3.14 Air Quality

3.14.1 Regulatory Setting

The Federal Clean Air Act (FCAA) as amended in 1990 is the federal law that governs air quality. The California Clean Air Act of 1988 is its companion state law. These laws, and related regulations by the U.S. Environmental Protection Agency (U.S. EPA) and California Air Resources Board (ARB), set standards for the quantity of pollutants that can be 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. The criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM, broken down for regulatory purposes into particles of 10 micrometers or smaller – PM_{10} and particles of 2.5 micrometers and smaller - $PM_{2.5}$), lead (Pb), and sulfur dioxide (SO_2). In addition, State standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and State standards are set at a level that protects 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 within their general definition.

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

FCAA Section 176(c) prohibits the U.S. Department of Transportation and other federal agencies from funding, authorizing, or approving plans, programs, or projects that are not first found to conform to State Implementation Plan (SIP) for achieving the goals of Clean Air Act requirements related to the NAAQS. "Transportation Conformity" Act 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. U.S. EPA regulations at 40 CFR 93 govern the conformity process.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and in some areas sulfur dioxide (SO2). California has nonattainment or maintenance areas for all of these transportation-related “criteria pollutants” except SO2, and also has a nonattainment area for lead. However, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all of the transportation projects planned for a region over a period of at least 20 years for the RTP, and 4 years for the FTIP. RTP and FTIP conformity is based on use of travel demand and, air quality models to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO) and Federal Highway Administration (FHWA), and Federal Transit Administration (FTA), make 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, scope, and open to traffic schedule of a proposed transportation project are the same as described in the RTP and FTIP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires “hot spot” analysis if an area is “nonattainment” or “maintenance” for carbon monoxide (CO) and/or particulate matter (PM_{10} or $PM_{2.5}$). A region is “nonattainment” if one or more of the monitoring stations in the region measures violation of the relevant standard, and U.S. EPA officially designates the area nonattainment. Areas that were previously designated as nonattainment areas but subsequently meet the standard may be officially redesignated to attainment by the U.S. EPA, and are then called “maintenance” areas. “Hot spot” analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific procedural and documentation standards for projects that require a hot spot analysis. In general, projects must not cause the “hot spot”-related standard to be violated, and must not cause any increase in the number and severity of violations in nonattainment areas. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

3.14.2 Affected Environment

The information in this section is based on the project's *Final Air Quality Assessment Report* (May 2010), the *Supplemental Particulate Matter Hot-Spot Analysis* (March 2011), and the *Air Quality Conformity Analysis* (June 2012). The findings of that report are summarized in this section. The methodologies and assumptions for the air quality analysis are described in detail in the *Final Air Quality Assessment Report*.

3.14.2.1 Climatic Conditions

The project site is in Orange and Riverside Counties, an area within the South Coast Air Basin (Basin), which includes Orange County and the nondesert parts of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the Basin is administered by the SCAQMD.

The 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 of the Basin, and high mountains surround the rest of the Basin. The region lies in the semipermanent high-pressure zone of the eastern Pacific Ocean. 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 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 stations closest to the project limits for the project that monitor temperature are the Anaheim and Corona Stations.[1] The annual average maximum temperatures recorded at these stations range from 77.2°F to 78.2°F, and the annual average minimum temperatures range from 48.3°F to 55.3°F. December is typically the coldest month in this area of the Basin.

The majority of rainfall in the Basin occurs between November and April. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern part of the Basin along the coastal side of the mountains. The climatological stations closest to the project limits that monitor precipitation are the Anaheim and Corona Stations. Average rainfall measured at these stations varied from a high of 2.62 to 3.66 in in February to 0.34 in

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[1] Western Regional Climatic Center. 2008. http://www. wrcc.dri.edu, accessed December 3, 2008.

or less between May and September, with an average annual total of 12.71 to 12.95 in. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The 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 mid-afternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Winds in the vicinity of the project area blow predominantly from the east-southeast at relatively low velocities with wind speeds averaging about 4 mph. Summer wind speeds average slightly higher than winter wind speeds. Low average wind speeds together with a persistent temperature inversion limit the vertical dispersion of air pollutants throughout the Basin. Strong, dry, northerly or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months, dispersing air contaminants. Santa Ana conditions tend to last for several days at a time.

Inversion layers have a substantial role 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 such as CO. PM_{10} is both directly emitted and created indirectly in the atmosphere as a result of chemical reactions. Concentration levels 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 earth's surface goes through a radiative process on clear nights, when heat energy is transferred from the ground to a cooler night sky. As the earth's surface 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 are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and 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.

3.14.2.2 Monitored Air Quality

The primary federal and State ambient air quality standards (AAQS) for pollutants are shown in Table 3.14.1. The project site is in the jurisdiction of the SCAQMD. As shown in Figure 3.14-1, the SCAQMD maintains ambient air quality monitoring stations throughout the Basin. The closest monitoring station to the project area is the Riverside-Rubidoux Station located at 5888 Mission Boulevard in Rubidoux. Table 3.14.2 provides monitoring data from that station for 2006, 2007, and 2008.

From the ambient air quality data provided in Table 3.14.2, it can be seen that CO, SO_2, and NO_2 levels are below the relevant State and federal standards at the Riverside-Rubidoux station. One-hour ozone levels exceeded the State standard in each of the past 3 years. Eight-hour ozone levels exceeded the federal standard in each of the past 3 years. The PM_{10} levels in the project area exceeded the State standards in each of the past 3 years and exceeded the federal PM_{10} standard in 2007. The federal 24-hour $PM_{2.5}$ standard was exceeded in each of the past 3 years. The federal and State annual $PM_{2.5}$ standards were also exceeded in each of the past 3 years.

Historical ambient air quality data are used to classify the attainment status for the Basin. More specifically, the data collected at the air quality monitoring stations are used by the EPA to identify regions as attainment or nonattainment, depending on whether the region met the requirements in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of attainment such as 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 Basin's attainment status for each of the criteria pollutants is listed in Table 3.14.3.

Table 3.14.1 National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	**Method[4]**	**Primary[2,5]**	**Secondary[3,6]**	**Method[7]**
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	No Federal standard	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM_{10})	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		–		
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Nondispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Nondispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	–
Nitrogen Dioxide (NO_2)[8]	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	Gas Phase Chemiluminescence	53 ppb (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 µg/m^3)		100 ppb	None	
Lead[9]	30-day average	1.5 µg/m^3	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 µg/m^3	Same as Primary Standard	
	Rolling 3-Month Average[10]	–		0.15 µg/m^3		
Sulfur Dioxide (SO_2)[11]			Ultraviolet Fluorescence			Spectrophotometry (Pararosaniline Method)
	24-Hour	0.04 ppm (105 µg/m^3)		–	–	
	3-Hour	–		–	0.5 ppm (1300 µg/m^3)	
	1-Hour	0.25 ppm (655 µg/m^3)		75 ppb (196 µg/m^3)	–	
Visibility-Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[9]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: California Air Resources Board (ARB) (September 8, 2010).

Table footnotes are provided on the following page.

Table 3.14.1 Footnotes:

[1] California standards for ozone; carbon monoxide (except Lake Tahoe); sulfur dioxide (1- and 24-hour); nitrogen dioxide; suspended particulate matter, PM_{10}; and visibility-reducing particles are values not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 mg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current Federal policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent procedure that can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

[8] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).

[9] The ARB has identified lead and vinyl chloride as “toxic air contaminants” with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[10] National lead standard, rolling 3-month average: final rule signed October 15, 2008.

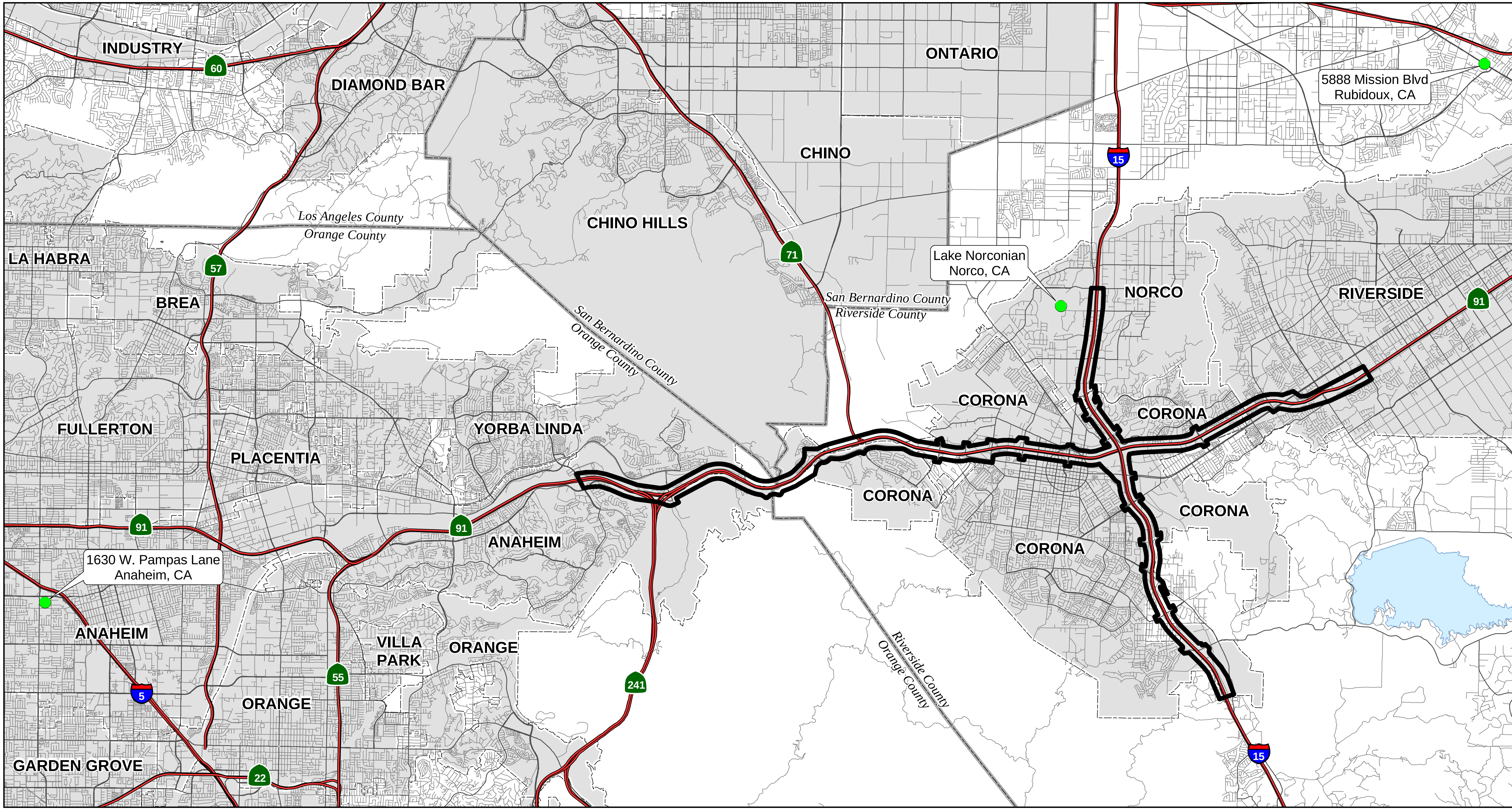
[11] On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. EPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older pararosaniline methods until the new FRM have adequately permeated State monitoring networks. The EPA also revoked both the existing 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO_2 standard was not revised at this time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the new primary national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm

EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion
°C = degrees Celsius

Table 3.14.2 Air Quality Levels Monitored at the Riverside-Rubidoux Station

Pollutant	Standard	2008	2007	2006
Carbon Monoxide				
Max 1-hr concentration (ppm)		2.7	3.8	2.7
No. days exceeded: State	> 20 ppm/1-hr	0	0	0
Federal	> 35 ppm/1-hr	0	0	0
Max 8-hr concentration (ppm)		1.9	2.9	2.3
No. days exceeded: State	..9.1 ppm/8-hr	0	0	0
Federal	..9.5 ppm/8-hr	0	0	0
Ozone				
Max 1-hr concentration (ppm)		0.146	0.131	0.151
No. days exceeded: State	> 0.09 ppm/1-hr	52	31	45
Ozone				
Max 8-hr concentration (ppm)		0.116	0.111	0.117
No. days exceeded: Federal[1]	> 0.075 ppm/8-hr	63	46	57
Particulates (PM_{10})				
Max 24-hr concentration ($\mu g/m^3$)		82	559	109
No. days exceeded: State	> 50 $\mu g/m^3$	7	65	69
Federal	> 150 $\mu g/m^3$	0	1	0
Annual avg. concentration ($\mu g/m^3$)		45.0	57.1	52.7
Exceeds Standard? State	> 20 $\mu g/m^3$	Yes	Yes	Yes
Particulates ($PM_{2.5}$)				
Max 24-hr concentration ($\mu g/m^3$)		47.9	75.6	68.4
No. days exceeded: Federal	> 35 $\mu g/m^3$	5	33	32
Annual avg. concentration ($\mu g/m^3$)		16	19	19
Exceeds Standard? State	> 12 $\mu g/m^3$	Yes	Yes	Yes
Federal	> 15 $\mu g/m^3$	Yes	Yes	Yes
Nitrogen Dioxide				
Max 1-hr concentration (ppm): State	> 0.18 ppm/1-hr	0.072	0.072	0.076
No. days exceeded		0	0	0
Annual avg. concentration: Federal	0.053 ppm annual avg.	0.020	0.020	0.020
No. days exceeded		0	0	0
Sulfur Dioxide				
Max 24-hr concentration (ppm)		0.003	0.004	0.003
No. days exceeded: State	0.04 ppm	0	0	0
Federal	0.14 ppm	0	0	0
Annual avg. concentration: Federal	0.030 ppm annual avg.	0.001	0.002	0.001
Exceed federal standard?		No	No	No

Sources: EPA and ARB (2006 to 2008).
[1] In 2008, the EPA revised the 8-hour ozone standard from 0.08 to 0.075 ppm.
$\mu g/m^3$ = micrograms per cubic meter
ARB = California Air Resources Board
EPA = United States Environmental Protection Agency
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ppm = parts per million



LEGEND

Study Area Boundary

Gaseous and Particulate Monitoring Site

N

0 1 2
Miles

SOURCE: Thomas Bros (2010), PB (2010)

FIGURE 3.14-1

SR-91 Corridor Improvement Project

Locations of Local Air Quality Monitoring Stations

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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Table 3.14.3 Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3 (1-hour)	Nonattainment	Revoked June 2005
O_3 (8-hour)	Nonattainment	Extreme Nonattainment[1]
PM_{10}	Nonattainment	Serious Nonattainment[2]
$PM_{2.5}$	Nonattainment	Nonattainment[3]
CO	Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment/Maintenance
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board (ARB), http://www.arb.ca.gov/desig/desig.htm (2010).

[1] Effective June 2010, the federal 8-hour O_3 nonattainment status was changed to extreme with an attainment date of 2024.

[2] In October 2006, the EPA, in its final rule revision, eliminated the annual PM_{10} standard.

[3] The $PM_{2.5}$ nonattainment designation is based on the 1997 standard. In 2006, the EPA revised the 24-hour standard. The 2006 $PM_{2.5}$ new standard of 35 $\mu g/m^3$ applies 1 year after the effective date of the new designation (April 2010).

$\mu g/m^3$ = micrograms per cubic meter
CO = carbon monoxide
EPA = United States Environmental Protection Agency
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter
SCAQMD = South Coast Air Quality Management District

3.14.2.3 Regional Air Quality Conformity

The project is currently programmed in the 2012 RTP, which was found to conform by the FHWA/FTA on June 4, 2012. The project is also programmed in the SCAG financially constrained 2011 FTIP (through Amendment 24), which was also found to be conforming by the FHWA/FTA on June 4, 2012. The description of the project in the 2012 RTP is as follows: Project ID No. RIV071250; Description: Phase 1: On SR-91/I-15: SR91 – Construct 1 mixed flow lane (SR-71 through I-15)/1 aux lane at various locations (SR-241 through Pierce)(OC PM 14.43-18.91), CD system (2/3/4 lanes from Main Street to I-15), 1 toll express lane (TEL) and convert HOV to TEL in each direction (OC to I-15); I-15 – construct TEL median direct connector NB I-15 to WB SR-91 and EB SR-91 to SB I-15, 1 TEL in each direction (SR-91 direct connector – Ontario Interchange)(I-15 PM 37.56-42.94). Phase 2: on SR-91/I-15: SR91 – Add 1 mixed flow lane in each direction (SR241 – SR71)(I15 – Pierce); I15 – add toll express lane (TEL) median direct connector (SB15 to WB91 & EB91 to NB15), 1 TEL each direction from Hidden Valley –SR-91 direct connector and from Ontario Interchange to Cajalco Interchange.

The description of the Initial Phase (Phase 1 as described in the RTP) in the 2011 FTIP (Amendment 24) is as follows: Project ID No. RIV071250; Description: On SR-91/I-15: SR91 – Construct 1 mixed flow lane (SR-71 through I-15)/1 aux lane at various locations (SR-241 through Pierce)(OC PM 14.43-18.91), CD system (2/3/4 lanes from Main Street to I-15), 1 TEL and convert HOV to TEL in each direction (OC to I-15); I-15 – construct TEL median direct connector NB I-15 to WB SR-91 and EB SR-91 to SB I-15, 1 TEL in each direction (SR-91 direct connector – Ontario Interchange)(I-15 PM 37.56-42.94).

The approved 2012 RTP and 2011 FTIP (Amendment 24) project listings are provided in Appendix K.

3.14.2.4 Project-Level Air Quality Conformity

Because the project is within an attainment/maintenance area for CO and a nonattainment area for federal $PM_{2.5}$ and PM_{10} 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 in Section 3.14.3, Environmental Consequences.

In regards to the related interagency consultation required for this project, SCAG's Transportation Conformity Working Group (TCWG) deemed the Particulate Matter Hot-Spot Qualitative Analysis acceptable for NEPA circulation at their September 22, 2009 meeting. On April 24, 2012, the TCWG reviewed and concurred that the identified Preferred Alternative (Alternative 2f) meets the particulate matter conformity requirements. See Chapter 5 for a copy of review results posted by TCWG.

FHWA approved the regional air quality conformity determinations for the 2012 RTP and Amendment 24 to the 2011 FTIP on June 4, 2012. In a letter dated June 5, 2012, the Department submitted the *Air Quality Conformity Analysis* and requested that FHWA issue a project-level air quality conformity determination for the SR-91 CIP.

The *Air Quality Conformity Analysis* for the SR-91 CIP documents that all the transportation conformity requirements have been met. The interagency consultation requirement was met when the PM_{10} hot-spot analysis for the SR-91 CIP was first presented to the SCAG TCWG on September 22, 2009, and again on April 24, 2012. Opportunities for review were provided to the public when the Draft EIR/EIS was circulated for public review in May 2011.

One June 6, 2012, FHWA approved the project-level *Air Quality Conformity Analysis* for the SR-91 CIP in Orange and Riverside Counties. A separate project-level air quality conformity determination will be necessary prior to approval of a ROD for the Ultimate Project.

3.14.3 Environmental Consequences

3.14.3.1 Summary of Impacts

Alternatives 1 and 2 would improve traffic flow by reducing congestion in the project area. This improvement in traffic flow would reduce regional vehicle emissions. In addition, the Build Alternatives would not delay the attainment of CO, $PM_{2.5}$, or PM_{10} standards. Therefore, Alternatives 1 and 2 and their design variations would not result in long-term adverse impacts related to air quality.

The No Build Alternative would not result in any construction along the project segments of SR-91 and I-15. Therefore, this Alternative would not result in the long-term reduction in regional air quality emissions.

The construction of Alternatives 1 and 2 has the potential to temporarily increase air quality emissions in the project area. Implementing the standard Department and SCAQMD measures would substantially reduce this short-term impact.

The No Build Alternative would not result in any construction along the project segments of SR-91 and I-15. Therefore, this Alternative would not result in temporary air quality impacts.

Summary of Impacts for Alternative 2f

Alternative 2f has been identified as the Preferred Alternative. The Alternative 2f Initial Phase and Ultimate Project would improve traffic flow by reducing congestion in the project area and would result in reduced regional vehicle emissions. The Alternative 2f Initial Phase and Ultimate Project would not delay the attainment of CO, $PM_{2.5}$, or PM_{10} standards. Therefore, the Alternative 2f Initial Phase and Ultimate Project would not result in long-term adverse air quality impacts.

The construction of the Alternative 2f Initial Phase and Ultimate Project has the potential to temporarily increase air quality emissions in the project area. Implementing the standard Department and SCAQMD measures to control construction-related air quality emissions would substantially reduce this short-term impact of Alternative 2f.

3.14.3.2 Permanent Impacts

Alternatives 1 and 2

Regional Emissions

The SR-91 CIP proposes improvements to an existing highway and does not propose construction of a new highway. The purpose of the project is to alleviate existing and future traffic congestion along SR-91 during peak hours. The Build Alternatives would not generate new vehicular traffic trips because they would not construct new homes or businesses. However, there is a possibility that some traffic currently using other routes would be attracted to use the improved facility, thus resulting in increased VMT on SR-91. Therefore, the potential impact of the Build Alternatives on regional vehicle emissions was calculated using traffic data for the project region and emission rates from the EMFAC2007 emission model.

Refer to Section 3.6.2.4, Baseline Traffic Conditions, for discussion regarding the use of 2007 traffic data for the Baseline/Existing conditions. The air quality analyses in this section also include existing conditions related to air quality, based on the Baseline/Existing (2007) traffic volumes.

As discussed in detail in Chapter 1, Project, the Initial Phase of the Build Alternatives was originally programmed to be open for operations in 2015. However, the opening date for the Initial Phase has been changed to 2017. The traffic analysis for the project described in this EIR/EIS is based on Baseline/Existing (2007) traffic data and 2015 and 2035 forecasts developed from the adopted regional traffic forecasting model. The air quality analysis in this section was conducted using the Baseline/Existing (2007), 2015, and 2035 traffic volumes from the project traffic study. Per the Supplemental Request for 20-year Period Design Exception approved by the Department on January 26, 2012, forecasted volumes for 2017 were estimated based on existing traffic counts for 2010. Because 2010 traffic counts are approximately 4 percent lower than 2007 traffic counts, 2017 forecasted volumes will be generally lower than the 2015 forecasted volumes used for the analysis of the SR-91 CIP. Because the opening year traffic volumes analyzed for 2015 are more conservative when compared to those for 2017, updating the traffic and air quality analyses for an opening year of 2017 was not necessary.

The project traffic analysis (January 2010) estimated the effect that the Build Alternatives would have on regional VMT and VHT. This VMT and VHT data, along with the EMFAC2007 emission rates, were used to calculate the CO, ROGs, NO_x, SO_x, PM_{10}, and $PM_{2.5}$ emissions for the 2035 regional conditions. The results of the modeling are included in Appendix D to the *Final Air Quality Assessment Report* and are summarized in Tables 3.14.4 and 3.14.5. As shown in those tables, the 2035 Alternatives 1 and 2 would reduce the vehicle emissions within the region. Therefore, the project would not contribute substantially to regional vehicle emissions.

Table 3.14.4 Alternative 1 Regional Vehicle Emissions (lbs/day)

Pollutant	Baseline/Existing (2007)	2035 Baseline Emissions	2035 Alternative 1 Project Emissions	Project-Related Change
CO	17,255	32,294	32,166	-128
ROG	4,630	1,638	1,619	-19
NO_X	23,792	7,463	7,451	-12
SO_X	97	194	190	-5
PM_{10}	1,264	1,657	1,650	-7
$PM_{2.5}$	841	1,065	1,053	-11

Sources: *Final Air Quality Assessment Report* (May 2010), and analysis of Baseline/Existing (2007) conditions conducted in March 2011.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 10 microns in size
ROG = reactive organic gases
SO_X = sulfur oxides

Table 3.14.5 Alternative 2 Regional Vehicle Emissions (lbs/day)

Pollutant	Baseline/Existing (2007)	2035 Baseline Emissions	2035 Alternative 2 Project Emissions	Project-Related Change
CO	17,255	32,294	32,031	-264
ROG	4,630	1,638	1,603	-35
NO_X	23,792	7,463	7,432	-31
SO_X	97	194	186	-8
PM_{10}	1,264	1,657	1,642	-15
$PM_{2.5}$	841	1,065	1,044	-20

Source: *Final Air Quality Assessment Report* (May 2010).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 10 microns in size
ROG = reactive organic gases
SO_X = sulfur oxides

Carbon Monoxide (CO)

The Caltrans *Transportation Project-Level Carbon Monoxide Protocol* (December 1997) was used to assess the project’s impact on local CO concentrations. Based on this protocol, a screening analysis was conducted to determine whether the project would result in any CO hot spots. Localized emissions of CO may increase with implementation of the project. However, as described in detail in the *Final Air Quality Assessment Report*, the Build Alternatives are not expected to result in any concentrations exceeding the 1-hour or 8-hour CO standards. Therefore, the potential project CO impact has been sufficiently addressed and no further analysis is needed.

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

Projects of Air Quality Concern

The first step in the hot-spot analysis is to determine whether a project meets the standard for a project of air quality concern (POAQC). The EPA specified in 40

CFR 93.123(b)(1) of the 2006 Final Rule that POAQC are certain highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified in the $PM_{2.5}$ and PM_{10} SIP as a localized air quality concern. The 2006 Final Rule defines the POAQC that require a $PM_{2.5}$ and PM_{10} hot-spot analysis in 40 CFR 93.123(b)(1) as:

i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
ii. Projects affecting intersections that are at 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 would meet the criteria in items i and ii above, because it would expand an existing facility and affect local intersections with a significant number of diesel vehicles. Therefore, this project is considered to be a POAQC, and a qualitative project-level $PM_{2.5}$ and PM_{10} hot-spot analysis was conducted to assess whether the project would cause or contribute to any new localized $PM_{2.5}$ or PM_{10} violations, increase the frequency or severity of any existing violations, or delay timely attainment of the $PM_{2.5}$ and PM_{10} AAQS.

Types of Emissions Considered

In accordance with the EPA/FHWA Guidance, this hot-spot analysis is based on directly emitted and re-entrained, or resuspended, $PM_{2.5}$ and PM_{10} emissions. Tailpipe, brake wear, tire wear, and road dust $PM_{2.5}$ and PM_{10} emissions were considered in this hot-spot analysis.

Vehicles cause dust from paved and unpaved roads to be re-entrained in the atmosphere. According to the 2006 Final Rule, road dust emissions are to be considered for PM_{10} hot-spot analyses. For $PM_{2.5}$, road dust emissions are only to be considered in hot-spot analyses if the EPA or the State air agency has made a finding that such emissions are a significant contributor to the $PM_{2.5}$ air quality problem (40 CFR 93.102(b)(3)). The EPA has published a guidance on the use of AP-42 for re-entrained road dust for SIP development and conformity (August 2007); therefore, re-entrained $PM_{2.5}$ is considered in this analysis.

Secondary particles formed through $PM_{2.5}$ and PM_{10} precursor emissions from a transportation project take several hours to form in the atmosphere, giving emissions time to disperse beyond the immediate project area of concern for localized analyses; therefore, they were not considered in this hot-spot analysis. Secondary emissions of $PM_{2.5}$ and PM_{10} are considered as part of the regional emission analysis prepared for the conforming RTP and FTIP.

According to the project schedule, no phase of construction would last more than 5 years, and construction-related emissions may be considered temporary; therefore, any construction-related $PM_{2.5}$ and PM_{10} emissions due to this project were not included in this hot-spot analysis. This project will comply with the applicable SCAQMD Fugitive Dust Rules for the control of fugitive dust during construction of this project. In addition, per Transportation Conformity Rule 93.117, the project will be required to comply with any applicable $PM_{2.5}$ and PM_{10} control measures in the SIP. Excavation, transportation, placement, and handling of excavated soils will result in no visible dust migration. A water truck or tank will be available within the project limits at all times to suppress and control the migration of fugitive dust from earthwork operations.

Analysis Method

According to the hot-spot methodology, estimates of future localized $PM_{2.5}$ and PM_{10} pollutant concentrations need to be determined. This analysis makes those estimates by extrapolating present $PM_{2.5}$ and PM_{10} pollutant concentrations from air quality data measured at monitoring stations in the vicinity of the project. The data from these stations are combined with projections from the 2003 and 2007 Air Quality Management Plans (AQMPs) prepared by the SCAQMD and examined for trends in order to predict future conditions in the project vicinity. Additionally, the impacts of the project and the likelihood of these impacts interacting with the ambient $PM_{2.5}$ and PM_{10} levels to cause hot spots are discussed.

Data Considered

The closest air quality monitoring station to the project within the County of Riverside is the Norco Station. This station is located within 4,000 ft of I-15. However, this station only monitors PM_{10} concentrations. The monitoring station closest to the project area that currently monitors $PM_{2.5}$ concentrations is the 1630 West Pampas Lane, Anaheim Station. This station is approximately 1,200 ft from I-5 and 1.3 mi from SR-91.

The existing truck volumes along I-5 and SR-91 in the vicinity of the Anaheim Station are 26,000 and 19,900 daily trips, respectively. The existing truck volume along I-15 in the vicinity of the Norco Station is 18,000 daily trips. These volumes are higher than the 16,500 to 18,000 daily truck trips along SR-91 and I-15, respectively, in the project area. The total vehicle trips along I-5, I-15, and SR-91 in the vicinity of these monitoring stations vary from 200,000 to 285,000, similar to or greater than the 200,000 to 272,000 existing daily trips along SR-91 and I-15, respectively, in the project area. Therefore, the air quality concentrations monitored at these stations are representative of the existing conditions in the project area.

Trends in Baseline $PM_{2.5}$ Concentrations

The monitored $PM_{2.5}$ concentrations at the Anaheim Station are shown in Table 3.14.6. These data show that, for the years 2005 to 2009, the federal 24-hour $PM_{2.5}$ AAQS (35 micrograms per cubic meter [$\mu g/m^3$]) was exceeded. The federal annual average $PM_{2.5}$ AAQS (15 $\mu g/m^3$) at the Anaheim Station was exceeded in 2 out of 5 years; however, the concentrations have been decreasing steadily overtime.

Table 3.14.6 Ambient $PM_{2.5}$ Monitoring Data ($\mu g/m^3$)

	2005	2006	2007	2008	2009
Anaheim Air Quality Monitoring Station					
3-year average 98th percentile	49.3	45.7	44.7	38.2	36.6
Exceeds federal 24-hour standard (35 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	Yes
3-year National annual average	16.33	15.21	14.35	13.47	12.72
Exceeds federal annual average standard (15 $\mu g/m^3$)?	Yes	Yes	No	No	No

Source: EPA website: http://www.epa.gov/air/data/monvals.html?st~CA~California, accessed March 2011.
$\mu g/m^3$ = micrograms per cubic meter
EPA = United States Environmental Protection Agency
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

Projected 24-hour Concentrations

The levels of $PM_{2.5}$ in the project vicinity exceeded the federal 24-hour standard in each of the past 5 years. Table V-2-16 in the 2007 AQMP estimates that the 24-hour $PM_{2.5}$ concentration at the Anaheim Station would be 42.8 µg/m^3 in 2015. However, based on the data in Table 3.14.6, the concentrations in 2008 and 2009 are below the level that the AQMP has projected for 2015. Extrapolating from the data in Table 3.14.6, it is estimated that the concentration would not exceed the federal 24-hour standard of 35 µg/m^3 by 2011. By 2015, it is estimated that the 24-hour $PM_{2.5}$ level would be 27.6 µg/m^3, which is 21 percent below the federal standard.

Projected Annual Concentrations

While the levels of $PM_{2.5}$ in the project vicinity exceeded the federal annual standard twice between 2005 and 2009, indications are that levels in the future would continue to decrease. As shown in Table V-2-15c in the 2007 AQMP, the annual $PM_{2.5}$ concentration, with the California Air Resources Board (ARB) emission reduction plan and the SCAQMD emission reduction overlay, at the Anaheim Station is projected to be 12.3 µg/m^3 in 2014. This concentration would not exceed the federal annual average standard of 15 µg/m^3.

Trends in Baseline PM_{10} Concentrations

The monitored PM_{10} concentrations at the Norco Station, shown in Table 3.14.7, indicate that the federal 24-hour PM_{10} AAQS (150 µg/m^3) was exceeded once in 2007.

Table 3.14.7 Ambient PM_{10} Monitoring Data (µg/m^3)

	2005	2006	2007	2008	2009
Norco Air Quality Monitoring Station					
First Highest	79	74	332	86	79
Second Highest	64	71	93	85	68
Third Highest	59	67	92	76	66
Fourth Highest	57	66	87	76	65
No. of days above national 24-hour standard (150 µg/m^3)	0	0	1	0	0

Source: ARB website: http://www.arb.ca.gov/adam/welcome.html, accessed March 2011.
µg/m^3 = micrograms per cubic meter
ARB = California Air Resources Board
PM_{10} = particulate matter less than 10 microns in size

The 2007 AQMP reports that since the federal annual PM_{10} standard has been revoked, the Basin is expected to be declared in attainment for the 24-hour federal PM_{10} standard since 2000. Table V-3-1 in the 2007 AQMP lists the projected 24-hour PM_{10} concentrations at various stations within the Basin. It is estimated that the 24-hour concentration at the Anaheim Station (the closest station to the project area listed in the AQMP) would be 78 $\mu g/m^3$ by 2015, which is 48 percent below the federal standard.

Transportation and Traffic Conditions

Baseline/Existing (2007), interim (2015), and future (2035) No Build ADT volumes and average daily truck volumes for SR-91 and I-15 in the project area are shown in Table 3.14.8. The table indicates that SR-91 and I-15 each currently experience more than 10,000 trucks annual average daily traffic (AADT).

Table 3.14.8 Baseline/Existing (2007) and No Build Average Daily Traffic and Truck Volumes

Roadway Link	Baseline/Existing (2007)		2015 No Build		2035 No Build	
	Avg Daily Traffic Volumes	Avg Daily Truck Volumes	Avg Daily Traffic Volumes	Avg Daily Truck Volumes	Avg Daily Traffic Volumes	Avg Daily Truck Volumes
SR-91 from SR-241 to SR-71	280,000	15,500	320,300	17,500	325,200	18,900
SR-91 from SR-71 to I-15	272,000	14,500	305,900	16,800	305,900	16,800
SR-91 east of I-15	224,000	16,300	243,300	18,400	273,200	21,800
I-15 north of SR-91	171,000	17,900	201,500	23,000	319,800	31,600
I-15 south of SR-91	201,000	10,300	242,700	13,500	336,900	20,500

Source: Riverside County Transportation Commission (July 2009).
Avg = Average
I-15 = Interstate 15
SR-241 = State Route 241
SR-71 = State Route 71
SR-91 = State Route 91

Table 3.14.9 summarizes the existing LOS for the intersections along SR-91 and I-15 in the project area. As shown, the LOS currently vary from LOS A to LOS F.

Traffic Changes Due to the Project

The project is a highway improvement project that would increase the capacity of SR-91 and I-15. Based on the *Traffic Study Report* (July 2010), the project would increase peak-hour and daily traffic volumes on SR-91 and I-15. The future traffic volumes for 2015 and 2035 are shown in Tables 3.14.10 and 3.14.11, respectively. The with project reduction in traffic along SR-91 east of I-15 is due to the new HOV connectors that would separate traffic from SR-91 until after McKinley Street, where traffic volumes are lower.

