Chapter 3 Affected Environment, Environmental Consequences, and Mitigation Measures

The following sections describe the affected environment, environmental consequences, and mitigation measures for each environmental resource area for the proposed project. The environmental analyses are based on technical reports and memoranda (see following list) which are available for review in the Caltrans District 4, Office of Environmental Analysis, 111 Grand Avenue, Oakland, California.

List of Technical Studies/Memorandum Prepared in Support of this EA/EIR

Water Quality Comments for Environmental Document Review Memorandum – prepared February 18, 2000

Hydraulic Study Memorandum – prepared June 7, 2001.

Regional Geology and Seismic Sections Memorandum – prepared June 26, 2001

Air Quality Impact Report, Route 101 From Route 12 to Steele Lane in Sonoma County – prepared December 6, 2000

Noise Impact Report for the Proposed Widening Project on Route 101 in Sonoma County From Route 12 to Just North of Steele Lane – prepared June 4, 2001

Natural Environment Study/Preconstruction Notification for Route 101 Widening, City of Santa Rosa, Sonoma Co., From Junction of SON-12 to Steele Lane – prepared September 24, 2001

Biological Assessment, Sonoma 101 Widening Project From SR-12 to Steele Lane – prepared April 4, 2003 (prepared with support from Entrix, Inc.)

Initial Site Assessment, Route 101 Between Route 12 and Steele Lane, Sonoma County, California – prepared August 2000 (prepared by Geocon for Caltrans District 4)

Relocation Impact Statement – prepared October 11, 2001.

Traffic Operations Analysis Report, SON-101 Widening Project – prepared June 2001

Traffic Technical Memorandum #1 – Revised Year 2010 Traffic Analyses – prepared January 13, 2003

Visual Resources Assessment Memorandum, Route 101 – SR-12 to Steele Lane – prepared August 14, 2002

Historic Architectural Survey Report (HASR) – prepared July 2002

Historic Property Survey Report and Finding of Effect for a Proposed Project in Sonoma County in Santa Rosa on Route SON-101 From the State Route 12 Interchange to Just North of Steele Lane – prepared September, 2003

Archaeological Survey Report and Discovery Plan for a Proposed Project in Sonoma County in Santa Rosa on Route SON-101 From the State Route 12 Interchange to Just North of Steele Lane – prepared September, 2003

3.1 Hydrology, Stormwater Runoff, and Floodplains

3.1.1 Affected Environment

3.1.1.1 Hydrology

The city of Santa Rosa is situated on the alluvial fan of perennial Santa Rosa Creek, whose headwaters are east of the city in the Mayacamas Mountains, a rugged range that separates Sonoma and Napa Counties. About 1 km (0.6 mi.) east of the project area, Santa Rosa Creek meets Matanzas Creek, another perennial watercourse, which originates in the mountains surrounding Bennett Valley. The combined watercourse crosses the project area near its southern end. Another perennial stream, Paulin Creek, is located on the northern end of the project area. A few kilometers to the west, Santa Rosa Creek joins lesser watercourses to create the Laguna de Santa Rosa, a network of waterways that form a vast seasonal lake throughout the winter months. The Laguna is drained north into the Russian River, which continues west for about 30 km (18 mi) to meet the Pacific Ocean near the town of Jenner. South of Cotati is the Petaluma River drainage basin, which flows into San Pablo Bay.

Groundwater. Groundwater depths in the project area vary between approximately 1 and 4 m (3 and 13 ft) below the ground surface, with the exception of the vicinity of the Santa Rosa Creek Bridge, which has an observed groundwater depth at approximately 7 m (24 ft) (Caltrans 2001c). The groundwater in the region generally flows to the west although local groundwater conditions can be affected by nearby streams and channels, as well as by seasonal rains.

3.1.1.2 Stormwater Runoff

The proposed project is located within the jurisdiction of the North Coast Region (Region 1) of the California Regional Water Quality Control Board (RWQCB). The California Porter-Cologne Water Quality Control Act of 1969 requires that each RWQCB within the State formulate and adopt water quality control plans or basin plans for all areas in the region. The Clean Water Act, as amended in 1972, imposes similar requirements. The project occurs within the footprint of the Santa Rosa Basin Plan, which lists many beneficial uses for streams and springs in the vicinity of the

project including municipal, agricultural, industrial, recreation, warm and cold freshwater habitat, migration, spawning and wildlife habitat, and navigation.

The Clean Water Act establishes a "303d list" of water bodies that have pollutants which cannot completely be managed. In the project vicinity, the 303d water bodies include Santa Rosa Creek, which crosses the project area, and Laguna de Santa Rosa, into which Santa Rosa Creek empties about 8 km (5 miles) west of the project area . Santa Rosa Creek is listed for pathogens and the Laguna de Santa Rosa is listed because it contains excessive sediment, nitrogen, potassium, phosphorous, and dissolved oxygen (Caltrans 2001c).

The California Water Resources Control Board implements the National Pollutant Discharge Elimination System (NPDES) program, which was established by the U.S. Environmental Protection Agency (EPA) to regulate stormwater runoff. There are three categories of NPDES permits: construction (over 0.4 hectares or 1.0 acres of disturbance), municipal, and industrial.

3.1.1.3 Floodplains

According to the Federal Emergency Management Agency, the entire project is in an area of minimal flooding (Caltrans 2001d). For purposes of federal Executive Order 11988, which requires projects with federal involvement to determine whether the project would take place in a floodplain, FHWA has determined that the proposed project would not take place in a floodplain.

3.1.2 Environmental Consequences

3.1.2.1 Hydrology

Widening Route 101 would increase the impervious area occupied by the freeway by 65-70%, with an increase in new paved area of about 8 hectares (20 acres). Within the larger context of the Santa Rosa basin, this increase is negligible and would not alter existing drainage patterns. With the increase in impervious surface area, the potential exists for a minor decrease in groundwater infiltration and for effects on nearby streams and rivers that are fed by groundwater.

The proposed project could also affect surface water quality due to siltation. The project could cause erosion in the project area, and could cause erosion or scour in creeks that receive drainage from the project area. During construction, groundwater

could be encountered in excavations. If this groundwater is discharged into Santa Rosa Creek, water quality in the creek could be affected.

3.1.2.2 Stormwater Runoff

Since the proposed project would have a soil disturbance of 0.4 or more hectares (1 acre), this project is subject to the conditions of the NPDES Permit for construction activities (Order No. 99-08-DWQ, NPDES No. CAS000002), which is incorporated by reference to the Caltrans NPDES Permit, Stormwater Discharges for the State of California, Caltrans properties, facilities, and activities (Order No. 99-06-DWQ, NPDES No. CAS000003). Copies of these permits can be obtained for the State Water Resources Control Board web site at http://www.swrcb.ca.gov.

Of the "303d list" water bodies and pollutants of concern listed in Section 3.1.1.2, the only pollutant associated with the construction or operation of highways is sediment. Because of the effectiveness of available measures to avoid and minimize sediment generation, the project would not be likely to contribute to sediment concentrations in the Laguna de Santa Rosa.

The proposed freeway widening project would result in more paved area, and therefore, generate a slightly greater amount of runoff than the existing facility. This additional runoff would cause a slight increase in the amount of stormwater runoff to roadside ditches, Santa Rosa Creek, and Paulin Creek from the freeway during rain events. However, the additional runoff would be negligible and would not substantially change the amount of surface water running into these local receiving waters. There would also not be a noticeable effect on the peak flows in nearby streams. Please refer to the mitigation measures section below for more detail on decreasing stormwater runoff.

