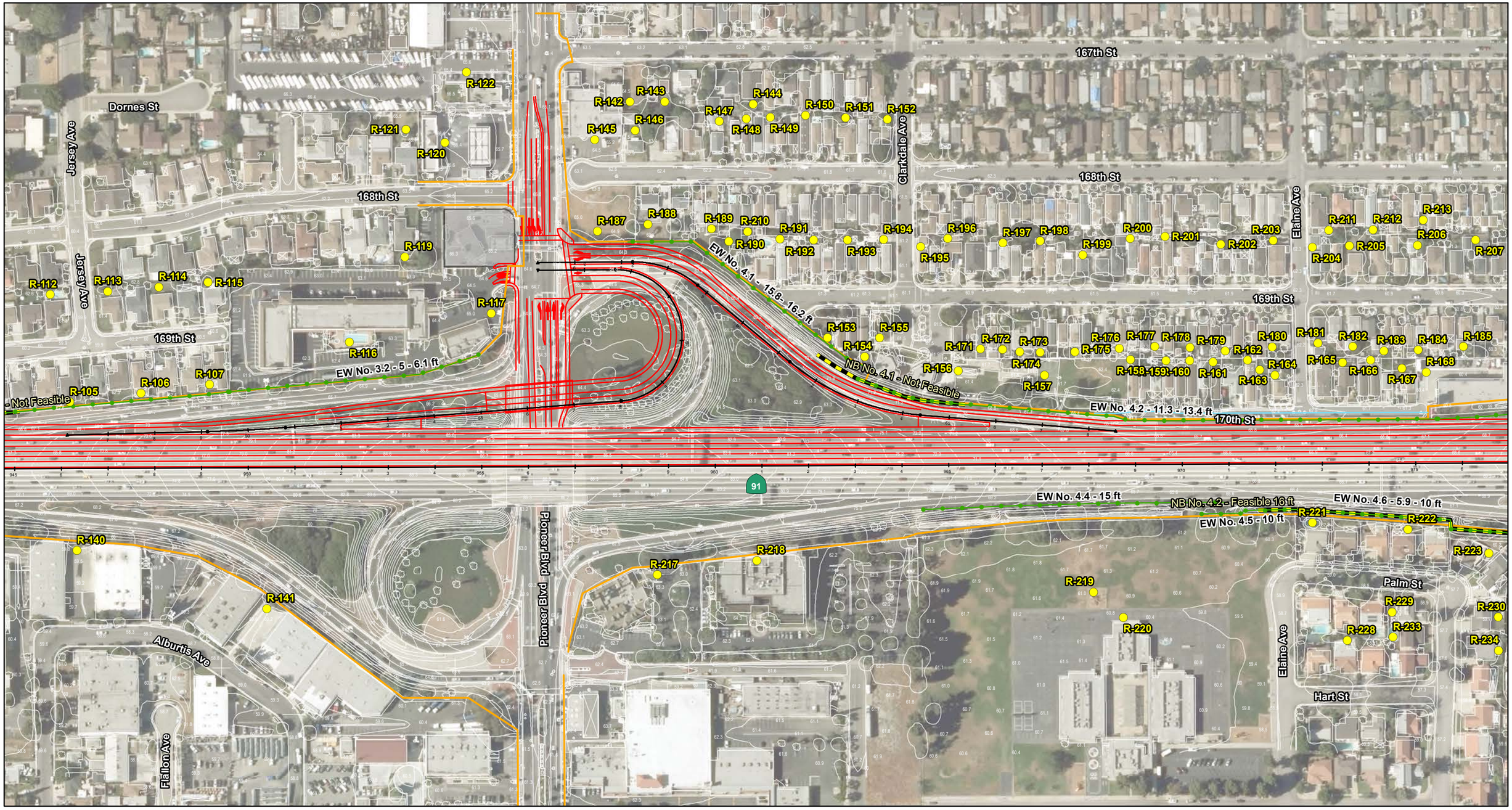
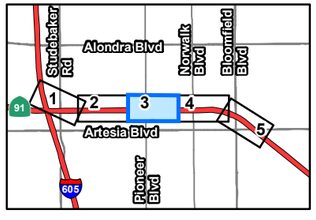


LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-7
Sheet 3 of 5

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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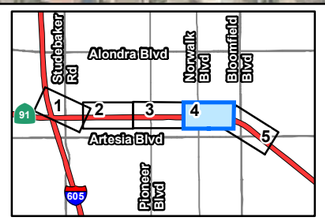
LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-7
Sheet 4 of 5

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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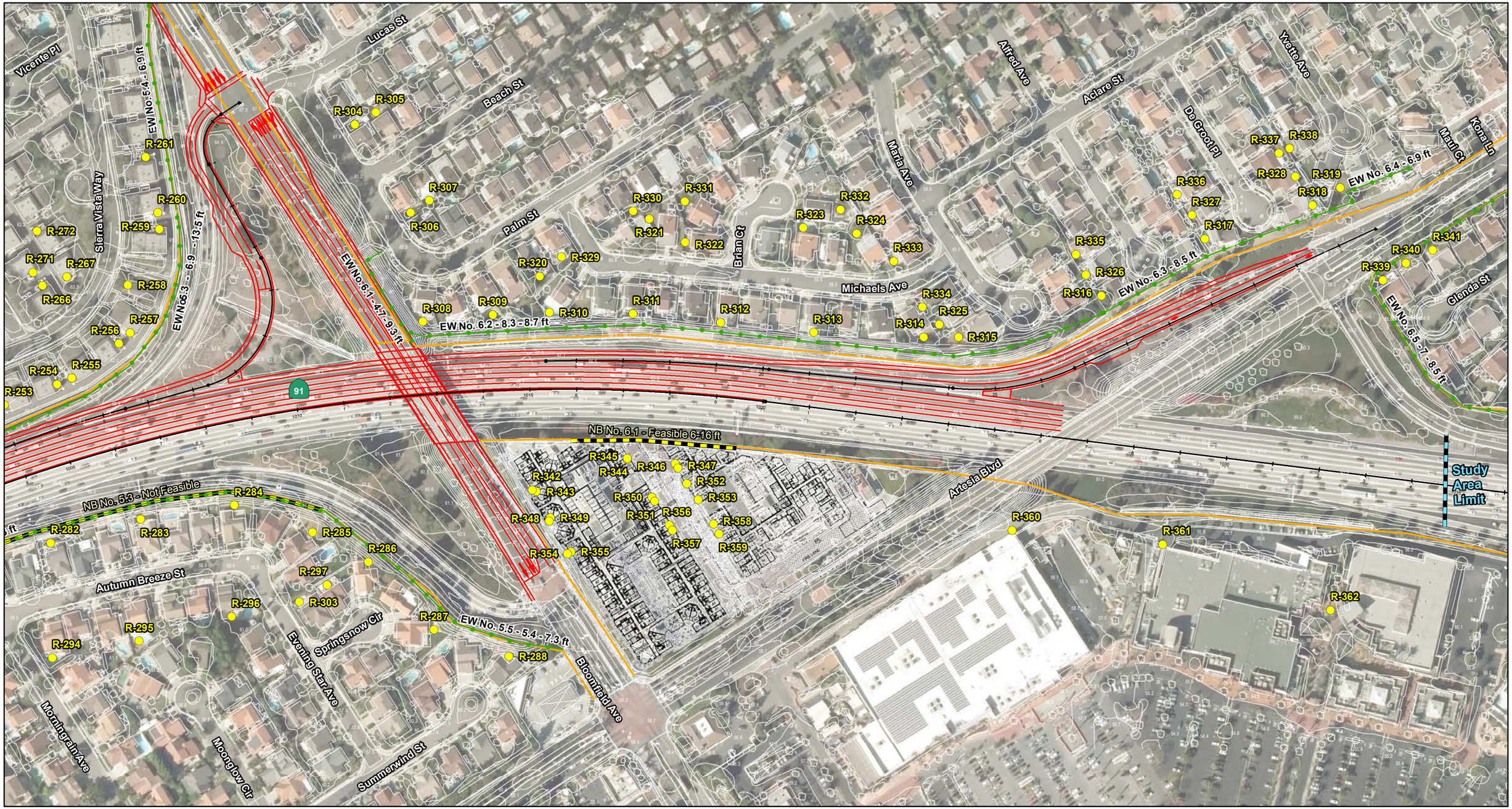

LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

FIGURE 2.13-7
Sheet 5 of 5

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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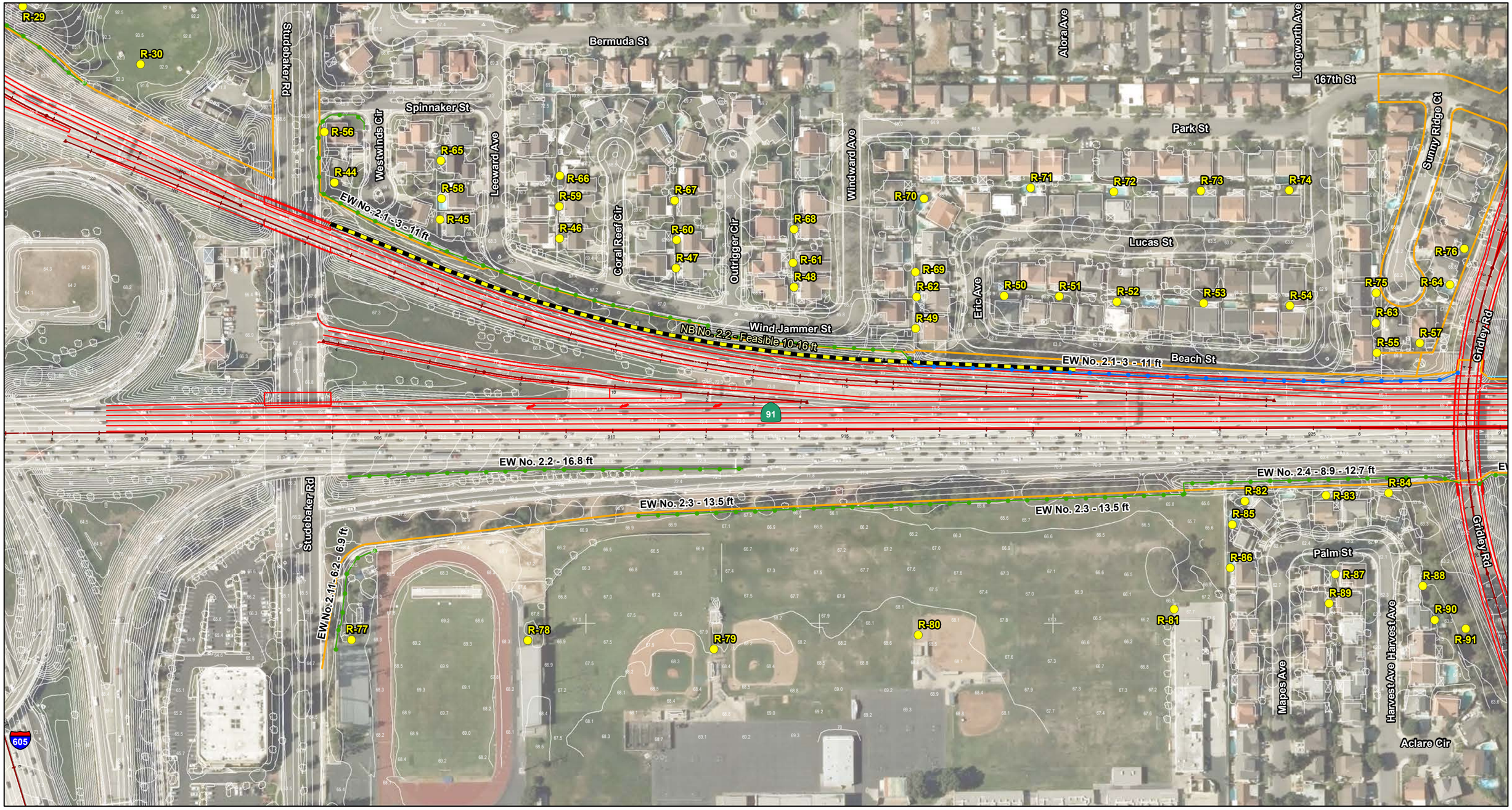
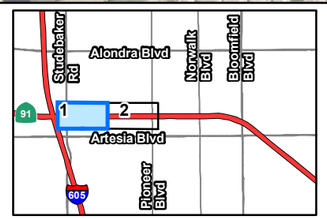


LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-8
Sheet 1 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Land and Shoulder Widths Design Option – Alternate Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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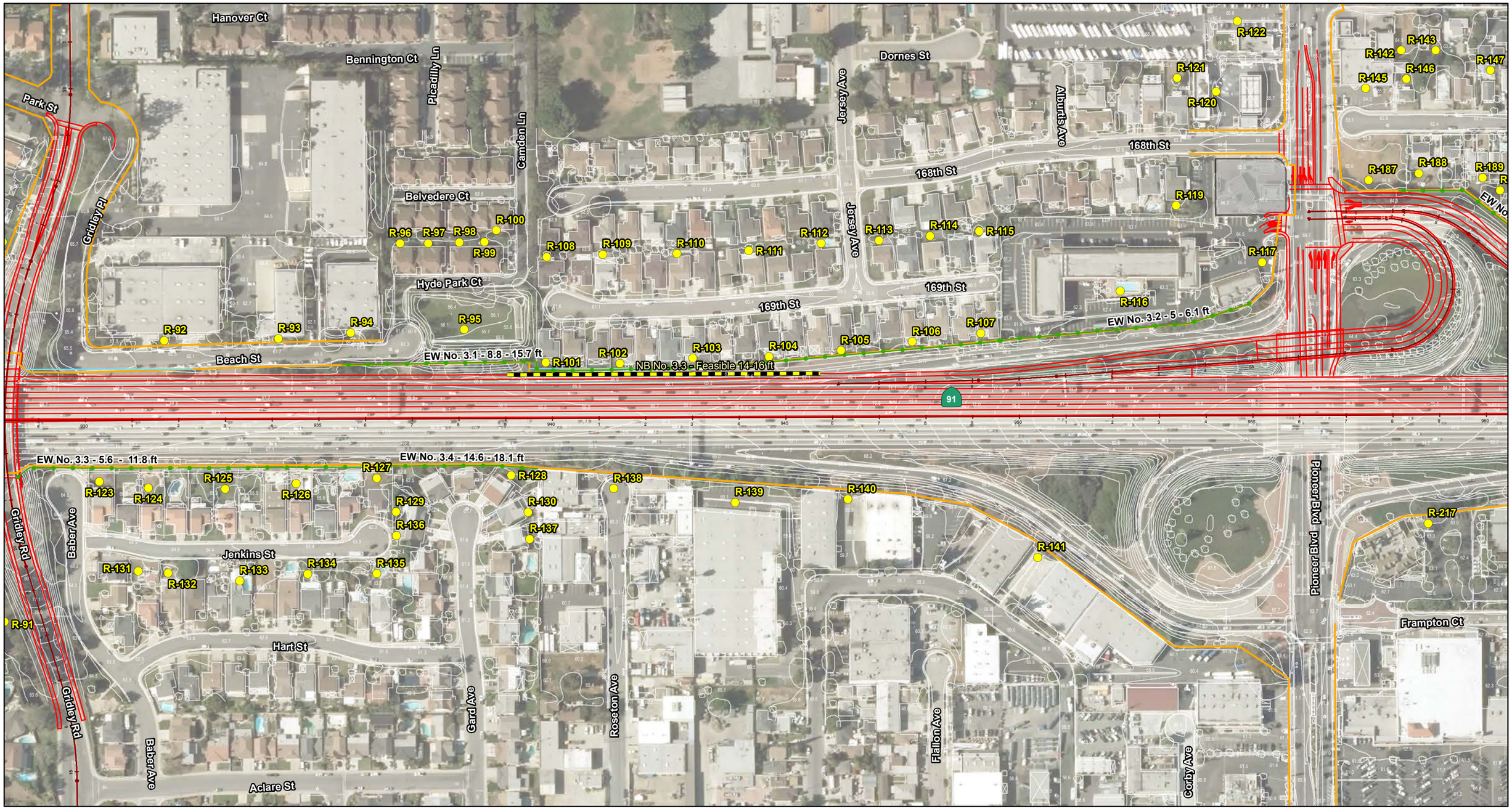

LEGEND

- Modeled Receptors*
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptor R-118 is not shown because the property would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-8
Sheet 2 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Land and Shoulder Widths Design Option – Alternate Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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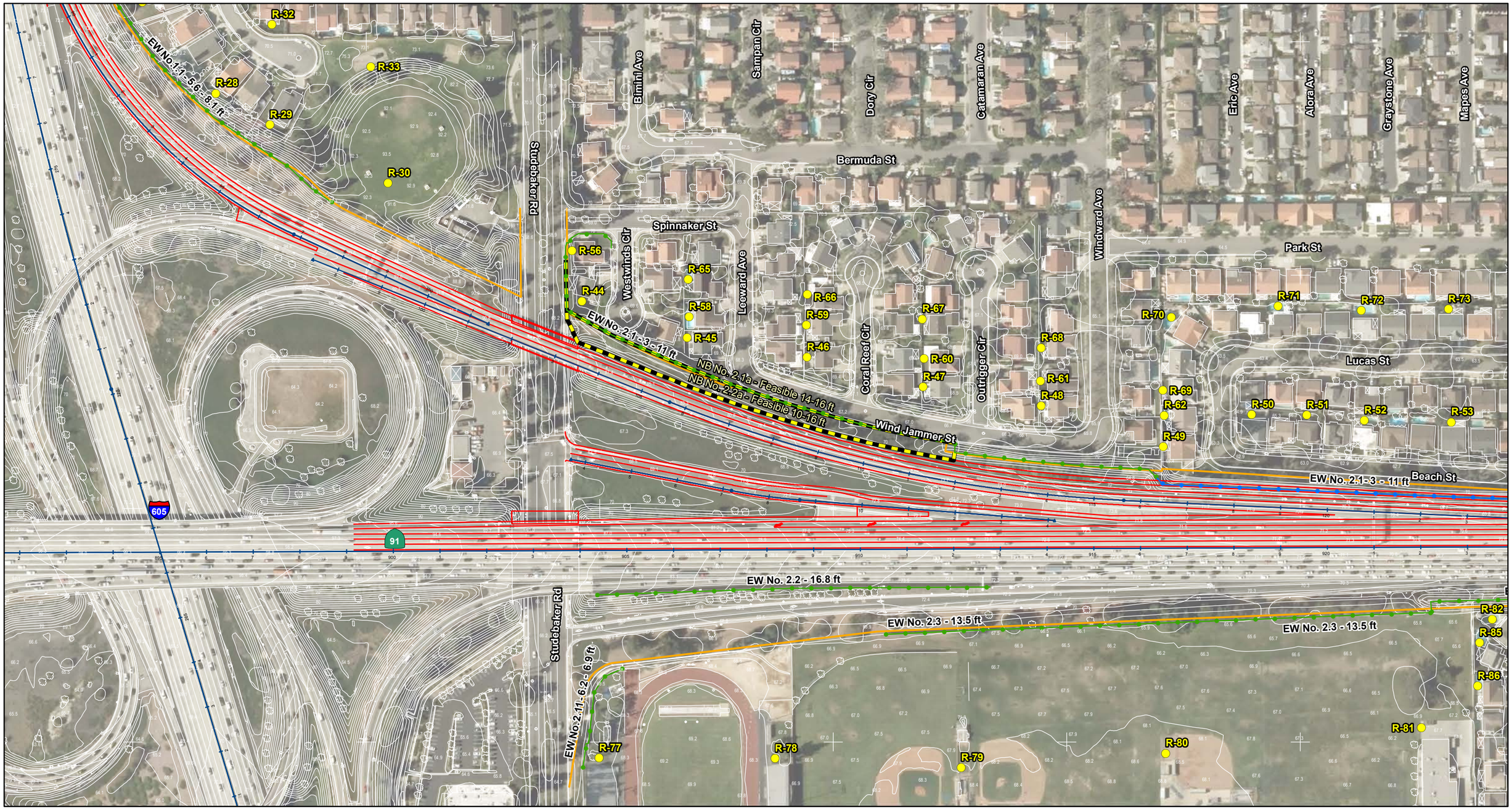
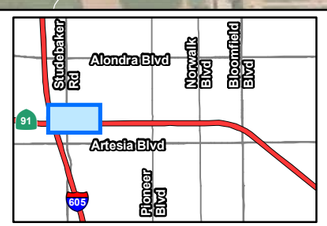


LEGEND

- Modeled Receptors
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)*
- Modeled Noise Barriers

*The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

0 100 200
FEET



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-9

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Non-Standard Lane and Shoulder Widths Design Option – Reduced Barriers