Table 3.14.9 Existing Intersection Levels of Service

Intersection		A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
1.	Green River Road/SR-91 WB Ramps	170.8	F	12.0	B
2.	Green River Road/SR-91 EB Ramps	11.8	B	14.6	B
3.	Auto Center Drive/SR-91 WB Ramps	34.9	C	13.6	B
4.	Maple Street/Pomona Drive	9.3	A	9.6	A
5.	6th Street/SR-91 EB Ramps	21.9	C	137.4	F
6.	Paseo Grande/6th Street	28.1	C	47.2	D
7.	SR-91 WB Ramps/Pomona Road	224.9	F	36.5	D
8.	Lincoln Avenue/SR-91 EB Ramps	22.1	C	243.1	F
9.	Main Street/Grand Boulevard	23.9	C	28.7	C
10.	Main Street/SR-91 WB Ramps	36.1	D	40.1	D
11.	Main Street/3rd Street	24.9	C	39.7	D
12.	McKinley Street/Griffin Way	36.7	D	175.9	F
13.	McKinley Street/Sampson Avenue	28.7	C	93.8	F
14.	Pierce Street/Magnolia Avenue	32.2	C	105.2	F
15.	Hamner Avenue/Hidden Valley Parkway	63.0	E	143.0	F
16.	Rimpau Avenue/Magnolia Avenue	98.7	F	94.9	F
17.	El Sobrante/Magnolia Avenue	168.0	F	65.4	E
18.	I-15 SB Ramps/Magnolia Avenue	63.4	E	64.3	E
19.	I-15 SB Ramps/Ontario Avenue	35.6	D	29.1	A
20.	Bedford Canyon/Cajalco Road	11.4	B	73.3	E

Source: Riverside County Transportation Commission (July 2009).
Delay = stopped time delay at intersection; LOS = levels of service; SR-91 = State Route 91
EB = eastbound; SB = southbound; WB = westbound
I-15 = Interstate 15; sec = seconds

Table 3.14.10 2015 Highway Traffic Volumes

Roadway Link	No Build		Alternative 1		Alternative 2	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
SR-91 from SR-241 to SR-71	320,300	17,500	329,600	18,100	333,500	18,300
SR-91 from SR-71 to I-15	305,900	16,400	310,400	16,800	327,300	17,700
SR-91 east of I-15	243,300	18,400	235,400	18,100	238,900	18,400
I-15 north of SR-91	201,500	23,000	208,400	24,200	209,600	24,300
I-15 south of SR-91	242,700	13,500	248,800	13,900	251,800	14,100

Source: Riverside County Transportation Commission (July 2009).
ADT = average daily traffic; SR-241 = State Route 241; SR-91 = State Route 91
I-15 = Interstate 15; SR-71 = State Route 71

Table 3.14.11 2035 Highway Traffic Volumes

Roadway Link	No Build		Alternative 1		Alternative 2	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
SR-91 from SR-241 to SR-71	325,200	18,900	334,800	19,400	361,900	21,000
SR-91 from SR-71 to I-15	305,900	16,800	307,000	16,900	344,700	19,000
SR-91 east of I-15	273,200	21,900	267,400	21,400	282,200	22,600
I-15 north of SR-91	319,800	31,700	333,000	33,000	334,900	33,200
I-15 south of SR-91	336,900	20,600	348,000	21,200	353,200	21,600

Source: Riverside County Transportation Commission (July 2009).
ADT = average daily traffic; SR-241 = State Route 241; SR-91 = State Route 91
I-15 = Interstate 15; SR-71 = State Route 71

Tables 3.14.12 through 3.14.15 show the 2015 and 2035 LOS in the project area for the a.m. and p.m. peak hours. As shown, the project would worsen the LOS at various intersections along the project alignment.

Table 3.14.12 2015 A.M. Intersection Levels of Service

	Intersection	No Build		Alternative 1		Alternative 2	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1.	Green River Road/SR-91 WB Ramps	89.4	F	39.9	D	60.9	E
2.	Green River Road/SR-91 EB Ramps	31.2	C	30.8	C	32.2	C
3.	Auto Center Drive/SR-91 WB Ramps	31.7	C	33.1	C	38.3	D
4.	Maple Street/Pomona Drive	31.4	C	42.1	D	69.7	E
5.	6th Street/SR-91 EB Ramps	21.1	C	20.5	C	24.4	C
6.	Paseo Grande/6th Street	34.3	C	32.7	C	31.1	C
7.	SR-91 WB Ramps/Pomona Road	40.0	D	72.5	E	67.5	E
8.	Lincoln Avenue/SR-91 EB Ramps	24.8	C	100.0	F	91.1	F
9.	Main Street/Grand Boulevard	32.6	C	31.0	C	30.5	C
10.	Main Street/SR-91 WB Ramps	27.9	C	18.2	B	20.1	C
11.	Main Street/3rd Street	56.9	E	68.0	E	68.5	E
12.	McKinley Street/Griffin Way	27.9	C	28.8	C	31.7	C
13.	McKinley Street/Sampson Avenue	33.5	C	26.4	C	25.4	C
14.	Pierce Street/Magnolia Avenue	35.4	D	32.7	C	32.5	C
15.	Hamner Avenue/Hidden Valley Parkway	46.5	D	47.7	D	46.2	D
16.	Rimpau Avenue/Magnolia Avenue	54.6	D	55.0	D	55.4	E
17.	El Sobrante/Magnolia Avenue	72.9	E	70.2	E	71.5	E
18.	I-15 SB Ramps/Magnolia Avenue	45.1	D	47.5	D	45.1	D
19.	I-15 SB Ramps/Ontario Avenue	78.9	E	91.3	F	75.2	E
20.	Bedford Canyon/Cajalco Road	45.3	D	43.1	D	50.6	D

Source: Riverside County Transportation Commission (July 2009).
Delay = stopped time delay at intersection; LOS = levels of service; SR-91 = State Route 91
EB = eastbound; SB = southbound; WB = westbound
I-15 = Interstate 15; sec = seconds

Table 3.14.13 2015 P.M. Intersection Levels of Service

	Intersection	No Build		Alternative 1		Alternative 2	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1.	Green River Road/SR-91 WB Ramps	30.6	C	31.5	C	27.7	C
2.	Green River Road/SR-91 EB Ramps	96.2	F	104.7	F	129.6	F
3.	Auto Center Drive/SR-91 WB Ramps	18.6	B	18.0	B	17.4	B
4.	Maple Street/Pomona Drive	40.2	D	38.6	D	36.8	D
5.	6th Street/SR-91 EB Ramps	85.0	F	35.1	D	36.9	D
6.	Paseo Grande/6th Street	43.7	D	48.7	D	60.5	E
7.	SR-91 WB Ramps/Pomona Road	40.0	D	25.8	C	27.1	C
8.	Lincoln Avenue/SR-91 EB Ramps	146.1	F	98.4	F	107.4	F
9.	Main Street/Grand Boulevard	86.1	F	86.3	F	84.6	F
10.	Main Street/SR-91 WB Ramps	81.0	F	63.8	E	64.1	E
11.	Main Street/3rd Street	42.4	D	60.9	E	59.6	E
12.	McKinley Street/Griffin Way	52.3	D	56.1	E	73.1	E
13.	McKinley Street/Sampson Avenue	42.3	D	43.7	D	50.0	D
14.	Pierce Street/Magnolia Avenue	94.7	F	93.1	F	87.5	F
15.	Hamner Avenue/Hidden Valley Parkway	85.0	F	99.1	F	93.0	F
16.	Rimpau Avenue/Magnolia Avenue	50.1	D	52.6	D	49.4	D
17.	El Sobrante/Magnolia Avenue	28.3	C	28.7	C	26.8	C
18.	I-15 SB Ramps/Magnolia Avenue	85.1	F	89.3	F	90.4	F
19.	I-15 SB Ramps/Ontario Avenue	37.7	D	37.3	D	36.0	D
20.	Bedford Canyon/Cajalco Road	58.0	E	59.0	E	58.7	E

Source: Riverside County Transportation Commission (July 2009).
Delay = stopped time delay at intersection; LOS = levels of service; SR-91 = State Route 91
EB = eastbound; SB = southbound; WB = westbound
I-15 = Interstate 15; sec = seconds

Table 3.14.14 2035 A.M. Intersection Levels of Service

	Intersection	No Build		Alternative 1		Alternative 2	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1.	Green River Road/SR-91 WB Ramps	84.9	F	73.9	E	79.1	E
2.	Green River Road/SR-91 EB Ramps	42.6	D	39.1	D	41.5	D
3.	Auto Center Drive/SR-91 WB Ramps	82.0	F	64.4	E	59.4	E
4.	Maple Street/Pomona Drive	79.2	E	67.1	E	79.6	E
5.	6th Street/SR-91 EB Ramps	24.4	C	28.3	C	23.8	C
6.	Paseo Grande/6th Street	38.0	D	38.3	D	36.1	D
7.	SR-91 WB Ramps/Pomona Road	40.5	D	97.3	F	82.8	F
8.	Lincoln Avenue/SR-91 EB Ramps	36.1	D	181.1	F	167.6	F
9.	Main Street/Grand Boulevard	36.0	D	41.9	D	38.8	D
10.	Main Street/SR-91 WB Ramps	25.2	C	42.8	D	17.4	B
11.	Main Street/3rd Street	61.9	E	79.0	E	36.3	D
12.	McKinley Street/Griffin Way	33.8	C	31.3	C	33.1	C
13.	McKinley Street/Sampson Avenue	43.5	D	46.0	D	40.4	D
14.	Pierce Street/Magnolia Avenue	58.1	E	46.4	D	49.6	D
15.	Hamner Avenue/Hidden Valley Parkway	191.9	F	187.7	F	175.4	F
16.	Rimpau Avenue/Magnolia Avenue	133.0	F	115.9	F	117.0	F
17.	El Sobrante/Magnolia Avenue	160.7	F	163.4	F	156.7	F
18.	I-15 SB Ramps/Magnolia Avenue	111.5	F	114.7	F	106.7	F
19.	I-15 SB Ramps/Ontario Avenue	75.2	E	59.7	E	58.1	E
20.	Bedford Canyon/Cajalco Road	28.0	C	27.5	C	28.0	C

Source: Riverside County Transportation Commission (July 2009).
Delay = stopped time delay at intersection; LOS = levels of service; SR-91 = State Route 91
EB = eastbound; SB = southbound; WB = westbound
I-15 = Interstate 15; sec = seconds

Table 3.14.15 2035 P.M. Intersection Levels of Service

	Intersection	No Build		Alternative 1		Alternative 2	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1.	Green River Road/SR-91 WB Ramps	29.8	C	31.8	C	32.0	C
2.	Green River Road/SR-91 EB Ramps	158.4	F	163.3	F	144.8	F
3.	Auto Center Drive/SR-91 WB Ramps	19.7	B	22.4	C	14.3	B
4.	Maple Street/Pomona Drive	49.9	D	22.7	C	45.8	D
5.	6th Street/SR-91 EB Ramps	97.2	F	36.0	D	38.4	D
6.	Paseo Grande/6th Street	65.2	E	47.2	D	56.0	E
7.	SR-91 WB Ramps/Pomona Road	30.2	C	30.6	C	32.7	C
8.	Lincoln Avenue/SR-91 EB Ramps	68.3	E	123.1	F	133.5	F
9.	Main Street/Grand Boulevard	124.3	F	97.0	F	152.7	F
10.	Main Street/SR-91 WB Ramps	141.3	F	119.2	F	37.8	D
11.	Main Street/3rd Street	68.8	E	109.2	F	75.3	E
12.	McKinley Street/Griffin Way	69.1	E	72.5	E	71.4	E
13.	McKinley Street/Sampson Avenue	60.5	E	71.3	E	72.4	E
14.	Pierce Street/Magnolia Avenue	183.3	F	141.1	F	136.4	F
15.	Hamner Avenue/Hidden Valley Parkway	178.6	F	189.8	F	184.6	F
16.	Rimpau Avenue/Magnolia Avenue	91.4	F	83.1	F	81.2	F
17.	El Sobrante/Magnolia Avenue	202.8	F	141.5	F	141.7	F
18.	I-15 SB Ramps/Magnolia Avenue	156.4	F	141.7	F	140.3	F
19.	I-15 SB Ramps/Ontario Avenue	37.7	D	35.1	D	35.2	D
20.	Bedford Canyon/Cajalco Road	208.7	F	185.3	F	211.0	F

Source: Riverside County Transportation Commission (July 2009).
Delay = stopped time delay at intersection; LOS = levels of service; SR-91 = State Route 91
EB = eastbound; SB = southbound; WB = westbound
I-15 = Interstate 15; sec = seconds

Daily Vehicle Emission Changes Due to the Project

The Traffic Study Report calculated the daily VMT, daily VHT, and daily vehicle delay for all the vehicle trips along the SR-91 corridor and within the project region. These traffic data, in conjunction with the EMFAC2007 emission model, were used to calculate the $PM_{2.5}$ and PM_{10} exhaust, tire wear, and brake wear emissions for each of the project alternatives. EMFAC2007 does not estimate road dust emissions; therefore, the emission rates listed in Section 13.2.1 of EPA's AP-42 were used to calculate the road dust $PM_{2.5}$ and PM_{10} emissions under each alternative. The exhaust and dust emissions generated along the SR-91 corridor are listed in Tables 3.14.16 and 3.14.17 for $PM_{2.5}$ and PM_{10}, respectively. The exhaust and dust emissions generated within the RCTC region are listed in Tables 3.14.18 and 3.14.19 for $PM_{2.5}$ and PM_{10}, respectively. The results of the modeling are provided in Attachment A of the $PM_{2.5}$ and PM_{10} Analysis.

Table 3.14.16 Daily $PM_{2.5}$ Emissions Along the SR-91 Corridor (lbs/day)

Traffic Condition	Exhaust Emissions	Vehicle Delay	Tire Wear	Brake Wear	Road Dust	Total	Change from No Build
Baseline/Existing (2007)	1,121	40	64	128	4,493	5,845	-
2015 No Build	787	59	79	159	5,582	6,666	-
2015 Alt 1	775	54	80	162	5,673	6,744	78 (+1.2%)
2015 Initial Phase of Alt 2	767	54	79	159	5,579	6,638	-28 (-0.4%)
2015 Alt 2	760	51	80	161	5,671	6,724	58 (+0.9%)
2035 No Build	848	48	97	196	6,870	8,059	-
2035 Alt 1	828	45	98	197	6,913	8,080	21 (+0.3%)
2035 Alt 2	813	43	98	197	6,936	8,088	29 (+0.4%)

Source: *Final Air Quality Assessment Report* (May 2010).
Alt = Alternative
lbs/day = pounds per day
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SR-91 = State Route 91

Table 3.14.17 Daily PM_{10} Emissions Along the SR-91 Corridor (lbs/day)

Traffic Condition	Exhaust Emissions	Vehicle Delay	Tire Wear	Brake Wear	Road Dust	Total	Change from No Build
Baseline/Existing (2007)	1,218	33	254	330	9,848	11,682	-
2015 No Build	1,057	49	315	409	12,234	14,065	-
2015 Alt 1	1,040	45	320	416	12,434	14,255	190 (+1.4%)
2015 Initial Phase of Alt 2	1,029	45	315	409	12,227	14,025	-40 (-0.3%)
2015 Alt 2	1,019	42	320	416	12,430	14,228	163 (+1.2%)
2035 No Build	915	53	388	504	15,058	16,918	-
2035 Alt 1	894	50	390	507	15,151	16,992	74 (+0.4%)
2035 Alt 2	878	48	391	509	15,202	17,028	110 (+0.7%)

Source: *Final Air Quality Assessment Report* (May 2010).
Alt = Alternative
lbs/day = pounds per day
PM_{10} = particulate matter less than 10 microns in size
SR-91 = State Route 91

Table 3.14.18 Daily $PM_{2.5}$ Emissions in the South Coast Air Basin (lbs/day)

Traffic Condition	Exhaust Emissions	Vehicle Delay	Tire Wear	Brake Wear	Road Dust	Total	Change from No Build
Baseline/Existing (2007)	40,918	1,003	2,278	4,580	160,832	209,610	-
2015 No Build	26,381	1,454	2,668	5,362	188,324	224,190	-
2015 Alt 1	26,367	1,454	2,666	5,359	188,193	224,038	-152 (-0.1%)
2015 Initial Phase of Alt 2	26,397	1,460	2,667	5,361	188,276	224,162	-28 (-0.01%)
2015 Alt 2	26,336	1,449	2,665	5,357	188,146	223,953	-237 (-0.1%)
2035 No Build	28,262	1,342	3,130	6,292	220,959	259,984	-
2035 Alt 1	28,152	1,329	3,128	6,287	220,803	259,699	-285 (-0.1%)
2035 Alt 2	28,164	1,330	3,129	6,289	220,866	259,778	-206 (-0.1%)

Source: *Final Air Quality Assessment Report* (May 2010).
Alt = Alternative
lbs/day = pounds per day
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

Table 3.14.19 Daily PM_{10} Emissions in the South Coast Air Basin (lbs/day)

Traffic Condition	Exhaust Emissions	Vehicle Delay	Tire Wear	Brake Wear	Road Dust	Total	Change from No Build
Baseline/Existing (2007)	44,493	834	9,078	11,796	352,508	418,709	-
2015 No Build	35,406	1,209	10,630	13,812	412,766	473,823	-
2015 Alt 1	35,387	1,209	10,623	13,802	412,477	473,498	-325 (-0.1%)
2015 Initial Phase of Alt 2	35,428	1,214	10,627	13,809	412,660	473,739	-84 (-0.02%)
2015 Alt 2	35,345	1,205	10,620	13,799	412,374	473,343	-480 (-0.1%)
2035 No Build	30,483	1,492	12,472	16,206	484,294	544,947	-
2035 Alt 1	30,366	1,478	12,463	16,194	483,952	544,454	-493 (-0.1%)
2035 Alt 2	30,379	1,479	12,467	16,199	484,090	544,614	-333 (-0.1%)

Source: *Final Air Quality Assessment Report* (May 2010).
Alt = Alternative
lbs/day = pounds per day
PM_{10} = particulate matter less than 10 microns in size

As shown in Tables 3.14.16 and 3.14.17, implementation of both project alternatives would result in a net increase in $PM_{2.5}$ and PM_{10} emissions in 2015 and 2035 along the SR-91 corridor. However, by 2015 the project region is expected to be 21 percent below the 24-hour $PM_{2.5}$ standard, 34 percent below the annual $PM_{2.5}$ standard, and 48 percent below the federal PM_{10} standard. Therefore, the 0.3 to 1.4 percent increase in PM emissions along SR-91 would not delay the attainment of the $PM_{2.5}$ or PM_{10} air quality standards within the Basin. In addition, as shown in Tables 3.14.18 and 3.14.19, implementation of both Build Alternatives would result in a net decrease in regional $PM_{2.5}$ and PM_{10} emissions in 2015 and 2035.

Conclusion

Transportation conformity is required under Section 176(c) of the federal CAA to ensure that federally supported highway and transit project activities are consistent with the purpose of the SIP. Conformity to the purpose of the SIP means that transportation activities would not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant AAQS. As required by the 2006 Final Rule, the qualitative $PM_{2.5}$ and PM_{10} hot-spot analysis demonstrates that this project meets CAA conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts.

It is not expected that changes to $PM_{2.5}$ and PM_{10} emissions levels associated with the Build Alternatives would result in new violations of the NAAQS for the following reasons:

- The traffic volumes in the vicinity of the Norco and Anaheim air quality monitoring stations are consistent with the existing traffic volumes along I-15 and SR-91.
- The ambient PM_{10} concentrations at the Norco Station exceeded the 24-hour federal standard only once within the past 5 years and is projected to be 48 percent below the NAAQS by 2015.
- Based on the local monitoring data and the 2007 AQMP, the 24-hour and annual average $PM_{2.5}$ concentrations in the project area would be reduced to below the federal 24-hour and annual NAAQS by 2015. The ambient $PM_{2.5}$ concentrations at the Anaheim Station are projected to be 65 percent of the 24-hour standard and 82 percent of the annual standard by 2014.
- The 0.3 to 1.2 percent increase in $PM_{2.5}$ emissions along the SR-91 corridor associated with Alternatives 1 and 2 would not result in new exceedances of the NAAQS. The Initial Phase of Alternative 2 would result in a slight decrease in the 2015 $PM_{2.5}$ emissions along the SR-91 corridor. $PM_{2.5}$ emissions along the SR-91 corridor for Baseline/Existing (2007) conditions and 2015 and 2035 with and without the Build Alternatives are listed in Table 3.14.16.
- The 0.4 to 1.4 percent increase in PM_{10} emissions along the SR-91 corridor associated with Alternatives 1 and 2 would not result in new exceedances of the NAAQS. The Initial Phase of Alternative 2 would result in a slight decrease in the 2015 PM_{10} emissions along the SR-91 corridor. PM_{10} emissions along the SR-91 corridor for Baseline/Existing (2007) conditions

and 2015 and 2035 with and without the Build Alternatives are listed in Table 3.14.17.

- Alternatives 1 and 2 and the Initial Phase of Alternative 2 would result in a net decrease in $PM_{2.5}$ emissions in the Basin. The $PM_{2.5}$ emissions in the Basin for Baseline/Existing (2007) conditions and 2015 and 2035 with and without the Build Alternatives are listed in Table 3.14.18.
- Alternatives 1 and 2 and the Initial Phase of Alternative 2 would result in a net decrease in PM_{10} emissions within the Basin. The PM_{10} emissions in the Basin for Baseline/Existing (2007) conditions and 2015 and 2035 with and without the Build Alternatives are listed in Table 3.14.19.

For these reasons, future new or worsened $PM_{2.5}$ and PM_{10} violations of any standards are not anticipated; therefore, the Build Alternatives meet the conformity hot-spot requirements in 40 CFR 93-116 and 93-123 for both $PM_{2.5}$ and PM_{10}.

Federal Highway Administration Air Quality Conformity Analysis Determination

Section 3.14.2.3, Regional Air Quality Conformity, provides the description of the SR-91 CIP in the 2012 RTP. A project-level *Air Quality Conformity Analysis* was prepared and concluded that the project's design concept and scope have not changed from what was analyzed in the 2012 RTP. The 2012 RTP was approved by SCAG in April 2012. FHWA approved the regional air quality conformity for the 2012 RTP on June 4, 2012. The individual projects contained in the RTP will be conforming projects and will have air quality impacts consistent with those identified in the SIP for achieving the NAAQS.

The SR-91 CIP Alternative 2 Initial Phase is also included in Amendment 24 to the 2011 FTIP and is described as follows: Project ID: RIV071250; Description: On SR-91/I-15: SR91 – Construct 1 mixed flow lane (SR-71 through I-15)/1 aux lane at various locations (SR-241 through Pierce)(OC PM 14.43-18.91), CD system (2/3/4 lanes from Main Street to I-15), 1 toll express lane (TEL) and convert HOV to TEL in each direction (OC to I-15); I-15 – construct TEL median direct connector NB I-15 to WB SR-91 and EB SR-91 to SB I-15, 1 TEL in each direction (SR-91 direct connector – Ontario Interchange)(I-15 PM 37.56-42.94). The project's open-to-the-public year of 2017 is consistent with (within the same regional emission period as) the construction completion date identified in the 2012 RTP and 2011 FTIP (Amendment 24). The FTIP gives priority to eligible TCMs identified in the SIP and provides sufficient funds to provide for their implementation. FHWA approved the air quality conformity for Amendment 24 to the 2011 FTIP on June 4, 2012.

As discussed in Section 3.14.2.4, in a letter dated June 5, 2012, the Department requested that FHWA issue a project-level air quality conformity determination for the SR-91 CIP, and on June 6, 2012, FHWA determined the SR-91 CIP, in Orange and Riverside Counties, conforms to the SIP in accordance with 40 CFR Part 93. A copy of the FHWA letter is provided in Attachment 5.H of Chapter 5, Comments and Coordination. A separate project-level air quality conformity determination will be necessary prior to approval of the ROD for the Ultimate Project.

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, other mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8,430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS).[1] In addition, the EPA identified the following seven compounds with substantial contributions from mobile sources that are among the national- and regional-scale cancer risk drivers from its 1999 National Air Toxics Assessment (NATA)[2]: acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (DPM), formaldehyde, naphthalene, and polycyclic organic matter (POM). While FHWA considers these to be the priority MSAT, the list is subject to change and may be adjusted in response to future EPA rules.

The 2007 EPA rule mentioned above requires controls that would dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if VMT increases by 145

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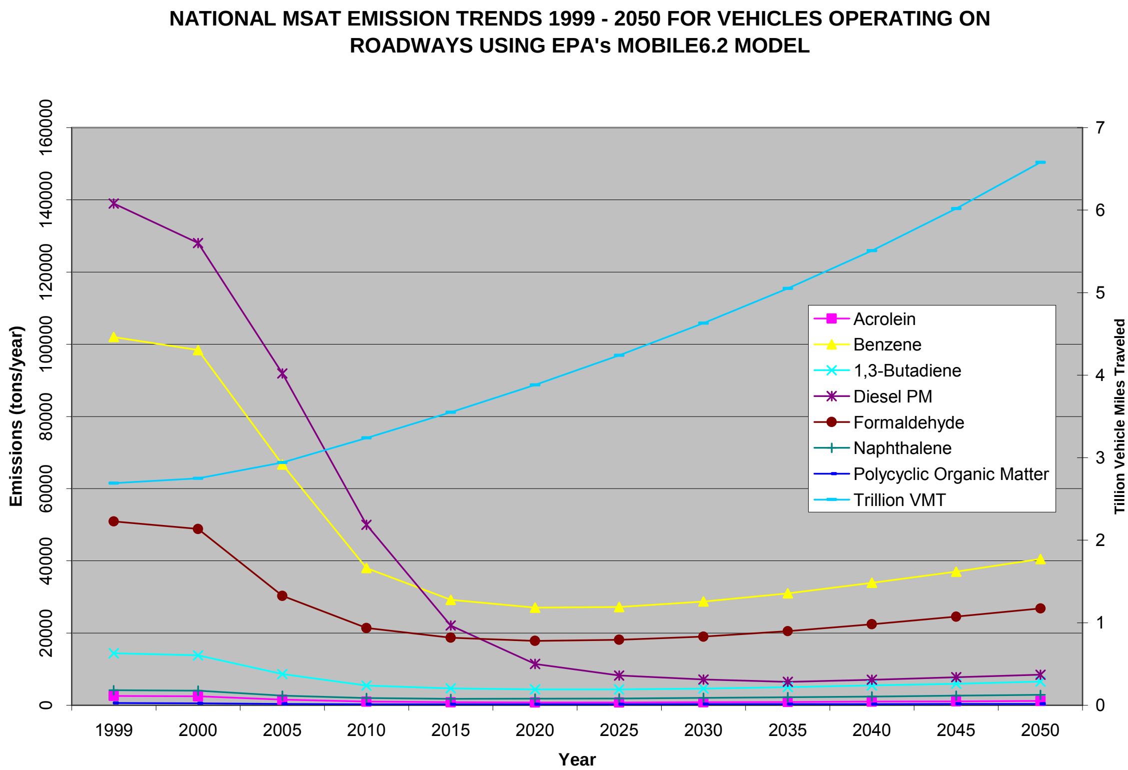
1 http://www.epa.gov/ncea/iris/index.html.

2 http://www.epa.gov/ttn/atw/nata1999/.

percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in Figure 3.14-2.



Source: http://www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm.

Figure 3.14-2 National MSAT Emission Trends

The projected reduction in MSAT emissions would be slightly different in California due to the use of the EMFAC2007 emission model in place of the MOBILE6.2 model.

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 within the context of NEPA.

In September 2009, the FHWA issued a memorandum titled Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents[1] to advise FHWA division offices as to when and how to analyze MSAT in the NEPA process for highways. This document is an update to the previous guidance released in February 2006. 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.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

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. It is also 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 EPA 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."[2] Each report contains assessments of noncancerous 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 Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance. 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

[1] http://www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm.

[2] EPA, http://www.epa.gov/ncea/iris/index.html.

respiratory tract, including the exacerbation of asthma. Less obvious are the potential adverse human health effects of MSAT compounds at current environmental concentrations[1] or in the future as vehicle emissions substantially decrease.[2]

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts, with each step in the process building on the model predictions obtained in the previous step. All are encumbered by uncertain science or technical shortcomings that prevent a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime assessments (i.e., 70 years), particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affect emissions rates) over that time frame, because that type of information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's EMFAC2007 model, and the EPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 substantially underestimates DPM emissions and substantially overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in a National Cooperative Highway Research Program (NCHRP) study,[3] which documents poor model performance at 10 sites across the country: 3 sites where intensive monitoring was conducted plus an additional 7 sites with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and to underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with NAAQS for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast

1 HEI, http://pubs.healtheffects.org/view.php?id=282.

2 HEI, http://pubs.healtheffects.org/view.php?id=306.

3 EPA, http://www.epa.gov/scram001/dispersion_alt.htm#hyroad.

MSAT exposure near roads and to determine the part of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, which is a concern expressed by HEI.[1] 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 DPM. The EPA[2] and the HEI[3] have not established a basis for quantitative risk assessment of DPM in ambient settings.

There is also the lack of a 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 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, such as 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 a 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 a 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 a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a 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

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1 http://pubs.healtheffects.org/view.php?id=282.

2 http://www.epa.gov/risk/basicinformation.htm#g.

3 http://pubs.healtheffects.org/getfile.php?u=395.

impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against project benefits (e.g., reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response) that are better suited for quantitative analysis.

Depending on the specific project circumstances, the FHWA has identified three levels of analysis:

- **Exempt Projects or Projects with No Meaningful MSAT Impacts:** Exempt projects typically include those with no effects on traffic volumes or vehicle mix. Projects qualifying as categorical exclusions under 23 CFR 771.117I or that are exempt from CAA conformity under 40 CFR 93.126 are also considered projects with no meaningful MSAT impacts.
- **Projects with Low Potential MSAT Effects:** These projects have average annual daily trips less than 140,000 per day and for which the project does not add substantially to the total number of trips. In California, the corresponding AADT thresholds are 100,000 on urban non-freeways and 50,000 on rural non-freeways. In addition, California has a third criterion, which states that if freeway modifications are to be completed more than 500 to 1,000 ft from a sensitive land use (e.g., residences, schools, day care centers, playgrounds, and medical facilities), the project would result in low potential MSAT effects (Brady pers. comm. 2010). These projects are usually evaluated qualitatively.
- **Projects with Higher Potential MSAT Effects:** These projects typically are those that have average annual daily trips exceeding 140,000 per day and that have the potential to substantially increase DPM exhaust. In California, the corresponding AADT thresholds are 100,000 on urban non-freeways and 50,000 on rural non-freeways. In addition, California considers a project to have a higher potential MSAT effect if modifications to freeways are proposed to take place within 500 to 1,000 ft of sensitive land uses (Brady pers. comm. 2010). These projects require a quantitative evaluation.

The project widens an existing highway with average annual daily trips exceeding 140,000 per day located within 500 ft of sensitive land uses. Consequently, based on the FHWA's 2009 MSAT guidance and the ARB's *Air Quality and Land Use Handbook* (April 2005), this project is considered to have higher potential MSAT effects, and a quantitative analysis of MSAT emissions is required (FHWA 2009; ARB 2005).

MSAT Analysis Methodology

The basic procedure for analyzing emissions for on-road MSAT is to calculate emission factors using EMFAC2007 and apply the emission factors to speed and VMT data specific to the project. EMFAC2007 is the emission inventory model developed by the ARB that calculates emission inventories for motor vehicles operating on roads in California. The emission factors information used in this analysis is from EMFAC2007 and is specific to the Basin.

This analysis focuses on the seven MSAT pollutants identified by the EPA as being the highest priority MSAT: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM. EMFAC2007 provides emission factor information for DPM, but does not provide emission factors for the remaining six MSAT. Each of the remaining six MSAT, however, is a constituent of motor vehicle total organic gas (TOG) emissions, and EMFAC2007 provides emission factors for TOG. ARB has supplied the Department with speciation factors for each of the remaining six MSAT not directly estimated by EMFAC2007.[1] Each speciation factor represents the portion of TOG emissions estimated to be a given MSAT. For example, if a speciation factor of 0.03 is provided for benzene, its emissions level is estimated to be 3 percent of total TOG emissions, utilizing the speciation factor as a multiplier once TOG emissions are known. This analysis used the ARB-supplied speciation factors to estimate emissions of the aforementioned six MSAT as a function of TOG emissions.

The University of California, Davis, in cooperation with the Department, developed a spreadsheet tool that incorporates EMFAC2007 emission factors, ARB speciation factors, and project-specific traffic activity data such as peak- and off-peak-hour VMT, speed, travel times, and traffic volumes. The spreadsheet tool applies the traffic activity data to the emission factors and estimates MSAT emissions for base-case (with No Build Alternative) and Build Alternative scenarios. Results were produced for the opening year (2015) and the horizon year (2035). The 2015 and 2035 analyses compared No Build conditions to expected conditions resulting from implementation of the project. The spreadsheet used in this analysis is based on FHWA’s 2006 MSAT guidance. Once speciation factors for naphthalene and POM have been established, a new spreadsheet will

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1 As of December 2009, speciation factors were not available for naphthalene and POM.

be developed that is capable of calculating a project's emissions for all seven MSATs.

MSAT Analysis Results

As described above, emission factors for DPM and TOG have been obtained for the Basin using EMFAC2007. The spreadsheet tool developed by the University of California, Davis, was then utilized in applying the emission factors, speciation factors from ARB, and the traffic activity data for the Build Alternatives. The results of that analysis are included in Appendix C to the *Final Air Quality Assessment Report* and are summarized in Tables 3.14.20 through 3.14.24. As speciation factors are not available for naphthalene and POM, the emissions for these pollutants are not included in Tables 3.14.20 through 3.14.24. However, as with benzene, 1,3-butadiene, acrolein, and formaldehyde, these pollutants are a subset of TOG. Therefore, the future with and without project naphthalene and POM emissions would have a similar increase or decrease as the other MSAT.

As shown in Tables 3.14.20 through 3.14.23, implementation of the Build Alternatives would result in a slight increase in the MSAT emissions compared to the No Build Alternative. However, the emissions from the No Build and Build Alternatives would be lower than the Baseline/Existing (2007) emissions for all MSAT pollutants. As shown in Table 3.14.24, Alternative 2 would reduce MSAT emissions in 2035.

Table 3.14.20 2015 Initial Phase of Alternative 1 Changes in MSAT Emissions

Toxic Air Contaminant	Baseline/Existing (2007) Emissions (gms/day)	2015 No Build Emissions (gms/day)	2015 Build Emissions[1]		
			gms/day	Change from Baseline/ Existing (2007)	Change from No Build
Diesel Particulate Matter	83,743	59,801	58,280	-25,463	-1,521
Benzene	77,664	40,983	41,247	-36,418	264
1,3-Butadiene	15,014	6,933	7,039	-7,976	106
Naphthalene[2]	N/A	N/A	N/A	N/A	N/A
POM[2]	N/A	N/A	N/A	N/A	N/A
Acrolein	3,407	1,566	1,593	-1,814	27
Formaldehyde	68,739	40,343	40,187	-28,551	-156
Average Percent Change	–	–	–	-40.3%	-0.9%

Source: *Final Air Quality Assessment Report* (May 2010).

1 The project *Traffic Study Report* (July 2010) did not include the Initial Phase of the Alternative 1 Project in 2015. Therefore, no MSAT emissions analysis for the Initial Phase of the Alternative 1 Project in 2015 was conducted.