Effects to groundwater reinfiltration would be minimal because standard drainage features such as unlined ditches would promote percolation.

Construction activities associated with the new Santa Rosa Creek Bridge would be regulated under the federal Clean Water Act, so Caltrans must obtain permits from both the U.S. Army Corps of Engineers (ACOE) and the Regional Water Quality Control Board. These permits include requirements for protecting surface water quality. The ACOE permit is required for any temporary impact to Wetlands or Waters of the U.S. under Section 404 of the Clean Water Act. As a result of needing to obtain a Nationwide Permit, Caltrans must also obtain a Section 401 Water Quality Certification or Waiver from the Regional Water Quality Control Board before final

design of the project is completed. The Section 401 Certification or Waiver would describe all activities to be performed within the creek that could impact water quality. It would also include all the Best Management Practices (BMPs) to be implemented to minimize or eliminate water quality impacts.

3.1.2.3 Floodplains

Because the project area is not susceptible to flooding, the project would not cause or aggravate any flooding problems.

3.1.3 Mitigation Measures

3.1.3.1 Hydrology

Several steps would be taken during the design of the facility drainage system to mitigate or limit the effects on groundwater reinfiltration. Hydraulic models would be used to assess the performance of various drainage systems. Based upon the assessment, the preferred drainage system would be designed to take advantage of opportunities for groundwater recharge . Given the existing drainage shed patterns in the project area, highway runoff could be spread in a sheet flow that is filtered by shoulder vegetation. Also, the drainage system would maximize the use of unlined ditches and detention basins, which promote groundwater reinfiltration.

Caltrans would require the construction contractor to prepare a Storm Water Pollution Prevention Plan, which covers not just storm water, but all discharges. Measures to improve the quality of non-storm water discharges include preventing heavy equipment from distributing mud via their tires, establishing contained areas for rinsing out concrete mixing and forming areas, and implementing provisions for any discharges associated with excavation activities.

During the construction phase of the proposed project, groundwater may be encountered during bridge structure excavations, especially near Santa Rosa Creek. Extracted groundwater could potentially be discharged into the storm drain system or Santa Rosa Creek. The Region 1 RWQCB requires submittal of a permit application to discharge into the storm drain system within their region. As such, Caltrans would apply for the right to discharge under the de-watering permit prior to construction. Groundwater would be tested for contamination before being discharged. Clean water could be discharged directly into the storm drain. If the testing revealed the presence of contaminants that the RWQCB regulates, the water would be treated

before being discharged. Also, as part of the project's hazardous materials site investigation efforts, Caltrans would prepare a Site Investigation Report that identifies potential groundwater pollutants and that includes the appropriate contract provisions for properly handling contaminated groundwater.

Final project plans would include measures to control pollution during and after construction. During construction, construction site BMPs including, but not limited to, silt fences, plastic cover, stabilized construction entrances / exits, temporary soil stabilizers and other measures would be specified in the contract. In addition to what Caltrans provides for in the contract, the construction contractor would also be responsible for identifying any additional measures needed for site-specific requirements that are not presently identifiable. Permanent erosion control would be required for all construction slopes and all other soil disturbed areas, by using both mechanical means (organic nettings, blankets and mulches) and revegetation with native grasses and shrubs.

3.1.3.2 Stormwater Runoff

In planning to design and operate a highway facility in a way that protects water quality, Caltrans prepares a Storm Water Data Report in order to choose project features known as Permanent Control Measures (PCMs).

PCMs to be constructed for this project include energy dissipater structures at outlet locations in order to prevent scouring. The drainage features used for hydrologic purposes, such as unlined ditches and detention basins, would also enhance removal of particulate material such as sediment, reducing the amount of pollutants discharged to local receiving waters via stormwater runoff from the freeway. The locations of the unlined ditches, detention basins, and energy dissipater structures would be finalized during the final design process.

The Regional Water Quality Control Board (RWQCB) would require Caltrans to submit a Notice of Construction at least 30 days before the beginning of construction. As part of the requirements, the construction contractor must prepare a project-specific Storm Water Pollution Prevention Program, and amend it as necessary to reflect changing conditions for the duration of the construction project.

3.1.3.3 Floodplains

None required.

3.2 Geology, Soils, and Seismicity

3.2.1 Affected Environment

3.2.1.1 Regional Geology

The City of Santa Rosa is situated on the alluvial fan of perennial Santa Rosa Creek, whose headwaters are east of the City in the Mayacamas Mountains, a rugged range that separates Sonoma County and Napa County. The project area maintains a relatively level elevation of about 45 m (approximately 150 ft) above mean sea level along the western edge of the gently sloping fan. The adjoining hills to the east and southeast rise relatively abruptly to as much as 610 m (2,000 ft) in elevation. The Santa Rosa Plain continues north to the Town of Windsor and south to the Town of Cotati.

Bedrock in the Santa Rosa area is recognized as Petaluma Formation of Pliocene age in regional cross sections at the Route 101/SR-12 interchange area. The depth to the top of the Petaluma Formation near the interchange is 84 m (276 ft). The Petaluma Formation is described as clay and shale with minor amounts of sandstone (California Department of Water Resources 1975).

3.2.1.2 Soils and Sediments

Most of the project area is covered by soils of the Zomora series, followed by the Yolo and Clear Lake series, and alluvial sediments.

3.2.1.3 Seismicity

The project corridor is situated between the San Andreas and the Healdsburg-Rodgers Creek Fault Zones, which have been seismically active during the Holocene. The San Andreas Fault Zone is located more than 32 km (20 mi) west of the project area along the Pacific coast, while the Healdsburg-Rodgers Creek Fault Zone is located about 2.1 km (3.4 mi) east of the project area. Numerous earthquakes and ground failures have been generated along these fault zones in prehistoric and historic times (Budding et al. 1991; Huffman and Armstrong 1980; Lawson 1908, Schwartz 1992; Youd and Hoose 1978; and Cloud et al. 1970). The Santa Rosa area has been subject to at least six damaging earthquakes since 1865, as summarized in Table 3.2-2.

Table 3.2-2. Seismic History in the Santa Rosa Area

Date	Magnitude	Fault	Reported Damage
8 March 1865	4.7	Rodgers Creek	Severe in Bennett Valley
9 September 1893	5.1	Rodgers Creek	Many chimneys damaged
12 December 1899	N/A	Rodgers Creek	Some chimneys down
18 April 1906 *	~8.0	San Andreas	Severe damage in downtown Santa Rosa and surrounding area (including portions of the project area). At least 61 dead and 12 missing. Ground cracking and settlement along Santa Rosa Creek.
25 April 1968	4.6	Rodgers Creek	Chimneys and plaster damaged.
1 October 1969 *	5.6 & 5.7	Rodgers Creek	Approximately six million dollars in damage. Several old brick and frame buildings damaged beyond repair. Water lines severed. Ground cracking and settlement along Santa Rosa Creek. Earth-fill approaches to the SR-12 bridge over Route 101 subsided several inches.

Note: * Known to have caused some damage in the project area
Source: Budding, 1991; Huffman, 1980; Lawson, 1908; Schwartz, 1992; Youd, 1978; Cloud, 1970.

Downtown Santa Rosa suffered tremendous damage as a result of an earthquake and subsequent fire in April 1906 (Lawson 1908). Within the project area, the earthquake destroyed scores of buildings, including the County courthouse and the fire destroyed many more. Portions of the project area experienced less severe damage as a result of the 1969 earthquake.