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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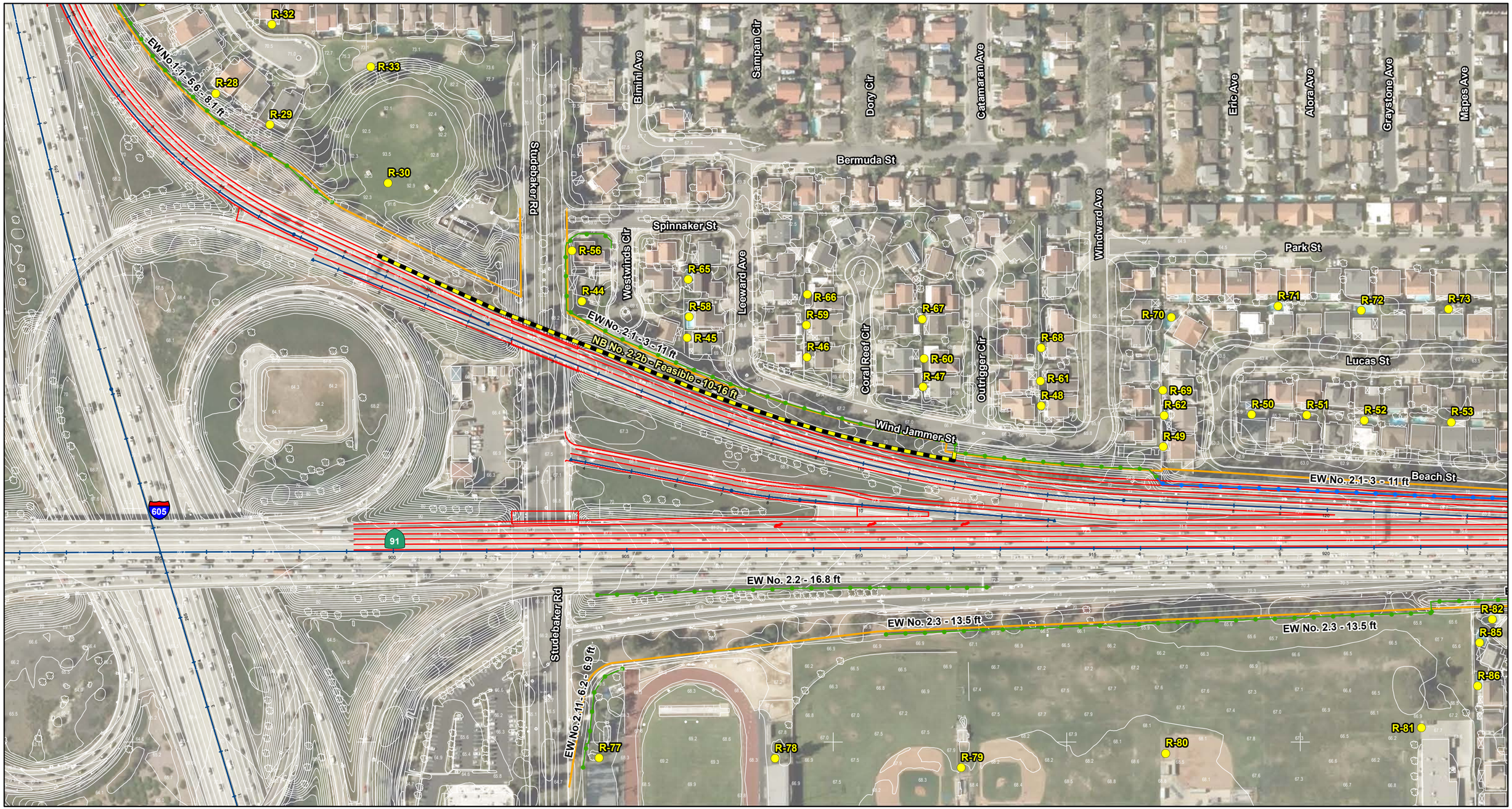

LEGEND

- Modeled Receptors
- Non-Standard Lane and Shoulder Widths Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)*
- Modeled Noise Barrier

*The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

0 100 200
FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-10

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Location for Design Option 1: Reduced Lane/Shoulder Width – Noise Barrier No. 2.2b

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123 through R-128.
- **NB No. 3.3:** A 670 ft long barrier along the edge of the shoulder on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104.
- **NB No. 4.1:** A 340 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptor R-155.
- **NB No. 4.2:** A 971 ft long barrier along the private property line and the State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-221 through R-225, R-229, R-230, and R-234.
- **NB No. 5.1:** A 1,028 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptor R-242.
- **NB No. 5.2:** A 408 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-246, R-247, and R-262.
- **NB No. 5.3:** A 2,008 ft long barrier along the State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-276, R-277, R-279, R-282 through R-284, and R-289.
- **NB No. 6.1:** A 355 ft long barrier along the edge of the shoulder on the eastbound side of SR-91 was analyzed to shield Receptors R-344 through R-347 and R-351.

Design Option 5: Four-Lane Gridley Road Overcrossing

The four-lane Gridley Road Overcrossing structure is a design option request by the City of Cerritos. No additional ROW acquisition would result. The location of the modeled noise barrier for Design Option 5 (Four-Lane Gridley Road Overcrossing) is shown on Figure 2.13-9. The following noise barrier was analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Design Option 5 (Four-Lane Gridley Road Overcrossing) and is summarized in Table 2.13.12:

- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123, R-124, and R-126 through R-128.

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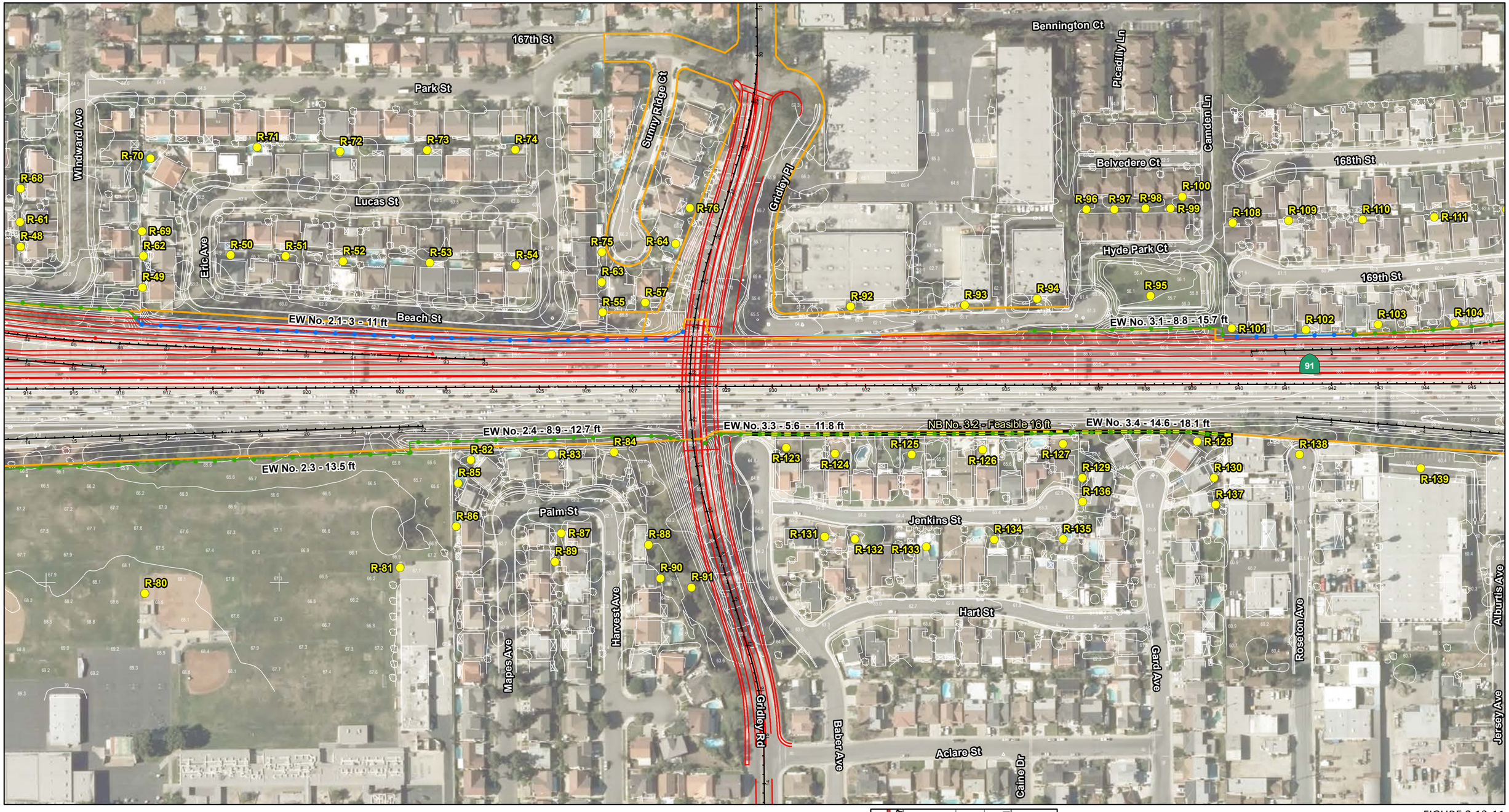

LEGEND

- Modeled Receptors
- Four-Lane Gridley Road Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)*
- Modeled Noise Barriers

0 100 200
FEET

*The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-11

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Four-Lane Gridley Road Overcrossing Design Option

07-LA-91

SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8

EFIS 0716000284; EA 29811

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Design Option 2: Pioneer Boulevard L-9

Design Option 2 (Pioneer Boulevard L-9) of the Build Alternative proposes a Type L-9 westbound ramp configuration at the Pioneer Boulevard interchange, which is the same configuration as the existing condition. However, the two westbound on-ramps would be squared up in relation to Pioneer Boulevard. The locations of the modeled noise barriers for Design Option 2 (Pioneer Boulevard L-9) is shown on Figure 2.13-12. The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Design Option 2 (Pioneer Boulevard L-9) and are summarized in Table 2.13.13.

- **NB No. 3.1:** A 1,051 ft long barrier along the private property line and State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104 and R-107.
- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123, R-124, and R-126 through R-128.
- **NB No. 4.1:** A 1,671 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-155 and R-177 through R-183.

Design Option 3: Pioneer Boulevard Westbound Ramps/168th Alignment

Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment) of the Build Alternative proposes to align the SR-91 westbound ramps with 168th Street in Artesia, creating a four-legged intersection with Pioneer Boulevard as the north-south legs, the westbound ramps being the east leg, and 168th Street being the west leg. This option requires additional ROW acquisition of six properties within Artesia and demolition and replacement of the western portion of EW No. 4.1, which is shown on Figure 2.13-13. The noise level reduction provided by the replacement of EW No. 4.1 is shown in Table 2.13.17. The locations of the modeled noise barriers for Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment) are shown on Figure 2.13-13. The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment) and are summarized in Table 2.13.14:

- **NB No. 3.1:** A 1,051 ft long barrier along the private property line and State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104 and R-107.