2 The emissions for these pollutants are not included because speciation factors are not available.

gms/day = grams per day N/A = Not Available

MSAT = Mobile Source Air Toxics POM = polycyclic organic matter

Table 3.14.21 2015 Initial Phase of Alternative 2 Changes in MSAT Emissions

Toxic Air Contaminant	Baseline/Existing (2007) Emissions (gms/day)	2015 No Build Emissions (gms/day)	2015 Build Emissions		
			gms/day	Change from Baseline/ Existing (2007)	Change from No Build
Diesel Particulate Matter	83,743	59,801	54,034	-29,710	-5,768
Benzene	77,664	40,983	40,507	-37,157	-476
1,3-Butadiene	15,014	6,933	6,915	-8,100	-18
Naphthalene[1]	N/A	N/A	N/A	N/A	N/A
POM[1]	N/A	N/A	N/A	N/A	N/A
Acrolein	3,407	1,566	1,568	-1,839	2
Formaldehyde	68,739	40,343	38,450	-30,289	-1,894
Average Percent Change	–	–	–	-43.1%	-5.4%

Source: *Final Air Quality Assessment Report* (May 2010).
[1] The emissions for these pollutants are not included because speciation factors are not available.
gms/day = grams per day N/A = Not Available
MSAT = Mobile Source Air Toxics POM = polycyclic organic matter

Table 3.14.22 2015 Alternative 2 Changes in MSAT Emissions

Toxic Air Contaminant	Baseline/Existing (2007) Emissions (gms/day)	2015 No Build Emissions (gms/day)	2015 Build Emissions		
			gms/day	Change from Baseline/ Existing (2007)	Change from No Build
Diesel Particulate Matter	83,743	59,801	56,595	-27,148	-3,207
Benzene	77,664	40,983	40,983	-36,682	0
1,3-Butadiene	15,014	6,933	7,031	-7,983	98
Naphthalene[1]	N/A	N/A	N/A	N/A	N/A
POM[1]	N/A	N/A	N/A	N/A	N/A
Acrolein	3,407	1,566	1,594	-1,814	27
Formaldehyde	68,739	40,343	39,630	-29,108	-713
Average Percent Change	–	–	–	-41.3%	-2.5%

Source: *Final Air Quality Assessment Report* (May 2010).
[1] The emissions for these pollutants are not included because speciation factors are not available.
gms/day = grams per day N/A = Not Available
MSAT = Mobile Source Air Toxics POM = polycyclic organic matter

Table 3.14.23 2035 Alternative 1 Changes in MSAT Emissions

Toxic Air Contaminant	Baseline/Existing (2007) Emissions (gms/day)	2035 No Build Emissions (gms/day)	2035 Build Emissions		
			gms/day	Change from Baseline/ Existing (2007)	Change from No Build
Diesel Particulate Matter	83,743	30,374	29,272	-54,472	-1,103
Benzene	77,664	22,571	22,443	-55,221	-128
1,3-Butadiene	15,014	3,137	3,150	-11,865	13
Naphthalene[1]	N/A	N/A	N/A	N/A	N/A
POM[1]	N/A	N/A	N/A	N/A	N/A
Acrolein	3,407	704	709	-2,698	5
Formaldehyde	68,739	22,453	22,005	-46,733	-447
Average Percent Change	–	–	–	-68.8%	-2.1%

Source: *Final Air Quality Assessment Report* (May 2010).
[1] The emissions for these pollutants are not included because speciation factors are not available.
gms/day = grams per day N/A = Not Available
MSAT = Mobile Source Air Toxics POM = polycyclic organic matter

Table 3.14.24 2035 Alternative 2 Changes in MSAT Emissions

Toxic Air Contaminant	Baseline/Existing (2007) Emissions (gms/day)	2035 No Build Emissions (gms/day)	2035 Build Emissions		
			gms/day	Change from Baseline/ Existing (2007)	Change from No Build
Diesel Particulate Matter	83,743	30,374	26,471	-57,272	-3,904
Benzene	77,664	22,571	20,221	-57,443	-2,350
1,3-Butadiene	15,014	3,137	2,714	-12,300	-422
Naphthalene[1]	N/A	N/A	N/A	N/A	N/A
POM[1]	N/A	N/A	N/A	N/A	N/A
Acrolein	3,407	704	610	-2,797	-94
Formaldehyde	68,739	22,453	18,739	-50,000	-3,714
Average Percent Change	–	–	–	-72.3%	-13.2%

Source: *Final Air Quality Assessment Report* (May 2010).
[1] The emissions for these pollutants are not included because speciation factors are not available.
gms/day = grams per day N/A = Not Available
MSAT = Mobile Source Air Toxics POM = polycyclic organic matter

In summary, while the Build Alternatives would result in a small increase in localized MSAT emissions in 2015, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

3.14.3.3 Temporary Impacts

As discussed in Chapter 2, the Initial Phases of Alternatives 1 and 2 would generally implement shorter segments of the Alternative 1 and 2 improvements on SR-91 and I-15; the initial phases of Alternatives 1 and 2 are estimated to have a construction duration of 4 years. The subsequent phases for Alternatives 1 and 2 would likely be constructed as independent construction contracts, each with estimated construction durations of 1 to 2 years. The shorter durations for those subsequent phases of project implementation are based on the amount of work that would be completed in those phases and not necessarily based on funding.

The air quality analysis for construction impacts described in this section focuses on short-term air quality impacts associated with construction activities lasting 5 years or less. If a construction period lasts more than 5 years, the potential air quality impacts during that time would be considered permanent and would need to be analyzed as permanent and not temporary impacts. Because no phase of construction for Alternatives 1 and 2 is anticipated to last more than 4 years, the analysis of permanent air quality effects of the Build Alternatives does not include any construction-related effects.

No temporary road or intersection closures during construction are anticipated to last longer than 2 years. As a result, no hot-spot analysis of short-term air quality effects associated with temporary road or intersection closures is provided.

Alternatives 1 and 2

Short-term air pollutant emissions would occur as a result of construction activities and would include fugitive dust from grading/site preparation, equipment exhaust, and use of emulsified asphalt paving materials. Because no phase of project construction would require more than 5 years to complete at any location, a detailed construction emissions analysis was not required for conformity purposes for the Build Alternatives.

Exhaust Emissions

Construction activities produce combustion emissions from various sources such as grading equipment, utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, and motor vehicles transporting construction crews. Exhaust emissions during construction of the Build Alternatives would vary daily as construction activity levels change. The use of construction equipment on site would result in localized exhaust emissions. Caltrans Standard Specifications for Construction (Sections 10 and 18 for dust control and Section 39-3.06 for asphalt concrete plant) would be adhered to during all project construction activities to reduce emissions as a result of construction equipment.

Fugitive Dust

The SCAQMD has established Rule 403 for reducing fugitive dust emissions (PM_{10}). If a Build Alternative is selected for implementation, the best available control measures (BACM), as specified in SCAQMD Rule 403, would be incorporated in that Alternative. With implementation of the standard construction measures in Rule 403 (providing 50 percent effectiveness) such as frequent watering (minimum twice per day), fugitive dust emissions from construction activities for the Initial Phases of Alternatives 1 and 2 and the completed Alternatives 1 and 2 would not result in adverse air quality impacts.

Naturally Occurring Asbestos

The project is located in Orange and Riverside Counties, which are not among the counties listed as containing serpentine and ultramafic rock. Therefore, the impact from naturally occurring asbestos during project construction of Alternatives 1 and 2 would be minimal to none.

3.14.4 Avoidance, Minimization, and/or Mitigation Measures

The operation of the Build Alternatives would not result in adverse long-term air quality impacts; therefore, no avoidance, minimization or mitigation measures are required. However, construction of the Build Alternatives may result in adverse impacts related to fugitive dust and construction equipment and vehicle emissions. The standard conditions and SCAQMD Rule 403 described below would substantially reduce potential adverse short-term air quality impacts during construction of Alternatives 1 and 2.

3.14.4.1 Standard Conditions

The following standard conditions and measures would be required for the Initial Phases and Ultimate Projects under the SR-91 CIP Build Alternatives.

Construction Measures

SC-1 **Construction Emissions Mitigation Plan.** Prior to any site preparation, grading and/or construction activities, the RCTC Project Engineer will require the design/build contractor to finalize the project-specific Construction Emissions Mitigation Plan. That plan will specifically incorporate measures for controlling particulate and other emissions during construction from the following sources:

- Department’s Standard Specifications Sections 10 and 18 (Dust Control)
- Department’s Standard Specifications Section 39-3.06 (Asphalt Concrete Plant Emissions)
- SCAQMD Rule 403, including control measures from Tables 1, 2, and 3 in that rule

The plan will also include the following measures:

- Control of ozone precursor emissions from construction equipment vehicles by maintaining equipment engines in good condition and in proper tune per the manufacturers’ specifications.
- Control of material on all trucks hauling excavated or graded material from the site by compliance 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.

SC-2 **Implementation of the Construction Emissions Mitigation Plan.** During all site preparation, grading, construction, clean-up, and other activities during construction, RCTC's Resident Engineer will require the design/build contractor to comply with the measures in the Construction Emissions Mitigation Plan. RCTC's Resident Engineer will conduct site inspections at least once a month to ensure that the design/build contractor is complying with the provisions of the Construction Emissions Mitigation Plan.

SC-3 Prior to any construction activities, RCTC's Project Engineer will ensure that the grading plans and project specifications show the anticipated duration of construction in individual construction areas along the project alignment.

SC-4 During final design and prior to any ground disturbance, RCTC's Project Geologist will conduct appropriate testing to determine whether there are ACMs present in the project disturbance limits.

SC-5 If RCTC's Project Geologist determines that ACMs are present in the project disturbance limits during that final preconstruction inspection, RCTC's Resident Engineer will require the design/build contractor to properly remove and dispose of those ACMs.

Operational Measures

There are no measures required because the Build Alternatives would not result in adverse operational air quality impacts.

3.14.5 Climate Change

Climate change is analyzed in detail in Chapter 4. Neither the EPA nor the FHWA has promulgated explicit guidance or methodology to conduct project-level GHG analysis. As stated on FHWA's climate change website (http://www.fhwa.dot.gov/hep/climate/index.htm), climate change considerations should be integrated throughout the transportation decision-making process—from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will facilitate decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project level decision-making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

Because there have been more requirements set forth in California legislation and executive orders regarding climate change, the issue is addressed in detail in the CEQA chapter of this environmental document and may be used to inform the NEPA decision. The four strategies set forth by FHWA to lessen climate change impacts do correlate with efforts that the State has undertaken and is undertaking to deal with transportation and climate change; the strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and reduction in the growth of vehicle hours traveled.

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3.15 Noise

3.15.1 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.

3.15.1.1 California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are not feasible. The rest of this section will focus on the NEPA-23 CFR 772 noise analysis; please see Chapter 4 of this document for further information on noise analysis under CEQA.

3.15.1.2 National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and the Department, as assigned) involvement, the Federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 A-weighted decibels [dBA]) is lower than the NAC for commercial areas (72 dBA). Table 3.15.1 lists the noise abatement criteria for use in the NEPA-23 CFR 772 analysis.

Table 3.15.2 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise levels discussed in this section with common activities.

In accordance with the Department's *Traffic Noise Analysis Protocol for New Highway Construction, and Reconstruction Projects, August 2006*, a noise impact occurs when the future noise level with the project results in a substantial increase in noise level (defined as a 12 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, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

The Department's *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 in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978, and the cost per benefited residence.

3.15.2 Affected Environment

This section is based on the *Final Noise Study Report* (NSR; April 2010) and the *Noise Abatement Decision Report* (NADR; July 2010) prepared for the project.

3.15.2.1 Surrounding Land Uses and Sensitive Receivers

The study area was divided into 44 acoustically equivalent analysis areas (A to S1) for the noise analysis, as shown on Figure 3.15-1. (Figure 3.15-1 contains 17 sheets and is provided following the last page of text in this section to minimize disruptions in the text for the reader.)

Land uses in the project vicinity include a mix of residential, commercial, and open space uses, and some undeveloped land as shown on Figure 3.15-1.

As shown in Table 3.15.1, there are four activity categories with specific NAC. Single-family residences, multifamily residences, and hotels in the study area are considered Activity Category B land uses. Commercial uses are considered Activity Category C land uses. Noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. For this reason, the impact analysis focused on locations with defined outdoor activity areas, such as residential backyards and common use areas at multifamily residences.

There are no areas of frequent human activity in noise analysis areas B, D, F, H, J, L, N, X, Y, A1, C1, I1, L1, M1, and O1. The remaining noise analysis areas contain areas of frequent human activity considered to be noise-sensitive land uses.

3.15.2.2 Noise Level Measurements

The primary source of noise in the noise analysis areas is traffic on SR-91, the SR-91 ramps, I-15, the I-15 ramps, and adjacent local roads. Short- and long-term noise-level measurements were conducted from September 8, 2008, to September 19, 2008, to document the existing noise environment at representative noise-sensitive land uses. Short-term noise measurements were taken at 55 measurement sites. Those noise measurement sites are shown on Figure 3.15-1. Table 3.15.3 summarizes the short-term noise measurements at those sites.

Long-term monitoring was conducted at eight sites (2, 7, 16, 26, 31, 34, 41, and 47) using Larson-Davis Type 2 sound level meters: Model 700 (Serial No. 0218), Model 712 (Serial No. 0343 and 0218), Model 705 (Serial No. 40722), and Model 720 (Serial No. 0460). The purpose of these measurements was to document variations in sound levels throughout the day rather than absolute sound levels at a specific receptor. The long-term sound level data were collected over several 24-hour periods, beginning Monday, September 8, 2008, and ending Friday, September 12, 2008.

The results of the long-term 24-hour monitoring at the eight sites are shown in Tables 3.15.4 through 3.15.11. The numbers in bold represent the loudest-hour sound level measured. The locations of the eight monitoring sites are shown on Figure 3.15.1.

3.15.2.3 Existing Noise Levels

The results of the existing traffic noise modeling are shown in Table 3.15.12. Of the 191 modeled receiver locations, 111 receivers currently approach or exceed the 67 dBA equivalent noise level (L_{eq}) NAC. Figure 3.15-1 shows the locations of the modeled receiver locations.

3.15.3 Environmental Consequences

3.15.3.1 Summary of Impacts

Based on the design variations for Build Alternatives 1 and 2, six to seven receiver locations would result in a noise level increase of 12 dBA or more in 2035 compared to existing noise conditions, which would be an impact of the project.

In 2035, Alternative 1 would result in noise levels greater than 67 dBA at up to 38 locations, and Alternative 2 would result in noise levels greater than 67 dBA at up to 41 locations, depending on the design variations.

In 2035, Alternative 1 would result in noise levels 75 dBA or greater at 34 to 37 receivers depending on the design variation. In 2035, Alternative 2 would result in noise levels 75 dBA or greater at 37 to 41 receivers, depending on the design variation.

Noise Barriers (NBs) K-1, M-1, M-2, O-1, O-2, P-1, Q-1, T-1, V-1, W-1, and K1-A will be constructed during the Initial Phase of the project. NBs E-1 and D1-B will be constructed for the Ultimate Project (refer to Tables 3.15.25 through 3.15.28 later in this section).

During construction of Alternatives 1 and 2, and the Initial Phases of Alternatives 1 and 2, noise from construction equipment and activities would be generated. The noise levels during construction would not be considered adverse based on compliance with Caltrans' Standard Specifications Section 14-08.02, "Noise Control," and SSP S5-310, and compliance with local noise ordinances (Cities of Anaheim, Corona, Norco, and Riverside).

Summary of Impacts for Alternative 2f

Alternative 2f has been identified as the Preferred Alternative. Alternative 2f, under the Initial Phase in 2015 and under the Ultimate Project in 2035, would result in noise levels greater than 67 dBA at up to 87 locations; of the 87 locations, 46 are predicted to have noise levels 75 dBA or greater before the construction of noise barriers as mitigation. NBs K-1, M-1, M-2, O-1, O-2, P-1, Q-1, T-1, V-1, W-1, and K1-A will be constructed during the Initial Phase of the project. NBs E-1 and D1-B will be constructed for the Ultimate Project.

The temporary noise impacts during construction of Alternative 2f would be similar to those described above for Alternative 2. The noise levels during construction of Alternative 2f are not considered adverse based on compliance with Caltrans

Standard Specifications Section 14-8.02, "Noise Control" and SSP S5-310 and compliance with local noise ordinances (Cities of Anaheim, Corona, Norco and Riverside).

3.15.3.2 Permanent Impacts

Alternatives 1 and 2

Potential long-term noise impacts associated with project operations are solely from traffic noise. Traffic noise was evaluated for the future No Build Alternative and Alternatives 1 and 2 for worst-case conditions.

The predicted future worst-case traffic noise levels for Alternatives 1 and 2 at the representative sensitive receiver locations within the project area were determined assuming the existing noise walls were in place, and with no new modeled barriers using the worst-case traffic volumes. The traffic condition is assumed to be LOS D/E, which corresponds to 1,950 vplph on mixed-flow lanes for the SR-91 toll lanes, and the SR-91 and I-15 mainlines. For freeway ramps, the worst-case traffic volume assumes 1,500 vplph. Vehicle speeds on the SR-91 express lanes and SR-91 and I-15 mainlines were modeled using 65 mph. Off-ramp vehicle speeds were modeled using 40 mph. On-ramp vehicle speeds were modeled using 65 mph with flow control devices at the start of the ramps. The vehicle mix (percentage of autos,[1] medium truck,[2]and heavy trucks[3]), which was based on the traffic counts, was 90 percent autos, 5 percent medium trucks, and 5 percent heavy trucks. The Department's Annual Average Daily Truck Traffic index was also consulted (http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/index.htm) to determine if the vehicle mix based on the traffic counts was reasonable. Table 3.15.13 shows the noise level model results for existing, future No Build Alternative, and Alternatives 1 and 2 and their design variations under the worst-case traffic conditions.

The modeled noise levels for Alternatives 1 and 2 under the worst-case traffic conditions were compared to the modeled existing noise levels (after calibration) from Traffic Noise Model (TNM) 2.5 to determine whether a substantial noise increase would occur. The modeled future noise levels for Alternatives 1 and 2 under worst-case conditions were also compared to the NAC to determine whether a traffic noise impact would occur.

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1 Vehicles with two axles and four wheels.

2 Vehicles with two axles and more than four wheels.

3 Vehicles with more than two axles.

Traffic noise impacts occur when either of the following occurs: (1) the traffic noise level at a sensitive receiver location is predicted to approach or exceed its NAC for that land use, or (2) the predicted traffic noise level is 12 dBA or more higher than the corresponding modeled existing noise level at the sensitive receiver location analyzed. When traffic noise impacts are identified, noise abatement measures must be considered. In Table 3.15.13, receivers that would approach or exceed the 67 dBA L_{eq} NAC under Activity Category B for Alternatives 1 and 2 and their design variations are shown in **bold face** type. Of the 191 modeled receivers, 6 to 7 receivers would experience a substantial noise increase of 12 dBA or more over their corresponding existing noise level for Alternatives 1 and 2 and their design variations, respectively. Those receivers are also shown in **bold face** type in Table 3.15.13. Noise barriers were identified adjacent to the noise sensitive areas for which they were evaluated. Table 3.15.12 lists the noise sensitive areas along with each receiver, and Figure 3.15.1 (Sheets 1 through 17) shows the receivers, noise sensitive areas, and modeled noise barriers.

In addition, the modeled receiver locations shown in Table 3.15.13 indicate that 37 to 38 and 34 to 35 receivers for Alternative 1, respectively, depending on the design variation, would experience a severe traffic noise impact of 75 dBA L_{eq} or higher. For Alternative 2, 37 to 41 and 36 to 40 receivers, respectively, depending on the design variation, would experience a severe traffic noise impact of 75 dBA L_{eq} or higher. For those locations, unusual and extraordinary abatement measures such as feasible sound barriers (reducing noise levels by 5 dBA or more) that have an estimated construction cost exceeding the total reasonable allowance or interior noise abatement should be considered. Unusual and extraordinary abatement measures are subject to approval by FHWA when those noise barriers are proposed to be funded with federal transportation funds.

Noise Abatement Consideration

In accordance with 23 CFR 772 and the Caltrans *Traffic Noise Analysis Protocol*, noise abatement (reduction) is considered where noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. Potential noise abatement measures identified in the Caltrans *Traffic Noise Analysis Protocol* include:

- Avoiding the impact by using design alternatives such as altering the horizontal and/or vertical alignments of the project
- Constructing noise barriers

- Acquiring property to serve as a buffer zone between the noise source and the receiver
- Using traffic management measures to regulate the types of vehicles and their speeds on the transportation facility
- Acoustically insulating public-use or nonprofit institutional structures

The Caltrans *Traffic Noise Analysis Protocol* establishes a process for assessing the reasonableness and feasibility of noise abatement. Noise abatement is considered to be acoustically feasible if it provides noise reduction of at least 5 dBA at the noise impacted receivers. Other nonacoustical factors relating to geometric standards (e.g., sight distances), safety, maintenance, and security can also affect the feasibility of noise abatement. Before publication of a Draft EIR/EIS, a *preliminary noise abatement decision* is made. The preliminary noise abatement decision is based on the *feasibility* of evaluated abatement and the *preliminary reasonableness determination.*

23 CFR 772 requires that noise abatement measures that are reasonable and feasible, and that are likely to be incorporated into the project, be identified before adoption of the Final EIR/EIS. The assessment of whether a noise abatement measure is reasonable and feasible, and key information on abatement, is provided in a NADR.

The NADR presents the preliminary noise abatement decision based on acoustical and nonacoustical feasibility factors and the relationship between noise abatement allowances and the engineer's cost estimate for the noise abatement features. The NADR does not present the final decision regarding noise abatement. It presents information on abatement to be considered throughout the environmental review process, which is based on the best available information at the time the Draft EIR/EIS is published. The final noise abatement decision takes this information into account, along with other reasonableness factors identified during the environmental review process. These factors include:

- Impacts of abatement construction,
- Public and local agency input,
- Life cycle of abatement measures,
- Views/opinions of impacted residents, and
- Social, economic, environmental, legal, and technological factors.

All the noise abatement options were considered for the Build Alternatives. However, because of the configuration and location of the project, abatement in the form of noise barriers is the only abatement considered to be feasible.

Noise abatement was considered for each site where a traffic noise impact would occur.

Feasibility

Table 3.15.13 shows the receiver locations that would approach or exceed the 67 dBA L_{eq} NAC for Alternatives 1 and 2 and their design variations. Noise barriers were analyzed for each of these sensitive receiver locations. At each location, six noise barrier heights were analyzed: 6, 8, 10, 12, 14, and 16 ft. The detailed results of the noise barrier modeling for Alternative 1 are shown in Tables B-1 and B-2 in Appendix B of the *Final Noise Study Report*. The detailed results of the noise barrier modeling for Alternative 2 are shown in Tables B-3 and B-4 in Appendix B of the *Final Noise Study Report*. The locations of the modeled barriers for Alternatives 1 and 2 are shown on Figure 3.15-1.

Each noise barrier evaluated was evaluated for feasibility based on achievable noise reduction of 5 dBA or more. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated using Worksheet C to determine the total allowance for the barrier per benefited residence. Worksheet C is provided in Appendix C of the *Final Noise Study Report*.

Reasonableness

For a noise barrier to be considered reasonable from a cost perspective, the estimated construction cost of the barrier should be equal to or less than the total cost allowance calculated for that barrier. Of the noise barriers evaluated for Alternative 1 and the Initial Phase of Alternative 1, Tables 3.15.14 and 3.15.15 respectively identify in **bold face** type those barriers that are both feasible and reasonable.

Of the noise barriers evaluated in Alternative 2 and in the Initial Phase of Alternative 2, Tables 3.15.16 and 3.15.17 respectively identify in **bold face** type those barriers that are both feasible and reasonable.

There are many receivers that are projected to experience a traffic noise level of 75 dBA L_{eq} or higher, but they would be shielded by feasible and reasonable noise barriers. As discussed earlier, unusual and extraordinary abatement measures would be considered for receivers that would experience a severe traffic noise impact of 75 dBA L_{eq} or higher and are in locations where noise barriers were determined to be not reasonable. Feasible noise barrier heights that have an estimated construction cost exceeding the total reasonable allowance or interior noise abatement can be provided for these receivers. Those receivers are located behind NBs M3 and D1-B for Alternatives 1 and 2 and their design variations. Unusual and extraordinary abatement measures for residences projected to experience severe traffic noise impacts would be evaluated on a case-by-case basis. Severely impacted receivers are shown in Table 3.15.18.

Some receivers would experience a severe traffic noise impact of 75 dBA L_{eq} or higher in areas where noise barriers would not have a useful life of 20 years or more due to future planned and programmed highway projects along I-15. Those receivers are located behind NBs N1-A, N1-B, N1-C, N1-D, N1-D and P1-A, Q1-A, and S1-A and S1-B for Alternatives 1 and 2 and their design variations. Because these barriers would not meet the required 20-year minimum life cycle, these barriers are not considered feasible and, therefore, would not be constructed as part of this project. However, if the proposed improvements for I-15, as part of a separately funded project (I-15 Project), are not constructed within 5 years from the completion of the construction of the SR-91 CIP, the RCTC would initiate a separate project to construct these barriers.

NB K1-A was considered reasonable under Alternatives 1 and 2 and their design variations. However, like NBs N1-A, N1-B, N1-C, N1-D, P1-A, Q1-A, S1-A, and S1-B discussed above, this barrier within the project footprint and along I-15 would not meet the required 20-year minimum life cycle and therefore was not considered reasonable prior to the circulation of the Draft EIR/EIS. However, based on public comments received on the Draft EIR/EIS related to NB K1-A and previous commitments made as part of previous projects in the area, RCTC decided to make a special exception and fund the construction of NB K1-A even though that noise barrier did not meet the required 20-year minimum life cycle.

Nonacoustical Factors Related to Feasibility

The location and length of the modeled noise abatement is the same for all alternatives, so the nonacoustical factors for the noise abatement are presented as the same for each alternative. Nonacoustical factors relating to the feasibility of the 32 acoustically feasible noise barriers were evaluated.

Placement of the barriers in the modeled locations is feasible and would not cause concerns regarding safety, security, geotechnical considerations, or utility relocations based on current knowledge.

The design standards limit the height of noise barriers within 15 ft of the travel way to 14 ft; because of this limit, a wall located on the edge of shoulder (EOS) would have a maximum height of 14 ft. This affects NBs E-1, K-1, O-1, O-2, O-3, P-1, Q-1, T-1, V-1, F-1A, J1-A, J1-B, K1-A, N1-A, N1-B, N1-C, N1-D, P1-A, R1-B, S1-A, and S1-B.

Maintenance of barriers outside the State right-of-way is also a concern. RCTC would need to reach an agreement with all property owners regarding who would be responsible for the maintenance of the barriers that are not located on State right-of-way before the walls can be built. This affects NBs I-1, I-2, Z-1, D1-B, and J1-C.

Overall feasibility and reasonableness of the noise abatement should also consider future road improvements planned and programmed in the project area. Noise barriers are required to have a minimum useful life of 20 years to be considered reasonable. For this reason, placement of barriers on the EOS of I-15 are not considered feasible or reasonable for this project because improvements to I-15 are being planned within 20 years of the completion of the project.

Based on the studies completed to date and the information provided in the NADR for the project, RCTC intends to incorporate noise abatement measures in the form of noise barriers that are both feasible and reasonable as identified in Tables 3.15.19 and 3.15.20 for Alternative 1 and the Initial Phase of Alternative 1, respectively. Feasible and reasonable noise barriers are identified in Tables 3.15.21 and 3.15.22 for Alternative 2 and the Initial Phase of Alternative 2, respectively. Tables 3.15.19 through 3.15.22 show the recommended height, number of benefited residences, the total reasonable allowance, and the estimated construction cost for each barrier.

If conditions have changed substantially during final design, noise abatement may not be necessary at some of these locations. The final decision of the noise abatement would be made on completion of the project design and the public involvement processes.

Noise Barrier Survey Public Outreach Efforts

Permanent noise impacts were identified at 416 properties. In accordance with Department procedures, certified mail was sent to each property owner on May 20, 2011. The following material was included in each package:

- Noise barrier survey letter and survey form
- Map of the noise barrier being considered specific to the property
- Postage paid return envelope
- Notice of Availability of the Draft EIR/EIS
- Electronic copy of the Draft EIR/EIS on a compact disc

Of the 416 packages sent, 320 went unclaimed and were returned. Only 24 completed surveys were received. The noise barrier mailing list was cross referenced with updated property information and the contacts and addresses were updated as appropriate.

Based on the low number of completed surveys returned as part of the first noise barrier survey mail-out and the fact that several residents had requested additional clarification on the purpose of the noise barrier survey and the voting process, RCTC initiated an additional noise barrier public outreach effort that included a focused meeting for property owners affected by NBs D1-B, I-1, and I-2, and a second mail-out of noise barrier survey information to all property owner addresses on the updated noise barrier mailing list.

The second noise barrier survey mail-out occurred on August 5, 2011. During the second round mail-out, 319 property owners received a package that included a noise barrier survey letter, noise barrier survey form, a map of the sound barrier location, and a pre-stamped return envelope. Of the 319 packages sent by both certified mail and regular first class mail, 45 went unclaimed and were returned, and 74 completed surveys were received.

Invitations to two noise barrier focus meetings were also sent on August 5, 2011, to residents affected by NBs D1-B, I-1, and I-2. A second mailing for the noise barrier focus meeting was sent on August 17, 2011, to the same residents as a reminder of the upcoming focus meetings.

The first noise barrier focus meeting for property owners affected by NBs I-1 and I-2, was held at The Veranda at the Green River Golf Club, 5215 Green River Road, Corona, on August 23, 2011, from 7:00 p.m. to 8:00 p.m. A similar meeting with the same format and handouts was held for property owners affected by NB D1-B from 7:00 p.m. to 8:00 p.m. on August 25, 2011, in the Multipurpose Room in Corona City Hall, at 400 South Vicentia Avenue, Corona. All property owners were requested to provide their votes by September 9, 2011.

Due to a large number of no responses received from affected property owners, there were not enough votes to constitute a 100 percent (for noise barriers on private property) or a majority (for noise barriers in State right-of-way) vote in support of or against for all noise barriers. Therefore, RCTC and the Department conducted a third round of public outreach efforts. RCTC and the Department distributed a cover letter and noise barrier survey during door-to-door home visits conducted between the hours of 3:30 p.m. and 7:30 p.m. on September 30, 2011, and October 4, 2011. All teams that made personal visits to property owners were bilingual and provided noise barrier surveys with self-addressed stamped envelopes that requested the completed surveys be returned and postmarked no later than October 5, 2011. A total of 140 homes were visited during the third round public outreach process. A total of 39 noise barrier surveys were returned.

A focused effort was made to inform the Villaggio Condo Homeowners Association (HOA) about the proposed location of NB D1-B. RCTC and the Department held a meeting with the Villagio HOA and interested residents at the Villaggio community pool on Saturday, November 12, 2011, from 11:00 am to 12:30 pm. Six agency and consultant staff and 15 homeowners attended the meeting. After the meeting, the HOA was asked to vote in support or against the construction of NB D1-B.

Based on public comments and previous commitments as a part of previous projects, RCTC decided to fund the construction of NB K1-A.

A noise barrier survey package was sent by certified mail and regular first class mail to 53 property owners potentially affected by the construction of NB K1-A on December 7 and 8, 2011. Property owners were asked to return their surveys no later than December 20, 2011. In an effort to obtain enough votes for a majority approval of NB K1-A, an additional public outreach effort was conducted through door-to-door surveys on January 12, 2012. Property owners were asked to return their surveys no later than January 19, 2012.

Detailed discussion regarding the outcome of the noise barrier survey vote and additional public outreach efforts is provided later in Section 5.2.7, Noise Barrier Public Outreach.

Noise Barrier Survey Results

For proposed noise barrier locations outside the State right-of-way, all (100 percent) of the affected property owners must be supportive of the proposed barrier, the location, and the material to be used for construction. Additionally, a permanent easement must be secured for all (100 percent) of the affected properties to construct and maintain the barrier. All proposed barrier locations within the State right-of-way require a majority of votes (51 percent or greater) in support of the noise barrier for the noise barrier to be approved for construction. The voting results for each barrier are shown in Table 3.15.23 and are summarized as follows:

- NBs E-1, K-1, M-1, M-2, O-2, P-1, T-1, Q-1, V-1, W-1, K1-A, and Z-1 are all within State right-of-way and require a majority vote from the adjacent property owners to be approved for construction.
- NBs E-1, K-1, M-1, M-2, O-2, P-1, T-1, Q-1, V-1, K1-A, and W-1 received votes indicating a majority of adjacent property owners are in support of these noise barriers. NB Z-1 received votes indicating a majority against the construction of that noise barrier. Therefore, NBs E-1, K-1, M-1, M-2, O-2, T-1, Q-1, V-1, K1-A, and
- W-1 will be carried through during construction, and NB Z-1 was eliminated from further consideration by RCTC and the Department.
- NBs J1-C, I-1, I-2, and D1-B are proposed on private property and will require 100 percent approval from those property owners in order for the barrier to be constructed. Based on the noise barrier surveys received, NBs J-C, I-1, and I-2 were eliminated from further consideration. However, NB D1-B will be carried through during construction.

Addresses that were determined to be invalid based on returned packages were eliminated during the two subsequent noise barrier public outreach efforts. The final noise barrier mailing list included only 302 valid property addresses. The number of packages sent out during the three survey efforts conducted for the SR-91 CIP are summarized in Table 3.15.24.

Although NB M-3 was considered along with NBs M-1 and M-2, NB M-3 was removed from further consideration due to the visual impacts related to Miguel's Restaurant and the Ayres Suites hotel. In addition, according to the NADR, NB M-3 is considered feasible but not reasonable.

Noise barriers that would not meet a minimum life span of 20 years are not considered reasonable by the Department and therefore were not considered for inclusion in the final design for the SR-91 CIP. Based on comments received during the public review period of the Draft EIR/EIS and prior commitments made by previous Department projects to build NB K1-A, along I-15, a noise barrier survey was conducted for property owners affected by the construction of NB K1-A. Based on the surveys submitted by affected property owners, NB K1-A received a majority approval and will be constructed as part of the SR-91 CIP. If noise barriers along I-15 other than NB K1-A are not constructed as part of the separate I-15 Project within 5 years from the completion of the SR-91 CIP, RCTC will initiate a separate project to construct these noise barriers. Mitigation Measure N-4 in Section 3.15.4.3, Mitigation for Operational Noise on I-15, confirms RCTC's commitment regarding these other noise barriers along I-15.

The final barrier height, length, location, number of benefitted residents, total reasonable allowance, and estimated construction cost for the Initial Phases and Ultimate Projects of Alternatives 1 and 2 are shown in Tables 3.15.25 through 3.15.28.

Based on design refinements after the identification of the preferred Alternative, the values for the final recommended barriers in Tables 3.15.25 through 3.15.28 changed from the values shown for the initial recommended barriers shown in Tables 3.15.19 through 3.15.22.

Ground-borne Vibration Impacts

Ground-borne vibrations are mostly associated with passenger vehicles and trucks traveling on roads with poor surface conditions, including potholes, bumps, expansion joints, and/or other discontinuities in the road surface. Passenger vehicles and trucks would cause effects such as the rattling of windows, and the source is almost always ground-borne noise. Because Alternatives 1 and 2 include the use of new asphalt pavement, there will be no potholes, bumps, expansion joints, or other discontinuities in the road surface that would generate ground-borne vibration or noise impacts from vehicular traffic traveling the project segments of SR-91 and I-15. Therefore, ground-borne vibration impacts generated by vehicles traveling on those freeway segments under Alternatives 1 and 2 would be negligible.

No Build Alternative

Long-term noise impacts under the No Build Alternative would be from traffic noise. The 2035 noise levels without the Build Alternatives are not expected to change from the existing noise levels. Of the 191 modeled receivers, 111 receivers currently approach or exceed the 67 dBA L_{eq} NAC under future traffic noise conditions without the project.

Ground-borne Vibration Impacts

The No Build Alternative would not result in ground-borne vibration impacts beyond the impacts currently experienced as a result of vehicles traveling on the project segments of SR-91 and I-15.

3.15.3.3 Temporary Impacts

Alternatives 1 and 2

Construction noise represents a short-term impact on noise-sensitive receivers. Receivers affected by freeway noise could also be adversely affected by project construction noise. Construction noise is not generally considered a substantial impact because of the temporary nature and limited nighttime exposure. Although the total construction period for the Initial Phases and Ultimate Projects for Alternatives 1 and 2 would be several years, the construction duration for the project improvements at any given location along SR-91 and I-15 would be substantially less than the total construction period. As a result, project-related construction noise is not considered a substantial impact.

Typical construction equipment expected to be used during construction of the project and the noise levels generated by that equipment are shown in Table 3.15.29.

As described later in Measure N-2, sound control during construction will conform to the provisions in Section 14-8.02 of the Department "Sound Control Requirements" and adhere to the updated SSP S5-310, which will be edited specifically for this project during the PS&E Phase. The content of SSP S5-310 is provided at http://www.dot.ca.gov/hq/esc/oe/specifications/SSPs/2006-SSPs/Sec_05_Gens/District/S5-310_E_A06-05-09.doc.

The design/build contractor would also be responsible for complying with the applicable ordinances for the Cities of Anaheim, Corona, Norco, and Riverside, which all prohibit excessive noise between 7:00 p.m. and 7:00 a.m. during construction days.

The noise level requirement will apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers, or transient equipment that may or may not be owned by the design/build contractor. The use of loud sound signals will be avoided in favor of light warnings except those required by safety laws for the protection of personnel. Full compensation for conforming to the requirements of this section will be considered as included in the prices paid for the various contract items of work involved, and no additional compensation will be allowed therefore.

No adverse noise impacts from the construction of Alternatives 1 and 2 are anticipated because construction would be conducted in accordance with Caltrans Standard Specifications Section 14-08.02, "Noise Control," SSP S5-310, and applicable local noise standards.

Construction-related Ground-borne Vibration Impacts

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 from the piece of construction equipment. The response of buildings near an active construction area to construction-related vibrations range from no perception to low rumbling sounds with perceptible vibrations and slight damage at the highest vibration levels. Typically, construction-related vibrations do not reach levels that would result in damage to nearby structures. However, old and fragile structures would require special consideration to avoid damage.