3.2.2 Environmental Consequences

3.2.2.1 Site Geology

The proposed project lies within two different fan deposits. The older deposits are Late Pleistocene, which is classified as having very low liquefaction susceptibility. The younger deposits are Holocene and classified as having moderate to high liquefaction susceptibility where groundwater is within 3 m (10 ft). Groundwater depths in the project area vary between approximately 1 and 4 m (3 and 13 ft) below the ground surface, with the exception of the vicinity of the Santa Rosa Creek Bridge, which has an observed groundwater depth at approximately 7 m (24 ft) (Caltrans 2001c). The groundwater in the region generally flows to the west although local groundwater conditions can be affected by nearby streams and channels, as well as by seasonal rains. The potential impact of constructing the proposed project on soils having high liquefaction susceptibility is roadway segments buckling. Buckling can occur when sandy or silty roadbed materials laterally spread from ground oscillation causing earthen material to settle in a different pattern. Solutions for this potential problem are described in Section 3.2.3.1 (Mitigation Measures).

3.2.2.2 Soils and Sediments

All soil units contained in the project area exhibit slow runoff characteristics and erosion potential is slight except for the Zomora Series, which has slight to moderate erosion potential (Miller 1972). The proposed project would not create situations associated with erosion, such as steep slopes, areas of bare soil, or surface water flows.

3.2.2.3 Seismicity

Route 101 is located approximately 2.1 km (3.4 mi) west of the Healdsburg-Rodgers Creek Fault. A concealed splay of this fault has been mapped near the project area, immediately south of SR-12. Another concealed splay of this fault has also been mapped crossing Route 101 near Bellevue Avenue (Bortugno 1999). There has been no evidence of fault movement along these fault splays across the project area during the Quarternary Period. Therefore, these fault splays are not considered active and have not been listed on the Alquist-Priolo Fault Rupture Hazard Zones in California. Given these conditions the potential for fault rupture within the proposed project area is low, but more study may be required depending what is planned to be constructed at these locations. The project area also has the potential to be affected by large earthquakes from the San Andreas Fault Zone depending on the location and magnitude. The design solutions for seismic activity are explained in the next section.

Liquefaction susceptibility from seismic related ground failure for the Pleistocene fan deposits is very low. However, for Holocene alluvium deposits liquefaction susceptibility is moderate to high (Sowers et al. 1998). Therefore, Route 101 from 6th Street to Steele Lane has a low to moderate liquefaction susceptibility rating. Further detailed information regarding liquefaction potential would be determined during the construction process when subsurface investigations, borings, and field mapping would be performed.

Landslides from earthquake activities are considered of low probability due to the project area being classified as an area of greatest relative stability due to slope inclination, predominantly less than 15 percent (California Division of Mines and Geology 1980). Also, the proposed project does not include substantial cuts or fills, therefore no additional adverse effects are anticipated.

3.2.3 Mitigation Measures

3.2.3.1 Site Geology

In order to minimize any potential liquefaction impacts associated with the proposed project, stone columns, sub-excavation, dynamic compaction, or de-watering methods could be implemented during construction. The most suitable method would be selected after subsurface investigations take place and the potential for liquifaction is identified.

3.2.3.2 Soils and Sediments

Potential treatment actions for impacted expansive soils include the use of lime, cement, fly ash, compaction control measures, moisture control measures, and/or removal and replacement with non-expansive backfill. Implementation of these actions or a combination of these actions would help to reduce the effects of high shrink-swell soils by controlling the harsh effects of earthen materials that expand and contract. These measures would be explored during the design/ construction process when subsurface investigations, borings, and field mapping would be performed.

3.2.3.3 Seismicity

The Maximum Credible Earthquake (MCE) is used to define the safety evaluation for freeway design. The MCE is defined as the largest earthquake reasonably capable of occurring under the conditions presently known (Maulchin 1996).

Construction of the Route 101 widening project utilizing a flexible system (embankment or mechanically stabilized embankment) as opposed to a rigid system (bridge, viaduct, or retaining wall), where possible, should minimize the potential damage from earthquakes. Construction of new structures associated with this project must meet the standards of the Caltrans Office of Earthquake Engineering for the MCE.

3.3 Hazardous Materials

Hazardous materials have been historically used, stored, and disposed of in the project vicinity and are known to be present in areas of surface and/or subsurface soils and groundwater as a result of historical releases. Protective measures to reduce or eliminate hazardous materials related impacts are described, as necessary.

3.3.1 Affected Environment

3.3.1.1 Overview

Caltrans conducted an Initial Site Assessment (ISA) to identify the location of known hazardous material sites in the project vicinity. The ISA included a visual site inspection of the project area as well as reviews of Sanborn Fire Insurance Maps in the project vicinity, Vista Information Systems "Site Assessment Plus Reports," regulatory files from the California Environmental Protection Agency, regulatory files from the North Coast Regional Water Quality Control Board, the 1993 Munger Map Book, aerial photography of Santa Rosa, and topographic maps of the Santa Rosa area. All of these data sources helped in the identification of previous and current land uses that could contribute to the contamination of the project area.

3.3.1.2 Identified Hazardous Material Sites

The ISA located 27 sites in the project vicinity. Of the 27 potential hazardous material sites identified by the file search, 18 are leaking underground storage tanks (USTs) that are within 0.4 km (0.25 mi) of the proposed construction site, but none of these is anticipated to be affected by construction. All 27 sites are currently under regulatory oversight for monitoring and remediation, insuring the protection of human health and the environment. Table 3.3-1 identifies each site, its location, the type of hazardous material found, and its potential risk to the proposed project's scope and schedule. Caltrans' risk classifications are as follows: High risk hazardous materials issues could cause project costs to rise more than 20% for remediation, could cause long-term project schedule delays, or could require a large commitment of staff time to handle long term responsibilities caused by acquisition and becoming a responsible party to a remediation. Moderate risk issues are somewhat routine and would require investigation, but would not be anticipated to impact the schedule or scope of the project. Low risk issues are mainly related to contractor worker safety issues and disposal of materials generated during the construction phase of the project and would not impact the schedule, cost, or scope of the project.

Figure 3.3-1 depicts the approximate location of the 27 sites in the study area and shows their relative proximity to Route 101. Only one of the identified hazardous materials sites was found to exhibit a high potential risk of impacting the project's scope, cost, and schedule: the Shell Service Station located at 266 College Avenue. Four other identified sites were found to exhibit a moderate to high potential risk of impacting the project scope, cost and schedule. Three of the 27 sites listed have been

identified as sites that might be partially acquired for the project. The other sites might impact deep excavations within current State right of way planned for the project. These excavation areas might produce soil and groundwater contaminated by these nearby sites.

3.3.1.3 Aerially Deposited Lead

When Route 101 was first constructed, leaded gasoline was used by most vehicles. One of the results of burning leaded gasoline is the potential for aerially deposited lead (ADL) from leaded fuel exhaust to come to rest near the surface of soils, particularly the unpaved shoulders and median. This potentially results in the contamination of soils adjacent to older freeways. Typically, ADL exists within the top 0.15 m (six in) of soil in unpaved shoulder areas of many freeway corridors. ADL soil testing would occur after final design of the proposed project has been approved.