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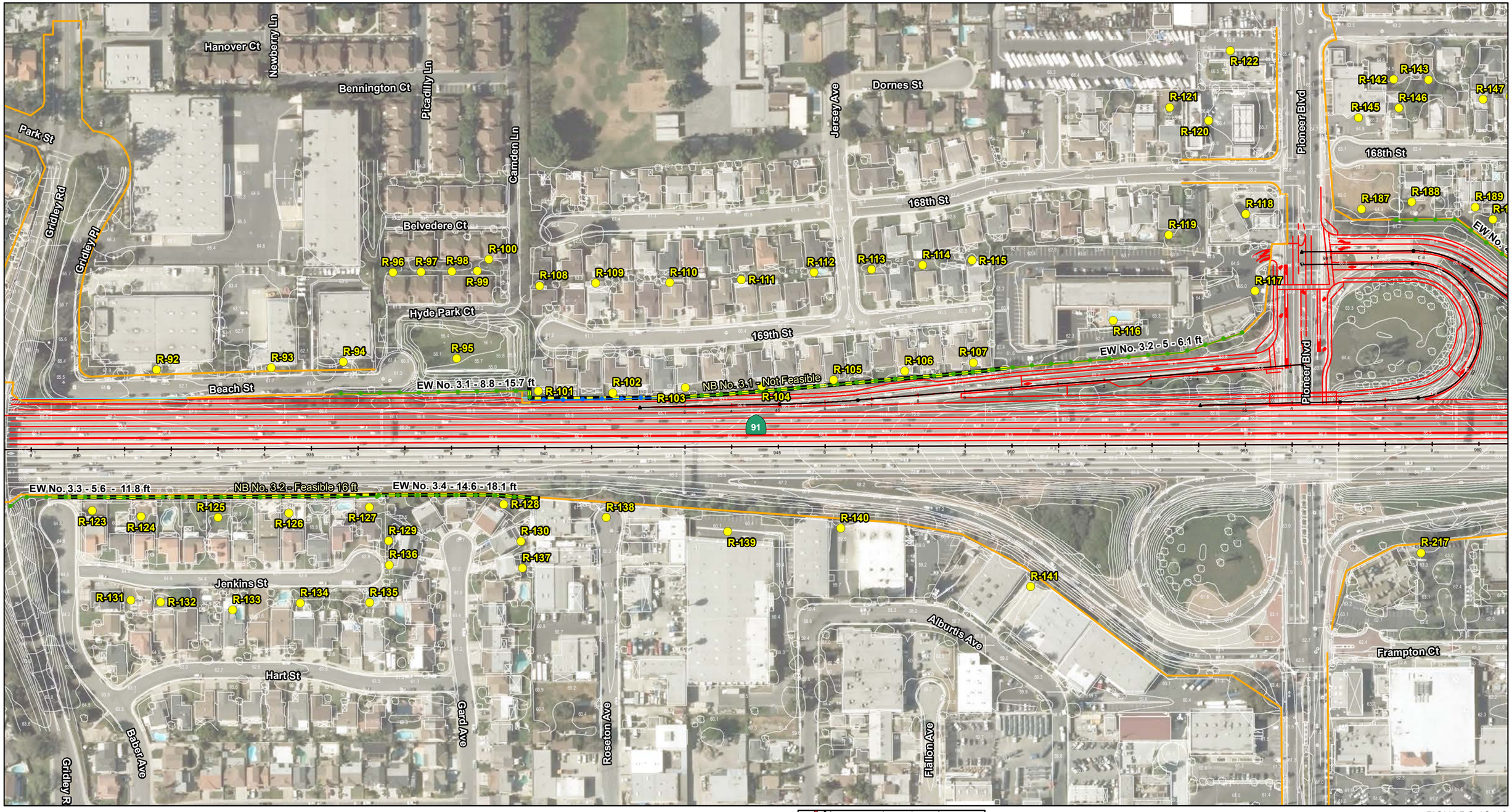
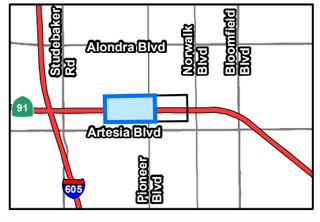


LEGEND

- Modeled Receptors*
- Pioneer Boulevard L-9 Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200
FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-12
Sheet 1 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Pioneer Boulevard L-9 Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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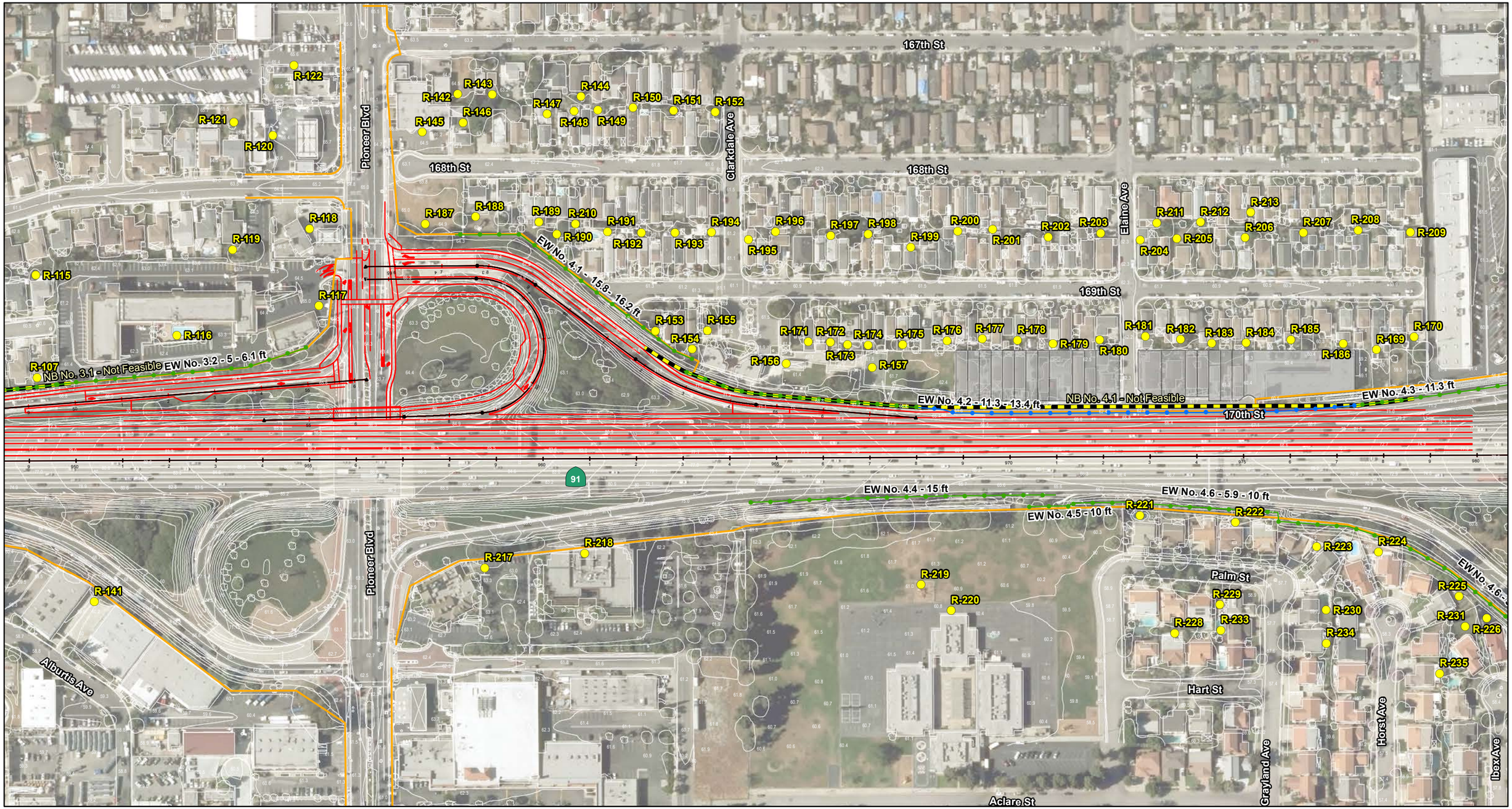
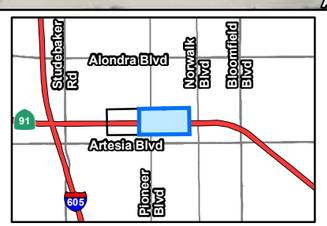


LEGEND

- Modeled Receptors*
- Pioneer Boulevard L-9 Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-12
Sheet 2 of 2

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Pioneer Boulevard L-9 Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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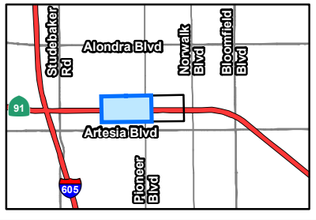
LEGEND

- Modeled Receptors*
- Pioneer Boulevard Westbound Ramps/168th Alignment Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Existing Wall (Replace)***
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-158 through R-168 and R-187 through R-189 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.
***Replacement location for EW No. 4.1.



SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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FIGURE 2.13-13
Sheet 1 of 2
Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Pioneer Boulevard Westbound Ramps/168th Alignment Design Option
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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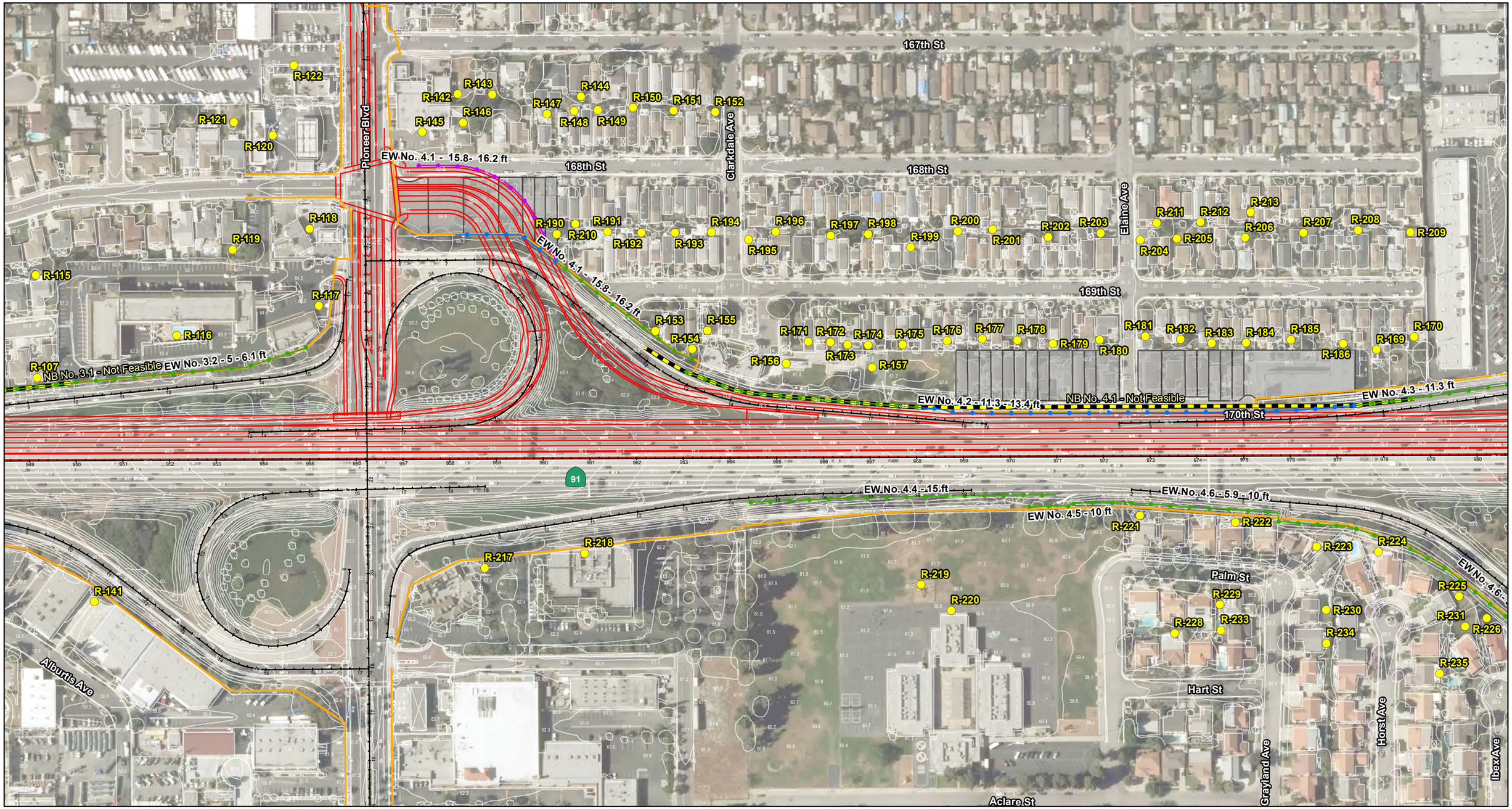

LEGEND

- Modeled Receptors*
- Pioneer Boulevard Westbound Ramps/168th Alignment Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Existing Wall (Replace)***
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

SOURCE: Eagle Aerial (4/2014); Michael Baker (12/2017)

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*Receptors R-158 through R-168 and R-187 through R-189 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.
***Replacement location for EW No. 4.1.

FIGURE 2.13-13
Sheet 2 of 2
Westbound SR-91 Improvement Project
Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Pioneer Boulevard Westbound Ramps/168th Alignment Design Option
07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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Table 2.13.17 Change in Noise Level from the Replacement of EW No. 4.1 for Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)			
							2044 Noise Level			
							Without Project, dBA L_{eq}	With Project without Replacement of EW No. 4.1, dBA L_{eq}	With Project with Replacement of EW No. 4.1, dBA L_{eq}	Change in Noise Level
R-142	EW No. 4.1		167th Street	Vacant Land	0	56	57	58	57	1
R-143	EW No. 4.1		167th Street	Residential	3	57	57[2]	59	56	3
R-144	EW No. 4.1		167th Street	Residential	2	56	57	59	57	2
R-145	EW No. 4.1		Pioneer Boulevard	Light Industrial	0	61	61	63	63	0
R-146	EW No. 4.1		168th Street	Residential	2	56	56	59	58	1
R-147	EW No. 4.1		168th Street	Residential	2	56	56	59	58	1
R-148	EW No. 4.1		168th Street	Residential	3	56	56	59	56	3
R-149	EW No. 4.1		168th Street	Residential	2	56	56	58	56	2
R-150	EW No. 4.1		168th Street	Residential	3	56	56	58	56	2
R-151	EW No. 4.1		168th Street	Residential	3	56	56	57	56	1
R-152	EW No. 4.1		168th Street	Residential	2	56	56	57	57	0
R-153	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	60	61	62	62	0
R-154	EW No. 4.1	NB No. 4.1	169th Street	Residential	2	61	62	63	63	0
R-155	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	65	65	**66**	**66**	0
R-156	EW No. 4.2	NB No. 4.1	169th Street	Community Center	1	66 / 46[3]	67 / 47[3]	68 / 48[3]	68 / 48[3]	0
R-157	EW No. 4.2	NB No. 4.1	169th Street	Playground	1	64	65	65	65	0
R-158	EW No. 4.2*		170th Street	Residential	2	65	65	NA	NA	NA
R-159	EW No. 4.2*		170th Street	Residential	2	60	60	NA	NA	NA
R-160	EW No. 4.2*		170th Street	Residential	2	59	59	NA	NA	NA
R-161	EW No. 4.2*		170th Street	Residential	2	58	58	NA	NA	NA
R-162	EW No. 4.2*		170th Street	Residential	2	62	63	NA	NA	NA
R-163	EW No. 4.2*		170th Street	Residential	1	62	62	NA	NA	NA
R-164	EW No. 4.2*		170th Street	Residential	1	63	64	NA	NA	NA
R-165	EW No. 4.2*		170th Street	Residential	1	64	65	NA	NA	NA
R-166	EW No. 4.2*		170th Street	Residential	2	64	65	NA	NA	NA
R-167	EW No. 4.2*		170th Street	Residential	2	64	64	NA	NA	NA
R-168	EW No. 4.2*		170th Street	Light Industrial	0	61	61	NA	NA	NA
R-169	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	62	63	63	0
R-170	EW No. 4.3	NB No. 4.1	169th Street	Residential	1	61	61	62	62	0
R-171	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	64	0
R-172	EW No. 4.2	NB No. 4.1	169th Street	Residential	1	63	63	64	64	0
R-173	EW No. 4.2	NB No. 4.1	169th Street	Day Care Center	1	63 / 43[3]	64 / 44[3]	64 / 44[3]	64 / 44[3]	0
R-174	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	63	63	64	64	0
R-175	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	64	64	0

Table 2.13.17 Change in Noise Level from the Replacement of EW No. 4.1 for Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA $L_{eq}(h)$	Future Worst-Hour Noise Levels, dBA $L_{eq}(h)$			
							2044 Noise Level			
							Without Project, dBA L_{eq}	With Project without Replacement of EW No. 4.1, dBA L_{eq}	With Project with Replacement of EW No. 4.1, dBA L_{eq}	Change in Noise Level
R-176	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	64	0
R-177	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	**67**	0
R-178	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	**67**	**67**	0
R-179	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	63	**67**	**67**	0
R-180	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	64	**67**	**67**	0
R-181	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	**67**	0
R-182	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	64	65	**67**	**67**	0
R-183	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	65	65	**67**	**67**	0
R-184	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	61	61	64	64	0
R-185	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	64	0
R-186	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	64	64	0
R-187			168th Street	Vacant Land	0	65	65	NA	NA	NA
R-188	EW No. 4.1		168th Street	Residential	2	59	59	NA	NA	NA
R-189	EW No. 4.1		168th Street	Residential	3	55	56	NA	NA	NA
R-190	EW No. 4.1		169th Street	Residential	1	55	56	63	56	7
R-191	EW No. 4.1		169th Street	Residential	2	56	57	59	58	1
R-192	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	57	58	59	58	1
R-193	EW No. 4.1	NB No. 4.1	169th Street	Residential	3	58	58	59	59	0
R-194	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	58	58	59	59	0
R-195	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	62	62	63	62	1
R-196	EW No. 4.2	NB No. 4.1	169th Street	Residential	2	61	61	62	62	0
R-197	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	61	61	62	61	1
R-198	EW No. 4.2	NB No. 4.1	169th Street	Residential	3	60	60	61	61	0
R-199	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	59	59	60	59	1
R-200	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	64	0
R-201	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	64	0
R-202	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	63	63	0
R-203	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	62	63	64	64	0
R-204	EW No. 4.2*	NB No. 4.1	169th Street	Residential	2	63	63	64	64	0
R-205	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	62	63	64	64	0
R-206	EW No. 4.2*	NB No. 4.1	169th Street	Residential	3	63	64	65	65	0
R-207	EW No. 4.3*	NB No. 4.1	169th Street	Residential	3	60	60	61	61	0
R-208	EW No. 4.3	NB No. 4.1	169th Street	Residential	3	60	61	61	61	0
R-209	EW No. 4.3	NB No. 4.1	169th Street	Residential	2	61	61	61	61	0

Table 2.13.17 Change in Noise Level from the Replacement of EW No. 4.1 for Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

Receptor No.	Existing Wall No.[1]	Noise Barrier No.	Location	Land Use	No. of Receptors/ Units	Existing Noise Level, dBA L_{eq}(h)	Future Worst-Hour Noise Levels, dBA L_{eq}(h)			
							2044 Noise Level			
							Without Project, dBA L_{eq}	With Project without Replacement of EW No. 4.1, dBA L_{eq}	With Project with Replacement of EW No. 4.1, dBA L_{eq}	Change in Noise Level
R-210	EW No.4.1		168th Street	Residential	2	56	56	61	57	4
R-211	EW No. 4.2*	NB No. 4.1	168th Street	Residential	2	62	63	64	64	0
R-212	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	63	63	64	64	0
R-213	EW No. 4.2*	NB No. 4.1	168th Street	Residential	3	64	64	65	65	0
R-214	EW No. 4.3		Park Street	Light Industrial	0	66	66	66	66	0
R-215			Norwalk Boulevard	Gas Station	0	69	69	69	69	0
R-216			Norwalk Boulevard	Light Industrial	0	63	63	63	63	0

Source: Compiled by LSA Associates, Inc. (2018).

[1] An * represents an existing wall that would be demolished as part of the project. The existing wall would be reconstructed to match the existing height at a minimum.

[2] Numbers in **bold** represent noise levels that approach or exceed the NAC.