Table 3.15.30 shows the vibration damage potential threshold criteria for various types of structures. As shown, the vibration damage threshold is 0.3 peak particle velocity (PPV) (inches per second [in/sec]) for older residential structures and 0.5 PPV (in/sec) for newer residential structures. Table 3.15.31 shows the vibration annoyance potential criteria. Tables 3.15.30 and 3.15.31 were used to evaluate the potential for short-term, construction-related ground-borne vibration during construction of Alternatives 1 and 2.

The construction of Alternatives 1 and 2 may require the use of a vibratory steel wheel roller to compact the new asphalt concrete. Other heavy-tracked construction equipment may be required during construction. As shown in Table 3.15.32, a typical vibratory steel wheel roller would generate approximately 0.210 PPV (in/sec) when measured at 25 ft from the roller. Table 3.15.32 also shows that typical heavy-tracked construction equipment would generate approximately 0.003 to 0.089 PPV (in/sec) when measured at 25 ft from the piece of equipment. In addition, the project construction will include CIDH piles as an alternative to using pile drivers.

Vibration generated from drilling using the CIDH method would be negligible. Therefore, no ground-borne vibration impacts from the installation of CIDH piles would occur.

The closest existing home to the SR-91 CIP construction areas is estimated at approximately 25 ft. A home 25 ft from a piece of heavy construction equipment would be exposed to ground-borne vibration levels of 0.210 PPV (in/sec) and 0.089 PPV (in/sec) from potential asphalt concrete placement and heavy-tracked construction equipment, respectively. As shown in Table 3.15.32, short-term construction-related vibration levels from heavy-tracked construction equipment will be well below 0.3 PPV (in/sec) for older residential structures.

No Build Alternative

The No Build Alternative would not result in construction of improvements to SR-91 and I-15 and, therefore, would not result in temporary noise impacts.

The No Build Alternative includes no project-related construction and, therefore, would not result in short-term, construction-related, ground-borne vibration impacts.

3.15.4 Avoidance, Minimization, and/or Mitigation Measures

3.15.4.1 Measure for Operational Noise

Measure N-1 would be required for the Initial Phases of the SR-91 Build Alternatives.

N-1 Based on studies completed to date, RCTC intends to incorporate noise abatement in the form of reasonable and feasible barriers at 15 to 16 locations, depending on the selected alternative, ranging in height from 8 ft to 14 ft, depending on the alternative and the design variations. Calculations based on preliminary design data indicate that the barriers will reduce noise levels by 5 to 15 dBA for 333 to 419 homes and the Green River Golf Club, depending on the design variation. If during final design conditions have substantially changed, noise abatement at some of these locations may not be necessary. The final decision on noise abatement will be made on completion of the project design and the public involvement processes for the environmental document.

RCTC's Resident Engineer will require the design/build contractor to construct the noise abatement measures included in the final design and project specifications.

3.15.4.2 Measures for Construction Noise

Measures N-2 and N-3 would be required for the Initial Phases and Ultimate Projects under the SR-91 Build Alternatives.

N-2 RCTC's Resident Engineer will require the design/build contractor to control noise from construction activity consistent with the Department's Standard Specifications, Section 14-8.02, "Noise Control," and Standard Special Provisions S5-310. RCTC's Resident Engineer will require the design/build contractor to ensure that noise levels from construction operations within the State right-of-way between the hours of 9:00 p.m. and 6:00 a.m. not exceed 86 dBA at a distance of 50 ft. The noise level requirement will apply to the equipment on the job site or related to the job, including, but not limited to trucks, transit mixers, or transient equipment that may or may not be owned by the contractor.

RCTC's Resident Engineer will require the design/build contractor to use an alternative warning method instead of a sound signal unless required by safety laws. In addition, RCTC's Resident Engineer will require the design/build contractor to equip all internal combustion engines with the manufacturer-recommended mufflers and not operate any internal combustion engine on the job site without the appropriate mufflers. As directed by RCTC's Resident Engineer, the design/build contractor will implement appropriate additional noise mitigation measures, including changing the location of stationary construction equipment, turning off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, and installing acoustic barriers around stationary construction noise sources.

N-3 In accordance with the Municipal Codes of the Cities of Anaheim, Corona, Riverside, and Norco, RCTC's Resident Engineer will require the design/build contractor to limit construction activities to between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, excluding weekends and holidays. If construction is needed outside those hours or days, RCTC's Resident Engineer will require the design/build contractor to coordinate with the affected local jurisdiction. If the local jurisdiction approves construction hours that are different from those imposed by this measure, then the design/build contractor will immediately request that RCTC's Resident Engineer consider a modification to this measure in accordance with CEQA to allow construction during the new hours that the local jurisdiction approved.

In addition to Measure N-3, Measure GEO-3 specifically addresses potential noise control in the event blasting is necessary during construction along SR-91 east of I-15.

3.15.4.3 Abatement for Operational Noise on I-15

N-4 If noise barriers proposed for I-15 (with the exception of NB K1-A), as part of a separate project, are not constructed within 5 years of completion of the construction of the SR-91 CIP, the RCTC will initiate a separate project to construct those walls.

3.15.4.4 Unusual and Extraordinary Abatement

N-5 Residences that would experience a severe traffic noise impact of 75 dBA L_{eq} or higher would qualify for consideration of unusual and extraordinary abatement under Alternative 2f. NBs M-3 and D1-B are considered unusual and extraordinary noise abatement. During the design/build phase, RCTC will contract with a qualified acoustical specialist to conduct interior noise analyses at residences projected to experience severe traffic noise impacts. Interior noise abatement for each of these homes will be evaluated on a case-by-case basis per the guidance on "Unusual and Extraordinary Abatement" in the Department's *Traffic Noise Analysis Protocol* (August 2006).

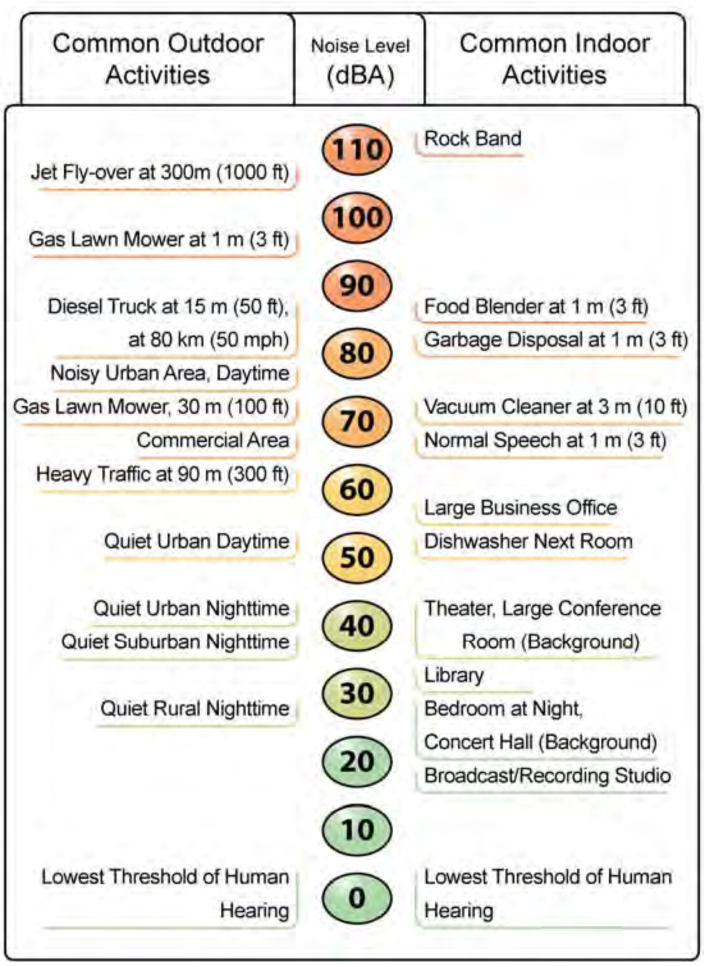
Table 3.15.1 Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA L_{eq}(h)	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above
D	–	Undeveloped lands
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (California Department of Transportation 2006).

CFR = Code of Federal Regulations
dBA = A-weighted decibels
L_{eq}(h) = equivalent continuous noise level over a specified period of time
NAC = Noise Abatement Criteria
NEPA = National Environmental Policy Act

Table 3.15.2 Noise Levels of Common Activities



Source: California Department of Transportation (1998).

Table 3.15.3 Summary of Short-Term Measurements

Measurement Site	Address	Area	Figure 3.15-1 Sheet No.	Land Uses	Start Time	Duration (minutes)	Measured dBA L_{eq}
1	24001 Santa Ana Canyon Road – Campsite 21	A	1	campground	10:30 A.M.	10	63.4
3	25580 Aragon	C	1	SFR	1:20 P.M.	10	54.5
4	25636 Corsica Way	C	1,2	SFR	10:55 A.M.	10	53.3
5	28610 Brush Canyon Drive	C	2	SFR	9:30 A.M.	10	54.8
6	Green River Golf Course	E	3	golf course	1:00 P.M.	10	66.4
8	4901 Green River Drive	E	3	mobile home	11:20 A.M.	10	64.9
61	4901 Green River Drive	E	3	mobile home	2:50 P.M.	10	59.0
9	4521 Pennyroyal Drive	G	3, 4	SFR	11:00 A.M.	10	60.4
10	940 Manor Way	I	4	SFR	1:35 P.M.	10	61.2
11	710 Meridian Circle	I	4	SFR	12:15 P.M.	10	70.4
12	737 Highland View Drive	I	4	SFR	10:30 A.M.	10	64.3
13	3315 Braemar Lane	I	4	SFR	10:50 A.M.	10	65.1
14	3195 Nutmeg Drive	I	4	SFR	11:20 A.M.	10	63.5
15	No Measurement Taken	I	4	SFR	No Measurement Taken		
17	2391 Northmoor Drive	K	5, 6	SFR	12:30 P.M.	10	58.1
18	700 Butternut Lane	M	5, 6	SFR	11:55 A.M.	10	57.8
19	2020 Ridgeview Terrace	M	5, 6	SFR	12:05 P.M.	10	67
20	1559 Pleasant View Avenue	O	7, 8	SFR/MFR	1:05 P.M.	10	70.6
21	307 South Smith Street	O	7, 8	mobile home	11:05 A.M.	10	70.5
22	1343 Agnes Street	O	7, 8	SFR	1:20 P.M.	10	66.2
23	205 Magdalena Circle	O	7, 8	mobile home	10:30 A.M.	10	67.6
24	995 Pomona Road	P	7, 8	mobile home	1:20 P.M.	10	64.8
25	101 North Vicentia Avenue	R	9	SFR	1:30 P.M.	10	66.6
27	205 South Vicentia Avenue	S	9	SFR	2:15 P.M.	10	70.7
28	201 Second Street	U	9	SFR	1:15 P.M.	10	64.8
29	112 School Street	R	9	SFR	1:40 P.M.	10	66.9
30	104 North Belle Avenue	T	9	SFR	12:45 P.M.	10	64.8
32	318 East Second Street	W	9	SFR	12:45 P.M.	10	65
33	1324 Cresta Road	Z	10, 14	SFR	1:15 P.M.	10	64.9
62	1466 Ripchak Road	Z	10, 14	SFR	12:09 P.M.	10	60.2
35	374 South Arthur Circle	B1	10	SFR	10:50 A.M.	10	64.9
36	366 Glacier Circle	B1	10, 11	SFR	10:50 A.M.	10	61.6
37	370 Hendricks Circle	D1	11	SFR	2:20 P.M.	10	62.1

Table 3.15.3 Summary of Short-Term Measurements

Measurement Site	Address	Area	Figure 3.15-1 Sheet No.	Land Uses	Start Time	Duration (minutes)	Measured dBA L_{eq}
38	370 Berkley Circle	D1	11	SFR	2:35 P.M.	10	63.6
39	2900 Via Milano #101	D1	11, 12	MFR	1:25 P.M.	10	69.7
40	317 Camden	D1	12	SFR	12:40 P.M.	10	64.4
42A	4000 Pierce Street #169	D1	12	mobile home	1:15 P.M.	10	61.2
42B	4000 Pierce Street #163	D1	12	mobile home	1:30 P.M.	10	61.5
43	3887 Pierce Street	F1	12	MFR	12:45 P.M.	10	67.7
44	1323 Valley View	H1	13	SFR	11:45 A.M.	10	65.6
45	495 New Hall Drive	K1	13	SFR	12:10 P.M.	10	56.7
46	822 Corona	J1	13	SFR	11:50 A.M.	10	61.9
48	935 Mandevilla Way	J1	13, 14	SFR	1:20 P.M.	10	63.7
49	Cresta Verde Golf Course	Z	10, 14	golf course	11:24 A.M.	10	67.1
50	Parcel 107-230-017 Bel Air	N1	15	SFR	12:30 P.M.	10	73.9
51	7335 Bel Air Street	N1	16	SFR	2:25 P.M.	10	74.7
52	18890 State Street	N1	16	SFR	11:45 A.M.	10	55.0
53	19260 State Street	P1	16	SFR	3:00 P.M.	10	70.2
54	2520 State Street	Q1	16	SFR	3:30 P.M.	10	73.4
55	7255 Piute Creek Drive	P1	16	SFR	11:17 A.M.	10	66.4
56	7306 Calico Circle	Q1	16	SFR	11:45 A.M.	10	60.8
57	19835 Bedford Canyon	S1	16, 17	SFR	1:00 P.M.	10	67.5
58	7570 Liberty Avenue	R1	16	SFR	1:50 P.M.	10	68
59	20131 Bedford Canyon	S1	16	SFR	1:15 P.M.	10	71.6
60	20225 Bedford Canyon	S1	16	SFR	1:30 P.M.	10	69.1

Source: *Final Noise Study Report* (April 2010).
Note: Refer to Figure 3.15-1 (sheets 1–17) for the measurement site locations and the boundaries of each noise analysis area.
dBA = A-weighted decibels
L_{eq} = equivalent noise level
MFR = multifamily residence
SFR = single-family residence

Table 3.15.4 Summary of Long-Term Monitoring at Location 2

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	55.1	-10.0
1:00 a.m.	54.8	-10.3
2:00 a.m.	55.2	-9.9
3:00 a.m.	57.0	-8.1
4:00 a.m.	60.1	-5.0
5:00 a.m.	62.4	-2.7
6:00 a.m.	**65.1**	0.0
7:00 a.m.	64.8	-0.3
8:00 a.m.	64.1	-1.0
9:00 a.m.	62.5	-2.6
10:00 a.m.	61.5	-3.6
11:00 a.m.	62.0	-3.1
12:00 p.m.	62.1	-3.0
1:00 p.m.	64.0	-1.1
2:00 p.m.	63.5	-1.6
3:00 p.m.	64.5	-0.6
4:00 p.m.	64.8	-0.3
5:00 p.m.	**65.1**	0.0
6:00 p.m.	64.7	-0.4
7:00 p.m.	62.7	-2.4
8:00 p.m.	60.0	-5.1
9:00 p.m.	59.0	-6.1
10:00 p.m.	58.5	-6.6
11:00 p.m.	57.3	-7.8

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.5 Summary of Long-Term Monitoring at Location 7

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	56.2	-10.0
1:00 a.m.	56.0	-10.3
2:00 a.m.	54.6	-9.9
3:00 a.m.	57.5	-8.1
4:00 a.m.	61.4	-5.0
5:00 a.m.	61.2	-2.7
6:00 a.m.	60.1	0.0
7:00 a.m.	61.1	-0.3
8:00 a.m.	60.8	-1.0
9:00 a.m.	59.5	-2.6
10:00 a.m.	61.6	-3.6
11:00 a.m.	63.5	-3.1
12:00 p.m.	63.0	-3.0
1:00 p.m.	70.2	-1.1
2:00 p.m.	70.3	-1.6
3:00 p.m.	68.7	-0.6
4:00 p.m.	68.1	-0.3
5:00 p.m.	**72.2**	0.0
6:00 p.m.	69.3	-0.4
7:00 p.m.	69.5	-2.4
8:00 p.m.	68.0	-5.1
9:00 p.m.	59.5	-6.1
10:00 p.m.	58.8	-6.6
11:00 p.m.	57.8	-7.8

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.6 Summary of Long-Term Monitoring at Location 16

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	64.2	-5.3
1:00 a.m.	63.4	-6.1
2:00 a.m.	63.2	-6.3
3:00 a.m.	64.9	-4.6
4:00 a.m.	67.6	-1.9
5:00 a.m.	68.0	-1.5
6:00 a.m.	68.8	-0.7
7:00 a.m.	69.0	-0.5
8:00 a.m.	69.4	-0.1
9:00 a.m.	**69.5**	0.0
10:00 a.m.	69.2	-0.3
11:00 a.m.	69.0	-0.5
12:00 p.m.	68.5	-1.0
1:00 p.m.	68.5	-1.0
2:00 p.m.	68.4	-1.1
3:00 p.m.	67.5	-2.0
4:00 p.m.	67.6	-1.9
5:00 p.m.	67.7	-1.8
6:00 p.m.	68.7	-0.8
7:00 p.m.	68.0	-1.5
8:00 p.m.	67.7	-1.8
9:00 p.m.	67.8	-1.7
10:00 p.m.	67.8	-1.7
11:00 p.m.	65.8	-3.7

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.7 Summary of Long-Term Monitoring at Location 26

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	62.2	-12.1
1:00 a.m.	61.2	-13.1
2:00 a.m.	62.0	-12.3
3:00 a.m.	64.0	-10.3
4:00 a.m.	66.6	-7.7
5:00 a.m.	66.3	-8.0
6:00 a.m.	67.8	-6.5
7:00 a.m.	67.3	-7.0
8:00 a.m.	66.9	-7.4
9:00 a.m.	67.4	-6.9
10:00 a.m.	66.9	-7.4
11:00 a.m.	66.8	-7.5
12:00 p.m.	67.6	-6.7
1:00 p.m.	70.7	-3.6
2:00 p.m.	**74.3**	0.0
3:00 p.m.	73.0	-1.3
4:00 p.m.	73.9	-0.4
5:00 p.m.	73.9	-0.4
6:00 p.m.	71.8	-2.5
7:00 p.m.	69.6	-4.7
8:00 p.m.	65.9	-8.4
9:00 p.m.	65.5	-8.8
10:00 p.m.	65.2	-9.1
11:00 p.m.	64.1	-10.2

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.8 Summary of Long-Term Monitoring at Location 31

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	63.5	-10.9
1:00 a.m.	63.8	-10.6
2:00 a.m.	63.1	-11.3
3:00 a.m.	64.4	-10.0
4:00 a.m.	68.1	-6.3
5:00 a.m.	66.4	-8.0
6:00 a.m.	63.5	-10.9
7:00 a.m.	63.7	-10.7
8:00 a.m.	66.2	-8.2
9:00 a.m.	65.3	-9.1
10:00 a.m.	69.2	-5.2
11:00 a.m.	68.4	-6.0
12:00 p.m.	70.1	-4.3
1:00 p.m.	71.3	-3.1
2:00 p.m.	73.7	-0.7
3:00 p.m.	72.4	-2.0
4:00 p.m.	74.0	-0.4
5:00 p.m.	**74.4**	0.0
6:00 p.m.	70.4	-4.0
7:00 p.m.	68.2	-6.2
8:00 p.m.	67.8	-6.6
9:00 p.m.	66.2	-8.2
10:00 p.m.	65.4	-9.0
11:00 p.m.	64.8	-9.6

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.9 Summary of Long-Term Monitoring at Location 34

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	60.3	-5.0
1:00 a.m.	61.0	-4.3
2:00 a.m.	60.7	-4.6
3:00 a.m.	61.7	-3.6
4:00 a.m.	64.7	-0.6
5:00 a.m.	64.1	-1.2
6:00 a.m.	**65.3**	0.0
7:00 a.m.	64.3	-1.0
8:00 a.m.	64.8	-0.5
9:00 a.m.	62.9	-2.4
10:00 a.m.	64.2	-1.1
11:00 a.m.	64.4	-0.9
12:00 p.m.	64.3	-1.0
1:00 p.m.	64.7	-0.6
2:00 p.m.	63.9	-1.4
3:00 p.m.	63.9	-1.4
4:00 p.m.	63.1	-2.2
5:00 p.m.	63.0	-2.3
6:00 p.m.	63.7	-1.6
7:00 p.m.	64.4	-0.9
8:00 p.m.	64.1	-1.2
9:00 p.m.	63.3	-2.0.
10:00 p.m.	62.3	-3.0
11:00 p.m.	61.4	-3.9

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.10 Summary of Long-Term Monitoring at Location 41

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	65.7	-8.3
1:00 a.m.	63.3	-10.7
2:00 a.m.	66.0	-8.0
3:00 a.m.	62.2	-11.8
4:00 a.m.	66.2	-7.8
5:00 a.m.	70.2	-3.8
6:00 a.m.	72.2	-1.8
7:00 a.m.	73.4	-0.6
8:00 a.m.	72.1	-1.9
9:00 a.m.	71.5	-2.5
10:00 a.m.	71.4	-2.6
11:00 a.m.	71.9	-2.1
12:00 p.m.	71.5	-2.5
1:00 p.m.	72.1	-1.9
2:00 p.m.	**74.0**	0.0
3:00 p.m.	73.1	-0.9
4:00 p.m.	73.0	-1.0
5:00 p.m.	73.3	-0.7
6:00 p.m.	71.4	-2.6
7:00 p.m.	70.1	-3.9
8:00 p.m.	70.1	-3.9
9:00 p.m.	69.3	-4.7
10:00 p.m.	69.2	-4.8
11:00 p.m.	66.5	-7.5

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.11 Summary of Long-Term Monitoring at Location 47

Beginning Hour	Noise Level, dBA L_{eq}(h)	Difference from Loudest Hour (dBA)
12:00 a.m.	61.9	-10.3
1:00 a.m.	61.2	-11.0
2:00 a.m.	61.1	-11.1
3:00 a.m.	61.7	-10.5
4:00 a.m.	65.1	-7.1
5:00 a.m.	66.8	-5.4
6:00 a.m.	67.7	-4.5
7:00 a.m.	68.2	-4.0
8:00 a.m.	67.8	-4.4
9:00 a.m.	67.9	-4.3
10:00 a.m.	67.3	-4.9
11:00 a.m.	67.1	-5.1
12:00 p.m.	65.8	-6.4
1:00 p.m.	66.1	-6.1
2:00 p.m.	66.4	-5.8
3:00 p.m.	68.2	-4.0
4:00 p.m.	70.3	-1.9
5:00 p.m.	71.8	-0.4
6:00 p.m.	**72.2**	0.0
7:00 p.m.	68.3	-3.9
8:00 p.m.	65.8	-6.4
9:00 p.m.	64.9	-7.3
10:00 p.m.	63.9	-8.3
11:00 p.m.	63.7	-8.5

Source: *Final Noise Study Report* (April 2010).
Note: Worst-noise hour level is in **bold.**
dBA = A-weighted decibel L_{eq}(h) = equivalent continuous noise level over a specified period of time

Table 3.15.12 Existing Noise Levels, dBA L_{eq}

Receiver ID	Address	Area	Land Use	Number of Representative Units	Activity Category	Existing Noise Level
1M	24001 Santa Ana Canyon Road	A	Park	1,950 feet of Frontage (20)	B (67)	67
1	24001 Santa Ana Canyon Road	A	Park	1,500 Feet of Frontage (15)	B (67)	67
2M	24001 Santa Ana Canyon Road	A	Park	1,000 feet of Frontage (10)	B (67)	67
3M	24001 Santa Ana Canyon Road	C	Park	1,300 Feet of Frontage (13)	B (67)	67
2	24001 Santa Ana Canyon Road	C	Park	1,350 feet of Frontage (14)	B (67)	65
4M	25530 Aragon Way	C	SFR	8	B (67)	55
3	25580 Argon Way	C	SFR	10	B (67)	56
5M	25606 Argon Way	C	SFR	10	B (67)	55
4	25636 Corsica Way	C	SFR	9	B (67)	55
6M	25652 Cross Creek Drive	C	MFR	4	B (67)	63
7M	25644 River Bank Drive	C	MFR	3	B (67)	62
8M	28616 Brush Canyon Drive	C	SFR	11	B (67)	59
5	28610 Brush Canyon Drive	C	SFR	12	B (67)	59
9M	28672 Brush Canyon Drive	C	SFR	5	B (67)	53
124M	Green River Golf Course	E	Golf Course	1,800 feet of Frontage (18)	B (67)	62
125M	Green River Golf Course	E	Golf Course	1,500 feet of Frontage (15)	B (67)	68
6	Green River Golf Course	E	Golf Course	1,500 feet of Frontage (15)	B (67)	68
126M	Green River Golf Course	E	Golf Course	1,300 feet of Frontage (13)	B (67)	67
7	Green River Village (16)	E	Mobile Home	7	B (67)	66
10M	Green River Village (9)	E	Mobile Home	12	B (67)	66
11M	Green River Village (19)	E	Mobile Home	10	B (67)	64
8	Green River Village (333)	E	Mobile Home	11	B (67)	64
12M	Green River Village (308)	E	Mobile Home	16	B (67)	64
13M	Green River Village (190)	E	Mobile Home	20	B (67)	65
61	Green River Village (315)	E	Mobile Home	10	B (67)	60
9	4521 Pennyroyal Drive	G	SFR	9	B (67)	61
14M	4455 Pennyroyal Drive	G	SFR	9	B (67)	63
15M	4508 Feather River Road	G	SFR	10	B (67)	61
10	940 Manor Way	I	SFR	8	B (67)	65
11	724 Meridian Circle	I	SFR	9	B (67)	69
12	737 Highland Drive	I	SFR	5	B (67)	68
16M	7873 Via Bernardo	I	SFR	10	B (67)	59
13	3315 Braemar Lane	I	SFR	10	B (67)	64
17M	3207 Braemar Lane	I	SFR	7	B (67)	61
14	3195 Nutmeg Drive	I	SFR	6	B (67)	63
18M	3125 Nutmeg Drive	I	SFR	10	B (67)	62
19M	661 Colonial Drive	K	SFR	5	B (67)	61
20M	2593 Monterey Peninsula Drive	K	SFR	7	B (67)	62
16	2561 Northmoor Drive	K	SFR	7	B (67)	69
21M	2493 Northmoor Drive	K	SFR	9	B (67)	64
127M	Mountain View County Club	K	Golf Course	1,200 feet of Frontage (12)	B (67)	66
17	2391 Northmoor Drive	K	SFR	7	B (67)	62
22M	716 Sugar Lane	M	SFR	4	B (67)	65
18	700 Butternut Lane	M	SFR	4	B (67)	62
23M	714 Poplar Lane	M	SFR	4	B (67)	63
24M	714 Balsam Lane	M	SFR	4	B (67)	63
19	2020 Ridgeview Terrace	M	SFR	4	B (67)	69
25M	2048 Ridgeview Terrace	M	SFR	3	B (67)	64
26M	1972 Via Santiago	M	SFR	7	B (67)	65
20	1559 Pleasant View Avenue	O	MFR	8	B (67)	72

Table 3.15.12 Existing Noise Levels, dBA L_{eq}

Receiver ID	Address	Area	Land Use	Number of Representative Units	Activity Category	Existing Noise Level
27M	1555 Pleasant View Avenue	O	SFR	6	B (67)	67
28M	1504 Pleasant View Avenue	O	MFR	5	B (67)	70
21	307 Smith Avenue	O	Trailer Park	5	B (67)	73
29M	Countrywood Estates	O	Trailer Park	7	B (67)	68
30M	Countrywood Estates	O	Trailer Park	22	B (67)	65
22	1343 Agnes Street	O	SFR	8	B (67)	67
31M	1302 Agnes Street	O	SFR	10	B (67)	69
32M	1264 D Street	O	SFR	15	B (67)	64
23	205 Magdalena Circle	O	MFR	5	B (67)	68
33M	217 Isabella Way	O	MFR	4	B (67)	70
34M	228 Magdalena Circle	O	MFR	4	B (67)	68
43M	Corona West Mobile Estates	P	Trailer Park	5	B (67)	78
24	Corona West Mobile Estates	P	Trailer Park	5	B (67)	66
41M	Corona West Mobile Estates	P	Trailer Park	5	B (67)	70
44M	Corona West Mobile Estates	P	Trailer Park	5	B (67)	74
35M	Buena Vista Mobile Manor	Q	Trailer Park	7	B (67)	68
36M	Buena Vista Mobile Manor	Q	Trailer Park	7	B (67)	71
37M	Buena Vista Mobile Manor	Q	Trailer Park	7	B (67)	69
26	128 Buena Vista Avenue	Q	SFR	7	B (67)	71
45M	840 Bollero Place	R	SFR	6	B (67)	71
46M	101 N Vicentia Avenue	R	SFR	6	B (67)	73
25	102 N Vicentia Avenue	R	SFR	4	B (67)	68
42M	102 Cota Street	R	SFR	2	B (67)	73
29	112 School Street	R	SFR	2	B (67)	73
47M	122 School Street	R	SFR	4	B (67)	72
40M	129 Buena Vista Avenue	S	MFR	3	B (67)	79
38M	776 2nd Street	S	MFR	2	B (67)	76
27	205 S. Vicentia Avenue	S	MFR	3	B (67)	73
39M	658 2nd Street	S	MFR	2	B (67)	77
50M	205 S. Vicentia Avenue	S	MFR	6	B (67)	73
48M	130 Merrill Street	T	SFR	2	B (67)	76
49M	Sheridan Street	T	SFR	3	B (67)	78
30	Belle Avenue	T	SFR	5	B (67)	67
51M	488 2nd Street	U	SFR/School	4	B (67)	74
28	301 2nd Street	U	SFR	4	B (67)	68
52M	202 Belle Avenue	U	SFR	4	B (67)	76
53M	214 Sheridan Street	U	SFR	6	B (67)	69
54M	Victoria Avenue	V	SFR	3	B(67)	76
55M	Victoria Avenue	V	SFR	4	B (67)	73
31	Howard Street	V	MFR	4	B (67)	69
56M	202 Victoria Avenue	W	SFR	2	B (67)	76
32	318 2ND Street	W	SFR	5	B (67)	66
57M	209 Victoria Avenue	W	SFR	8	B (67)	72
58M	204 Joy Street	W	SFR	4	B (67)	72
128M	912 3rd Street	W	SFR	12	B (67)	64
92M	1302 Cresta Road	Z	SFR	5	B (67)	70
33	1324 Cresta Road	Z	SFR	5	B (67)	67
59M	1327 Cresta Road	Z	SFR	6	B (67)	65
60M	1416 Ripchak Road	Z	SFR	7	B (67)	66
62	1466 Ripchak Road	Z	SFR	10	B (67)	63
120M	1447 Ripchak Road	Z	SFR	10	B (67)	57
61M	1482 Ripchak Road	Z	SFR	6	B (67)	59
34	405 Wynola Court	Z	SFR	6	B (67)	64
62M	426 Wynola Court	Z	SFR	4	B (67)	61
63M	372 Colfax Circle	B1	SFR	6	B (67)	60
35	374 Arthur Circle	B1	SFR	6	B (67)	66
64M	380 Arthur Circle	B1	SFR	4	B (67)	62
65M	374 Yellowstone Circle	B1	SFR	4	B (67)	64
36	366 Glacier Circle	B1	SFR	4	B (67)	63

Table 3.15.12 Existing Noise Levels, dBA L_{eq}

Receiver ID	Address	Area	Land Use	Number of Representative Units	Activity Category	Existing Noise Level
66M	Collett Avenue	B1	MFR	4	B (67)	62
67M	2482 Griffin Way	D1	SFR	6	B (67)	62
37	370 Hendricks Circle	D1	SFR	4	B (67)	65
121M	390 Hendricks Circle	D1	SFR	4	B (67)	65
68M	370 Dylan Circles	D1	SFR	5	B (67)	65
38	370 Berkley Circle	D1	SFR	5	B (67)	66
69M	392 Berkley Circle	D1	SFR	4	B (67)	64
39	2900 Via Milano #101	D1	MFR	6	B (67)	73
70M	2916 Via Milano	D1	MFR	6	B (67)	71
71M	310 Oakwood Court	D1	SFR	4	B (67)	67
72M	324 Cypress Court	D1	SFR	8	B (67)	66
40	317 Camden Court	D1	SFR	4	B (67)	66
76M	The Meadows Mobile Home Park	D1	Trailer Park	7	B (67)	62
42A	4 The Meadows Mobile Home Park #169	D1	Trailer Park	7	B (67)	62
42B	The Meadows Mobile Home Park #163	D1	Trailer Park	7	B (67)	64
77M	The Meadows Mobile Home Park	D1	Trailer Park	17	B (67)	64
78M	The Meadows Mobile Home Park	D1	Trailer Park	7	B (67)	61
73M	Sierra Pine Mobile Home Park	E1	Trailer Park	10	B (67)	69
74M	Sierra Pine Mobile Home Park	E1	Trailer Park	10	B (67)	69
75M	Sierra Pine Mobile Home Park	E1	Trailer Park	15	B (67)	66
41	Sierra Pine Mobile Home Park	E1	Trailer Park	10	B (67)	67
79M	3887 Pierce Street (Pinnacle Riverwalk)	F1	MFR	2	B (67)	67
43	3887 Pierce Street (Pinnacle Riverwalk)	F1	MFR	4	B (67)	69
80M	3887 Pierce Street (Pinnacle Riverwalk)	F1	MFR	3	B (67)	68
81M	3887 Pierce Street (Pinnacle Riverwalk)	F1	MFR	4	B (67)	64
129M	Farmer Bros.	G1	Bus	0	C(72)	71
44	1323 Valley View	H1	SFR	5	B (67)	67
82M	1420 Valley View	H1	SFR	3	B (67)	64
46	822 Corona Avenue	J1	SFR	3	B (67)	66
83M	Corona Avenue	J1	SFR	3	B (67)	59
88M	890 Mandevilla Way	J1	SFR	5	B (67)	66
48	935 Mandevilla Way	J1	SFR	6	B (67)	66
89M	955 Mandevilla Way	J1	SFR	2	B (67)	63
84M	Corona City	K1	SFR	6	B (67)	61
86M	455 Newhall Drive	K1	SFR	6	B (67)	64
45	495 Newhall Drive	K1	SFR	6	B (67)	59
85M	452 Newhall Drive	K1	SFR	17	B (67)	61
87M	801 Laguna Drive	K1	SFR	9	B (67)	65
47	801 Laguna Drive	K1	SFR	7	B (67)	70
90M	817 Laguna Drive	K1	SFR	2	B (67)	69
91M	810 San Jacinto Circle	K1	SFR	3	B (67)	65
49	Cresta Verde Golf Course	Z	Golf Course	1,300 feet of Frontage (13)	B (67)	69
93M	1678 Bel Air Street	N1	SFR	7	B (67)	73
122M	1691 Bel Air Street	N1	SFR	11	B (67)	63
94M	1632 Bel Air Street	N1	SFR	7	B (67)	75
50	1694 Bel Air Street	N1	SFR	4	B (67)	75
95M	1892 Bel Air Street	N1	SFR	5	B (67)	77
96M	7171 Bel Air Street	N1	SFR	6	B (67)	75
51	7335 Bel Air Street	N1	SFR	2	B (67)	76
97M	7320 Bel Air Street	N1	SFR	3	B (67)	64

Table 3.15.12 Existing Noise Levels, dBA L_{eq}

Receiver ID	Address	Area	Land Use	Number of Representative Units	Activity Category	Existing Noise Level
98M	18745 State Street	N1	SFR	3	B (67)	67
52	18875 State Street	N1	SFR	4	B (67)	73
99M	18989 State Street	N1	SFR	2	B (67)	65
101M	2304 State Street	P1	SFR	4	B (67)	67
100M	2308 State Street	P1	SFR	2	B (67)	73
53	19620 State Street	P1	SFR	4	B (67)	71
55	7255 Piute Creek Drive	P1	SFR	4	B (67)	68
123M	7248 Piute Creek Drive	P1	SFR	6	B (67)	65
103M	7285 Piute Creek Drive	P1	SFR	4	B (67)	66
104M	El Cerrito Sports Park[1]	P1	Park	700 feet of Frontage (7)	B (67)	66
130M	El Cerrito Sports Park[1]	P1	Park	900 feet of Frontage (9)	B (67)	68
54	2520 State Street	Q1	SFR	2	B (67)	75
105M	19414 Dry Gulch Road	Q1	SFR	5	B (67)	73
107M	7375 Calico Circle	Q1	SFR	6	B (67)	74
106M	7260 Whiskey Creek Circle	Q1	SFR	7	B (67)	62
56	7315 Calico Circle	Q1	SFR	4	B (67)	62
108M	7279 Calico Circle	Q1	SFR	4	B (67)	62
109M	19726 Long Branch Way	Q1	SFR	3	B (67)	58
110M	19740 Long Branch Way	Q1	SFR	2	B (67)	58
112M	19801 Frances Street	R1	SFR	5	B (67)	71
58	7450 Liberty Avenue	R1	SFR	2	B (67)	69
113M	19890 Katy Way	R1	SFR	4	B (67)	67
114M	7630 Liberty Avenue	R1	SFR	3	B (67)	68
115M	7450 Liberty Avenue	R1	SFR	2	B (67)	63
57	19835 Bedford Canyon Road	S1	SFR	4	B (67)	68
111M	19905 Bedford Canyon Road	S1	SFR	2	B (67)	70
116M	20031 Bedford Canyon Road	S1	SFR	4	B (67)	74
59	20111 Corona Street	S1	SFR	3	B (67)	74
117M	20110 Klyne Street	S1	SFR	4	B (67)	71
118M	20141 Bedford Canyon Road	S1	SFR	4	B (67)	71
60	20225 Bedford Canyon Road	S1	SFR	3	B (67)	71
119M	7665 Boyd Street	S1	SFR	1	B (67)	68

Source: *Final Noise Study Report* (April 2010).