Table 3.3-1. Identified Hazardous Materials Sites

Map I.D.	Site Name	Site Address	Type of Hazardous Material Found	Potential Risk of Impacting Site
1	Phil Hirsch (Former Paris Cleaners)	230 South A Street	TPH, VOCs	Moderate
2	Former Grace Brothers Brewery	230 2nd Street	TPH	Low
3	Former Redwood Oil	130 3rd Street	Unavailable	Unknown
4	Former Shell Service Station	200 4th Street	TPH, MTBE	Low to Moderate
5	Texaco Service Station	210 5th Street	Unavailable	Moderate
6	Herbert Kurlander	123 4th Street	TPH, MTBE	Very Low
7	Former Texaco Service Station (La Rose Hotel Annex)	101 5th Street	TPH	Very Low
8	Shell Service Station	266 College Avenue	TPH, MTBE	High
9	Beacon (Former PB) Service Station	300 College Avenue	MTBE	Moderate to High
10	Former Unocal Service Station	College Avenue	Unavailable	Unknown
11	Crystal Clear Car Wash (Former Mobile Station)	257 College Avenue	Unavailable	Moderate to High
12	Former Service Station	College Avenue	Unavailable	Unknown
13	Chevron Service Station	136 College Avenue	TPH, MTBE	Low to Moderate
14	Suspected Former Service Station	College Avenue	Unavailable	Unknown
15	City of Santa Rosa "Freeway" Well W-3	1304 Cleveland Avenue	VOCs	Low
16	CDF Santa Rosa	135 Ridgeway Avenue	TPH, MTBE	Low
17	California National Guard Armory	1500 Armory Drive	Oil and Grease	Moderate to High
18	West Coast Welding Supply	1377 Cleveland Avenue	Unavailable	Unknown
19	Suspected Former Service Station	Cleveland Avenue	Unavailable	Unknown
20	Suspected Former Service Station	Armory Drive	Unavailable	Unknown
21	Shell Service Station	777 Steele Lane	TPH, MTBE	Moderate to High
22	Exxon Service Station	100 Coddington Center	TPH	Very Low
23	Former Texaco Service Station	Cleveland Avenue	Unavailable	Low
24	Chevron Service Station	2225 Cleveland Avenue	Unavailable	Low
25	Southern Pacific (Union Pacific) Railroad	99 Frances Avenue	Unavailable	Unknown
26	Purity Chemical Products Company	1005 Cleveland Avenue	Unavailable	Low
27	Argonaut Constructors	1236 Central Avenue	Unavailable	Low

TPH = Total Petroleum Hydrocarbons VOC = Volatile Organic Compound MTBE = Methyl tert-butyl ether
High Risk = high potential to impact the project's cost, scope and schedule by more than 20%
Moderate Risk = potential to impact the project's cost, scope and schedule
Low Risk = minimal risk to project's cost, scope and schedule

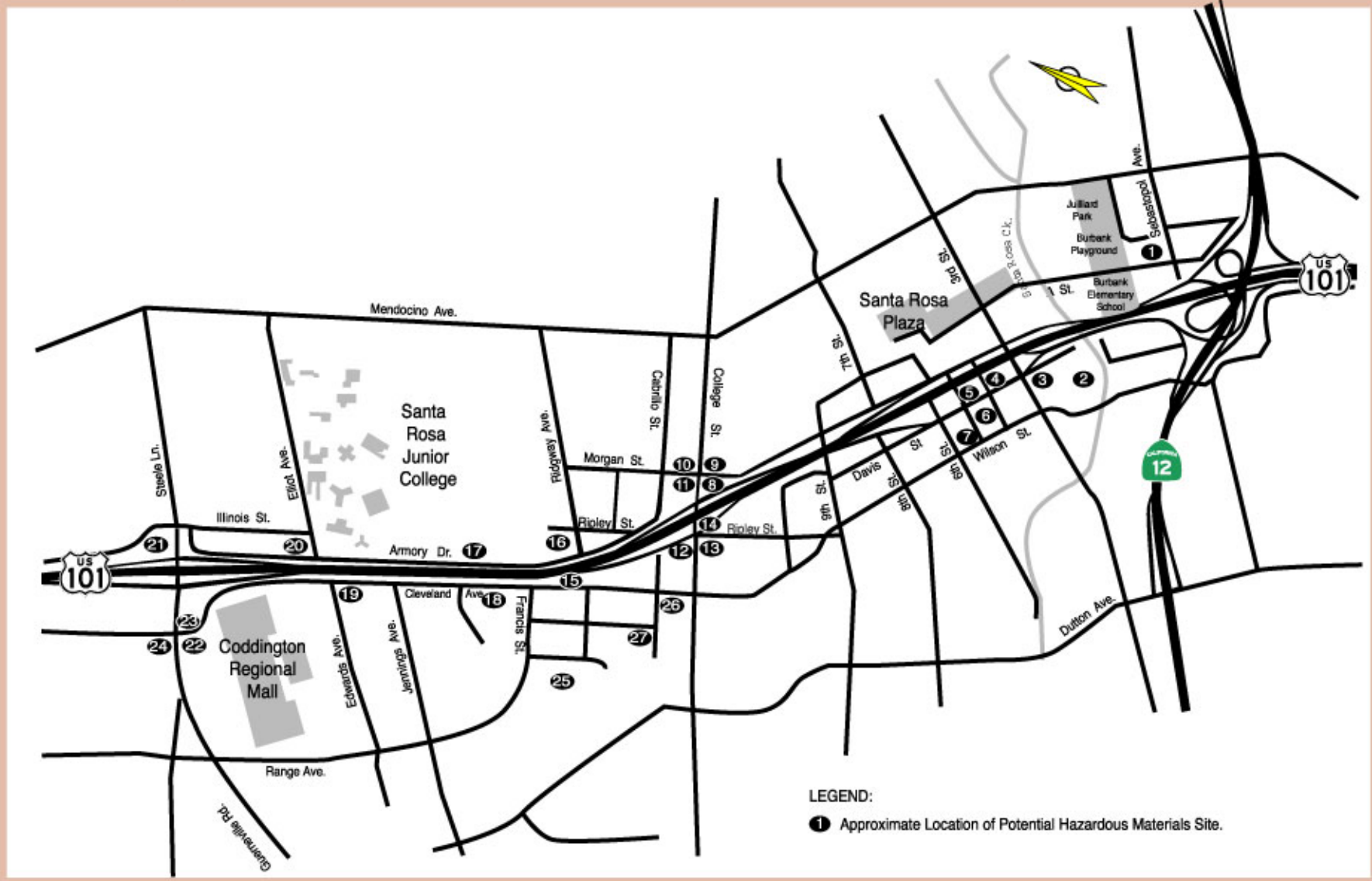


Figure 3.3-1: Potential Hazardous Materials Sites Within 0.4 km of Project Area

3.3.1.4 Lead Based Paint and Asbestos

Because of the age of the freeway, bridge structures on this portion of Route 101 and buildings near the freeway, lead-based paint and/or asbestos-containing materials may be present. Asbestos was commonly used in building materials until the early 1980's, when its use was phased out. Lead oxide and lead chromate were commonly used in paints until 1978, when regulations limited the allowable lead content in paint. Lead-based paint and asbestos in good condition do not present an immediate health risk, but asbestos fibers and lead particles could be emitted to the air during demolition or renovation activities.

3.3.2 Environmental Consequences

3.3.2.1 Hazardous Material Sites

The ISA determined that the lone high potential risk site in the project vicinity is the Shell Service Station located at 266 College Avenue. Though the proposed project would acquire part of this facility, it is not anticipated that the proposed right-of-way would encroach upon the gasoline island where the fuel pumps are located, nor the USTs for gasoline. After the project's final design has been approved, surveying may be necessary to determine the exact location of the proposed right-of-way acquired in relation to the USTs and gasoline island at 266 College Avenue. After the approval of the environmental document and prior to right of way acquisition and construction, soil testing in the surveyed area would determine whether there had been a hazardous materials release, and assess what action, if any, is appropriate for remediation of this site with respect to acquisition and construction purposes.