[3] The exterior-to-interior noise level reduction was assumed to be 20 dBA lower because the building type is light frame with ordinary windows.

dBA = A-weighted decibels

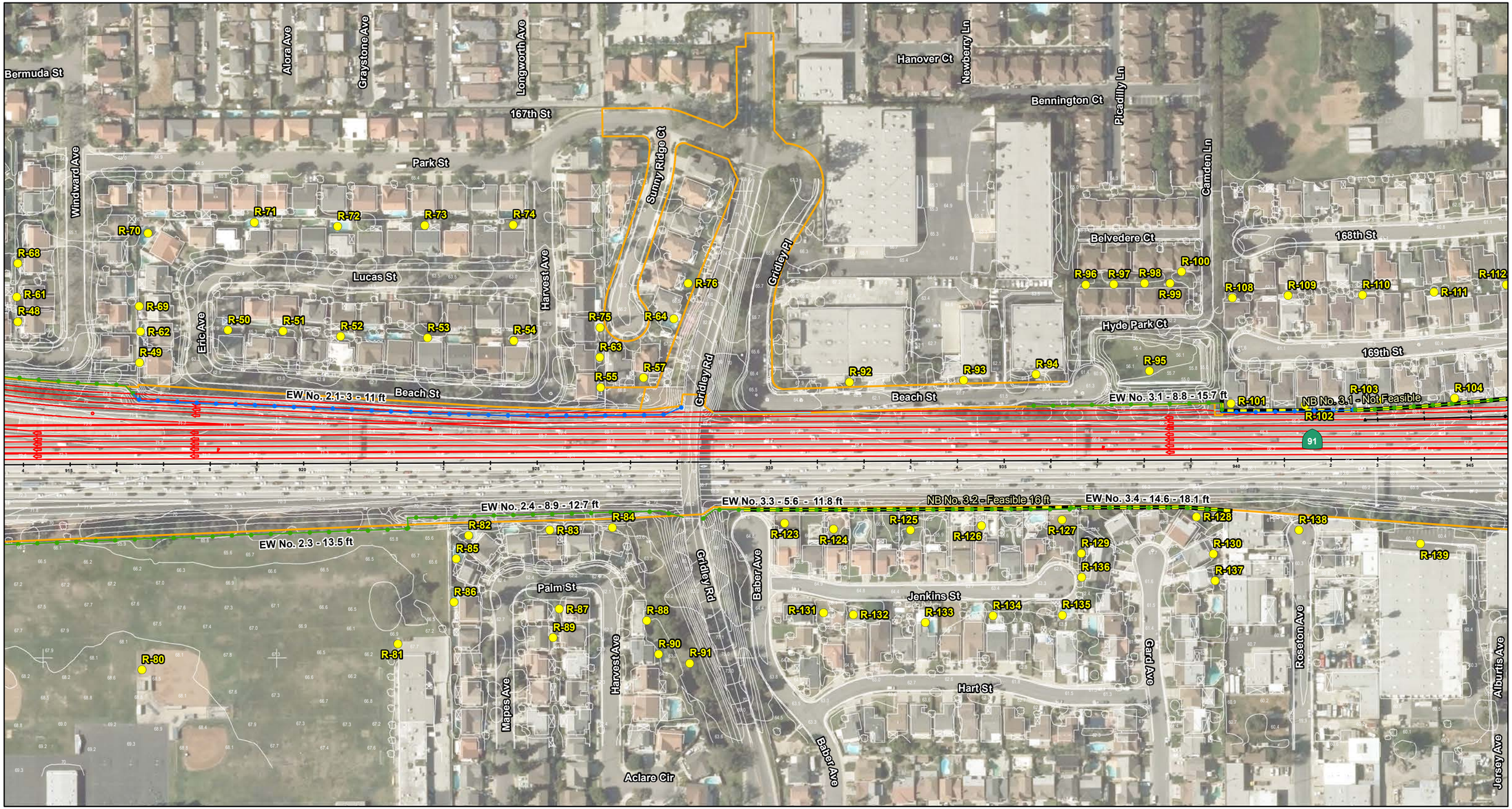
NAC = Noise Abatement Criteria

- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123, R-124, and R-126 through R-128.
- **NB No. 4.1:** A 1,671 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-155 and R-177 through R-183.

Design Option 4: Diamond Ramps

Design Option 4 (Diamond Ramps) of the Build Alternative proposes diamond configuration ramps at westbound Pioneer Boulevard and Norwalk Boulevard interchanges. The locations of the modeled noise barriers for Design Option 4 (Diamond Ramps) are shown on Figure 2.13-14. The following noise barriers were analyzed to shield receptor locations that would be exposed to traffic noise levels approaching or exceeding the NAC for Design Option 4 (Diamond Ramps) and are summarized in Table 2.13.15:

- **NB No. 3.1:** A 1,051 ft long barrier along the private property line and State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-101 through R-104 and R-107.
- **NB No. 3.2:** A 1,047 ft long barrier along the private property line on the eastbound side of SR-91 was analyzed to shield Receptors R-123, R-124, and R-126 through R-128.
- **NB No. 4.1:** A 1,667 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-155 and R-177 through R-183.
- **NB No. 4.2:** A 971 ft long barrier along the private property line and State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-221 through R-225, R-229, R-230, and R-234.
- **NB No. 5.1:** A 1,028 ft long barrier along the State ROW on the eastbound side of SR-91 was analyzed to shield Receptor R-234.
- **NB No. 5.2:** A 359 ft long barrier along the State ROW on the westbound side of SR-91 was analyzed to shield Receptors R-246, R-247, and R-262.
- **NB No. 5.3:** A 2,008 ft long barrier along the State ROW on the eastbound side of SR-91 was analyzed to shield Receptors R-276, R-277, R-279, R-282 through R-284, and R-289.

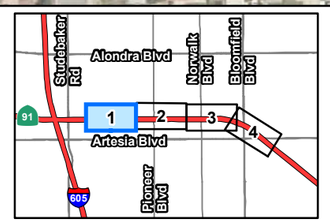


LEGEND

- Modeled Receptors*
- Diamond Ramps Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

I:\RBF1601\GIS\MXD\Noise\ModeledNoiseBarriers_Diamond.mxd (11/28/2018)

FIGURE 2.13-14
Sheet 1 of 4

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Diamond Ramps Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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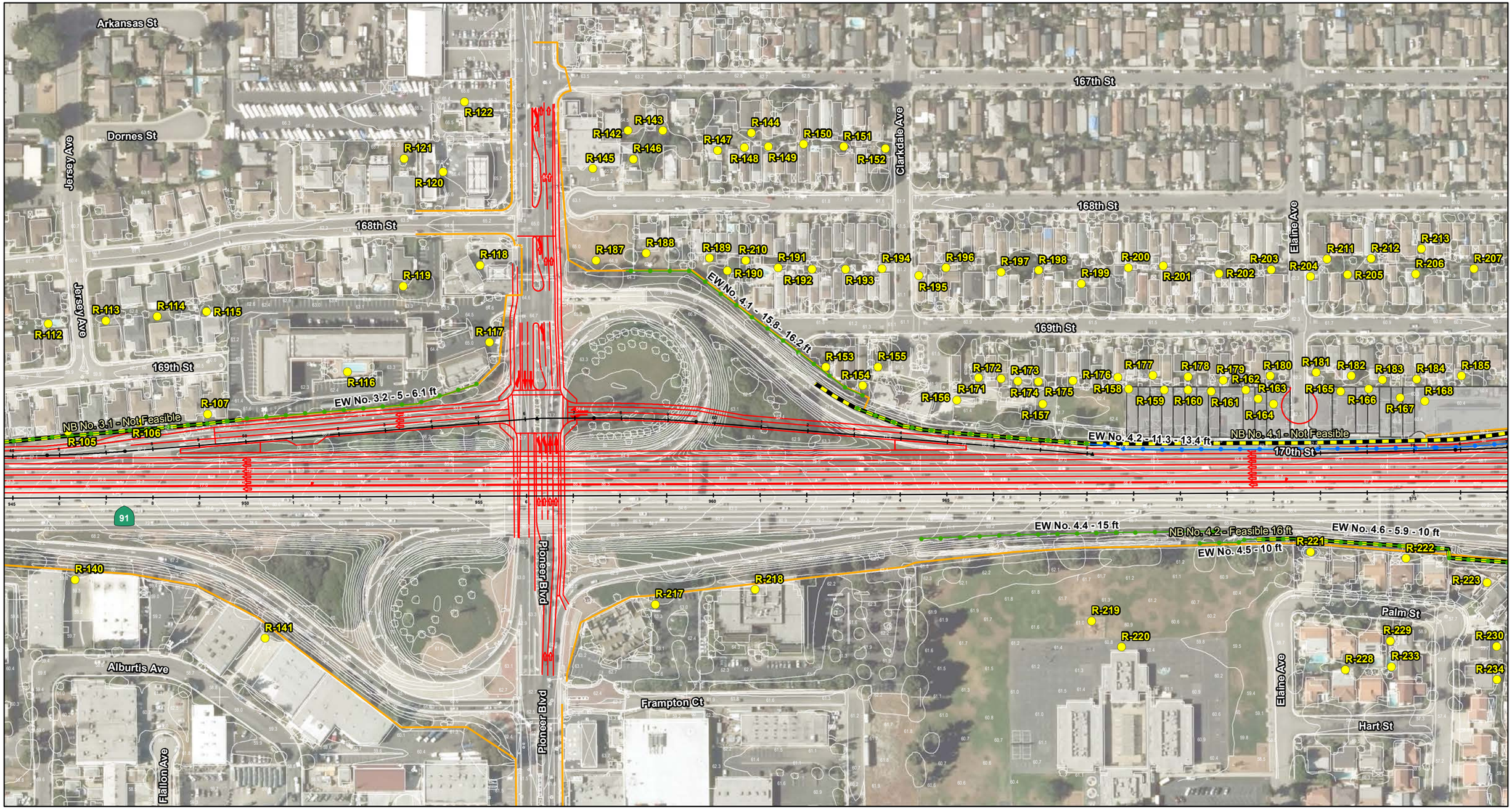
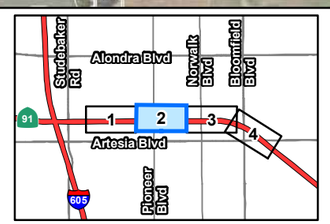


LEGEND

- Modeled Receptors*
- Diamond Ramps Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.



SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-14
Sheet 2 of 4

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Diamond Ramps Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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LEGEND

- Modeled Receptors*
- Diamond Ramps Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200 FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

I:\RBF1601\GIS\MXD\Noise\ModeledNoiseBarriers_Diamond.mxd (11/28/2018)

FIGURE 2.13-14
Sheet 3 of 4

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Diamond Ramps Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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LEGEND

- Modeled Receptors*
- Diamond Ramps Design Option
- Existing Right-of-Way
- Proposed Right-Of-Way
- Existing Wall
- Existing Wall (Demolish)**
- Modeled Noise Barriers
- Acquisition

0 100 200
FEET

*Receptors R-158 through R-168 are not shown because the properties would be acquired.
**The existing wall would be demolished as part of the project and replaced at the new location at a minimum.

SOURCE: Eagle Aerial (4/2014); Michael Baker (9/2017)

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FIGURE 2.13-14
Sheet 4 of 4

Westbound SR-91 Improvement Project

Modeled Noise Barriers and Receptor Locations for the Build Alternative with the Diamond Ramps Design Option

07-LA-91
SR-91 PM 16.9-19.8; I-605 PM 5.0-5.8
EFIS 0716000284; EA 29811

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Feasibility and Reasonable Allowance

Section 3 of the Noise 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 requirements for driveways, (3) the presence of local cross-streets, (4) underground utilities, (5) other noise sources in the area, and (6) safety considerations.

Tables 2.13.18 through 2.13.23 summarize the feasibility of the modeled noise barriers and list the noise barrier heights, the approximate lengths, the noise attenuation range, the number of benefited units/receptors, and the total reasonable allowance. Table 2.13.18 summarizes those factors under the Build Alternative. Table 2.13.19 summarizes those factors under the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width). Table 2.13.20 summarizes those factors under the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing). Table 2.13.21 summarizes those factors under the Build Alternative with Design Option 2 (Pioneer Boulevard L-9). Table 2.13.22 summarizes those factors under the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment). Table 2.13.23 summarizes those factors under the Build Alternative with Design Option 4 (Diamond Ramps). Tables 2.13.9 and 2.13.22 summarize those factors for the Preferred Alternative, which includes Design Option 1 and Design Option 3.

Of the 16 modeled noise barriers evaluated for the Build Alternative, 11 noise barriers were determined to be feasible. The remaining 5 noise barriers (NB Nos. 1.1, 2.3, 3.1, 4.1, and 5.3) were determined to be not feasible because the barriers were not capable of reducing noise levels by 5 dBA or more. Of the 15 modeled noise barriers evaluated for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width), 10 noise barriers were determined to be feasible. The remaining 5 noise barriers (NB Nos. 2.3, 3.1, 4.1, 5.2, and 5.3) were determined to be not feasible because the barriers were not capable of reducing noise levels by 5 dBA or more. One modeled noise barrier was evaluated for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing) and was determined to be feasible. Of the 3 modeled noise barriers evaluated for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9), 1 noise barrier was determined to be feasible. The remaining 2 noise barriers (NB Nos. 3.1 and 4.1) were determined to be not feasible because the barriers were not capable of reducing noise levels by 5 dBA or more.

Table 2.13.18 Summary of Feasible Noise Barriers for the Build Alternative

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		Top of Wall Elevation	
							Begin	End	Begin	End
2.1	14	1,697	6	1	$95,000	PL	903+75	918+80	98	88.65
	16[3]	1,697	7	4	$380,000		903+75	918+80	100	90.65
2.2	10[4]	1,639	5	1	$95,000	EOS	903+95	918+90	98	84.25
	12	1,639	5	7	$665,000		903+95	918+90	100	86.25
	14	1,639	6	11	$1,045,000		903+95	918+90	102	88.25
	16	1,639	6	11	$1,045,000		903+95	918+90	104	90.25
2.1a	14	991	6	1	$95,000	PL	903+75	912+00	84	82.6
	16[3]	991	7	4	$380,000		903+75	912+00	86	84.6
2.2a	14[5]	932	6	9	$855,000	EOS/PL	903+75	912+05	82.94	90
	16	932	6	13	$1,235,000		903+75	912+05	84.94	92
2.2b	16[4]	1,330	7	13	$1,235,000	EOS	898+75	912+05	108.23	92
3.2	16[4]	1,047	5	6	$570,000	PL	929+45	939+90	82.2	82
3.3	14[4]	1,122	6	9	$855,000	EOS	939+10	950+30	80.2	80
	16	1,122	7	9	$855,000		939+10	950+30	82.2	82
4.2	16[4]	971	5	5	$475,000	ROW/PL	971+65	980+60	86	82
5.1	14[4]	1,028	5	1	$95,000	ROW	986+15	992+00	78	78
	16	1,028	6	1	$95,000		986+15	992+00	80	80
5.2	16[3]	1,078	6	5	$475,000	ROW	993+85	1004+10	80	87.39
6.1	6	355	5	1	$95,000	ROW	1015+85	1019+50	68	68
	8	355	7	3	$285,000		1015+85	1019+50	70	70
	10	355	10	5	$475,000		1015+85	1019+50	72	72
	12	355	12	16	$1,520,000		1015+85	1019+50	74	74
	14	355	13	20	$1,900,000		1015+85	1019+50	76	76
	16[5]	355	14	20	$1,900,000		1015+85	1019+50	78	78

Source: *Noise Abatement Decision Report* (2018).

[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 $95,000 (the dollar amount per benefited receptor/unit).

[3] Denotes that the maximum feasible barrier height modeled would not break the line-of-sight between the receptor and a truck exhaust stack.

[4] Denotes that the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack is lower than the minimum feasible barrier height.

[5] Denotes the minimum barrier height required to break the line-of-sight between the receptor and a truck exhaust stack.

dBA = A-weighted decibels
EOS = edge of shoulder
ft = foot/feet
PL = property line
ROW = right-of-way

Table 2.13.19 Summary of Feasible Noise Barriers for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

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		Top of Wall Elevation	
							Begin	End	Begin	End
2.1	14	1,700	6	1	$95,000	PL	903+75	918+75	98	88.65
	16[3]	1,700	7	4	$380,000		903+75	918+75	100	90.65
2.2	14[4]	1,639	6	9	$855,000	EOS	903+95	918+90	102	88.25
	16	1,639	6	9	$855,000		903+95	918+90	104	90.25
2.1a	14	991	6	1	$95,000	PL	903+75	912+00	84	82.6
	16[3]	991	7	4	$380,000		903+75	912+00	86	84.6
2.2a	14	936	6	9	$855,000	EOS/PL	903+75	912+05	82.94	90
	16[3]	936	6	11	$1,045,000		903+75	912+05	84.94	92
2.2b	16[4]	1,330	7	11	$1,045,000	EOS	898+75	912+05	108.23	92
3.2	16[4]	1,047	5	3	$285,000	PL	929+45	939+90	82.2	82
3.3	14[5]	670	6	11	$1,045,000	EOS	939+10	945+75	78	80.67
	16	670	6	11	$1,045,000		939+10	945+75	80	82.67
4.2	16[4]	971	5	5	$475,000	ROW/PL	971+65	980+60	86	82
5.1	14	1,028	5	1	$95,000	ROW	986+15	992+00	78	78
	16[5]	1,028	6	1	$95,000		986+15	992+00	80	80
6.1	6	355	5	1	$95,000	ROW	1015+85	1019+50	68	68
	8	355	7	3	$285,000		1015+85	1019+50	70	70
	10	355	10	9	$855,000		1015+85	1019+50	72	72
	12	355	11	16	$1,520,000		1015+85	1019+50	74	74
	14	355	13	20	$1,900,000		1015+85	1019+50	76	76
	16[5]	355	14	20	$1,900,000		1015+85	1019+50	78	78

Source: *Noise Abatement Decision Report* (2018).

[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 $95,000 (the dollar amount per benefited receptor/unit).

[3] Denotes that the maximum feasible barrier height modeled would not break the line-of-sight between the receptor and a truck exhaust stack.

[4] Denotes that the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack is lower than the minimum feasible barrier height.

[5] Denotes the minimum barrier height required to break the line-of-sight between the receptor and a truck exhaust stack.

dBA = A-weighted decibels
EOS = edge of shoulder
ft = foot/feet
PL = property line
ROW = right-of-way

Table 2.13.20 Summary of Feasible Noise Barriers for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing)

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		Top of Wall Elevation	
							Begin	End	Begin	End
3.2	16[3]	1,047	5	6	$570,000	PL	929+45	939+90	82.2	82

Source: *Noise Abatement Decision Report* (2018).
[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 $95,000 (the dollar amount per benefited receptor/unit).
[3] Denotes that the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack is lower than the minimum feasible barrier height.
dBA = A-weighted decibels
EOS = edge of shoulder
ft = foot/feet
PL = property line
ROW = right-of-way

Table 2.13.21 Summary of Feasible Noise Barriers for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9)

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		Top of Wall Elevation	
							Begin	End	Begin	End
3.2	16[3]	1,047	5	6	$570,000	PL	929+45	939+90	82.2	82

Source: *Noise Abatement Decision Report* (2018).
[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 $95,000 (the dollar amount per benefited receptor/unit).
[3] Denotes that the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack is lower than the minimum feasible barrier height.
dBA = A-weighted decibels
ft = foot/feet
PL = property line

Table 2.13.22 Summary of Feasible Noise Barriers for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment)

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		Top of Wall Elevation	
							Begin	End	Begin	End
3.2	16[3]	1,047	5	6	$570,000	PL	929+45	939+90	82.2	82

Source: *Noise Abatement Decision Report* (2018).
[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 $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.
dBA = A-weighted decibels
ft = foot/feet
PL = property line

Table 2.13.23 Summary of Feasible Noise Barriers for the Build Alternative with Design Option 4 (Diamond Ramps)

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		Top of Wall Elevation	
							Begin	End	Begin	End
3.2	16[3]	1,047	5	6	$570,000	PL	929+45	939+90	82.2	82
4.2	16[4]	971	5	5	$475,000	ROW/PL	971+65	980+60	86	82
5.1	14[4]	1,028	5	1	$95,000	ROW	986+15	992+00	78	78
	16	1,028	6	1	$95,000		986+15	992+00	80	80

Source: *Noise Abatement Decision Report* (2018).
[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 $95,000 (the dollar amount per benefited receptor/unit).
[3] Denotes that the maximum feasible barrier height modeled would not break the line-of-sight between the receptor and a truck exhaust stack.
[4] Denotes that the minimum wall height required to break the line-of-sight between the receptor and a truck exhaust stack is lower than the minimum feasible barrier height..
dBA = A-weighted decibels
ft = foot/feet
PL = property line
ROW = right-of-way

Of the 3 modeled noise barriers evaluated for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment), 1 noise barrier was determined to be feasible. The remaining 2 noise barriers (NB Nos. 3.1 and 4.1) were determined to be not feasible because the barriers were not capable of reducing noise levels by 5 dBA or more. Of the 7 modeled noise barriers evaluated for the Build Alternative with Design Option 4 (Diamond Ramps), 3 noise barriers were determined to be feasible. The remaining 4 noise barriers (NB Nos. 3.1, 4.1, 5.2, and 5.3) were determined to be not feasible because the barriers were not capable of reducing noise levels by 5 dBA or more.