[1] This park was planned but not in operation when the noise modeling was conducted in 2008.

Bus = business

dBA = A-weighted decibel

L_{eq} = equivalent noise level

MFR = multifamily residential

SFR = single-family residential

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
1M	24001 Santa Ana Canyon Road	67	67	**67**	0	**67**	0	**67**	0	**67**	0
1	24001 Santa Ana Canyon Road	67	67	**67**	1	**67**	1	**67**	1	**67**	1
2M	24001 Santa Ana Canyon Road	67	67	**68**	1	**68**	1	**68**	1	**68**	1
3M	24001 Santa Ana Canyon Road	67	67	**68**	2	**69**	2	**68**	2	**69**	2
2	24001 Santa Ana Canyon Road	65	65	65	0	66	1	66	1	66	1
4M	25530 Aragon Way	55	55	55	0	55	0	55	0	55	0
3	25580 Argon Way	56	56	57	1	56	0	56	0	56	0
5M	25606 Argon Way	55	55	56	1	56	1	56	1	56	1
4	25636 Corsica Way	55	55	56	1	56	1	56	1	56	1
6M	25652 Cross Creek Drive	63	63	64	1	64	1	64	1	64	1
7M	25644 River Bank Drive	62	62	62	0	62	0	62	0	62	0
8M	28616 Brush Canyon Drive	59	59	60	1	60	1	60	1	60	1
5	28610 Brush Canyon Drive	59	59	60	1	60	1	60	1	60	1
9M	28672 Brush Canyon Drive	53	53	54	1	54	1	54	1	54	1
124M	Green River Golf Course	62	62	63	1	64	2	65	3	64	2
125M	Green River Golf Course	68	68	**70**	2	**70**	2	**71**	3	**70**	2

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
6	Green River Golf Course	68	68	**72**	4	**69**	1	**69**	1	**69**	1
126M	Green River Golf Course	67	67	**69**	2	63	-4	64	-3	63	-4
7	Green River Village (16)	66	66	**67**	1	64	-2	**67**	1	64	-2
10M	Green River Village (9)	66	66	**67**	1	64	-2	**67**	1	64	-2
11M	Green River Village (19)	64	64	66	2	66	2	66	2	66	2
8	Green River Village (333)	64	64	66	2	61	-3	61	-3	61	-3
12M	Green River Village (308)	64	64	**67**	3	65	1	65	1	65	1
13M	Green River Village (190)	65	65	**68**	3	66	1	66	1	66	1
61	Green River Village (315)	60	60	63	3	60	1	62	2	60	1
9	4521 Pennyroyal Drive	61	61	62	1	63	2	63	2	63	2
14M	4455 Pennyroyal Drive	63	63	62	-1	62	-1	63	0	62	-1
15M	4508 Feather River Road	61	61	61	0	61	0	61	0	61	0
10	940 Manor Way	65	65	66	1	66	1	67	2	67	2
11	724 Meridian Circle	69	69	**70**	1	**70**	1	**71**	2	**71**	2
12	737 Highland Drive	68	68	**69**	1	**69**	1	**69**	1	**69**	1
16M	7873 Via Bernardo	59	59	60	1	60	1	60	1	60	1
13	3315 Braemar Lane	64	64	65	1	65	1	65	1	65	1
17M	3207 Braemar Lane	61	61	62	1	62	1	63	2	63	2
14	3195 Nutmeg Drive	63	63	64	1	64	1	65	2	65	2
18M	3125 Nutmeg Drive	62	62	63	1	63	1	65	3	65	3

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
19M	661 Colonial Drive	61	61	**67**	6	**67**	6	**67**	6	**67**	6
20M	2593 Monterey Peninsula Drive	62	62	**67**	5	**67**	5	**67**	5	**67**	5
16	2561 Northmoor Drive	69	69	**81**	**12**	**81**	**12**	**79**	10	**79**	10
21M	2493 Northmoor Drive	64	64	**73**	9	**73**	9	**74**	10	**74**	10
127M	Mountain View County Club	66	66	**81**	**15**	**81**	**15**	**82**	**16**	**82**	**16**
17	2391 Northmoor Drive	62	62	66	4	66	4	66	4	66	4
22M	716 Sugar Lane	65	65	**68**[3]	3[3]	**68**[3]	3[3]	**68**[3]	3[3]	**68**[3]	3[3]
				67[4]	2[4]	**67**[4]	2[4]	**68**[4]	3[4]	**68**[4]	3[4]
18	700 Butternut Lane	62	62	**69**[3]	7[3]	**69**[3]	7[3]	**73**[3]	11[3]	**73**[3]	11[3]
				63[4]	1[4]	63[4]	1[4]	65[4]	3[4]	65[4]	3[4]
23M	714 Poplar Lane	63	63	64[3]	1[3]	64[3]	1[3]	75[3]	12[3]	75[3]	12[3]
				64[4]	1[4]	64[4]	1[4]	67[4]	4[4]	67[4]	4[4]
24M	714 Balsam Lane	63	63	65[3]	2[3]	65[3]	2[3]	73[3]	10[3]	73[3]	10[3]
				65[4]	2[4]	65[4]	2[4]	67[4]	4[4]	67[4]	4[4]
19	2020 Ridgeview Terrace	69	69	**75**[3]	6[3]	**75**[3]	6[3]	**78**[3]	9[3]	**78**[3]	9[3]
				75[4]	6[4]	**75**[4]	6[4]	**77**[4]	8[4]	**77**[4]	8[4]
25M	2048 Ridgeview Terrace	64	64	**69**[3]	5[3]	**69**[3]	5[3]	**73**[3]	9[3]	**73**[3]	9[3]
				67[4]	3[4]	**67**[4]	3[4]	**70**[4]	6[4]	**70**[4]	6[4]
26M	1972 Via Santiago	65	65	**67**[3]	2[3]	**67**[3]	2[3]	**68**[3]	3[3]	**68**[3]	3[3]
				67[4]	2[4]	**67**[4]	2[4]	**71**[4]	6[4]	**71**[4]	6[4]
20	1559 Pleasant View Avenue	72	72	**83**	11	**83**	11	**84**	**12**	**84**	**12**
27M	1555 Pleasant View Avenue	67	67	**74**	7	**74**	7	**74**	7	**74**	7
28M	1504 Pleasant View Avenue	70	70	**83**	13	**83**	**13**	**83**	**13**	**83**	**13**
21	307 Smith Avenue	73	73	**83**	10	**83**	10	**84**	11	**84**	11

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
29M	Countrywood Estates	68	68	**81**	13	**81**	**13**	82	**14**	**82**	**14**
30M	Countrywood Estates	65	65	**71**	6	**71**	6	**71**	6	**71**	6
22	1343 Agnes Street	67	67	**81**	14	**81**	**14**	**81**	**14**	**81**	**14**
31M	1302 Agnes Street	69	69	**74**	5	**74**	5	**75**	6	**75**	6
32M	1264 D Street	64	64	**68**	4	**68**	4	**68**	4	**68**	4
23	205 Magdalena Circle	68	68	NA[5]	NA	NA	NA	NA	NA	NA	NA
				80[6]	**12[6]**	**80[6]**	**12[6]**	**83[6]**	**15[6]**	**83[6]**	**15[6]**
33M	217 Isabella Way	70	70	**71[7]**	1[7]	**71[7]**	1[7]	**73[7]**	3[7]	**73[7]**	3[7]
				74[6]	4[6]	**74[6]**	4[6]	**78[6]**	8[6]	**78[6]**	8[6]
34M	228 Magdalena Circle	68	68	**76[7]**	8[7]	**76[7]**	8[7]	**77[7]**	9[7]	**77[7]**	9[7]
				75[6]	7[6]	**75[6]**	7[6]	**77[6]**	9[6]	**77[6]**	9[6]
43M	Corona West Mobile Estates	78	78	**71**	-7	**71**	-7	**71**	-7	**71**	-7
24	Corona West Mobile Estates	66	66	NA	NA	NA	NA	NA	NA	NA	NA
41M	Corona West Mobile Estates	70	70	**70**	0	**70**	0	**71**	1	**71**	1
44M	Corona West Mobile Estates	74	74	**79**	5	**79**	5	**80**	6	**80**	6
35M	Buena Vista Mobile Manor	68	68	**70[7]**	2[7]	**70[7]**	2[7]	**70[7]**	2[7]	**70[7]**	2[7]
				71[6]	3[6]	**71[6]**	3[6]	**75[6]**	7[6]	**75[6]**	7[6]
36M	Buena Vista Mobile Manor	71	71	**77[7]**	6[7]	**77[7]**	6[7]	**77[7]**	6[7]	**77[7]**	6[7]
				77[6]	6[6]	**77[6]**	6[6]	**80[6]**	9[6]	**80[6]**	9[6]
37M	Buena Vista Mobile Manor	69	69	**73[7]**	4[7]	**73[7]**	4[7]	**74[7]**	5[7]	**74[7]**	5[7]
				74[6]	5[6]	**74[6]**	5[6]	**77[6]**	8[6]	**77[6]**	8[6]
26	128 Buena Vista Avenue	71	71	**72[7]**	1[7]	**72[7]**	1[7]	**71[7]**	0[7]	**71[7]**	0[7]
				72[6]	1[6]	**72[6]**	1[6]	**76[6]**	5[6]	**76[6]**	5[6]
45M	840 Bollero Place	71	71	**78[7]**	7[7]	**78[7]**	7[7]	**73[7]**	2[7]	**73[7]**	2[7]
				78[6]	7[6]	**78[6]**	7[6]	**73[6]**	2[6]	**73[6]**	2[6]

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
46M	101 N Vicentia Avenue	73	73	**79**[7]	6[7]	**79**[7]	6[7]	**73**[7]	0[7]	**73**[7]	0[7]
				79[6]	6[6]	**79**[6]	6[6]	**73**[6]	0[6]	**73**[6]	0[6]
25	102 N Vicentia Avenue	68	68	**75**[7]	7[7]	**75**[7]	7[7]	**76**[7]	8[7]	**76**[7]	8[7]
				75[6]	7[6]	**75**[6]	7[6]	**76**[6]	8[6]	**76**[6]	8[6]
42M	102 Cota Street	73	73	**74**[7]	1[7]	**74**[7]	1[7]	**78**[7]	5[7]	**78**[7]	5[7]
				74[6]	1[6]	**74**[6]	1[6]	**76**[6]	3[6]	**76**[6]	3[6]
29	112 School Street	73	73	NA	NA	NA	NA	**70**[7]	-3[7]	**70**[7]	-3[7]
				NA	NA	NA	NA	**71**[6]	-2[6]	**71**[6]	-2[6]
47M	122 School Street	72	72	**71**[7]	-1[7]	**71**[7]	-1[7]	**73**[7]	1[7]	**73**[7]	1[7]
				71[6]	-1[6]	**71**[6]	-1[6]	**73**[6]	1[6]	**73**[6]	1[6]
40M	129 Buena Vista Avenue	79	79	**81**	2	**81**	2	**83**	4	**83**	4
38M	776 2nd Street	76	76	**77**	1	**77**	1	**80**	4	**80**	4
27	205 S. Vicentia Avenue	73	73	**70**	-3	**70**	-3	**71**	-2	**71**	-2
39M	658 2nd Street	77	77	**74**	-3	**74**	-3	**78**	1	**78**	1
50M	205 S. Vicentia Avenue	73	73	**73**	0	**73**	0	**75**	2	**75**	2
48M	130 Merrill Street	76	76	**78**	2	**78**	2	**78**	2	**78**	2
49M	Sheridan Street	78	78	**83**	5	**83**	5	**84**	6	**84**	6
30	Belle Avenue	67	67	**68**	1	**68**	1	**68**	1	**68**	1
51M	488 2nd Street	74	74	**76**	2	**76**	2	**78**	4	**78**	4
28	301 2nd Street	68	68	**78**	10	**78**	10	**70**	3	**70**	3
52M	202 Belle Avenue	76	76	**81**	5	**81**	5	**82**	6	**82**	6
53M	214 Sheridan Street	69	69	**74**	5	**74**	5	**75**	6	**75**	6
54M	Victoria Avenue	76	76	**80**	4	**80**	4	NA	NA	NA	NA
55M	Victoria Avenue	73	73	**75**	2	**75**	2	**76**	3	**76**	3
31	Howard Street	69	69	NA	NA	NA	NA	NA	NA	NA	NA
56M	202 Victoria Avenue	76	76	**75**	-1	**75**	-1	**76**	0	**76**	0
32	318 2nd Street	66	66	**73**	7	**73**	7	**73**	7	**73**	7

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
57M	209 Victoria Avenue	72	72	**74**	2	**74**	2	**74**	2	**74**	2
58M	204 Joy Street	72	72	**74**	2	**74**	2	**74**	2	**74**	2
128M	912 3rd Street	64	64	**67**	3	**67**	3	**69**	5	**69**	4
92M	1302 Cresta Road	70	70	**71**	1	**71**	1	**70**	0	**71**	1
33	1324 Cresta Road	67	67	**72**	5	**72**	5	**72**	5	**72**	5
59M	1327 Cresta Road	65	65	66	1	66	1	66	1	66	1
60M	1416 Ripchak Road	66	66	**67**	1	**68**	2	**67**	1	**68**	2
62	1466 Ripchak Road	63	63	64	1	64	1	64	1	64	1
120M	1447 Ripchak Road	57	57	58	1	57	0	58	1	57	0
61M	1482 Ripchak Road	59	59	59	0	59	0	60	1	59	0
34	405 Wynola Court	64	64	65	1	65	1	65	1	65	1
62M	426 Wynola Court	61	61	62	1	61	0	63	2	61	0
63M	372 Colfax Circle	60	60	62	2	61	1	62	2	61	1
35	374 Arthur Circle	66	66	**67**	1	**67**	1	**67**	1	**67**	1
64M	380 Arthur Circle	62	62	63	1	63	1	64	2	63	1
65M	374 Yellowstone Circle	64	64	66	2	65	1	66	2	65	1
36	366 Glacier Circle	63	63	65	2	65	2	65	2	65	2
66M	Collett Avenue	62	62	64	2	63	1	63	1	63	1
67M	2482 Griffin Way	62	62	63	1	63	1	63	1	63	1
37	370 Hendricks Circle	65	65	66	1	65	0	66	1	65	0
121M	390 Hendricks Circle	65	65	66	1	65	0	66	1	65	0
68M	370 Dylan Circles	65	65	66	1	65	0	66	1	65	0
38	370 Berkley Circle	66	66	**67**	1	**67**	1	**68**	2	**67**	1
69M	392 Berkley Circle	64	64	65	1	64	0	65	1	64	0
39	2900 Via Milano #101	73	73	**80**	7	**73**	0	**80**	7	**73**	0
70M	2916 Via Milano	71	71	**74**	3	**71**	0	**73**	2	**71**	0
71M	310 Oakwood Court	67	67	**69**	2	**68**	1	**69**	2	**68**	1
72M	324 Cypress Court	66	66	**67**	1	**67**	1	**68**	2	**67**	1

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
40	317 Camden Court	66	66	**68**	2	**67**	1	**68**	2	**67**	1
76M	The Meadows Mobile Home Park	62	62	63	1	63	1	63	1	63	1
42A	4 The Meadows Mobile Home Park #169	62	62	62	0	62	0	62	0	62	0
42B	The Meadows Mobile Home Park #163	64	64	64	0	64	0	65	1	64	0
77M	The Meadows Mobile Home Park	64	64	65	1	65	1	65	1	65	1
78M	The Meadows Mobile Home Park	61	61	61	0	61	0	61	0	61	0
73M	Sierra Pine Mobile Home Park	69	69	**71**	2	**69**	0	**70**	1	**69**	0
74M	Sierra Pine Mobile Home Park	69	69	**68**	-1	**69**	0	**69**	0	**69**	0
75M	Sierra Pine Mobile Home Park	66	66	**70**	3	**67**	1	**67**	1	**67**	1
41	Sierra Pine Mobile Home Park	67	67	**70**	3	**67**	0	**67**	0	**67**	0
79M	3887 Pierce Street (Pinnacle Riverwalk)	67	67	**67**	0	**67**	0	**67**	0	**67**	0
43	3887 Pierce Street (Pinnacle Riverwalk)	69	69	**69**	0	**69**	0	**69**	0	**69**	0
80M	3887 Pierce Street (Pinnacle Riverwalk)	68	68	**70**	2	**70**	2	**70**	2	**70**	2
81M	3887 Pierce Street (Pinnacle Riverwalk)	64	64	65	1	64	0	65	1	64	0
129M	Farmer Bros.	71	71	**71**	0	**71**	0	**71**	0	**71**	0
44	1323 Valley View	67	67	**67**	0	**67**	0	**67**	0	**67**	0

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
82M	1420 Valley View	64	64	64	0	64	0	64	0	64	0
46	822 Corona Avenue	66	66	**67**	1	66	0	**67**	1	66	0
83M	Corona Avenue	59	59	59	0	60	1	61	2	60	1
88M	890 Mandevilla Way	66	66	66	0	66	0	67	1	66	0
48	935 Mandevilla Way	66	66	**67**	1	**67**	1	**69**	3	**67**	1
89M	955 Mandevilla Way	63	63	65	2	65	2	66	3	65	2
84M	Corona City	61	61	63	2	63	2	64	3	63	2
86M	455 Newhall Drive	64	64	66	2	66	2	66	2	66	2
45	495 Newhall Drive	59	59	62	3	62	3	62	3	62	3
85M	452 Newhall Drive	61	61	62	1	62	1	63	2	62	1
87M	801 Laguna Drive	65	65	**67**	2	**67**	2	**67**	2	**67**	2
47	801 Laguna Drive	70	70	**74**	4	**71**	1	**74**	1	**71**	1
90M	817 Laguna Drive	69	69	**71**	2	**71**	2	**71**	2	**71**	2
91M	810 San Jacinto Circle	65	65	65	0	65	0	66	1	65	0
49	Cresta Verde Golf Course	69	69	**69**	0	**69**	0	**70**	1	**69**	0
93M	1678 Bel Air Street	73	73	**76**	3	**76**	3	**76**	3	**76**	3
122M	1691 Bel Air Street	63	63	65	2	65	2	65	2	65	2
94M	1632 Bel Air Street	75	75	**79**	4	**79**	4	**79**	4	**79**	4
50	1694 Bel Air Street	75	75	**78**	3	**78**	3	**78**	3	**78**	3
95M	1892 Bel Air Street	77	77	**76**	-1	**76**	-1	**76**	-1	**76**	-1
96M	7171 Bel Air Street	75	75	**79**	4	**79**	4	**79**	4	**79**	4
51	7335 Bel Air Street	76	76	**78**	2	**78**	2	**78**	2	**78**	2
97M	7320 Bel Air Street	64	64	**68**	3	**68**	4	**68**	4	**68**	5
98M	18745 State Street	67	67	**70**	3	**70**	3	**70**	3	**70**	3
52	18875 State Street	73	73	**75**	2	**75**	2	**75**	2	**75**	2
99M	18989 State Street	65	65	**67**	2	66	1	**67**	2	66	1
101M	2304 State Street	67	67	**69**	2	**69**	2	**69**	2	**69**	2

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
100M	2308 State Street	73	73	**74**	1	**74**	1	**74**	1	**74**	1
53	19620 State Street	71	71	**75**	4	**75**	4	**75**	4	**75**	4
55	7255 Piute Creek Drive	68	68	**68**	0	**68**	0	**68**	0	**68**	0
123M	7248 Piute Creek Drive	65	65	66	1	66	1	66	1	66	1
103M	7285 Piute Creek Drive	66	66	**67**	1	**67**	1	**67**	1	**67**	1
104M	Future Park	66	66	**67**	1	**67**	1	**67**	1	**67**	1
130M	Future Park	68	68	**68**	0	**68**	0	**68**	0	**68**	0
54	2520 State Street	75	75	**77**	2	**77**	2	**77**	2	**77**	2
105M	19414 Dry Gulch Road	73	73	**74**	1	**74**	1	**74**	1	**74**	1
107M	7375 Calico Circle	74	74	**74**	0	**74**	0	**74**	0	**74**	0
106M	7260 Whiskey Creek Circle	62	62	63	1	63	1	63	1	63	1
56	7315 Calico Circle	62	62	62	0	62	0	62	0	62	0
108M	7279 Calico Circle	62	62	62	0	62	0	62	0	62	0
109M	19726 Long Branch Way	58	58	58	0	58	0	58	0	58	0
110M	19740 Long Branch Way	58	58	58	0	58	0	58	0	58	0
112M	19801 Frances Street	71	71	**71**	0	**71**	0	**71**	0	**71**	0
58	7450 Liberty Avenue	69	69	**70**	1	**70**	1	**70**	1	**70**	1
113M	19890 Katy Way	67	67	66	-1	66	-1	66	-1	66	-1
114M	7630 Liberty Avenue	68	68	**68**	0	**68**	0	**68**	0	**68**	0
115M	7450 Liberty Avenue	63	63	63	0	63	0	63	0	63	0
57	19835 Bedford Canyon Road	68	68	**69**	1	**69**	1	**69**	1	**69**	1
111M	19905 Bedford Canyon Road	70	70	**72**	2	**72**	2	**72**	2	**72**	2
116M	20031 Bedford Canyon Road	74	74	**74**	0	**74**	0	**74**	0	**74**	0

Table 3.15.13 Projected Traffic Noise Levels, dBA L_{eq}

Receiver ID	Address	Existing Noise Level (dBA)	Design Year Noise Level without Project	Design Year Noise Level with Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 1[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]	Design Year Noise Level with the Initial Phase of Alternative 2[1]	Change in from Existing Noise Level (dBA)[2]
59	20111 Corona Street	74	74	**75**	1	**75**	1	**75**	1	**75**	1
117M	20110 Klyne Street	71	71	**72**	1	**72**	1	**72**	1	**72**	1
118M	20141 Bedford Canyon Road	71	71	**73**	2	**73**	2	**73**	2	**73**	2
60	20225 Bedford Canyon Road	71	71	**72**	1	**72**	1	**72**	1	**72**	1
119M	7665 Boyd Street	68	68	68	0	**68**	0	**68**	1	**68**	0

Source: *Final Noise Study Report* (April 2010).
[1] **Bold face type** indicates receivers that would approach or exceed 67 dBA.
[2] **Bold face type** indicates receivers that experience a noise increase of 12 dBA or more.
[3] Design Variation 1 = Eastbound Braid and Westbound Split Diamond.
[4] Design Variation 3 = Eastbound Braid and Westbound Direct Connector On-Ramp.
[5] Receiver would be acquired by the project.
[6] Design Variation 2 = Eastbound Lincoln Avenue Hook Ramps.
[7] Design Variation 1 = Lincoln Avenue Tight Diamond.
dBA = A-weighted decibel
L_{eq} = equivalent noise level
NA = not applicable

Table 3.15.14 Noise Barrier Feasibility and Reasonableness for Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
E	E-1	8	13[1]	$494,000	$1,214,187	Yes	No
		10	48[1]	$1,176,000	$1,513,195	Yes	No
		12	**96[1]**	**$3,608,000**	**$1,812,203**	**Yes**	**Yes**
		14	**119[1]**	**$4,356,000**	**$2,111,211**	**Yes**	**Yes**
		16	**119[1]**	**$4,356,000**	**$2,410,219**	**Yes**	**Yes**
I	I-1	**8**	**8**	**$308,000**	**$173,650**	**Yes**	**Yes**
		10	**8**	**$320,000**	**$197,170**	**Yes**	**Yes**
		12	**8**	**$320,000**	**$221,570**	**Yes**	**Yes**
		14	**8**	**$320,000**	**$246,610**	**Yes**	**Yes**
		16	**8**	**$336,000**	**$271,050**	**Yes**	**Yes**
I	I-2	8	5	$190,000	$458,496	Yes	No
		10	**14**	**$588,000**	**$520,592**	**Yes**	**Yes**
		12	**14**	**$616,000**	**$584,968**	**Yes**	**Yes**
		14	14	$644,000	$651,184	Yes	No
		16	14	$644,000	$715,520	Yes	No
K	K-1	**8**	**8**	**$1,216,000**	**$245,888**	**Yes**	**Yes**
		10	**19**	**$1,254,000**	**$307,360**	**Yes**	**Yes**
		12	**28**	**$1,848,000**	**$386,832**	**Yes**	**Yes**
		14	**28**	**$1,848,000**	**$430,304**	**Yes**	**Yes**
		16	**28**	**$1,848,000**	**$491,776**	**Yes**	**Yes**
M Variation 1	M1, M2, and M3	8	0	0	NA[2]	No	NA
		10	3	$150,000	$1,461,195	Yes	No
		12	18	$936,000	$1,683,915	Yes	No
		14	18	$1,008,000	$1,910,475	Yes	No
		16	18	$1,008,000	$2,138,315	Yes	No
M Variation 3	M1, M2, and M3	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	4	$216,000	$1,683,915	Yes	No
		14	4	$224,000	$1,910,475	Yes	No
		16	8	$448,000	$2,138,315	Yes	No
O Variation 1	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**44**	**$2,816,000**	**$800,010**	**Yes**	**Yes**
		12	**71**	**$4,686,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 1	O-2 and O-3	8	0	0	NA	No	NA
		10	8	$448,000	$1,134,830	Yes	No
		12	8	$464,000	$1,303,502	Yes	No
		14	8	$464,000	$1,476,014	Yes	No
		16	8	$480,000	$1,648,526	Yes	No
O Variation 2	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**44**	**$2,816,000**	**$800,010**	**Yes**	**Yes**
		12	**71**	**$4,686,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 2	O-2 and O-3	8	5	$300,000	$966,798	Yes	No
		10	5	$310,000	$1,134,830	Yes	No
		12	9	$576,000	$1,303,502	Yes	No
		14	13	$858,000	$1,476,014	Yes	No
		16	13	$858,000	$1,648,526	Yes	No
P and R Variation 1	P-1	**8**	**17**	**$986,000**	**$535,296**	**Yes**	**Yes**
		10	**32**	**$1,856,000**	**$669,120**	**Yes**	**Yes**
		12	**37**	**$2,200,000**	**$802,944**	**Yes**	**Yes**
		14	**37**	**$2,294,000**	**$936,768**	**Yes**	**Yes**
		16	**37**	**$2,294,000**	**$1,070,592**	**Yes**	**Yes**

Table 3.15.14 Noise Barrier Feasibility and Reasonableness for Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
P and R Variation 2	P-1	**8**	**17**	**$986,000**	**$535,296**	**Yes**	**Yes**
		10	**32**	**$1,920,000**	**$669,120**	**Yes**	**Yes**
		12	**37**	**$2,200,000**	**$802,944**	**Yes**	**Yes**
		14	**37**	**$2,294,000**	**$936,768**	**Yes**	**Yes**
		16	**37**	**$2,294,000**	**$1,070,592**	**Yes**	**Yes**
Q, S and U Variation 1	Q-1	**8**	**35**	**$1,960,000**	**$544,000**	**Yes**	**Yes**
		10	**46**	**$2,688,000**	**$680,000**	**Yes**	**Yes**
		12	**46**	**$2,688,000**	**$816,000**	**Yes**	**Yes**
		14	**52**	**$3,016,000**	**$952,000**	**Yes**	**Yes**
		16	**56**	**$3,248,000**	**$1,088,000**	**Yes**	**Yes**
Q, S and U Variation 2	Q-1	**8**	**28**	**$1,568,000**	**$544,000**	**Yes**	**Yes**
		10	**46**	**$2,576,000**	**$680,000**	**Yes**	**Yes**
		12	**46**	**$2,688,000**	**$816,000**	**Yes**	**Yes**
		14	**52**	**$3,120,000**	**$952,000**	**Yes**	**Yes**
		16	**56**	**$3,360,000**	**$1,088,000**	**Yes**	**Yes**
T	T-1	**8**	**10**	**$500,000**	**$213,700**	**Yes**	**Yes**
		10	**10**	**$520,000**	**$267,200**	**Yes**	**Yes**
		12	**10**	**$520,000**	**$320,640**	**Yes**	**Yes**
		14	**10**	**$520,000**	**$374,080**	**Yes**	**Yes**
		16	**10**	**$520,000**	**$427,520**	**Yes**	**Yes**
V	T-1 and V-1	**8**	**7**	**$336,000**	**$195,584**	**Yes**	**Yes**
		10	**7**	**$350,000**	**$244,480**	**Yes**	**Yes**
		12	**7**	**$350,000**	**$293,376**	**Yes**	**Yes**
		14	**7**	**$364,000**	**$342,272**	**Yes**	**Yes**
		16	7	$364,000	$427,520	Yes	No
W	W-1	8	4	$168,000	$168,704	Yes	No
		10	**11**	**$462,000**	**$210,880**	**Yes**	**Yes**
		12	**19**	**$836,000**	**$253,056**	**Yes**	**Yes**
		14	**19**	**$836,000**	**$295,232**	**Yes**	**Yes**
		16	**19**	**$836,000**	**$337,408**	**Yes**	**Yes**
Z	Z-1	8	0	0	NA	No	NA
		10	**5**	**$210,000**	**$187,731**	**Yes**	**Yes**
		12	**5**	**$220,000**	**$212,683**	**Yes**	**Yes**
		14	5	$220,000	$264,987	Yes	No
		16	5`	$230,000	$290,799	Yes	No
D1	D1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	6	$300,000	$631,780	Yes	No
		14	12	$624,000	$705,872	Yes	No
		16	12	$624,000	$777,744	Yes	No
F1	F1-A	8	0	0	NA	Yes	NA
		10	7	$280,000	$771,050	Yes	No
		12	9	$378,000	$867,498	Yes	No
		14	9	$378,000	$967,146	Yes	No
		16	9	$378,000	$1,066,794	Yes	No
J1	J1-A and J1-B	8	3	$114,000	$549,930	Yes	No
		10	3	$114,000	$672,050	Yes	No
		12	3	$120,000	$705,450	Yes	No
		14	3	$120,000	$786,410	Yes	No
		16	3	$120,000	$867,370	Yes	No
J1	J1-C	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	5	$190,000	$235,655	Yes	No
		14	**11**	**$440,000**	**$251,383**	**Yes**	**Yes**
		16	**11**	**$440,000**	**$266,431**	**Yes**	**Yes**

Table 3.15.14 Noise Barrier Feasibility and Reasonableness for Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
K1	K-1A	8	7	$350,000	$611,008	Yes	No
		10	**16**	**$832,000**	**$696,640**	**Yes**	**Yes**
		12	**22**	**$1,144,000**	**$783,553**	**Yes**	**Yes**
		14	**22**	**$1,188,000**	**$873,664**	**Yes**	**Yes**
		16	**24**	**$1,296,000**	**$964,416**	**Yes**	**Yes**
N1	N1-A	**8**	**23**	**$1,150,000**	**$806,270**	**Yes**	**Yes**
		10	**29**	**$1,450,000**	**$918,870**	**Yes**	**Yes**
		12	**29**	**$1,450,000**	**$1,034,110**	**Yes**	**Yes**
		14	**29**	**$1,798,000**	**$1,153,470**	**Yes**	**Yes**
		16	**40**	**$2,080,000**	**$1,272,190**	**Yes**	**Yes**
N1	N1-B, N1-C, and N1-D	8	4	$176,000	$1,893,497	Yes	No
		10	4	$184,000	$2,160,345	Yes	No
		12	11	$528,000	$2,430,393	Yes	No
		14	11	$528,000	$2,709,401	Yes	No
		16	14	$672,000	$2,989,689	Yes	No
P1	N1-D and P1-A	8	0	0	NA	No	NA
		10	6	$264,000	$1,583,460	Yes	No
		12	17	$748,000	$1,781,220	Yes	No
		14	17	$782,000	$1,985,380	Yes	No
		16	17	$782,000	$2,190,820	Yes	No
Q1	Q1-A	8	2	$88,000	$867,899	Yes	No
		10	13	$572,000	$985,883	Yes	No
		12	13	$598,000	$1,106,427	Yes	No
		14	13	$624,000	$1,231,211	Yes	No
		16	13	$624,000	$1,354,675	Yes	No
R	R-1A, and R-1B	8	5	$210,000	$1,048,416	Yes	No
		10	7	$294,000	$1,136,200	No	No
		12	7	$294,000	$1,226,084	Yes	No
		14	14	$616,000	$1,319,048	Yes	No
		16	14	$616,000	$1,409,452	Yes	No
S	S-1A and S-1B	8	18	$972,000	$1,242,311	Yes	No
		10	21	$1,134,000	$1,417,575	Yes	No
		12	21	$1,176,000	$1,594,119	Yes	No
		14	25	$1,400,000	$1,777,063	Yes	No
		16	25	$1,400,000	$1,961,287	Yes	No

Source: *Noise Abatement Decision Report* (July 2010).
Note: **Bold face type** indicates barriers determined to be feasible and reasonable.
[1] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
[2] NA = Not Applicable. Noise barrier was determined to be not feasible.
ft = feet

Table 3.15.15 Noise Barriers Feasibility and Reasonableness for the Initial Phase of Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
E	E-1	8	0	0	NA[1]	No	NA
		10	0	0	NA	No	NA
		12	**30[2]**	**$1,200,000**	**$898,442**	**Yes**	**Yes**
		14	**30[2]**	**$1,200,000**	**$1,000,674**	**Yes**	**Yes**
		16	**30[2]**	**$1,260,000**	**$1,104,546**	**Yes**	**Yes**
I	I-1	**8**	**8**	**$308,000**	**$173,650**	**Yes**	**Yes**
		10	**8**	**$320,000**	**$197,170**	**Yes**	**Yes**
		12	**8**	**$320,000**	**$221,570**	**Yes**	**Yes**
		14	**8**	**$320,000**	**$246,610**	**Yes**	**Yes**
		16	**8**	**$336,000**	**$271,050**	**Yes**	**Yes**
I	I-2	8	5	$190,000	$458,496	Yes	No
		10	**14**	**$588,000**	**$520,592**	**Yes**	**Yes**
		12	**14**	**$616,000**	**$584,968**	**Yes**	**Yes**
		14	**14**	**$644,000**	**$651,184**	**Yes**	**Yes**
		16	**14**	**$644,000**	**$715,520**	**Yes**	**Yes**
K	K-1	**8**	**8**	**$1,216,000**	**$245,888**	**Yes**	**Yes**
		10	**19**	**$1,254,000**	**$307,360**	**Yes**	**Yes**
		12	**28**	**$1,848,000**	**$386,832**	**Yes**	**Yes**
		14	**28**	**$1,848,000**	**$430,304**	**Yes**	**Yes**
		16	**28**	**$1,848,000**	**$491,776**	**Yes**	**Yes**
M Variation 1	M1, M2, and M3	8	0	0	NA	No	NA
		10	3	$150,000	$1,461,195	Yes	No
		12	18	$936,000	$1,683,915	Yes	No
		14	18	$1,008,000	$1,910,475	Yes	No
		16	18	$1,008,000	$2,138,315	Yes	No
M Variation 3	M1, M2, and M3	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	4	$216,000	$1,683,915	Yes	No
		14	4	$224,000	$1,910,475	Yes	No
		16	8	$448,000	$2,138,315	Yes	No
O Variation 1	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**44**	**$2,816,000**	**$800,010**	**Yes**	**Yes**
		12	**71**	**$4,686,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 1	O-2 and O-3	8	0	0	NA	No	NA
		10	8	$448,000	$1,134,830	Yes	No
		12	8	$464,000	$1,303,502	Yes	No
		14	8	$464,000	$1,476,014	Yes	No
		16	8	$480,000	$1,648,526	Yes	No
O Variation 2	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**44**	**$2,816,000**	**$800,010**	**Yes**	**Yes**
		12	**71**	**$4,686,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 2	O-2 and O-3	8	5	$300,000	$966,798	Yes	No
		10	5	$310,000	$1,134,830	Yes	No
		12	9	$576,000	$1,303,502	Yes	No
		14	13	$858,000	$1,476,014	Yes	No
		16	13	$858,000	$1,648,526	Yes	No
P and R Variation 1	P-1	**8**	**17**	**$986,000**	**$535,296**	**Yes**	**Yes**
		10	**32**	**$1,856,000**	**$669,120**	**Yes**	**Yes**
		12	**37**	**$2,200,000**	**$802,944**	**Yes**	**Yes**
		14	**37**	**$2,294,000**	**$936,768**	**Yes**	**Yes**
		16	**37**	**$2,294,000**	**$1,070,592**	**Yes**	**Yes**