Two other sites listed on Table 3.3-1 are anticipated to be partially acquired for the project. Crystal Clear Car Wash at 257 College Avenue is identified as a medium to high risk site and Chevron Service Station at 136 College Avenue is identified as a low risk site. Along with the service station at 266 College Avenue, these sites will also have soil testing for acquisition purposes.

The rest of the sites listed in Table 3.3-1 will not be acquired for the project but might impact soil and groundwater within State right of way at locations of excavation for this project. The excavation areas will also be tested to determine the presence of contamination in the soil and groundwater that might be encountered during construction. Based on the test results, appropriate contract specifications and plans

will be written to instruct the contractor to properly dispose of the soil and groundwater contaminated by the nearby sites.

If the proposed project is approved to proceed with design, Caltrans would determine where specific features would be located. When specific locations of excavation, groundwater contact, or right of way acquisition are known, proper methods for investigating hazardous materials contamination would be determined and conducted as soon as possible in the design phase of the project. Hazardous materials would be avoided wherever possible. Caltrans policy for land acquisition dictates that hazardous materials should be remediated before purchase. If this is not possible, the estimated cost of cleanup would be deducted from the cost of acquiring the property. Remediation of hazardous materials would be done in accordance with appropriate laws, regulations, rules, and policies, as further discussed in Section 3.3.3.1 (Mitigation Measures).

3.3.2.2 Aerially Deposited Lead

Lead contamination due to vehicle exhaust of leaded gasoline may exist in materials next to freeways constructed prior to the ban on such fuels. After the project's design has been approved, site investigations would be conducted in the unpaved shoulder areas in Caltrans right-of-way along the project to determine existing lead concentrations and, if appropriate, control measures would be included in the plans and specifications for the project.

3.3.2.3 Lead Based Paint and Asbestos

Demolition or renovation of existing bridge structures or buildings for the proposed project could result in the release of lead dust or asbestos fibers, potentially affecting construction workers and/or nearby residents. The proposed project calls for the full acquisition of seven properties and demolition of their structures Also, the proposed project details the replacement and renovation of several bridge structures on Route 101 within the project area. Based on the ages of all these structures, lead-based paint and/or asbestos-containing materials may be present. State and Federal regulations require the abatement of all lead-based paint and asbestos-containing materials prior to demolition or renovation activities that would disturb them.

3.3.3 Mitigation Measures

3.3.3.1 Hazardous Material Sites

As described in Section 3.3.2.1, sampling conducted in locations of proposed soil disturbance would characterize any areas of contamination. This information would be used to determine what actions, if any, are necessary to protect public health and the environment. If appropriate, precautions would be taken to ensure that hazardous materials do not come in contact with people or the environment. When hazardous materials are excavated, they must be transferred directly to containment, which could consist of a storage container, the containment area of a truck, or a stockpiling area. A stockpiling area must include a plastic liner and must be covered at the end of each workday. All excavated materials must be managed properly. If an excavation in a location of suspected groundwater contamination encounters water, the water must be contained and sampled, then managed in compliance with state and federal environmental laws. Also, dust must be controlled during excavations in contaminated locations.

Contract special provisions will be written and construction plans prepared so that contaminated soil to be excavated during construction for the purposes of the project would be handled and disposed of in accordance with the appropriate laws, regulations, rules, and policies. Any contaminated groundwater that is encountered during construction would be handled in accordance with the water quality provisions outlined in Chapter 3.1 of this document.

In the event a previously undocumented hazardous material site or UST is uncovered during construction of the proposed project, Caltrans would consult with the appropriate state and federal regulatory agencies to determine what action, if any, is appropriate.

3.3.3.2 Aerially Deposited Lead

Materials found to contain lead at concentrations that are considered potentially hazardous to either human health or the environment would be handled in accordance with all local, State, and Federal regulations. If regulatory requirements for soil re-use were met, a remediation plan would be prepared for proper reuse of the ADL material within the project limits, which would be at least 1.5 m (5.0 ft) above the maximum groundwater table and with an asphalt or soil cover. If the lead levels in the soil exceed the threshold authorized by the California Department of Toxic

Substances Control (DTSC), then ADL soils would be hauled to a permitted landfill. If the daily air monitoring results indicated that the lead levels in air exceeded 1.5 mg/cubic meter of air per day, then the contractor would stop work and modify the operations to prevent any further release of lead that exceeds the required limit. Air monitoring would be conducted under the direction of a Certified Industrial Hygenist.

3.3.3.3 Lead Based Paint and Asbestos

During the course of demolition or renovation activities, construction contractors and/or Caltrans would follow regulations requiring the abatement of lead-based paint and asbestos-containing materials to prevent exposure to both nearby residents and workers.

3.4 Air Quality

3.4.1 Affected Environment

3.4.1.1 Air Quality Standards

Air quality in the Bay Area has been determined to be a health problem by the U.S. EPA, the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD). Federal law has imposed several sets of deadlines for attaining national standards. Geographic areas with measured pollutant levels that violate the national ambient air standards are called nonattainment areas. The 1990 Clean Air Act amendments require that nonattainment areas be classified as serious, severe, or extreme based on the severity of pollution problems, and different standards and deadlines apply to various situations. In addition, areas must develop control plans or strategies for each nonattainment pollutant. These plans are generally referred to as clean air plans and are compiled by each state into a State Implementation Plan (SIP). A nonattainment area's transportation plans must be consistent with the SIP.

California has adopted its own standards for ambient air pollutant concentrations, which are more stringent than the Federal standards. The California Clean Air Act (CCAA) requires non-attainment areas (geographic areas that do not meet one or more Federal ambient air quality standards) to develop plans aimed at reducing emissions of non-attainment pollutants or their precursors by five percent per year. For the purposes of this document, the geographic non-attainment area coincides with the BAAQMD jurisdiction area listed above. Alternatively, if an air district is unable

to achieve a five percent reduction, the adoption of all feasible measures on an expeditious schedule is acceptable. The California Legislature, when it passed the CCAA in 1988 (amended in 1997), recognized that suspended particulate matter (PM_{10}) attainment was not easily obtained and excluded it from the requirements of CCAA.

Both the State and Federal governments have established health based Ambient Air Quality Standards (AAQS) for seven air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), suspended particulate matter ($PM_{2.5}$ and PM_{10})[1,2], and sulfur dioxide (SO_2). In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles. These standards are designed to protect the health and welfare of the populace within a reasonable margin of safety. Both the California Ambient Air Quality Standards and National Ambient Air Quality Standards are listed in Table 3.4-1.

Table 3.4-1. Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		Federal Standards	
		Concentration	Attainment Status	Concentration	Attainment Status
Ozone (O_3)	1-hour	0.09 ppm	N	0.12 ppm	N
	8-hour	-	-	0.08 ppm	U
Carbon Monoxide (CO)	8-hour	9.0 ppm	A	9 ppm	A
	1-hour	20 ppm	A	35 ppm	A
Nitrogen Dioxide(NO_2)	Annual Mean	-	-	0.053 ppm	A
	1-hour	0.25 ppm	A	-	-
Particulate Matter (PM_{10})	Annual Geometric Mean	30 ug/m^3	N	-	-
	24-hour	50 ug/m^3	N	150 ug/m^3	U
	Annual Arithmetic Mean	20ug/m^3	-	50 ug/m^3	-
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12ug/m^3	-	15 ug/m^3	U
	24-hour	-	-	65 ug/m^3	U
Sulfur Dioxide(SO_2)	Annual Mean	-	-	0.03 ppm	A
	24-hour	0.04 ppm	A	0.14 ppm	A
	1-hour	0.25 ppm	A	-	-

Notes: ppm = parts per million
ug/m^3 = micrograms per cubic meter
A = attainment
N = non-attainment
U = unclassified

1 P $M_{2.5}$ is defined as tiny solid or liquid particles, generally soot or aerosols. The size of the particles (2.5 microns or smaller) allows them to easily enter the air sacs deep in the lungs where they may cause adverse health effects. Small particles can also cause visibility reduction. http://www.baaqmd.gov/pie/aqgloss.htm.