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 Noise 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 the Build Alternative and the Build Alternative with design options was developed by the project engineer. Tables 2.13.24 through 2.13.29 summarize the abatement information and list 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. Table 2.13.24 summarizes those factors under the Build Alternative. Table 2.13.25 summarizes those factors under the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width). Table 2.13.26 summarizes those factors under the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing). Table 2.13.27 summarizes those factors under the Build Alternative with Design Option 2 (Pioneer Boulevard L-9). Table 2.13.28 summarizes those factors under the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment). Table 2.13.29 summarizes those factors under the Build Alternative with Design Option 4 (Diamond Ramps).

Table 2.13.24 Summary of Abatement Key Information for the Build Alternative

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
2.1	PL	14	1,697	6	1	$95,000	--[2]	No
		16	1,697	7	4	$380,000	$1,206,865	No
2.2	EOS	10	1,639	5	1	$95,000	--	No
		12	1,639	5	7	$665,000	--	No
		14	1,639	6	11	$1,045,000	--	No
		16	1,639	6	11	$1,045,000	--	No
2.1a	PL	14	991	6	1	$95,000	--	No
		16	991	7	4	$380,000	$692,385	No
2.2a	EOS/PL	14	932	6	9	$855,000	--	No
		16	932	6	13	$1,235,000	--	No
2.2b	EOS	16	1,330	7	13	$1,235,000	$1,073,820	Yes
3.2	PL	16	1,047	5	6	$570,000	--	No
3.3	EOS	14	1,122	6	9	$855,000	--	No
		16	1,122	7	9	$855,000	$1,244,266	No
4.2	ROW/PL	16	971	5	5	$475,000	--	No
5.1	ROW	14	1,028	5	1	$95,000	--	No
		16	1,028	6	1	$95,000	--	No
5.2	ROW	16	1,078	6	5	$475,000	--	No
6.1	ROW	6	355	5	1	$95,000	--	No
		8	355	7	3	$285,000	$227,332	Yes
		10	355	10	5	$475,000	$242,952	Yes
		12	355	12	16	$1,520,000	$261,421	Yes
		14	355	13	20	$1,900,000	$282,739	Yes
		16	355	14	20	$1,900,000	$304,057	Yes

Source: *Noise Abatement Decision Report* (2018).
[1] Number of receptors/units that are attenuated 5 dBA or more by the modeled barrier.
[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.
dBA = A-weighted decibels
EOS = Edge of Shoulder
ft = foot/feet
PL = property line
ROW = right-of-way

Table 2.13.25 Summary of Abatement Key Information for the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width)

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
2.1	PL	14	1,700	6	1	$95,000	--[2]	No
		16	1,700	7	4	$380,000	$1,208,286	No
2.2	EOS	14	1,639	6	9	$855,000	--	No
		16	1,639	6	9	$855,000	--	No
2.1a	PL	14	991	6	1	$95,000	--	No
		16	991	7	4	$380,000	$692,385	No
2.2a	EOS/PL	14	936	6	9	$855,000	--	No
		16	936	6	11	$1,045,000	--	No
2.2b	EOS	16	1,330	7	11	$1,045,000	$1,073,820	Yes[3]
3.2	PL	16	1,047	5	3	$285,000	--	No
3.3	EOS	14	670	6	11	$1,045,000	--	No
		16	670	6	11	$1,045,000	--	No
4.2	ROW/PL	16	971	5	5	$475,000	--	No
5.1	ROW	14	1,028	5	1	$95,000	--	No
		16	1,028	6	1	$95,000	--	No
6.1	ROW	6	355	5	1	$95,000	--	No
		8	355	7	3	$285,000	$227,332	Yes
		10	355	10	9	$855,000	$242,952	Yes
		12	355	11	16	$1,520,000	$261,421	Yes
		14	355	13	20	$1,900,000	$282,739	Yes
		16	355	14	20	$1,900,000	$304,057	Yes

Source: *Noise Abatement Decision Report* (2018).

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

[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.

[3] NB No. 2.2b is considered reasonable because the estimated construction cost is within 10 percent of the total reasonable allowance.

dBA = A-weighted decibels
EOS = Edge of Shoulder
ft = foot/feet
PL = property line
ROW = right-of-way

Table 2.13.26 Summary of Abatement Key Information for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing)

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
3.2	PL	16	1,047	5	6	$570,000	--[2]	No

Source: *Noise Abatement Decision Report* (2018).
[1] Number of receptors/units that are attenuated 5 dBA or more by the modeled barrier.
[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.
dBA = A-weighted decibels
ft = foot/feet
PL = property line

Table 2.13.27 Summary of Abatement Key Information for the Build Alternative with Design Option 2 (Pioneer Boulevard L-9)

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
3.2	PL	16	1,047	5	6	$570,000	--[2]	No

Source: *Noise Abatement Decision Report* (2018).
[1] Number of receptors/units that are attenuated 5 dBA or more by the modeled barrier.
[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.
dBA = A-weighted decibels
ft = foot/feet
PL = property line

Table 2.13.28 Summary of Abatement Key Information for the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound/168th Alignment)

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
3.2	PL	16	1,047	5	6	$570,000	--[2]	No

Source: *Noise Abatement Decision Report* (2018).
[1] Number of receptors/units that are attenuated 5 dBA or more by the modeled barrier.
[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.
dBA = A-weighted decibels
ft = foot/feet
PL = property line

Table 2.13.29 Summary of Abatement Key Information for the Build Alternative with Design Option 4 (Diamond Ramps)

Noise Barrier No.	Noise Barrier Location	Height (ft)	Approximate Length (ft)	Noise Attenuation Range (dBA)	Number of Benefited Receptors/ Units[1]	Total Reasonable Allowance	Estimated Construction Cost	Reasonable?
3.2	PL	16	1,047	5	6	$570,000	--[2]	No
4.2	ROW/PL	16	971	5	5	$475,000	--	No
5.1	ROW	14	1,028	5	1	$95,000	--	No
		16	1,028	6	1	$95,000	--	No

Source: *Noise Abatement Decision Report* (2018).
[1] Number of receptors/units that are attenuated 5 dBA or more by the modeled barrier.
[2] Shaded area represents barrier heights that have been determined to be not reasonable because the barrier would not reduce noise levels by 7 dBA or more.
dBA = A-weighted decibels
ft = foot/feet
PL = property line
ROW = right-of-way

As shown in Tables 2.13.24 and 2.13.25, calculations based on preliminary design data indicate that NB Nos. 2.2b and 6.1 under the Build Alternative and the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width), respectively, are the only noise barriers determined to be reasonable. All other feasible noise barriers were determined to be not reasonable for the Build Alternative with Design Option 5 (Four-Lane Gridley Road Overcrossing), the Build Alternative with Design Option 2 (Pioneer Boulevard L-9), the Build Alternative with Design Option 3 (Pioneer Boulevard Westbound Ramps/168th Alignment), and the Build Alternative with Design Option 4 (Diamond Ramps).

The height of 14 ft for NB No. 6.1 is the recommended height because the construction cost is lower than the 16 ft high barrier and provides the maximum number of benefited receptors/units.

As part of the public review period for the project, the property owners and non-owner occupants of the benefited receptors for NB No. 6.1 were sent a noise barrier survey letter to obtain their opinion on whether or not they are in favor of NB No. 6.1 at a height of 14 ft. The noise barrier survey letters were dated September 24, 2018 and the survey ended October 12, 2018. One response was received from a non-owner occupant and they were in favor of the 14 ft high noise barrier. A follow-up survey will be conducted during the final design phase.

In addition, under the Build Alternative, the construction of NB No. 2.2b with a height of 16 ft is recommended because the barrier is both feasible and reasonable. Under the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width), the construction of NB No. 2.2b with a height of 16 ft is recommended because the barrier is considered reasonable (estimated construction cost is within 10 percent of the total reasonable allowance).

Nonacoustical Factors Relating to Feasibility

Nonacoustical factors relating to feasibility were considered for the reasonable noise barriers. These factors include: geometric standards, safety, maintenance, security, drainage, geotechnical considerations, and utility relocations. The nonacoustical factors relating to feasibility are addressed below for the feasible and reasonable noise barriers.

Build Alternative

The nonacoustical factors relating to feasibility of NB Nos. 2.2b and 6.1 under the Build Alternative and the Build Alternative with Design Option 1 (Reduced Lane/Shoulder Width) are addressed below.

- **Geometric Standards:** NB Nos. 2.2b and 6.1 would not affect the geometric standards of adjacent roadways.
- **Safety:** NB Nos. 2.2b and 6.1 would not affect sight distance for vehicular or pedestrian traffic.
- **Maintenance:** NB No. 2.2b would be placed on the edge of shoulder and would be maintained by Caltrans. NB No. 6.1 would be placed on the edge of State ROW and maintenance of the private side of the noise barrier would be the responsibility of the private property owner because it would not be accessible to Caltrans.
- **Security:** NB No. 2.2b would create an empty space between it at the edge of shoulder and the existing R/W property line wall of the residences east of Studebaker. Access control such as constructing a masonry block wall to block off visibility will be addressed during final design. NB No. 6.1 would not change the security conditions of the site and therefore would not create potential security risks by providing cover for people or articles trying to remain out of sight.
- **Drainage:** NB Nos. 2.2b and 6.1 would not affect the existing and proposed drainage system.
- **Geotechnical Considerations:** NB Nos. 2.2b and 6.1 would be constructed at a similar grade to the existing condition in native soil.
- **Utility Relocations:** No utility impacts are anticipated as a result of NB Nos. 2.2b and 6.1.

No Build Alternative

Potential long-term noise effects under the No Build Alternative would be solely from traffic noise. Future No Build noise levels are shown in Table 2.13.6. Of the 362 modeled receptor locations, 40 receptors would continue to approach or exceed the NAC under the future No Build condition.

2.13.4 Avoidance, Minimization, and/or Mitigation Measures

Because the project will incorporate the project features and noise abatement described above in Sections 2.13.3.1 and 2.13.3.2, no adverse impacts related to noise would occur. Therefore, no avoidance, minimization, and/or mitigation measures are required.

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