Table 3.15.15 Noise Barriers Feasibility and Reasonableness for the Initial Phase of Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
P and R Variation 2	P-1	**8**	**17**	**$986,000**	**$535,296**	**Yes**	**Yes**
		10	**32**	**$1,920,000**	**$669,120**	**Yes**	**Yes**
		12	**37**	**$2,200,000**	**$802,944**	**Yes**	**Yes**
		14	**37**	**$2,294,000**	**$936,768**	**Yes**	**Yes**
		16	**37**	**$2,294,000**	**$1,070,592**	**Yes**	**Yes**
Q, S and U Variation 1	Q-1	**8**	**35**	**$1,960,000**	**$544,000**	**Yes**	**Yes**
		10	**46**	**$2,688,000**	**$680,000**	**Yes**	**Yes**
		12	**46**	**$2,688,000**	**$816,000**	**Yes**	**Yes**
		14	**52**	**$3,016,000**	**$952,000**	**Yes**	**Yes**
		16	**56**	**$3,248,000**	**$1088,000**	**Yes**	**Yes**
Q, S and U Variation 2	Q-1	**8**	**28**	**$1,568,000**	**$544,000**	**Yes**	**Yes**
		10	**46**	**$2,576,000**	**$680,000**	**Yes**	**Yes**
		12	**46**	**$2,688,000**	**$816,000**	**Yes**	**Yes**
		14	**52**	**$3,120,000**	**$952,000**	**Yes**	**Yes**
		16	**56**	**$3,360,000**	**$1088,000**	**Yes**	**Yes**
T	T-1	**8**	**10**	**$500,000**	**$213,700**	**Yes**	**Yes**
		10	**10**	**$520,000**	**$267,200**	**Yes**	**Yes**
		12	**10**	**$520,000**	**$320,640**	**Yes**	**Yes**
		14	**10**	**$520,000**	**$374,080**	**Yes**	**Yes**
		16	**10**	**$520,000**	**$427,520**	**Yes**	**Yes**
V	T-1 and V-1	**8**	**7**	**$336,000**	**$195,584**	**Yes**	**Yes**
		10	**7**	**$350,000**	**$244,480**	**Yes**	**Yes**
		12	**7**	**$350,000**	**$293,376**	**Yes**	**Yes**
		14	**7**	**$364,000**	**$342,272**	**Yes**	**Yes**
		16	7	$364,000	$427,520	Yes	No
W	W-1	8	4	$168,000	$168,704	Yes	No
		10	**11**	**$462,000**	**$210,880**	**Yes**	**Yes**
		12	**19**	**$836,000**	**$253,056**	**Yes**	**Yes**
		14	**19**	**$836,000**	**$295,232**	**Yes**	**Yes**
		16	**19**	**$836,000**	**$337,408**	**Yes**	**Yes**
Z	Z-1	8	0	0	NA	No	NA
		10	**5**	**$210,000**	**$187,731**	**Yes**	**Yes**
		12	**5**	**$220,000**	**$212,683**	**Yes**	**Yes**
		14	5	$220,000	$264,987	Yes	No
		16	5`	$220,000	$290,799	Yes	No
D1	D1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	6	$240,000	$631,780	Yes	No
		14	6	$240,000	$705,872	Yes	No
		16	6	$252,000	$777,744	Yes	No
F1	F1-A	8	0	0	NA	Yes	NA
		10	7	$280,000	$771,050	Yes	No
		12	9	$378,000	$867,498	Yes	No
		14	10	$420,000	$967,146	Yes	No
		16	10	$420,000	$1,066,794	Yes	No
J1	J1-A and J1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	3	$114,000	$705,450	Yes	No
		14	3	$114,000	$786,410	Yes	No
		16	3	$120,000	$867,370	Yes	No
J1	J1-C	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	5	$190,000	$235,655	Yes	No
		14	**11**	**$440,000**	**$251,383**	**Yes**	**Yes**
		16	**11**	**$440,000**	**$266,431**	**Yes**	**Yes**

Table 3.15.15 Noise Barriers Feasibility and Reasonableness for the Initial Phase of Alternative 1

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
K1	K1-A	8	0	NA	NA	No	NA
		10	**18**	**$900,000**	**$696,640**	**Yes**	**Yes**
		12	**24**	**$1,248,000**	**$783,553**	**Yes**	**Yes**
		14	**24**	**$1,248,000**	**$873,664**	**Yes**	**Yes**
		16	**27**	**$1,404,000**	**$964,416**	**Yes**	**Yes**
N1	N1-A	8	16	$768,000	$806,270	Yes	No
		10	**23**	**$1,150,000**	**$918,870**	**Yes**	**Yes**
		12	**23**	**$1,150,000**	**$1,034,110**	**Yes**	**Yes**
		14	**23**	**$1,196,000**	**$1,153,470**	**Yes**	**Yes**
		16	**34**	**$1,768,000**	**$1,272,190**	**Yes**	**Yes**
N1	N1-B, N1-C, and N1-D	8	4	$176,000	$1,893,497	Yes	No
		10	10	$460,000	$2,160,345	Yes	No
		12	17	$816,000	$2,430,393	Yes	No
		14	17	$816,000	$2,709,401	Yes	No
		16	20	$960,000	$2,989,689	Yes	No
P1	N1-D and P1-A	8	0	0	NA	No	NA
		10	6	$264,000	$1,583,460	Yes	No
		12	17	$748,000	$1,781,220	Yes	No
		14	17	$782,000	$1,985,380	Yes	No
		16	17	$782,000	$2,190,820	Yes	No
Q1	Q1-A	8	2	$88,000	$867,899	Yes	No
		10	13	$572,000	$985,883	Yes	No
		12	13	$598,000	$1,106,427	Yes	No
		14	13	$624,000	$1,231,211	Yes	No
		16	13	$624,000	$1,354,675	Yes	No
R1	R-1A and R-1B	8	5	$210,000	$1,048,416	Yes	No
		10	7	$294,000	$1,136,200	No	No
		12	7	$294,000	$1,226,084	Yes	No
		14	14	$616,000	$1,319,048	Yes	No
		16	14	$616,000	$1,409,452	Yes	No
S1	S-1A and S-1B	8	18	$792,000	$1,242,311	Yes	No
		10	21	$1,134,000	$1,417,575	Yes	No
		12	21	$1,176,000	$1,594,119	Yes	No
		14	25	$1,400,000	$1,777,063	Yes	No
		16	25	$1,400,000	$1,961,287	Yes	No

Source: *Noise Abatement Decision Report* (July 2010).
Note: **Bold face type** indicates barriers determined to be feasible and reasonable.
[1] NA = Not Applicable. Noise barrier was determined to be not feasible.
[2] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
ft = feet

Table 3.15.16 Noise Barriers Feasibility and Reasonableness for Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
E	E-1	8	0	0	NA	No	NA[1]
		10	**47[2]**	**$1,974,000**	**$1,513,195**	**Yes**	**Yes**
		12	**80[2]**	**$3,520,000**	**$1,812,203**	**Yes**	**Yes**
		14	**95[2]**	**$4,180,000**	**$2,410,219**	**Yes**	**Yes**
		16	**105[2]**	**$4,180,000**	**$1,104,546**	**Yes**	**Yes**
I	I-1	**8**	**8**	**$304,000**	**$173,650**	**Yes**	**Yes**
		10	**8**	**$320,000**	**$197,170**	**Yes**	**Yes**
		12	**8**	**$320,000**	**$221,570**	**Yes**	**Yes**
		14	**8**	**$336,000**	**$246,610**	**Yes**	**Yes**
		16	**8**	**$336,000**	**$271,050**	**Yes**	**Yes**
I	I-2	**8**	**14**	**$588,000**	**$458,496**	**Yes**	**Yes**
		10	**14**	**$616,000**	**$520,592**	**Yes**	**Yes**
		12	**14**	**$644,000**	**$584,968**	**Yes**	**Yes**
		14	**14**	**$644,000**	**$651,184**	**Yes**	**Yes**
		16	**14**	**$644,000**	**$715,520**	**Yes**	**Yes**
K	K-1	**8**	**19**	**$1,178,000**	**$245,888**	**Yes**	**Yes**
		10	**28**	**$1,736,000**	**$307,360**	**Yes**	**Yes**
		12	**28**	**$1,736,000**	**$386,832**	**Yes**	**Yes**
		14	**28**	**$1,792,000**	**$430,304**	**Yes**	**Yes**
		16	**28**	**$1,792,000**	**$491,776**	**Yes**	**Yes**
M Variation 1 and 2	M1, M2, and M3	8	8	$448,000	$1,293,755	Yes	No
		10	8	$448,000	$1,461,195	Yes	No
		12	19	$1,064,000	$1,683,915	Yes	No
		14	23	$1,288,000	$1,910,475	Yes	No
		16	27	$1,512,000	$2,138,315	Yes	No
M Variation 3 and 4	M1, M2, and M3	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	0	0	NA	No	NA
		14	7	$364,000	$1,910,475	Yes	No
		16	11	$572,000	$2,138,315	Yes	No
O Variation 1	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**66**	**$4,356,000**	**$800,010**	**Yes**	**Yes**
		12	**86**	**$5,676,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 1	O-2 and O-3	8	4	$208,000	$966,798	Yes	No
		10	8	$432,000	$1,134,830	Yes	No
		12	8	$432,000	$1,303,502	Yes	No
		14	8	$432,000	$1,476,014	Yes	No
		16	8	$448,000	$1,648,526	Yes	No
O Variation 2	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**66**	**$4,356,000**	**$800,010**	**Yes**	**Yes**
		12	**86**	**$5,676,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 2	O-2 and O-3	8	13	$806,000	$966,798	Yes	No
		10	13	$832,000	$1,134,830	Yes	No
		12	13	$858,000	$1,303,502	Yes	No
		14	13	$858,000	$1,476,014	Yes	No
		16	13	$858,000	$1,648,526	Yes	No
P and R Variation 1	P-1	**8**	**12**	**$720,000**	**$535,296**	**Yes**	**Yes**
		10	**22**	**$1,320,000**	**$669,120**	**Yes**	**Yes**
		12	**27**	**$1,620,000**	**$802,944**	**Yes**	**Yes**
		14	**39**	**$2,418,000**	**$936,768**	**Yes**	**Yes**
		16	**39**	**$2,418,000**	**$1,070,592**	**Yes**	**Yes**

Table 3.15.16 Noise Barriers Feasibility and Reasonableness for Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
P and R Variation 2	P-1	8	12	$720,000	$535,296	Yes	Yes
		10	22	$1,364,000	$669,120	Yes	Yes
		12	27	$1,674,000	$802,944	Yes	Yes
		14	39	$2,418,000	$936,768	Yes	Yes
		16	39	$2,418,000	$1,070,592	Yes	Yes
Q, S, and U Variation 1	Q-1	8	42	$2,436,000	$544,000	Yes	Yes
		10	55	$3,190,000	$680,000	Yes	Yes
		12	58	$3,480,000	$816,000	Yes	Yes
		14	58	$3,596,000	$952,000	Yes	Yes
		16	58	$3,596,000	$1,088,000	Yes	Yes
Q, S, and U Variation 2	Q-1	8	28	$1,624,000	$544,000	Yes	Yes
		10	55	$3,300,000	$680,000	Yes	Yes
		12	58	$3,480,000	$816,000	Yes	Yes
		14	58	$3,596,000	$952,000	Yes	Yes
		16	62	$3,844,000	$1,088,000	Yes	Yes
T	T-1	8	10	$520,000	$213,700	Yes	Yes
		10	10	$540,000	$267,200	Yes	Yes
		12	10	$540,000	$320,640	Yes	Yes
		14	10	$540,000	$374,080	Yes	Yes
		16	10	$540,000	$427,520	Yes	Yes
V	T-1 and V-1	8	4	$208,000	$195,584	Yes	Yes
		10	4	$216,000	$244,480	Yes	Yes
		12	4	$216,000	$293,376	Yes	No
		14	4	$224,000	$342,272	Yes	No
		16	4	$224,000	$427,520	Yes	No
W	W-1	8	19	$836,000	$168,704	Yes	Yes
		10	19	$874,000	$210,880	Yes	Yes
		12	19	$912,000	$253,056	Yes	Yes
		14	19	$912,000	$295,232	Yes	Yes
		16	19	$912,000	$337,408	Yes	Yes
Z	Z-1	8	0	0	NA	No	NA
		10	5	$210,000	$187,731	Yes	Yes
		12	5	$220,000	$212,683	Yes	Yes
		14	5	$220,000	$264,987	Yes	No
		16	5	$220,000	$290,799	Yes	No
D1	D1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	6	$300,000	$631,780	Yes	No
		14	6	$300,000	$705,872	Yes	No
		16	12	$624,000	$777,744	Yes	No
F1	F1-A	8	0	0	NA	No	NA
		10	7	$280,000	$771,050	Yes	No
		12	9	$378,000	$867,498	Yes	No
		14	9	$378,000	$967,146	Yes	No
		16	9	$378,000	$1,066,794	Yes	No
J1	J1-A and J1-B	8	0	0	NA	No	NA
		10	3	$114,000	$672,050	Yes	No
		12	3	$114,000	$705,450	Yes	No
		14	3	$120,000	$786,410	Yes	No
		16	3	$120,000	$867,370	Yes	No
J1	J1-C	8	2	$80,000	$205,719	No	No
		10	2	$84,000	$220,407	No	No
		12	5	$546,000	$235,655	Yes	Yes
		14	11	$546,000	$251,383	Yes	Yes
		16	11	$546,000	$266,431	Yes	Yes

Table 3.15.16 Noise Barriers Feasibility and Reasonableness for Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
K1	K-1A	8	0	0	NA	Yes	NA
		10	7	$364,000	$696,640	Yes	No
		12	**16**	**$832,000**	**$783,553**	**Yes**	**Yes**
		14	**22**	**$1,144,000**	**$873,664**	**Yes**	**Yes**
		16	**24**	**$1,296,000**	**$964,416**	**Yes**	**Yes**
N1	N1-A	**8**	**23**	**$1,150,000**	**$806,270**	**Yes**	**Yes**
		10	**29**	**$1,450,000**	**$918,870**	**Yes**	**Yes**
		12	**29**	**$1,450,000**	**$1,034,110**	**Yes**	**Yes**
		14	**29**	**$1,798,000**	**$1,153,470**	**Yes**	**Yes**
		16	**40**	**$2,080,000**	**$1,272,190**	**Yes**	**Yes**
N1	N1-B, N1-C, and N1-D	8	4	$176,000	$1,893,497	Yes	No
		10	4	$184,000	$2,160,345	Yes	No
		12	11	$528,000	$2,430,393	Yes	No
		14	11	$528,000	$2,709,401	Yes	No
		16	14	$672,000	$2,989,689	Yes	No
P1	N1-D and P1-A	8	0	0	NA	No	NA
		10	6	$264,000	$1,583,460	Yes	No
		12	17	$748,000	$1,781,220	Yes	No
		14	17	$782,000	$1,985,380	Yes	No
		16	17	$782,000	$2,190,820	Yes	No
Q1	Q1-A	8	2	$88,000	$867,899	Yes	No
		10	13	$572,000	$985,883	Yes	No
		12	13	$598,000	$1,106,427	Yes	No
		14	13	$624,000	$1,231,211	Yes	No
		16	13	$624,000	$1,354,675	Yes	No
R	R-1A and R-1B	8	5	$210,000	$1,048,416	Yes	No
		10	7	$294,000	$1,136,200	No	No
		12	7	$294,000	$1,226,084	Yes	No
		14	14	$616,000	$1,319,048	Yes	No
		16	14	$616,000	$1,409,452	Yes	No
S	S-1A and S-1B	8	18	$972,000	$1,242,311	Yes	No
		10	21	$1,134,000	$1,417,575	Yes	No
		12	21	$1,176,000	$1,594,119	Yes	No
		14	25	$1,400,000	$1,777,063	Yes	No
		16	25	$1,400,000	$1,961,287	Yes	No

Source: *Noise Abatement Decision Report* (July 2010).
Note: **Bold face type** indicates barriers determined to be feasible and reasonable.
[1] NA = Not Applicable. Noise barrier was determined to be not feasible.
[2] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
ft = feet

Table 3.15.17 Noise Barrier Feasibility and Reasonableness for the Initial Phase of Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
E	E-1	8	0	0	NA[1]	No	NA
		10	0	0	NA	No	NA
		12	**30[2]**	**$1,200,000**	**$898,442**	**Yes**	**Yes**
		14	**30[2]**	**$1,200,000**	**$1,000,674**	**Yes**	**Yes**
		16	**30[2]**	**$1,260,000**	**$1,104,546**	**Yes**	**Yes**
I	I-1	**8**	**8**	**$304,000**	**$173,650**	**Yes**	**Yes**
		10	**8**	**$320,000**	**$197,170**	**Yes**	**Yes**
		12	**8**	**$320,000**	**$221,570**	**Yes**	**Yes**
		14	**8**	**$336,000**	**$246,610**	**Yes**	**Yes**
		16	**8**	**$336,000**	**$271,050**	**Yes**	**Yes**
I	I-2	**8**	**14**	**$588,000**	**$458,496**	**Yes**	**Yes**
		10	**14**	**$616,000**	**$520,592**	**Yes**	**Yes**
		12	**14**	**$644,000**	**$584,968**	**Yes**	**Yes**
		14	**14**	**$644,000**	**$651,184**	**Yes**	**Yes**
		16	**14**	**$644,000**	**$715,520**	**Yes**	**Yes**
K	K-1	**8**	**19**	**$1,178,000**	**$245,888**	**Yes**	**Yes**
		10	**28**	**$1,736,000**	**$307,360**	**Yes**	**Yes**
		12	**28**	**$1,736,000**	**$386,832**	**Yes**	**Yes**
		14	**28**	**$1,792,000**	**$430,304**	**Yes**	**Yes**
		16	**28**	**$1,792,000**	**$491,776**	**Yes**	**Yes**
M Variation 1 and 2	M1, M2, and M3	8	8	$448,000	$1,293,755	Yes	No
		10	8	$448,000	$1,461,195	Yes	No
		12	19	$1,064,000	$1,683,915	Yes	No
		14	23	$1,288,000	$1,910,475	Yes	No
		16	27	$1,512,000	$2,138,315	Yes	No
M Variation 3 and 4	M1,M2, and M3	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	0	0	NA	No	NA
		14	7	$364,000	$1,910,475	Yes	No
		16	11	$572,000	$2,138,315	Yes	No
O Variation 1	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**66**	**$4,356,000**	**$800,010**	**Yes**	**Yes**
		12	**86**	**$5,676,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 1	O-2 and O-3	8	4	$208,000	$966,798	Yes	No
		10	8	$432,000	$1,134,830	Yes	No
		12	8	$432,000	$1,303,502	Yes	No
		14	8	$432,000	$1,476,014	Yes	No
		16	8	$448,000	$1,648,526	Yes	No
O Variation 2	O-1 and O-2	**8**	**28**	**$1,792,000**	**$682,602**	**Yes**	**Yes**
		10	**66**	**$4,356,000**	**$800,010**	**Yes**	**Yes**
		12	**86**	**$5,676,000**	**$918,058**	**Yes**	**Yes**
		14	**86**	**$5,676,000**	**$1,039,306**	**Yes**	**Yes**
		16	**86**	**$5,676,000**	**$1,159,914**	**Yes**	**Yes**
O Variation 2	O-2 and O-3	8	13	$806,000	$966,798	Yes	No
		10	13	$832,000	$1,134,830	Yes	No
		12	13	$858,000	$1,303,502	Yes	No
		14	13	$858,000	$1,476,014	Yes	No
		16	13	$858,000	$1,648,526	Yes	No
P and R Variation 1	P-1	**8**	**12**	**$720,000**	**$535,296**	**Yes**	**Yes**
		10	**22**	**$1,320,000**	**$669,120**	**Yes**	**Yes**
		12	**27**	**$1,620,000**	**$802,944**	**Yes**	**Yes**
		14	**39**	**$2,418,000**	**$936,768**	**Yes**	**Yes**
		16	**39**	**$2,418,000**	**$1,070,592**	**Yes**	**Yes**

Table 3.15.17 Noise Barrier Feasibility and Reasonableness for the Initial Phase of Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
P and R Variation 2	P-1	**8**	**12**	**$720,000**	**$535,296**	**Yes**	**Yes**
		10	**22**	**$1,364,000**	**$669,120**	**Yes**	**Yes**
		12	**27**	**$1,674,000**	**$802,944**	**Yes**	**Yes**
		14	**39**	**$2,418,000**	**$936,768**	**Yes**	**Yes**
		16	**39**	**$2,418,000**	**$1,070,592**	**Yes**	**Yes**
Q, S and U Variation 1	Q-1	**8**	**42**	**$2,436,000**	**$544,000**	**Yes**	**Yes**
		10	**55**	**$3,190,000**	**$680,000**	**Yes**	**Yes**
		12	**58**	**$3,480,000**	**$816,000**	**Yes**	**Yes**
		14	**58**	**$3,596,000**	**$952,000**	**Yes**	**Yes**
		16	**58**	**$3,596,000**	**$1,088,000**	**Yes**	**Yes**
Q, S and U Variation 2	Q-1	**8**	**28**	**$1,624,000**	**$544,000**	**Yes**	**Yes**
		10	**55**	**$3,300,000**	**$680,000**	**Yes**	**Yes**
		12	**58**	**$3,480,000**	**$816,000**	**Yes**	**Yes**
		14	**58**	**$3,596,000**	**$952,000**	**Yes**	**Yes**
		16	**62**	**$3,844,000**	**$1,088,000**	**Yes**	**Yes**
T	T-1	**8**	**10**	**$520,000**	**$213,700**	**Yes**	**Yes**
		10	**10**	**$540,000**	**$267,200**	**Yes**	**Yes**
		12	**10**	**$540,000**	**$320,640**	**Yes**	**Yes**
		14	**10**	**$540,000**	**$374,080**	**Yes**	**Yes**
		16	**10**	**$540,000**	**$427,520**	**Yes**	**Yes**
V	T-1 and V-1	8	4	$208,000	$195,584	Yes	Yes
		10	**4**	**$216,000**	**$244,480**	**Yes**	**Yes**
		12	4	$216,000	$293,376	Yes	No
		14	4	$224,000	$342,272	Yes	No
		16	4	$224,000	$427,520	Yes	No
W	W-1	**8**	**19**	**$836,000**	**$168,704**	**Yes**	**Yes**
		10	**19**	**$874,000**	**$210,880**	**Yes**	**Yes**
		12	**19**	**$912,000**	**$253,056**	**Yes**	**Yes**
		14	**19**	**$912,000**	**$295,232**	**Yes**	**Yes**
		16	**19**	**$912,000**	**$337,408**	**Yes**	**Yes**
Z	Z-1	8	0	0	NA	No	NA
		10	**5**	**$210,000**	**$187,731**	**Yes**	**Yes**
		12	**5**	**$220,000**	**$212,683**	**Yes**	**Yes**
		14	5	$220,000	$264,987	Yes	No
		16	5`	$220,000	$290,799	Yes	No
D1	D1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	6	$240,000	$631,780	Yes	No
		14	6	$240,000	$705,872	Yes	No
		16	6	$252,000	$777,744	Yes	No
F1	F1-A	8	0	0	NA	Yes	NA
		10	7	$280,000	$771,050	Yes	No
		12	9	$378,000	$867,498	Yes	No
		14	10	$420,000	$967,146	Yes	No
		16	10	$420,000	$1,066,794	Yes	No
J1	J1-A and J1-B	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	3	$114,000	$705,450	Yes	No
		14	3	$114,000	$786,410	Yes	No
		16	3	$120,000	$867,370	Yes	No
J1	J1-C	8	0	0	NA	No	NA
		10	0	0	NA	No	NA
		12	5	$190,000	$235,655	Yes	No
		14	**11**	**$440,000**	**$251,383**	**Yes**	**Yes**
		16	**11**	**$440,000**	**$266,431**	**Yes**	**Yes**

Table 3.15.17 Noise Barrier Feasibility and Reasonableness for the Initial Phase of Alternative 2

Area	Barrier	Height (ft)	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Acoustically Feasible?	Reasonable?
K1	K-1A	8	0	NA	NA	Yes	NA
		10	**18**	**$720,000**	**$696,640**	**Yes**	**Yes**
		12	**24**	**$1,008,000**	**$783,553**	**Yes**	**Yes**
		14	**24**	**$1,008,000**	**$873,664**	**Yes**	**Yes**
		16	**27**	**$1,134,000**	**$964,416**	**Yes**	**Yes**
N1	N1-A	8	16	$768,000	$806,270	Yes	No
		10	**23**	**$1,150,000**	**$918,870**	**Yes**	**Yes**
		12	**23**	**$1,150,000**	**$1,034,110**	**Yes**	**Yes**
		14	**23**	**$1,196,000**	**$1,153,470**	**Yes**	**Yes**
		16	**34**	**$1,768,000**	**$1,272,190**	**Yes**	**Yes**
N1	N1-B, N1-C, and N1-D	8	4	$176,000	$1,893,497	Yes	No
		10	10	$460,000	$2,160,345	Yes	No
		12	17	$816,000	$2,430,393	Yes	No
		14	17	$816,000	$2,709,401	Yes	No
		16	20	$960,000	$2,989,689	Yes	No
P1	N1-D and P1-A	8	0	0	NA	No	NA
		10	6	$264,000	$1,583,460	Yes	No
		12	17	$748,000	$1,781,220	Yes	No
		14	17	$782,000	$1,985,380	Yes	No
		16	17	$782,000	$2,190,820	Yes	No
Q1	Q1-A	8	2	$88,000	$867,899	Yes	No
		10	13	$572,000	$985,883	Yes	No
		12	13	$598,000	$1,106,427	Yes	No
		14	13	$624,000	$1,231,211	Yes	No
		16	13	$624,000	$1,354,675	Yes	No
R	R-1A and R-1B	8	5	$210,000	$1,048,416	Yes	No
		10	7	$294,000	$1,136,200	No	No
		12	7	$294,000	$1,226,084	Yes	No
		14	14	$616,000	$1,319,048	Yes	No
		16	14	$616,000	$1,409,452	Yes	No
S	S-1A and S-1B	8	18	$972,000	$1,242,311	Yes	No
		10	21	$1,134,000	$1,417,575	Yes	No
		12	21	$1,176,000	$1,594,119	Yes	No
		14	25	$1,400,000	$1,777,063	Yes	No
		16	25	$1,400,000	$1,961,287	Yes	No

Source: *Noise Abatement Decision Report* (July 2010).

Note: **Bold face type** indicates barriers determined to be feasible and reasonable.

[1] NA = Not Applicable. Noise barrier was determined to be not feasible.

[2] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.

ft = feet

Table 3.15.18 Severely Impacted Receivers

Receiver I.D.	Area	Alternative 2f Predicted Noise Level (dBA)	Proposed Noise Barrier	Reasonable Cost Allowance	Estimated Construction Cost
16	K	79	K-1	$1,792,000	$430,304
127M	K	82	K-1	$1,792,000	$430,304
23M	M	75	M-1. M-2	$1,288,000	$1,910,475
19	M	78	M3[1]	N/A	N/A
20	O	84	O-1, O-2	$5,676,000	$1,039,306
28M	O	83	O-1, O-2	$5,676,000	$1,039,306
21	O	84	O-1, O-2	$5,676,000	$1,039,306
29M	O	82	O-1, O-2	$5,676,000	$1,039,306
22	O	81	O-1, O-2	$5,676,000	$1,039,306
31M	O	75	O-1, O-2	$6,534,000	$2,515,320
23	O	83	O-1, O-2	$5,676,000	$1,039,306
33M	O	78	O-1, O-2	$5,676,000	$1,039,306
34M	O	77	O-1, O-2	$5,676,000	$1,039,306
44M	P	80	P-1	$2,418,000	$936,768
35M	Q	75	Q-1	$3,596,000	$952,000
36M	Q	80	Q-1	$3,596,000	$952,000
37M	Q	77	Q-1	$3,596,000	$952,000
26	Q	76	Q-1	$3,596,000	$952,000
25	R	76	P-1	$2,418,000	$936,768
42M	R	76	P-1	$2,418,000	$936,768
40M	S	83	Q-1	$3,596,000	$952,000
38M	S	80	Q-1	$3,596,000	$952,000
39M	S	78	Q-1	$3,596,000	$952,000
50M	S	75	Q-1	$3,596,000	$952,000
48M	T	78	P-1, T-1	$2,958,000	$1,310,848
49M	T	84	P-1, T-1	$2,958,000	$1,310,848
51M	U	78	Q-1	$3,596,000	$952,000
52M	U	82	Q-1	$3,596,000	$952,000
53M	U	75	Q-1	$3,596,000	$952,000
55M	W	76	W-1	$912,000	$253,056
56M	W	76	W-1	$912,000	$253,056
39	D1	80	D1-B	$300,000	$631,780
93M	N1	76	N1-A	$1,798,000	$1,153,470
94M	N1	79	N1-A	$1,798,000	$1,153,470
50	N1	78	N1-A	$1,798,000	$1,153,470
95M	N1	76	N1-A	$1,798,000	$1,153,470
96M	N1	79	N1-A	$1,798,000	$1,153,470
51	N1	78	N1-B, N1-C, N1-D	$528,000	$2,709,401
52	N1	75	N1-B, N1-C, N1-D	$528,000	$2,709,401
53	P1	75	N1-D, P1-A	$782,000	$1,985,000
54	Q1	77	Q1-A	$624,000	$1,231,211
59	S1	75	S-1A, S-1B	$1,400,000	$1,777,063

Source: *Final Noise Abatement Decision Report* (July 2010).
[1] Eliminated based on public input.
dBA = A-weighted decibels
N/A = not applicable

Table 3.15.19 Recommended Barriers for Alternative 1

Area	Barrier	Barrier Height (ft)	Break Line-of-Sight?	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Length of Barrier (ft)
E	E-1	14	Yes	EOS	119[1]	$4,356,000	$2,111,211	9,284
I	I-1	10	Yes	Property Line	8	$320,000	$197,170	680
I	I-2	12	Yes	Property Line	14	$644,000	$584,968	1,798
K	K-1	14	Yes	EOS	28	$1,848,000	$430,304	1,921
M Variation 1	M-1, M-2, and M-3	14	Yes	EOS	18	$1,008,000	$1,910,475	5,820
M Variation 3	M-1, M-2, and M-3	12	Yes	EOS	4	$216,000	$1,910,475	5,820
O Variation 1	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 1	O-2 and O-3	14	Yes	EOS	8	$464,000	$1,476,014	4,591
O Variation 2	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 2	O-2 and O-3	14	Yes	EOS	13	$832,000	$1,476,014	4,591
P and R Variation 1	P-1	14	Yes	EOS	37	$2,294,000	$936,768	4,182
P and R Variation 2	P-1	14	Yes	EOS	37	$2,294,000	$802,944	4,182
Q, S and U Variation 1	Q-1	14	Yes	EOS	52	$3,016,000	$1,088,000	4,250
Q, S and U Variation 2	Q-1	14	Yes	EOS	52	$3,120,000	$1,088,000	4,250
T	T-1	10	Yes	EOS	10	$520,000	$267,200	5,799
V	V-1	14	Yes	EOS	7	$364,000	$342,272	2,922
W	W-1	12	Yes	EOS	19	$836,000	$253,056	1,774
Z	Z-1	12	Yes	Property Line	5	$220,000	$212,683	721
D1	D1-B	12	Yes	ROW	6	$300,000	$631,780	1,011
J1	J1-C	14	Yes	Property Line	11	$440,000	$251,383	424

Source: *Noise Abatement Decision Report* (July 2010).
[1] The barrier at the golf course is based on 100 ft of highway frontage that equals one residence.
EOS = edge of shoulder
ft = feet
ROW = right-of-way

Table 3.15.20 Recommended Barriers for the Initial Phase of Alternative 1

Area	Barrier	Barrier Height (ft)	Break Line-of-Sight?	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost
E	E-1	14	Yes	EOS	30[1]	$1,200,000	$1,000,674
I	I-1	10	Yes	Property Line	8	$320,000	$197,170
I	I-2	12	Yes	Property Line	14	$644,000	$584,968
K	K-1	14	Yes	EOS	28	$1,848,000	$430,304
M Variation 1	M-1, M-2, and M-3	14	Yes	EOS	18	$1,008,000	$1,910,475
M Variation 3	M-1, M-2, and M-3	12	Yes	EOS	4	$216,000	$1,910,475
O Variation 1	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306
O Variation 1	O-2 and O-3	14	Yes	EOS	8	$464,000	$1,476,014
O Variation 2	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306
O Variation 2	O-2 and O-3	14	Yes	EOS	13	$832,000	$1,476,014
P and R Variation 1	P-1	14	Yes	EOS	37	$2,294,000	$802,944
P and R Variation 2	P-1	14	Yes	EOS	37	$2,294,000	$802,944
Q, S and U Variation 1	Q-1	14	Yes	EOS	52	$3,016,000	$1,088,000
Q, S and U Variation 1	Q-1	14	Yes	EOS	52	$3,120,000	$1,088,000
T	T-1	10	Yes	EOS	10	$520,000	$267,200
V	V-1	14	Yes	EOS	7	$364,000	$342,272
W	W-1	12	Yes	EOS	19	$836,000	$253,056
Z	Z-1	12	Yes	Property Line	5	$220,000	$212,683
J1	J1-C	14	Yes	Property Line	11	$440,000	$251,383

Source: *Noise Abatement Decision Report* (July 2010).
[1] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
EOS = edge of shoulder
ft = feet

Table 3.15.21 Recommended Barriers for Alternative 2

Area	Barrier	Barrier Height (ft)	Break Line-of-Sight?	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Length of Barrier (ft)
E	E-1	14	Yes	EOS	95[1]	$4,180,000	$2,410,219	9,284
I	I-1	10	Yes	Property Line	8	$320,000	$197,170	680
I	I-2	12	Yes	Property Line	14	$644,000	$584,968	1,798
K	K-1	14	Yes	EOS	28	$1,792,000	$430,304	1,921
M Variations 1 & 2	M-1, M-2, and M-3	14	Yes	EOS	23	$1,288,000	$1,910,475	5,820
M Variations 3 & 4	M-1, M-2, and M-3	12	Yes	EOS	7	$364,000	$1,910,475	5,820
O Variation 1	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 1	O-2 and O-3	14	Yes	EOS	8	$432,000	$1,476,014	4,591
O Variation 2	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 2	O-2 and O-3	14	Yes	EOS	13	$858,000	$1,476,014	4,591
P and R Variation 1	P-1	14	Yes	EOS	39	$2,418,000	$802,944	4,182
P and R Variation 2	P-1	14	Yes	EOS	39	$2,418,000	$936,768	4,182
Q, S and U Variation 1	Q-1	14	Yes	EOS	58	$3,596,000	$1,088,000	4,250
Q, S and U Variation 2	Q-1	14	Yes	EOS	58	$3,596,000	$1,088,000	4,250
T	T-1	10	Yes	EOS	10	$540,000	$267,200	5,799
V	V-1	8	Yes	EOS	4	$208,000	$195,584	2,415
W	W-1	12	Yes	EOS	19	$912,000	$253,056	1,400
Z	Z-1	12	Yes	Property Line	5	$220,000	$212,683	721
D1	D1-B	12	Yes	ROW	6	$300,000	$631,780	1,011
J1	J1-C	14	Yes	Property Line	11	$546,000	$251,383	424

Source: *Noise Abatement Decision Report* (July 2010).
[1] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
EOS = edge of shoulder
ft = feet
ROW = right-of-way

Table 3.15.22 Recommended Barriers for the Initial Phase of Alternative 2

Area	Barrier	Barrier Height (ft)	Break Line-of-Sight?	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Length of Barrier (ft)
E	E-1	14	Yes	EOS	30[1]	$1,200,000	$1,000,674	9,284
I	I-1	10	Yes	Property Line	8	$320,000	$197,170	680
I	I-2	12	Yes	Property Line	14	$644,000	$584,968	1,798
K	K-1	14	Yes	EOS	28	$1,848,000	$430,304	1,921
M Variation 1	M-1, M-2, and M-3	14	Yes	EOS	18	$1,008,000	$1,910,475	5,820
M Variation 3	M-1, M-2, and M-3	12	Yes	EOS	4	$216,000	$1,910,475	5,820
O Variation 1	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 1	O-2 and O-3	14	Yes	EOS	8	$464,000	$1,476,014	4,591
O Variation 2	O-1 and O-2	14	Yes	EOS	86	$5,676,000	$1,039,306	4,699
O Variation 2	O-2 and O-3	14	Yes	EOS	13	$832,000	$1,476,014	4,591
P and R Variation 1	P-1	12	Yes	EOS	37	$2,294,000	$802,944	4,182
P and R Variation 2	P-1	14	Yes	EOS	37	$2,294,000	$802,944	4,182
Q, S and U Variation 1	Q-1	14	Yes	EOS	52	$3,016,000	$1,088,000	4,250
Q, S and U Variation 1	Q-1	14	Yes	EOS	52	$3,120,000	$1,088,000	4,250
T	T-1	10	Yes	EOS	10	$540,000	$267,200	1,617
V	V-1	14	No	EOS	4	$208,000	$342,272	1,305
W	W-1	12	Yes	EOS	19	$912,000	$253,056	1,774
Z	Z-1	12	Yes	Property Line	5	$220,000	$212,683	721
J1	J1-C	14	Yes	Property Line	11	$440,000	$251,383	424

Source: *Noise Abatement Decision Report* (July 2010).
[1] The barrier at the golf course is based on 100 feet of highway frontage that equals 1 residence.
EOS = edge of shoulder
ft = feet

Table 3.15.23 Noise Barrier Survey Results

Noise Barrier	Private/Public Property	Wall Approved? (Yes/No)
E-1	Public (Department)	Yes
J1-C	Private	No
K-1	Public (Department)	Yes
M-1, M-2, and M-3[1]	Public (Department)	Yes
O-2	Public (Department)	Yes
P-1	Public (Department)	Yes
P-1 and T-1	Public (Department)	Yes
Q-1	Public (Department)	Yes
T-1	Public (Department)	Yes
T-1 and V-1	Public (Department)	Yes
V-1	Public (Department)	Yes
W-1	Public (Department)	Yes
Z-1	Public (Department)	No
D1-B	Private	Yes
I-1	Private	No
I-2	Private	No
K1-A	Public	Yes

Source: Riverside County Transportation Commission (2011).
Note: Public barriers (Department) require a majority to approve a noise barrier. Private barriers require a 100 percent vote to approve a noise barrier.
[1] NB M-3 was eliminated from consideration because the first row businesses voted not to have the noise barrier due to visual impact.
Department = California Department of Transportation
NB = noise barrier

Table 3.15.24 Noise Barrier Survey Package Distribution

Noise Barrier	Number of Surveys Distributed
E-1	31
I-1	8
I-2	25
J1-C	20
K-1	45
M-1 and M-2	93
O-2	209
P-1	43
P-1 and T-1	6
Q-1	47
T-1	6
T-1 and V-1	11
V-1	6
W-1	93
Z-1	10
D1-B	3
K1-A	53

Source: Riverside County Transportation Commission (November 2011).