2 PM_{10} is defined as tiny solid or liquid particles of soot, dust, smoke, fumes, or aerosols. The size of the particles (10 microns or smaller) allows them to easily enter the air sacs deep in the lungs where they may be deposited, resulting in adverse health effects. The size of the particles can also cause visibility reduction and is a criteria air pollutant. http://www.baaqmd.gov/pie/aqgloss.htm.

An area's air quality is categorized as attainment, non-attainment or unclassified for the ambient air pollutants listed in Table 3.4-1. An "attainment" designation for an area signifies that pollutant concentrations did not violate the standard for that pollutant in that area. A "non-attainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. An "unclassified" designation signifies that data do not support either an attainment or non-attainment status.

3.4.1.2 Regional Air Quality

The proposed project is located in the San Francisco Bay Area, a large shallow air basin ringed by hills that taper into a number of sheltered valleys around its perimeter. Two primary atmospheric outlets exist: 1) through the strait known as the Golden Gate, which is a direct outlet to the ocean; and 2) extending to the northeast, along the west Delta region of the Sacramento and San Joaquin Rivers. The San Francisco Bay Area Air Basin has been designated as a non-attainment area for ozone (O_3) and suspended particulate matter (PM_{10}) under California state standards.

Air quality conditions in the San Francisco Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air pollutants and the number of days during which the region exceeds air quality standards have fallen in recent years. In June 1995, the Bay Area was re-designated as an attainment area for the Federal ozone standard. However, the Bay Area returned to non-attainment status in August 1998 because the region exceeded Federal ozone standards in 1995 and 1996. BAAQMD submitted an Ozone Attainment Plan (1999 Plan) to EPA in August of 1999 to set policies and guidelines aimed at reducing ozone in the Bay Area by November 15, 2000. EPA approved parts and disapproved parts of the 1999 Bay Area Ozone Attainment Plan for failure to reach attainment status for ozone. BAAQMD developed the 2001 Plan to correct the deficiencies of the 1999 Plan and respond to the finding of failure to achieve attainment status for ozone. Levels of suspended matter in the Bay Area currently exceed California air quality standards and therefore the area is considered a non-attainment area for this pollutant. BAAQMD, MTC and ABAG are currently working on a revision to the 2001 Plan. BAAQMD expects to submit the plan to the EPA in early 2004.

The region's monitoring stations have not recorded the exceedance of state or federal carbon monoxide (CO) standards since 1991. In April 1998, the Bay Area was re-

designated by the U.S. EPA as an attainment area for the federal carbon monoxide standard.

The Bay Area is currently in attainment for nitrogen oxides (NO_x), nitrogen dioxide (NO_2), lead (Pb), and sulfur dioxide (SO_2).

BAAQMD's 1991, 1994, 1997 and 2000 Clean Air Plans contain district-wide control measures to reduce carbon monoxide and ozone precursor emissions. The state standards for these pollutants are more stringent than the national standards.

Exceedance of air quality standards occurs primarily during meteorological conditions conducive to high pollution levels, such as cold, windless winter nights or hot, sunny summer afternoons.

3.4.1.3 Local Air Quality

Air quality is a function of both local climate and local sources of air pollution. The balance between the natural dispersal capacity of the local atmosphere and human-generated air pollutant emission sources also affects air quality. The Santa Rosa Plain, which encompasses central Sonoma County including the city of Santa Rosa, is bordered by hills on the east and west sides. Terrain can influence air quality in Santa Rosa as much as it does in other parts of the Bay Area because the area topography can provide shelter or restrict the dilution of pollutants.

Pollutant monitoring results for the Years 1996 to 2001 at the Santa Rosa ambient air quality monitoring station indicate that air quality in the project area has generally been good. Table 3.4-2 summarizes the last six years of published data from this monitoring station. Sulfur dioxide (SO_2) data were not listed because no exceedance has been recorded in the past 10 years. Two or fewer violations per year of the state suspended particulate matter standard in the past six years were recorded, while no violation of federal suspended particulate matter standard was recorded. Only the state ozone standards have been exceeded, once in 1999, while no federal ozone standard was exceeded during the six year time period. Carbon monoxide and nitrogen dioxide standards were not exceeded in Santa Rosa during the six year period.

3.4.1.4 Effects of Pollutants

Ozone. Ozone (O_3) is the primary constituent of photochemical smog. Photochemical smog is produced when hydrocarbons and oxides of nitrogen combine in the presence of sunlight to form ozone. It is not emitted directly into the atmosphere, but is produced through a complex series of chemical reactions involving

hydrocarbons (HC) and oxides of nitrogen (NOx) in the presence of sunlight. Vehicle exhaust emissions contribute slightly less than half of the pollutants that form ozone. High ozone levels, which occur primarily in the summer and early fall, aggravate asthma, bronchitis, and other respiratory ailments, as well as cardiovascular disease. High concentrations of ozone may also cause dizziness, headaches, burning of eyes and throat, and nausea. EPA is phasing out and replacing the previous one-hour primary ozone standards with a new eight-hour standard to protect against longer exposure.

Carbon Monoxide. Carbon monoxide (CO) is almost exclusively emitted by motor vehicles. This pollutant binds to hemoglobin, the oxygen-carrying protein in blood, reducing the amount of the oxygen reaching the heart and brain. Exposure to carbon monoxide, even at low levels, can endanger people with coronary artery disease. It can also cause headaches, fatigue, and slow reflexes, even among healthy people.

Table 3.4-2. Ambient Air Quality at the Santa Rosa Air Monitoring Station

Pollutant	Averaging Time	1996	1997	1998	1999	2000	2001
Ozone (O_3)	**Max 1-hour Concentration**	0.08 ppm	0.09 ppm	0.07 ppm	0.10 ppm	0.08 ppm	0.09 ppm
	Number of Days Exceeded 1-Hour Federal Standard	0	0	0	0	0	0
	Number of Days Exceeded 1-Hour State Standard	0	0	0	1	0	0
	Max 8-hour Concentration	-	-	-	0.08 ppm	0.06 ppm	0.06 ppm
	Number of Days Exceeded 8-Hour Federal Standard	-	-	-	0	0	0
Carbon Monoxide (CO)	**Max 8-hour Concentration**	3.0 ppm	3.3 ppm	3.2 ppm	3.5 ppm	3.1 ppm	2.4 ppm
	Number of Days Exceeded 8-Hour Federal Standard	0	0	0	0	0	0
	Max 1-hour Concentration	-	-	-	5.7 ppm	4.5 ppm	4.8 ppm
	Number of Days Exceeded 1-Hour Federal Standard	-	-	-	0	0	0
Nitrogen Dioxide (NO_2)	**Max 1-hour Concentration**	0.06 ppm	0.06 ppm	0.06 ppm	0.07 ppm	0.05 ppm	0.06 ppm
	Number of Days Exceeded 1-Hour State Standard	0	0	0	0	0	0
Particulate Matter (PM_{10})	**Max 24-hour Concentration**	-	-	-	54 ug/m^3	46 ug/m^3	74 ug/m^3
	Annual Geometric Mean	15.3 ug/m^3	16.5 ug/m^3	16.6 ug/m^3	16.9 ug/m^3	15.9 ug/m^3	18.4 ug/m^3
	Number of Days Exceeded 24-Hour Federal Standard	0	0	0	0	0	0
	Number of Days Exceeded 24-Hour State Standard	0	2	1	1	0	2
Particulate Matter ($PM_{2.5}$)	**Max 24-hour Concentration**	-	-	-	54.9 ug/m^3	40.1 ug/m^3	75.9 ug/m^3
	Number of Days Exceeded 24-Hour Federal Standard	-	-	-	0	0	1

Notes: ppm = parts per million
ug/m^3 = micrograms per cubic meter
PM_{10} is sampled every 6th day. Actual days over standard can be estimated as six times the number shown.

Oxides of Nitrogen. Nitrogen Oxides (NOx) are produced by motor vehicles (particularly heavy duty vehicles) and high temperature industrial operations, but have not posed a separate, serious health problem in the Bay Area in the past several years.

Suspended Particulate Matter. Ambient air quality standards for suspended particulate matter (PM_{10}) took effect July 31, 1987. Suspended particulate matter (PM_{10}) is the term used to describe the small particles, of any composition and origin, with nominal size of 10 micrometers or less. Such particles are so small that, individually, they would not be visible. The fine particles are a threat to health, however, because they penetrate deep into the lungs during breathing and lodge there. Large particles, by contrast, are filtered out in the upper respiratory passages, or are cleared by coughing, sneezing, etc.

Air Toxics. The California Air Resources Board (CARB) has found that diesel particulate matter (PM) poses the greatest cancer risks among all identified air toxics. Diesel trucks contribute more than half of the total diesel PM emissions, with the remainder coming from stationary and other diesel combustion sources. However, the CARB has adopted a Diesel Risk Reduction Plan (DRRP) with control measures that would reduce the overall diesel PM emissions by about 85% from 2000 to 2020.

3.4.2 Environmental Consequences

3.4.2.1 Methodology

The air quality analysis for this document utilizes a protocol developed jointly by Caltrans and the University of California at Davis, Institute of Transportation and approved by EPA for use in the Bay Area. The protocol is based on the Bay Area's attainment status for carbon monoxide (CO). It permits a qualitative approach to determine if a given project would have a detrimental impact on air quality.

3.4.2.2 Conformity With the State Implementation Plan

On March 15, 2002, the Metropolitan Transportation Commission (MTC) made the finding that the 2001 Regional Transportation Plan (RTP) was in conformity. FHWA and FTA adopted the air quality conformity finding for the RTP on March 18, 2002. (MTC adopted the 2003 TIP on January 22, 2003. FHWA/FTA found the TIP in conformity on February 3, 2003). The project is also included in MTC's 2003 Transportation Improvement Program, TIP identification numbers SON990001 and

SON010001. The design concept and scope of the proposed project is consistent with the project description in the 2001 RTP, the TIPs for 2001 and 2003, and the assumptions in MTC's regional emissions analysis. The RTP and TIP listings for this project can be found in Appendix H.

The project is located in an attainment area for the federal PM_{10} standard, but in a non-attainment area for the stricter state PM_{10} standard. In this situation, the project is not subject to the federal transportation conformity rules for PM_{10}, but state rules prohibit it from contributing to the further degradation of the PM_{10} air quality. The Bay Area Air Basin, like other urbanized parts of California, does not meet the state's stringent standard for Maximum 24-Hour Concentration of PM_{10}, which is 30 ug/m^3. However, the Annual Geometric Mean for PM_{10} concentrations at the monitoring station closest to the project area, the Santa Rosa Air Quality Monitoring Station, for years 1999-2001 showed no violations and, as shown in Table 3.4-2, were well below the state standard of 30 ug/m^3.

3.4.2.3 Carbon Monoxide Analysis

The proposed project would be expected to experience conditions similar to another freeway location with comparable traffic characteristics. Comparisons were made between the Year 2007 Build conditions of Route 101 and the existing conditions on Interstate 880 in Alameda County from SR-92 to SR-84. The Year 2007 is the "build" condition when the facility is fully operational. This is the worst case scenario for CO since improved emission factors would yield lower CO levels for subsequent years. In order to effectively analyze the local Santa Rosa intersections along Route 101, comparisons were made to the Foothill Boulevard/Mission Boulevard intersection in Alameda County. Air quality at this compared site has been directly measured by air sampling. Since the air quality at the compared site is acceptable, the "analysis by comparison" method concludes that the proposed project would also result in acceptable air quality. Table 3.4-3 compares pertinent factors between the proposed project and the project on Interstate 880 in Alameda County.

Table 3.4-3. Carbon Monoxide Comparison Analysis

Parameters	Build Route 101	Existing Interstate 880
Receptor Distance	15.3 m (50 ft)	7.6 m (25 ft)
Roadway Configuration	6 lanes	8 lanes
Worst Case Meteorology	Coastal Valley	Coastal Valley
Peak Hourly Volumes	12,800 vph	15,000 vph
Hot / Cold Starts	50/10 northbound 50/10 southbound	50/10 northbound 50/10 southbound
Percent Trucks	0.9 to 2.9	7.6 to 8.3
Background Carbon Monoxide	3.2 ppm	3.2 ppm

Notes: vph = vehicles per hour ppm = parts per million

Caltrans also studied the anticipated air quality at intersections near the project area. Forecast projections for future years of 2010 indicate that traffic would be similar to existing levels. Most intersections would experience a less than 10 percent difference in future predicted traffic volumes between the project's Build and No Build conditions. Because of the complexity of predicting future air quality, the predictive method cannot conclude whether a 10 percent increase would have a measurable effect on air quality. The largest intersection within the project area, Steele Lane/Route 101, is considerably smaller than the Foothill Boulevard/Mission Boulevard intersection, which was used as the point of comparison. The Route 101 ramps were analyzed as a two-lane road, while Steele Lane was analyzed as a four-lane road (two lanes in each direction). The Foothill Boulevard/Mission Boulevard intersection is in Hayward, and represents the joining of two major State routes, plus a connector to the downtown area. This five-legged intersection consists of three-lane/three-lane/two-lane/three-lane approaches. Receptor distances are comparable at both intersections [4.5 to 6 m (15 to 20 ft)]. Traffic volumes and delays are greater at the Foothill Boulevard/Mission Boulevard intersection.

The proposed project would result in a facility that would be smaller and less congested than comparable facilities within the same Air District (Interstate 880 and Foothill Boulevard/Mission Boulevard intersection). Since the comparable facilities are in an area that meets air quality standards (a maintenance area), this project would also meet the microscale air quality requirements and would therefore not cause exceedances of state or federal carbon monoxide standards.

3.4.2.4 Suspended Particulate Matter

Because the state standards for PM_{10} are stricter than federal standards, the following discussions of suspended particulate matter and air toxics are for purposes of compliance with CEQA.

The proposed project would not be expected to generate an appreciable amount of new traffic in terms of vehicle miles traveled, but rather to transfer traffic from local streets to freeways. Freeways have lower silt loadings than local streets, and would be expected to have less re-entrained road emissions for the same amount of vehicle miles traveled. The project would also pave the 11.6-meter unpaved median and portions of the outside shoulders, reducing this source of dust including PM_{10}. The project is not located in an area where it could promote activities associated with generating considerable PM_{10}, such as an agricultural area or area of frequent snowfall. Because PM_{10} exceedances are not a problem in the project vicinity and

because project features are not expected to induce increased PM_{10} generation, the project would not be expected to have adverse effects on PM_{10} levels.