Table 3.15.25 Alternative 1 Ultimate Project Final Recommended Barriers

Barrier	Barrier Height	Barrier Length	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost
E-1	14	7,522	EOS	95	$4,180,000	$2,000,852
K-1	14	1,921	EOS	28	$1,792,000	$430,304
M-1, M2	14	4,072	EOS	23	$1,288,000	$1,283,578
O-1, O-2	14	4,795	EOS	86	$5,676,000	$1,039,306
P-1	14	4,182	EOS	39	$2,418,000	$936,768
Q-1	14	3,235	EOS	58	$3,596,000	$1,088,000
T-1	10	1,707	EOS	10	$540,000	$267,200
V-1	8	694	EOS	4	$208,000	$195,584
W-1	12	1,865	EOS	19	$912,000	$253,056
D1-B	12	1,011	Top of Slope	6	$300,000	$631,780
K1-A	14	2,462	Top of Slope	22	$1,144,000	$873,664

Source: Riverside County Transportation Commission (2011).

Table 3.15.26 Alternative 1 Initial Phase Final Recommended Barriers

Barrier	Barrier Height	Barrier Length	Barrier Location	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost
E-1	14	7,522	EOS	95	$4,180,000	$2,000,852
K-1	14	1,921	EOS	28	$1,792,000	$430,304
M-1,M2	14	4,072	EOS	23	$1,288,000	$1,283,578
O-1,O-2	14	4,795	EOS	86	$5,676,000	$1,039,306
P-1	14	4,182	EOS	39	$2,418,000	$936,768
Q-1	14	3,235	EOS	58	$3,596,000	$1,088,000
T-1	10	1,707	EOS	10	$540,000	$267,200
V-1	8	694	EOS	4	$208,000	$195,584
W-1	12	1,865	EOS	19	$912,000	$253,056
K1-A	14	2,462	Top of Slope	24	$1,248,000	$873,664

Source: Riverside County Transportation Commission (2011).

Table 3.15.27 Alternative 2 Ultimate Project Final Recommended Barriers

Barrier	Barrier Height (ft)	Barrier Length (ft)	Barrier Location	Starting Station	Ending Station	Number of Benefited Residences	Total Reasonable Allowance	Estimate Construction Cost
E-1	14	7,522[1]	EOS	36+32 0+00 (County Line)	77+66 (County Line) 27+76 (back) 23+62 (ahead) to 47+24	95	$4,180,000	$2,000,852
K-1	14	1,921	EOS	168+81	187+96	28	$1,792,000	$430,304
M-1,M-2	14	4,072[1]	EOS	M-1 – 187+06 M-2 – 192+75	M-1 – 205+84 M-2 – 207+34 (back) 7+34 (ahead) 12+00	23	$1,288,000	$1,283,578
O-1,O-2	14	4,795[1]	EOS	O-1 – 237+08 O-2 – 251+66	O-1 – 249+80 O-2 – 285+66	86	$5,676,000	$1,039,306
P-1	14	4,182	EOS	293+63	333+31	39	$2,418,000	$936,768
Q-1	14	3,235[1]	EOS	300+92	332+72	58	$3,596,000	$1,088,000
T-1	10	1,707[1]	EOS	328+60	345+31	10	$540,000	$267,200
V-1	8	694[1]	EOS	342+33	349+58	4	$208,000	$195,584
W-1	12	1,865[1]	EOS	340+22	358+17	19	$912,000	$253,056
D1-B	12	1,011	Top of Slope	526+54	535+69	6	$300,000	$631,780
K1-A	14	2,462[1]	Top of Slope	2210+41	2239+95	24	$1,248,000	$873,664

Source: Riverside County Transportation Commission (2011).
[1] The barrier lengths in this table are modified from the lengths listed in Table 3.15.21 based on the results of the Noise Survey comments and refined project design features (such as modification to the design of the ramps).
EOS = edge of shoulder
ft = feet

Table 3.15.28 Alternative 2 Initial Phase Final Recommended Barriers

Barrier	Barrier Height (ft)	Barrier Length (ft)	Barrier Location	Starting Station	Ending Station	Number of Benefited Residences	Total Reasonable Allowance	Estimate Construction Cost
E-1	14	7,522[1]	EOS	36+32 0+00 (County Line)	77+66 (County Line) 27+76 (back) 23+62 (ahead) to 47+24	95	$4,180,000	$2,000,852
K-1	14	1,921	EOS	168+81	187+96	28	$1,792,000	$430,304
M-1,M-2	14	4,072[1]	EOS	M-1 – 187+06 M-2 – 192+75	M-1 – 205+84 M-2 – 207+34 (back) 7+34 (ahead) 12+00	23	$1,288,000	$1,283,578
O-1,O-2	14	4,795[1]	EOS	O-1 – 237+08 O-2 – 251+66	O-1 – 249+80 O-2 – 285+66	86	$5,676,000	$1,039,306
P-1	14	4,182	EOS	293+63	333+31	39	$2,418,000	$936,768
Q-1	14	3,235[1]	EOS	300+92	332+72	58	$3,596,000	$1,088,000
T-1	10	1,707[1]	EOS	328+60	345+31	10	$540,000	$267,200
V-1	8	694[1]	EOS	342+33	349+58	4	$208,000	$195,584
W-1	12	1,865[1]	EOS	340+22	358+17	19	$912,000	$253,056
K1-A	14	2,462[1]	Top of Slope	2210+41	2239+95	22	$1,144,000	$873,664

Source: Riverside County Transportation Commission (2011).
[1] The barrier lengths in this table are modified from the lengths listed in Table 3.15.21 based on the results of the Noise Survey comments and refined project design features (such as modification to the design of the ramps).
EOS = edge of shoulder
ft = feet

Table 3.15.29 Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Scraper	89
Bulldozer	85
Heavy Truck	88
Backhoe	80
Pneumatic Tool	85
Concrete Pump	82

Source: Federal Transit Administration (1995).
dBA = A-weighted decibels

Table 3.15.30 Guideline Vibration Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources[1]	Continuous/Frequent Intermittent Sources[2]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation, Transportation- and Construction-Induced Vibration Guidance Manual (June 2004).
[1] Transient sources create a single, isolated vibration event, such as blasting or drop balls.
[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
in/sec = inches per second
PPV = peak particle velocity

Table 3.15.31 Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources[1]	Continuous/Frequent Intermittent Sources[2]
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans Transportation- and Construction-Induced Vibration Guidance Manual, June 2004.
[1] Transient sources create a single, isolated vibration event, such as blasting or drop balls.
[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
in/sec = inches per second
PPV = peak particle velocity

Table 3.15.32 Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV at 25 ft (in/sec)
Vibratory roller	0.210
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003
Crack-and-seat operations	2.4

Sources: Federal Transit Administration 1995 (except Hanson 2001 for vibratory rollers) and California Department of Transportation 2000 for crack-and-seat-operations.
ft = feet
in/sec = inches per second
PPV = peak particle velocity

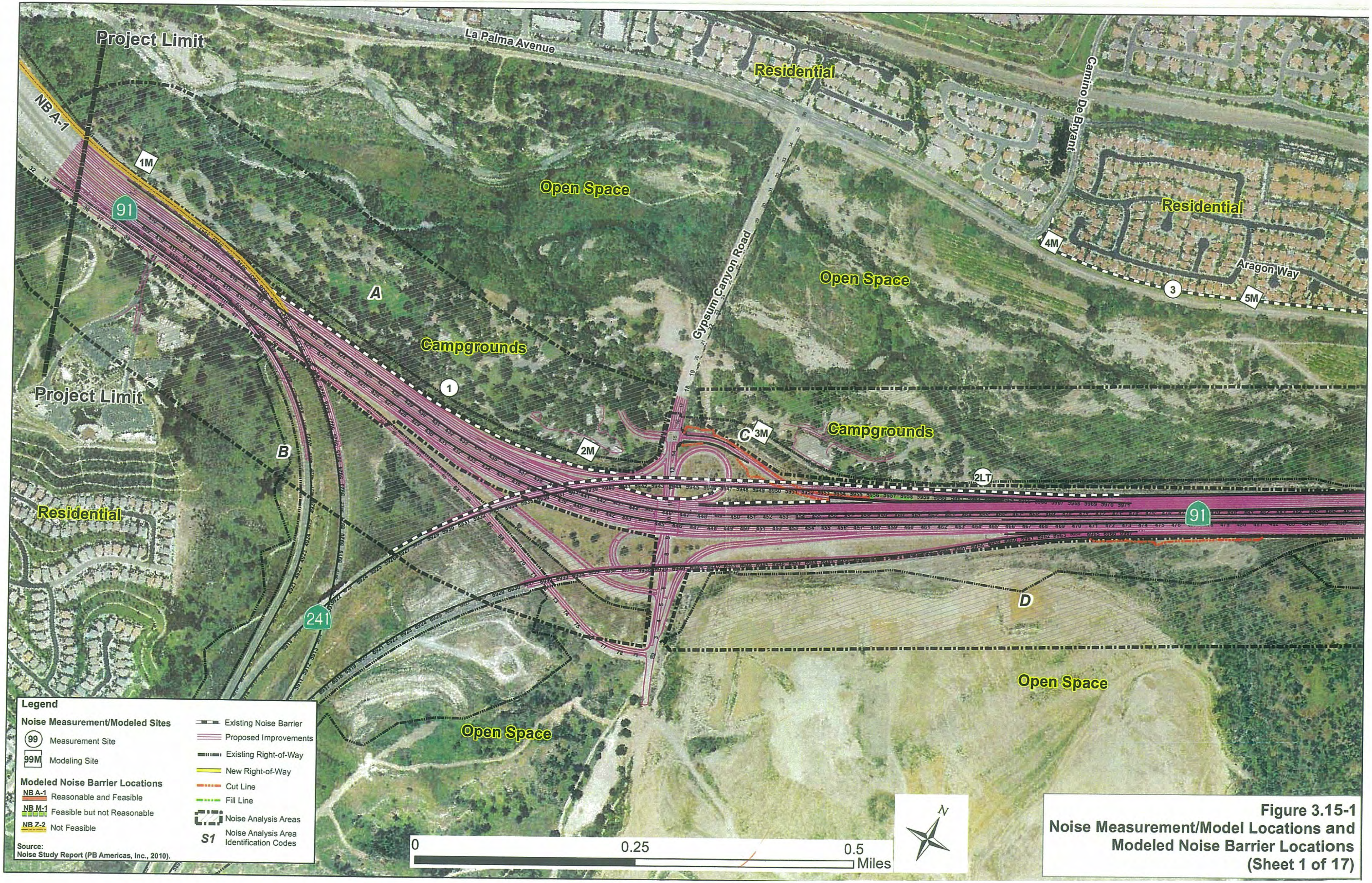


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations (Sheet 1 of 17)

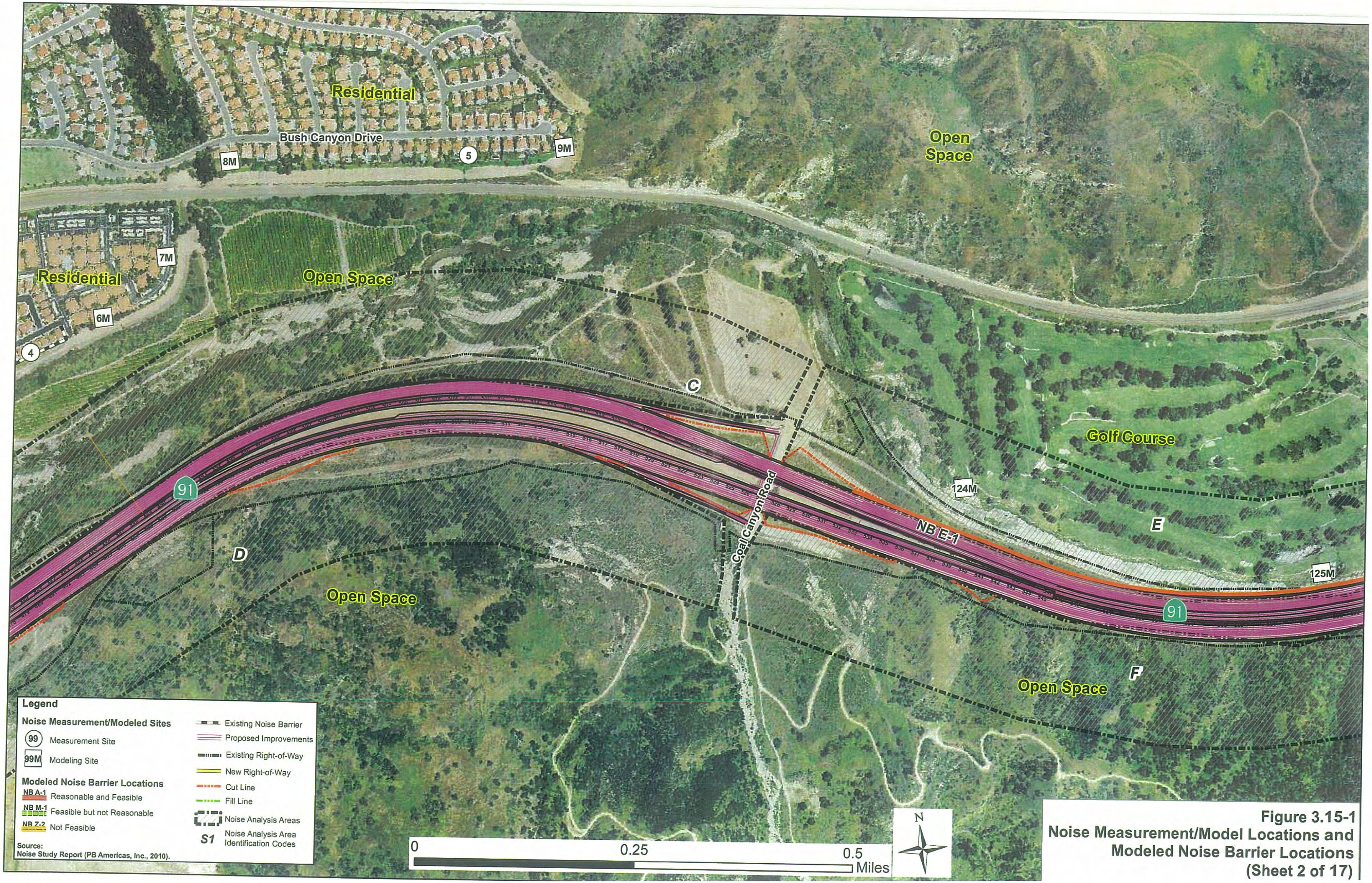


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 2 of 17)

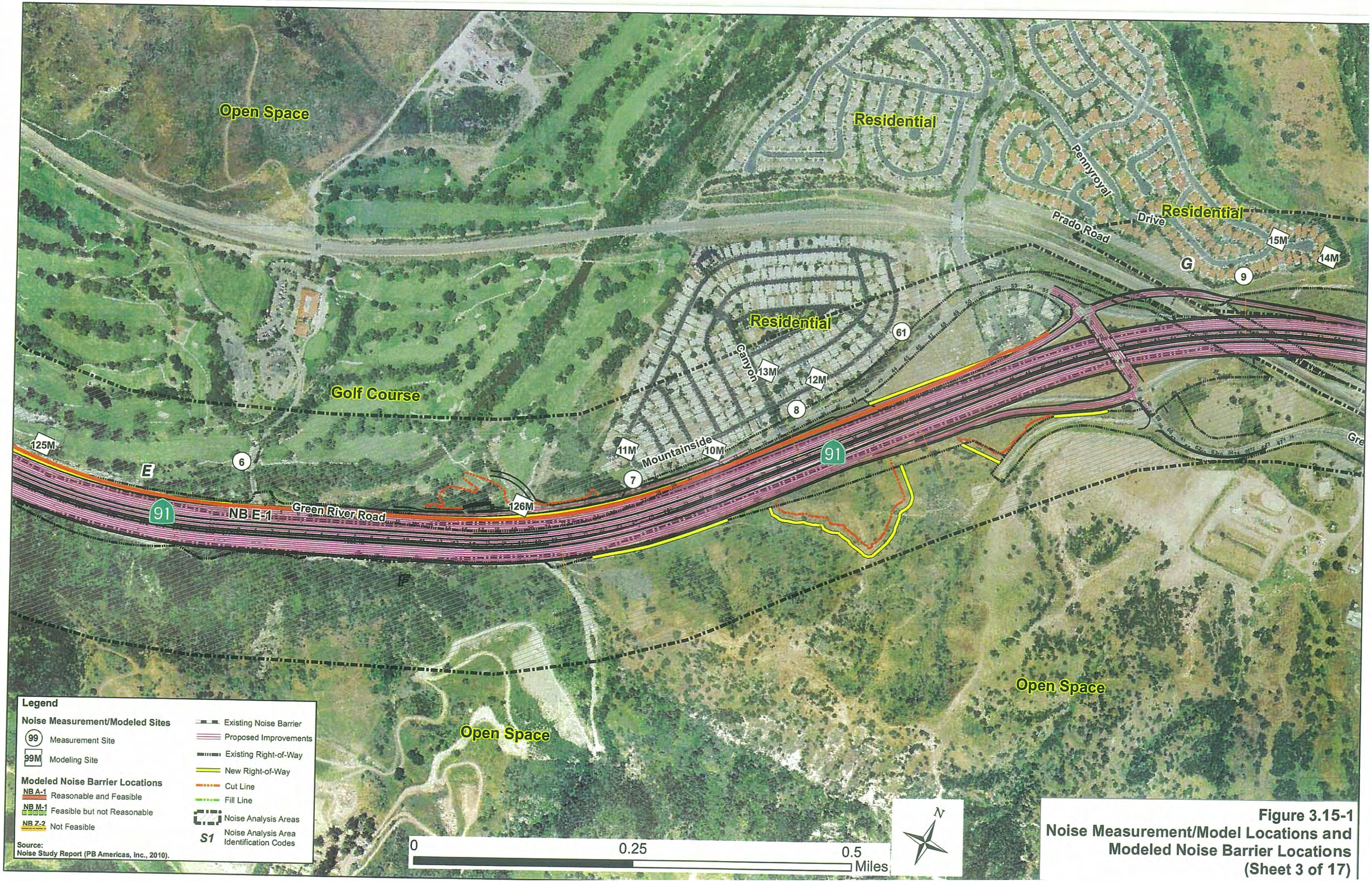


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 3 of 17)

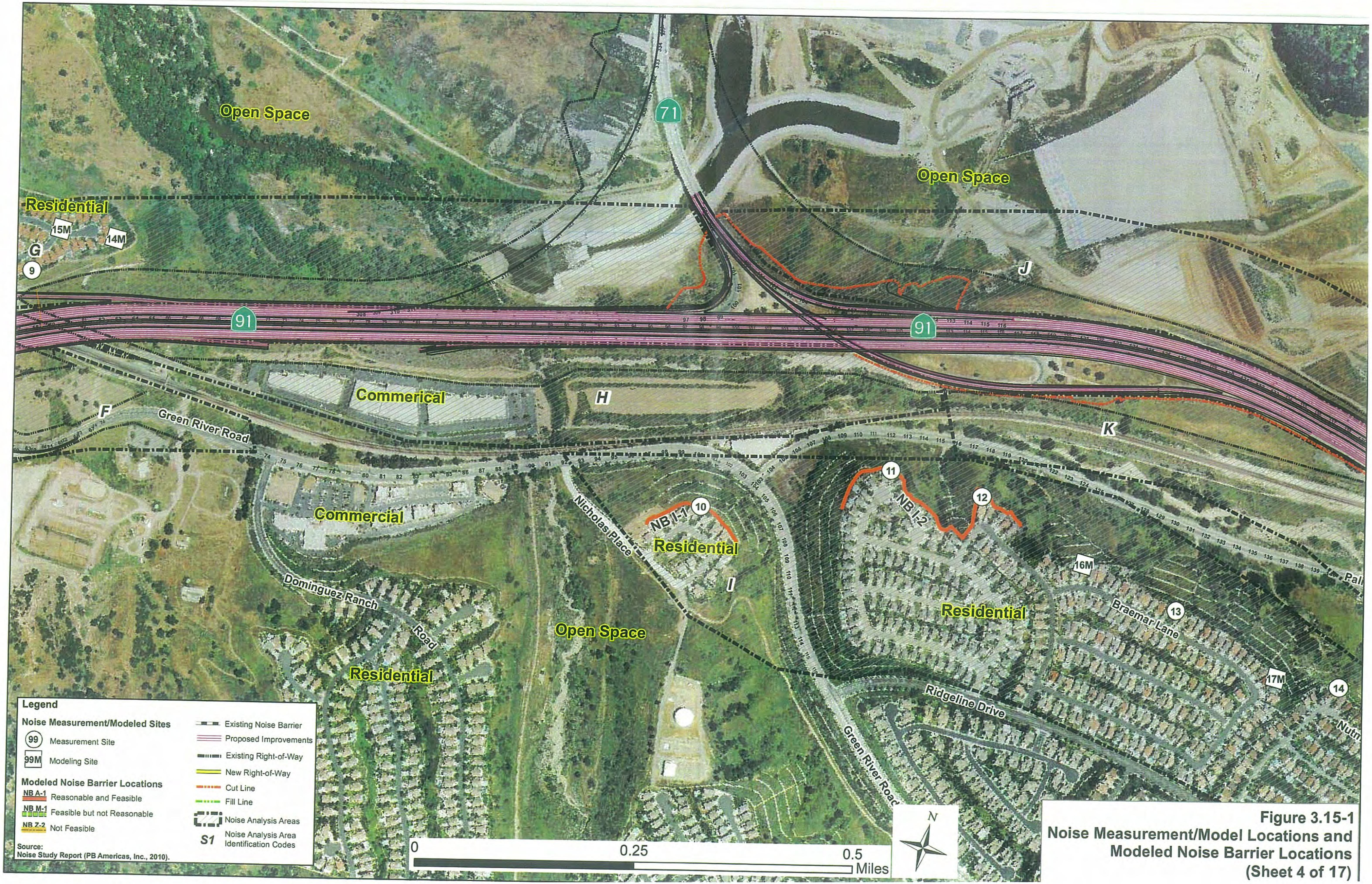


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 4 of 17)

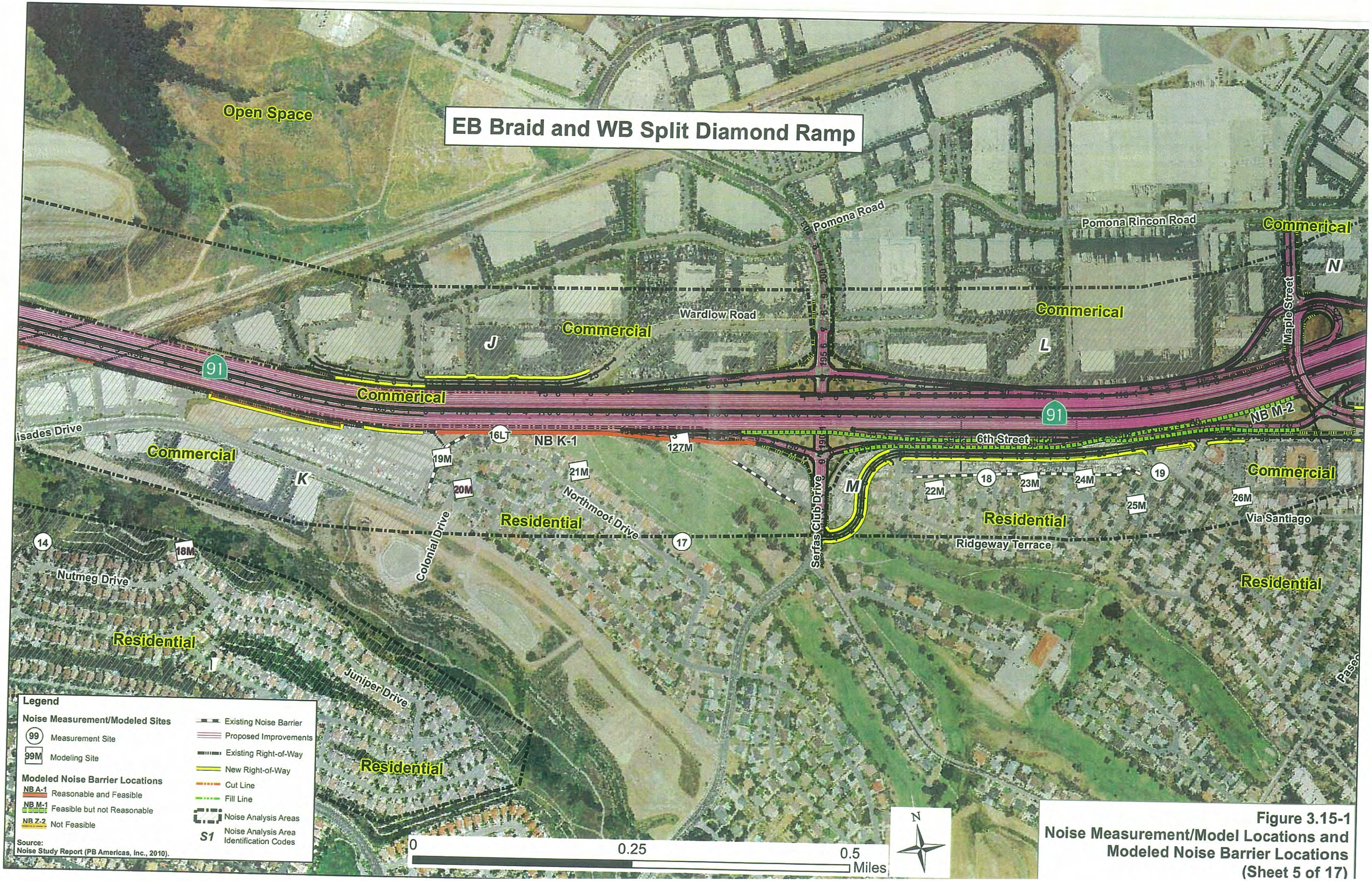


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 5 of 17)

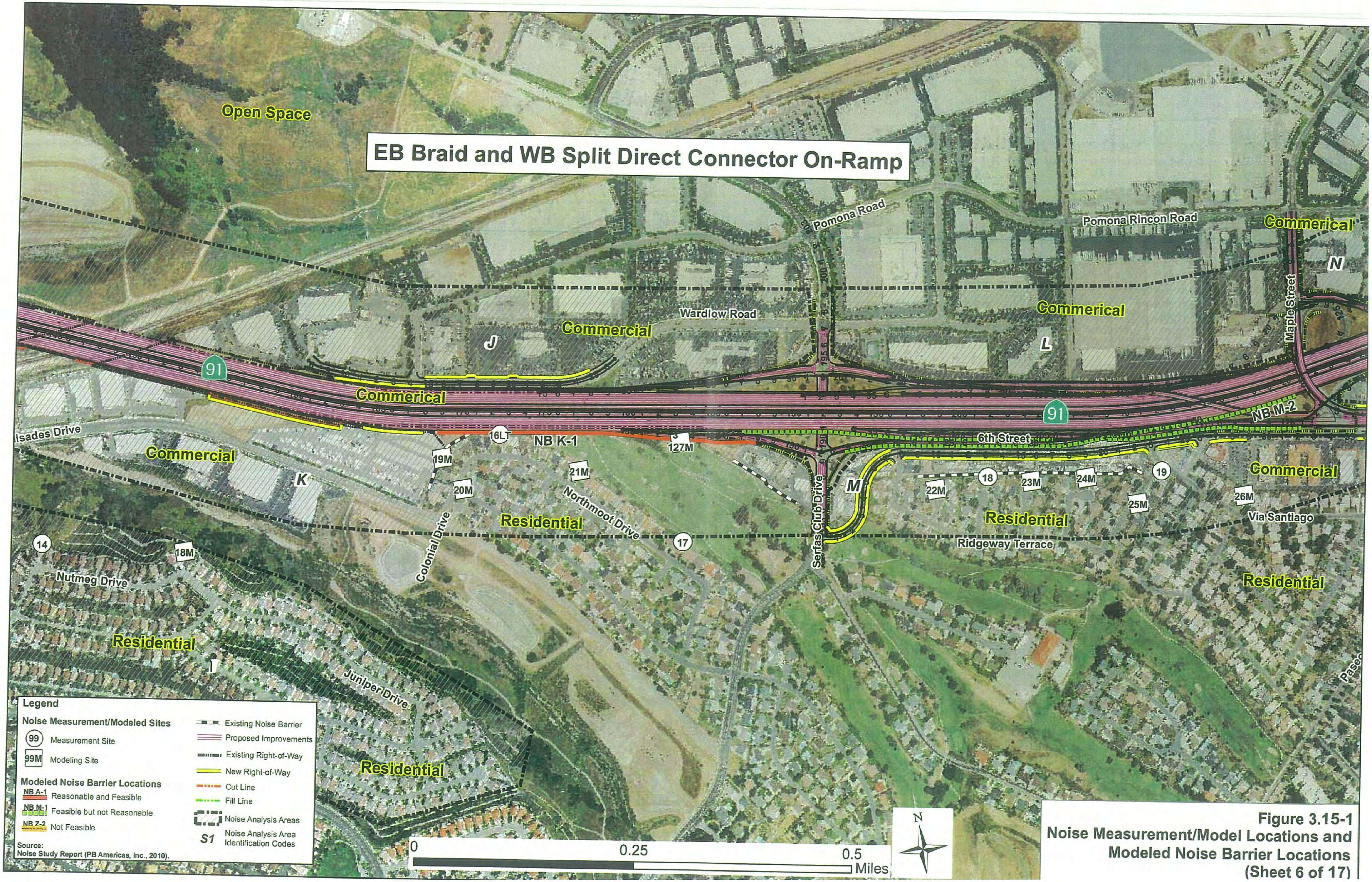


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 6 of 17)

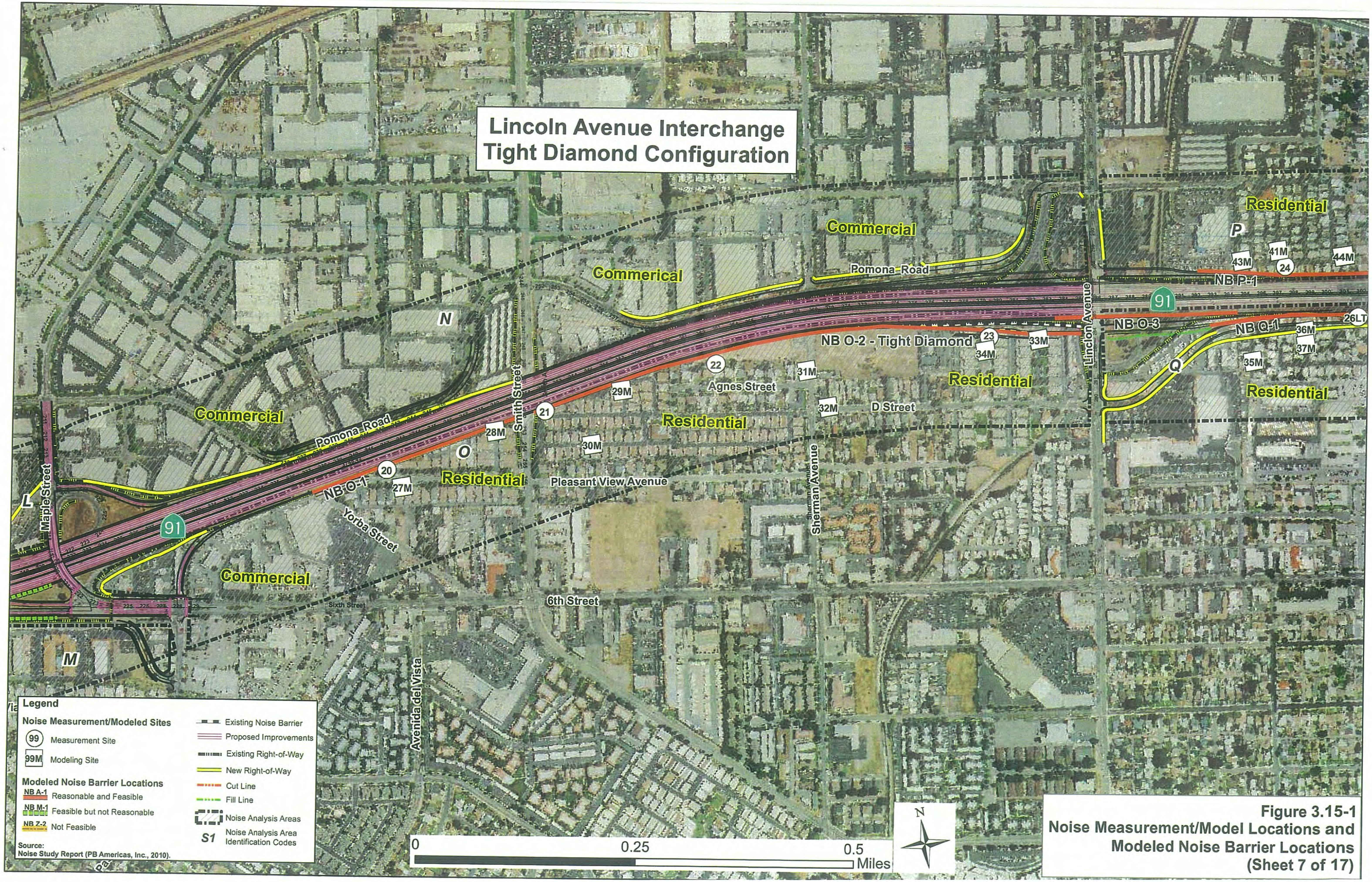


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations (Sheet 7 of 17)

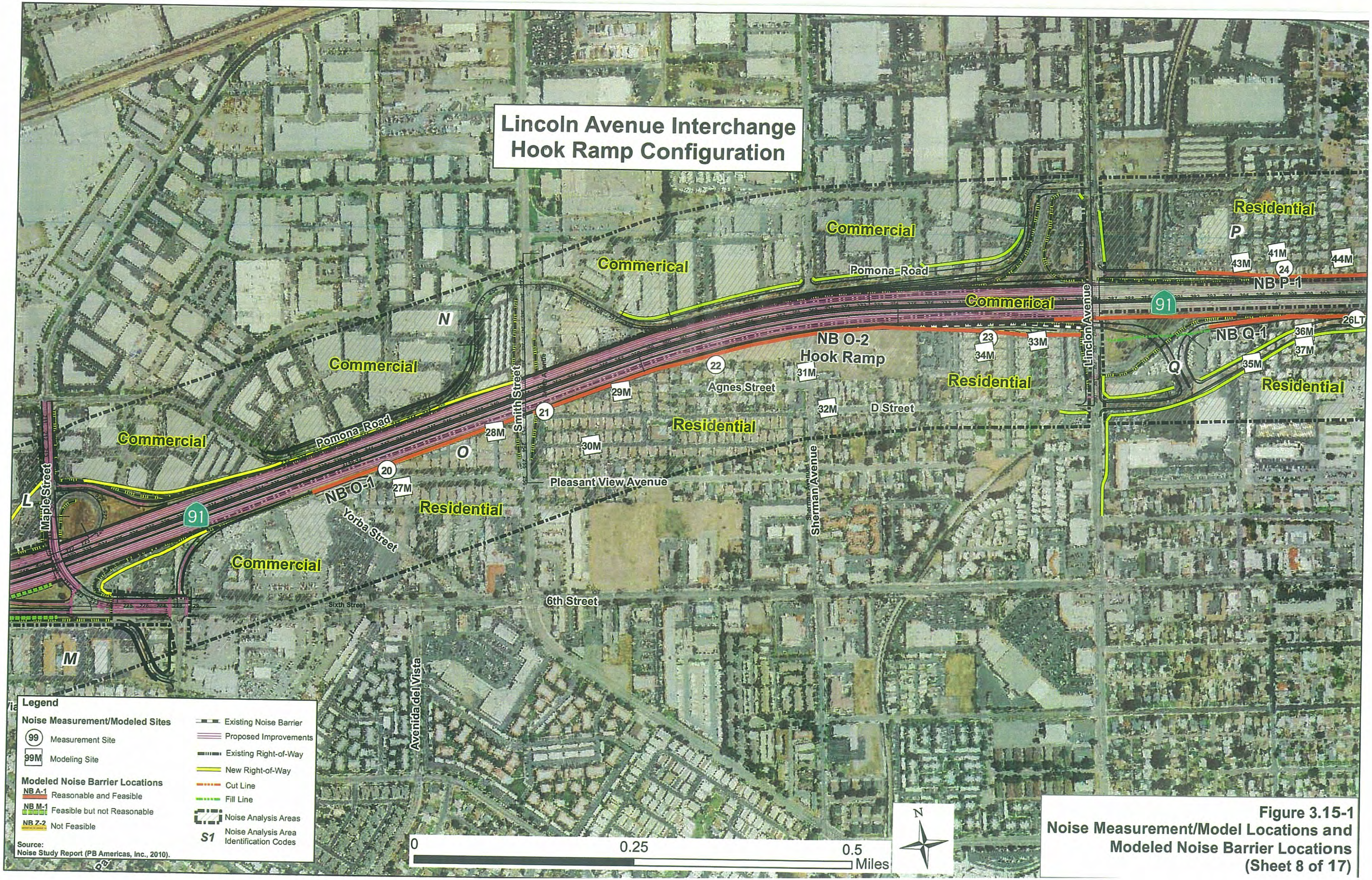
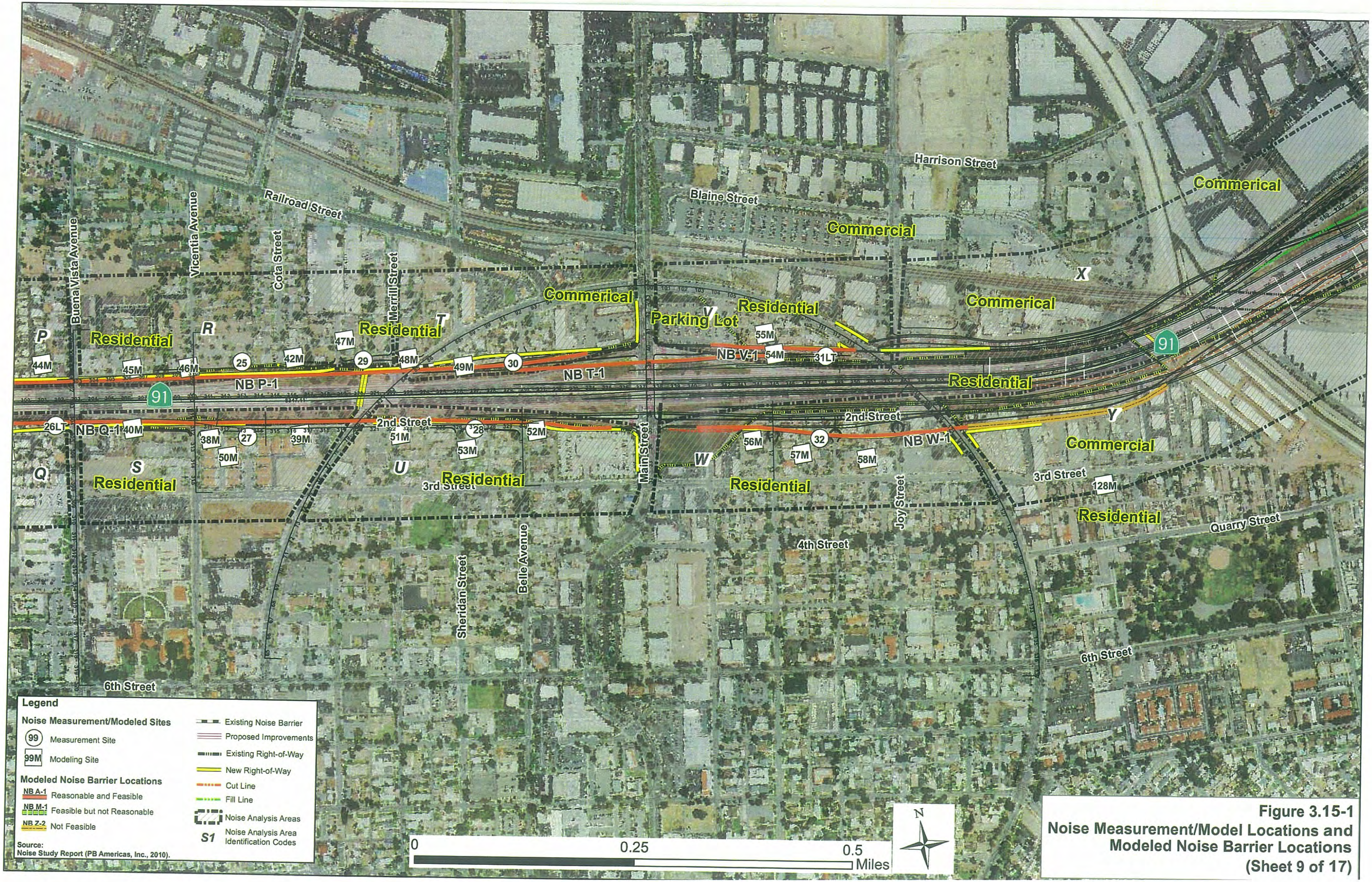


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 8 of 17)



Legend

Noise Measurement/Modeled Sites

99 Measurement Site

99M Modeling Site

Modeled Noise Barrier Locations

NB A-1 Reasonable and Feasible

NB M-1 Feasible but not Reasonable

NB Z-2 Not Feasible

Existing Noise Barrier

Proposed Improvements

Existing Right-of-Way

New Right-of-Way

Cut Line

Fill Line

Noise Analysis Areas

S1 Noise Analysis Area Identification Codes

Source:
Noise Study Report (PB Americas, Inc., 2010).

0 0.25 0.5 Miles

N

Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 9 of 17)

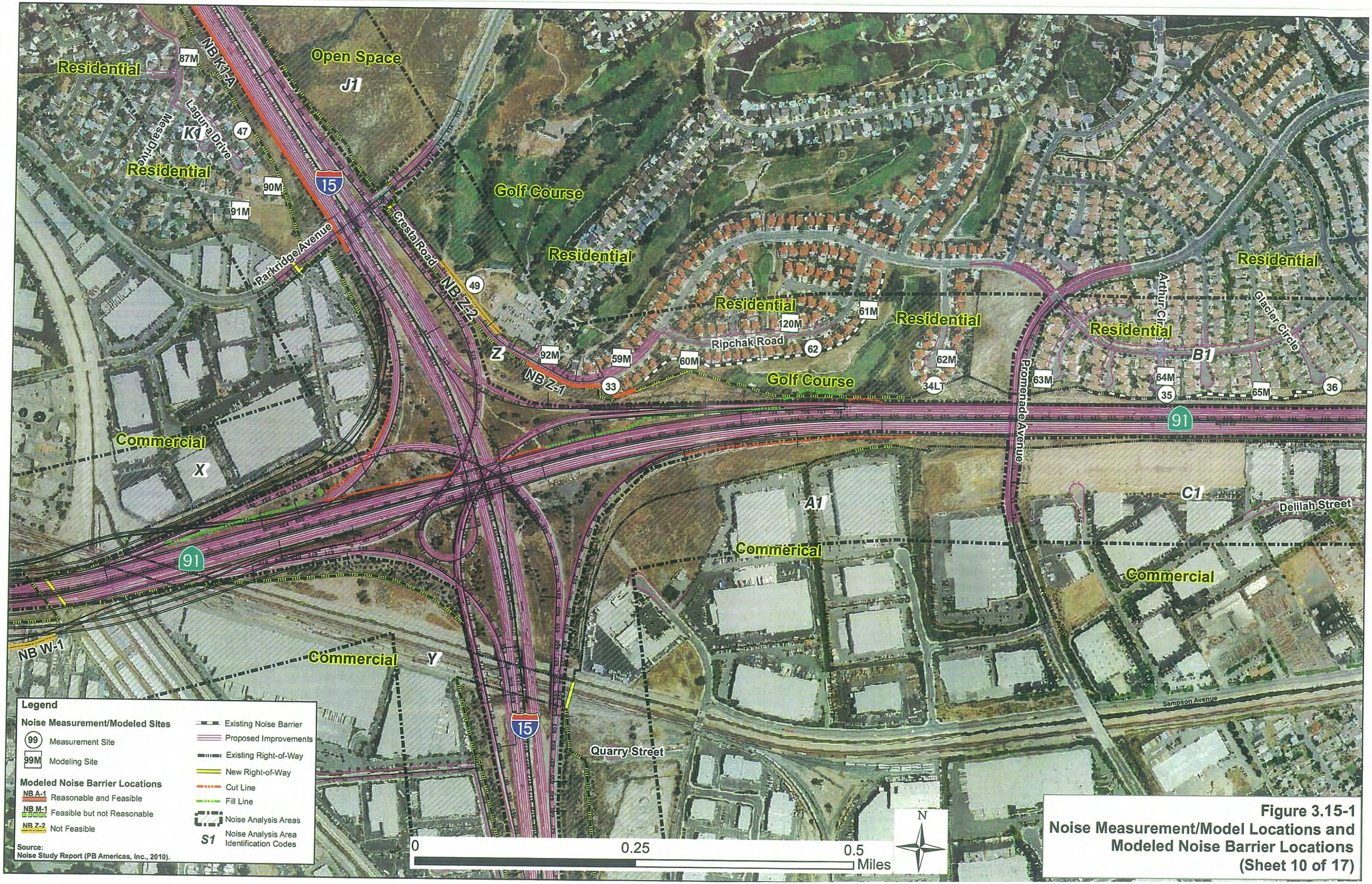


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 10 of 17)

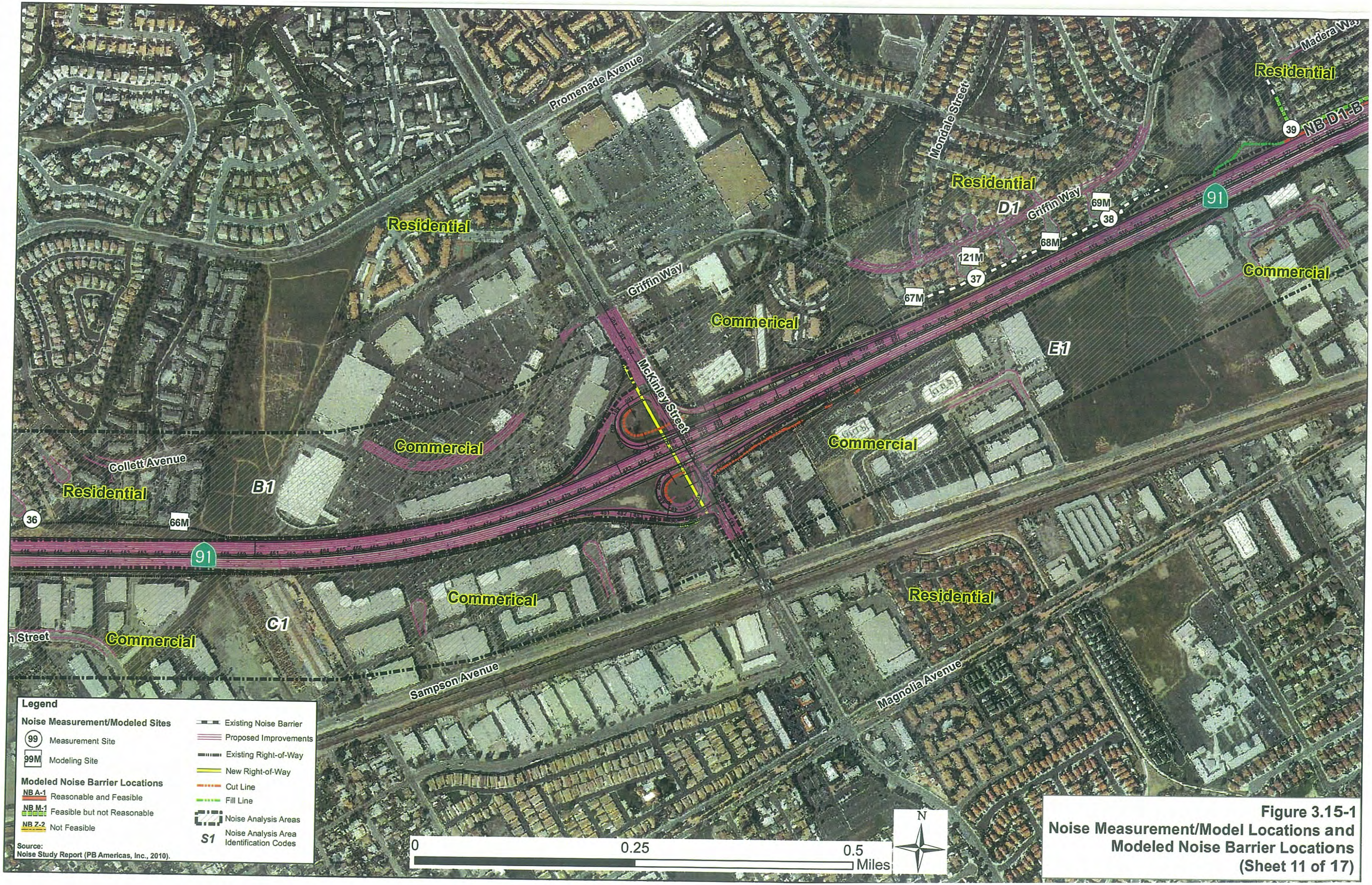


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 11 of 17)

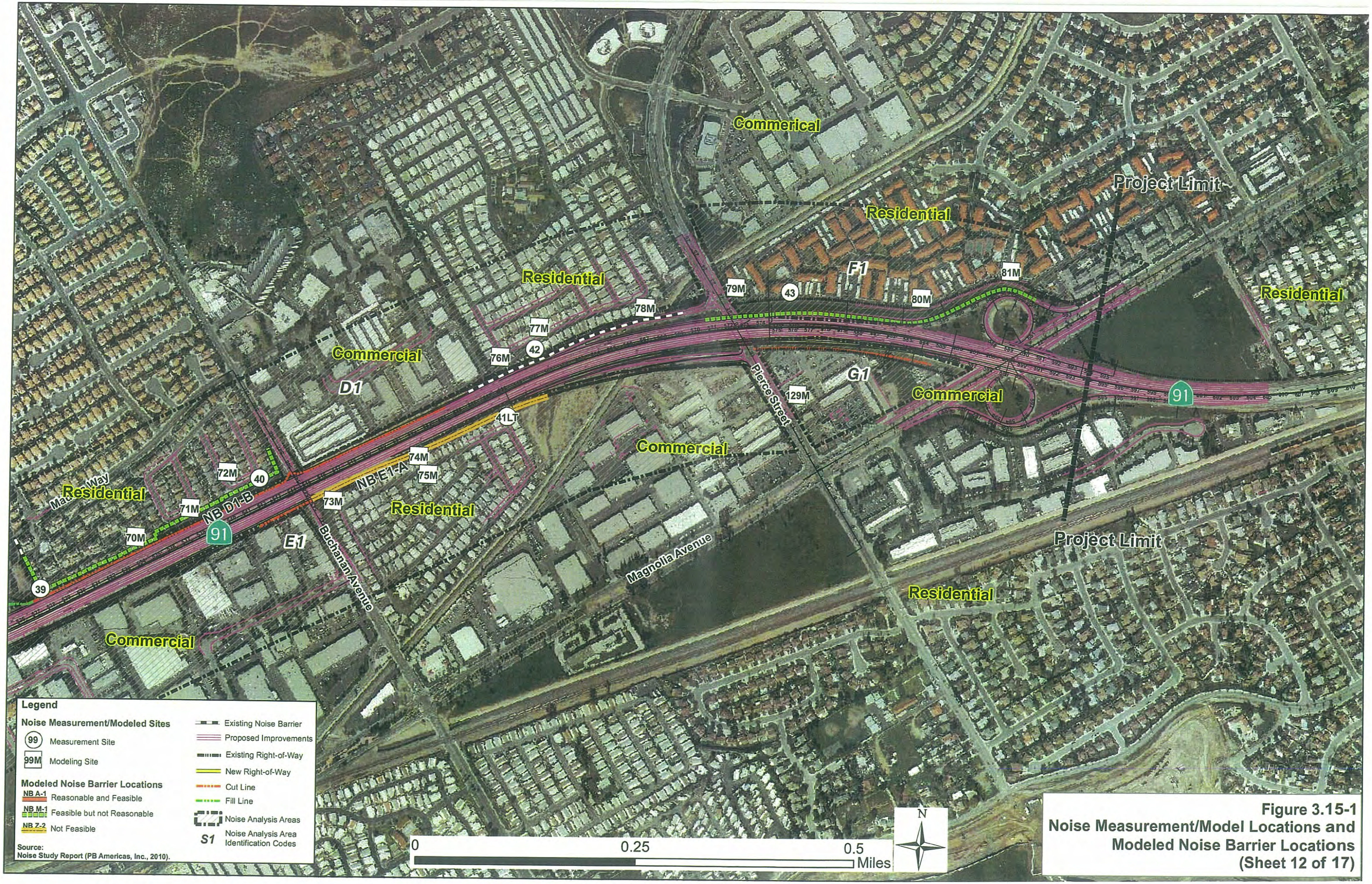


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 12 of 17)

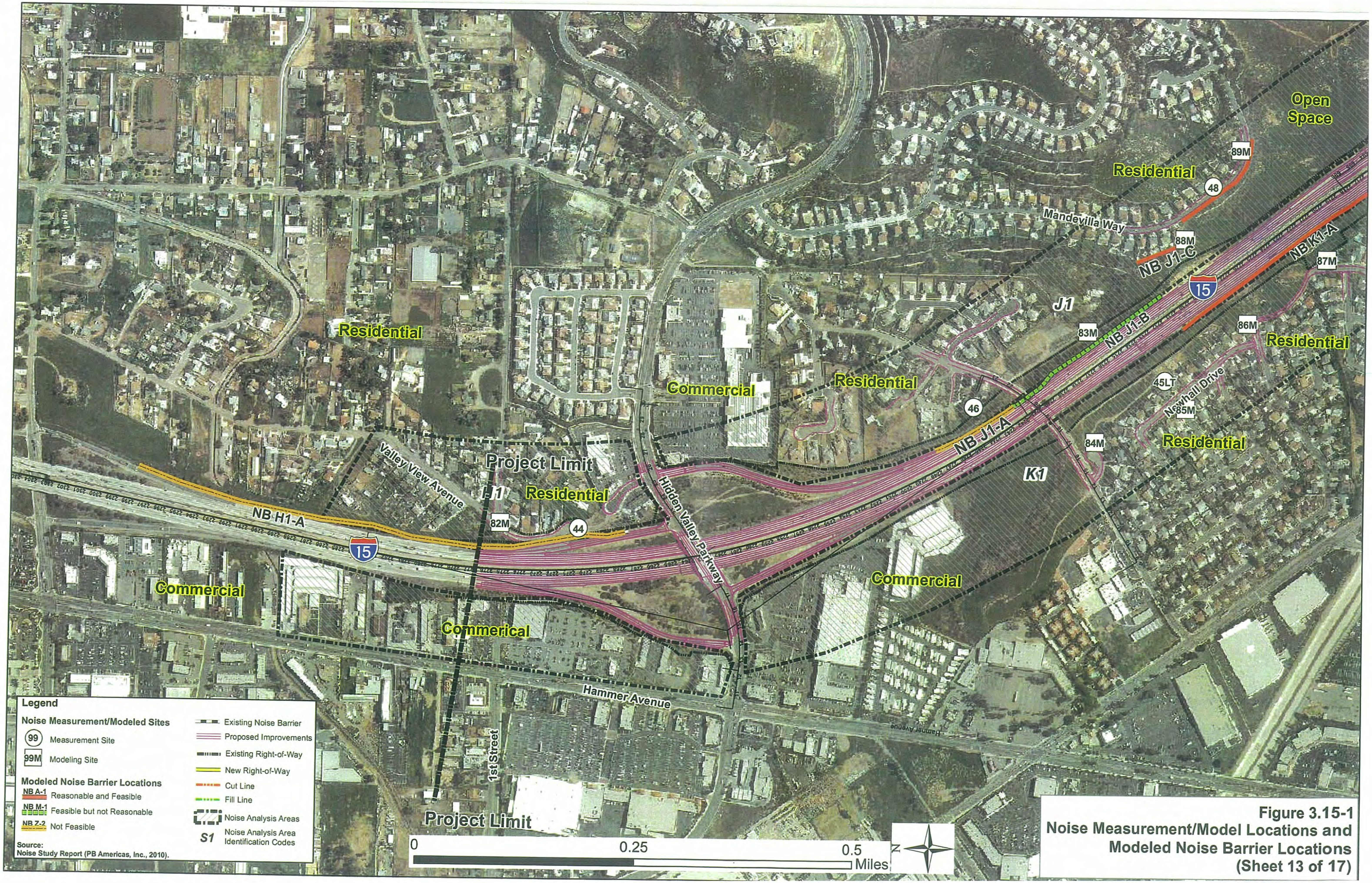


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 13 of 17)

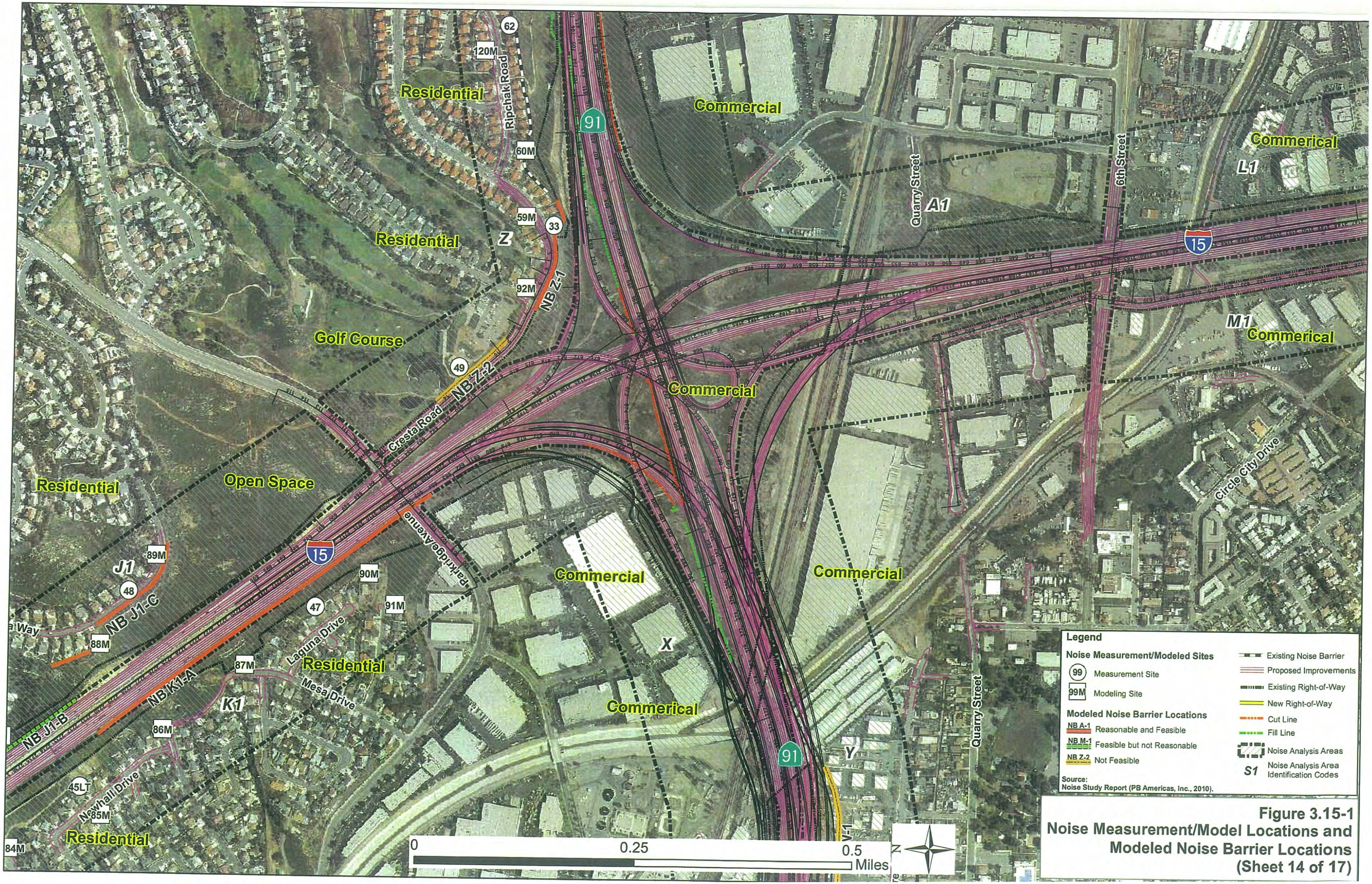


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 14 of 17)

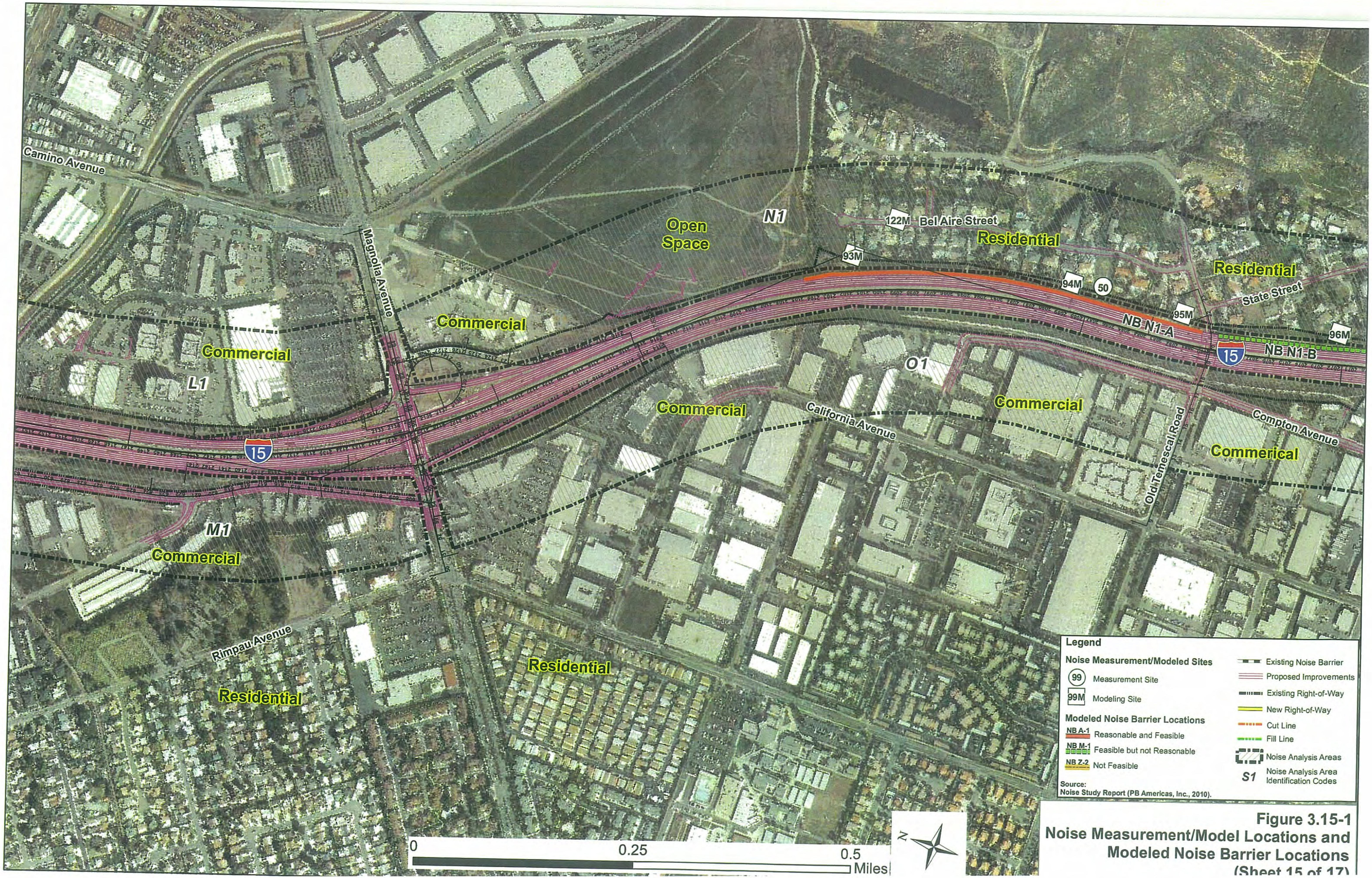


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 15 of 17)

Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 16 of 17)

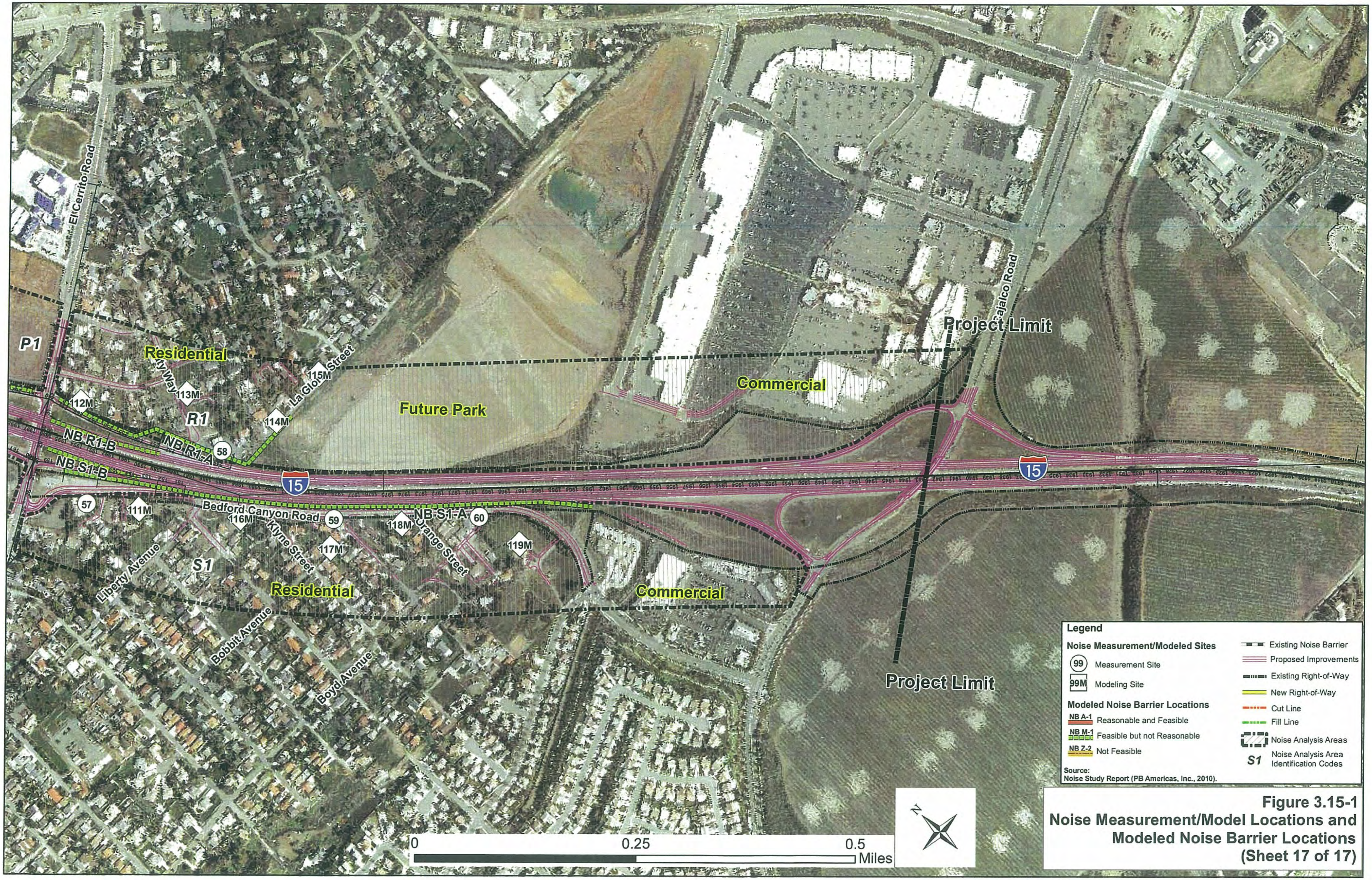


Figure 3.15-1
Noise Measurement/Model Locations and Modeled Noise Barrier Locations
(Sheet 17 of 17)

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