3.4.2.5 Air Toxics

While there are currently no quantitative tools available to assess the project's air toxics impact, a qualitative approach is to compare the Build scenario with the No Build scenario. We conclude that the project would not have a negative air toxic impact, based on the following comparisons:

(a) There would not be a substantial increase in truck traffic in the Build scenario compared to the No Build scenario.

(b) The Build scenario would reduce congestion with its stop-and-go conditions and change them into more free-flow conditions, and should therefore decrease the acceleration events that cause the highest per-vehicle exhaust emissions.

3.4.2.6 Construction Impacts

The proposed project would generate air pollutants during construction. Trucks and construction equipment emit hydrocarbons, oxides of nitrogen (NOx), carbon monoxide (CO), and suspended particulate matter (PM_{10} and $PM_{2.5}$). Most pollution would consist of wind-blown dust generated by excavation, grading, hauling, and various other activities. The impacts from the above activities vary from day to day as construction progresses.

If construction activities disturb materials that contain asbestos fibers, construction could cause human exposures to airborne asbestos in the immediate area. Asbestos does not occur naturally in the proposed project's local geology, but structures in the project area might contain asbestos.

3.4.3 Mitigation Measures

The Special Provisions and Standard Specifications in the construction contract for the proposed project would include requirements to minimize or eliminate construction related dust through the application of water or dust palliatives. Caltrans and its contractors would comply with "fugitive dust" emissions rules and policies to minimize construction dust impacts.

Additional requirements apply to potential sources of airborne asbestos. The Bay Area Air Quality Management District must be notified prior to any demolition in its jurisdiction. The notification must include evidence of inspection and determination

of the types and amounts of asbestos-containing materials present. Standard measures are available to manage any asbestos encountered, including the use of asbestos-certified contractors to handle removal of certain types of asbestos materials. The project proposal includes demolition both of buildings and of freeway structures. Up to four residential properties and up to three commercial buildings could be demolished for the proposed project. Caltrans would conduct investigations for asbestos materials in the buildings after acquiring them, which would would only happen if the environmental process is completed and the project is approved. Highway structures such as bridges and overcrossings could also contain asbestos materials. It is standard Caltrans procedure to conduct asbestos surveys on bridges and overcrossings during the design phase once it is determined that the bridge would be demolished or if load bearing members of the bridge would be renovated. Construction contract special provisions would outline which bridge structures contain asbestos and would require the contractor to comply with all applicable BAAQMD regulations for demolition and/or renovation of the bridge structures. The asbestos surveys would be provided to the construction contractor to attach to the demolition/renovation notification he/she submits to BAAQMD.

3.5 Noise

This noise analysis evaluates the implementation of the proposed project on the noise environment of Santa Rosa and discusses noise abatement measures for impacted areas.

3.5.1 Affected Environment

3.5.1.1 Overview

Noise is perceived subjectively by each individual. Acceptance of a certain type of noise or noise level varies among neighborhoods, individuals, and time of day. Physically, sound pressure magnitude is measured and quantified in terms of a logarithmic scale in units of decibels (dB).

Sounds heard in the everyday environment consist of a range of frequencies or pitches at different levels. Human hearing is not equally sensitive to sound in all frequencies. A frequency dependent adjustment, called A-weighting, has been devised to measure sound in a manner similar to the way the human hearing system responds. The A-weighted sound level decibel is abbreviated dBA. The A-weighted sound level is adequate for describing the noise at a particular location and instant in

time. However, the average level of environmental noise changes with the cycle of human activities. The sound level descriptor used in this document is the hourly energy equivalent sound level [Leq(h)]. It is a particularly stable and predictable unit for description of traffic noise and at the same time is well correlated to people's reaction to noise.

Noise can be classified into three categories. The first category is audible sounds that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or more. The other two categories refer to noise not audible to the human ear. Figure 3.5-1 shows what kind of experience or event might typically generate a certain amount of decibels.

3.5.1.2 Existing Noise Environment

Land adjacent to Route 101 is primarily residential and commercial. Commercial developments are considered noise sensitive if there are areas of frequent human use and lowered noise levels would be of benefit. (See Table 3-5.1 for a list of activity categories and the average level of noise allowable.) There are no known libraries or hospitals adjacent to Route 101. However, there are three schools located on the east side of the freeway and three community parks located in the southern portion of the study area. Burbank Elementary School is located in the southern portion of the study area off of Sonoma Avenue, while Santa Rosa High School and Santa Rosa Junior College are located in the northern portion of the study area off of Mendocino Avenue. Julliard Park is located on the east side of Route 101 off of Sonoma Avenue, Olive Park is located on the west side of Route 101 and off of Olive Street, while Railroad Square Park is also located on the west side of Route 101 off of Wilson Street.

Table 3.5-1. Activity Categories and Noise Abatement Criteria (NAC)

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.

Caltrans measured and estimated noise levels at 20 noise receptors in various locations throughout the study area. The noise receptors were generally situated in residential yards as well as the Burbank Elementary School where noise sensitive activities take place. These sites were chosen from the first row of residences close to Route 101 and were used to model traffic characteristics which yield the worst hour noise. Existing peak hour noise is the highest noise level in the 24-hour noise level spectrum. Existing peak hour noise levels range from 59 to 74 dBA Leq(h) (Caltrans 2000f). The following section will detail the existing and future noise levels by receptor. Generally, ambient noise levels in the project area are higher south of College Avenue. This is attributable to the types of land uses located in this area, primarily commercial developments with high activity levels in close proximity to Route 101. At the present time, most residences near Route 101 are receiving noise levels that approach or exceed the Federal/State Noise Abatement Criteria (NAC) of 67 dBA Leq(h) (See Table 3.5-2 and Figure 3.5-2A-C)(Caltrans 2000f).

3.5.2 Environmental Consequences

3.5.2.1 Methodology

The future noise levels referred to in this document are predicted by means of the SOUND32 computer model. This program is the Caltrans version of the FHWA Highway Traffic Noise Prediction Model (Report No. FHWA-RD-77-108) and Noise Barrier Cost Reduction procedure STAMINA2/OPTIMA using the California Vehicle Noise (CALVENO) reference energy mean emission level curves (Caltrans 2000f).

In order to project the worst-case noise levels for the proposed project, SOUND32 assumes traffic speeds of 105 km/hour (65 mi/hour); traffic volumes of 2000 vehicles per lane per hour; and a vehicle mix that includes 7.2 percent medium trucks and 7.8 percent heavy trucks with automobile traffic accounting for the remaining 85 percent (Caltrans 2000f). Projected noise levels are described for both the No-Build and the proposed project in Section 3.5.2.3, below.

Under FHWA and Caltrans policy, noise barriers would be considered at locations that meet the following criteria:

- Predicted worst-case noise that approaches or exceeds Federal NAC. Category (B) is 67 dBA Leq(h).
- Predicted future noise levels substantially exceed existing noise levels (determined as 12 dBA Leq(h)).

- At least a five dBA reduction can be achieved and the noise barrier should intercept the line of sight from the exhaust stack of a truck to the receptor.
- The noise barrier to be provided is deemed reasonable and feasible. (The final determination of reasonableness would be made only after a careful and thorough consideration of appropriate factors, such as cost effectiveness, noise reduction and development along the freeway. Regard should be given for the individual circumstances of each particular project.). Feasibility is defined with regard to engineering considerations. A 5 dBA noise reduction must be achieved in order for the proposed noise barrier to be considered feasible. Ability to achieve an adequate noise reduction may be limited by: (1) topography; (2) access requirements for driveways, ramps, etc.; (3) the presence of local cross streets; or (4) other noise sources in the area (See Appendix I, for Calculation of Reasonable Allowance).

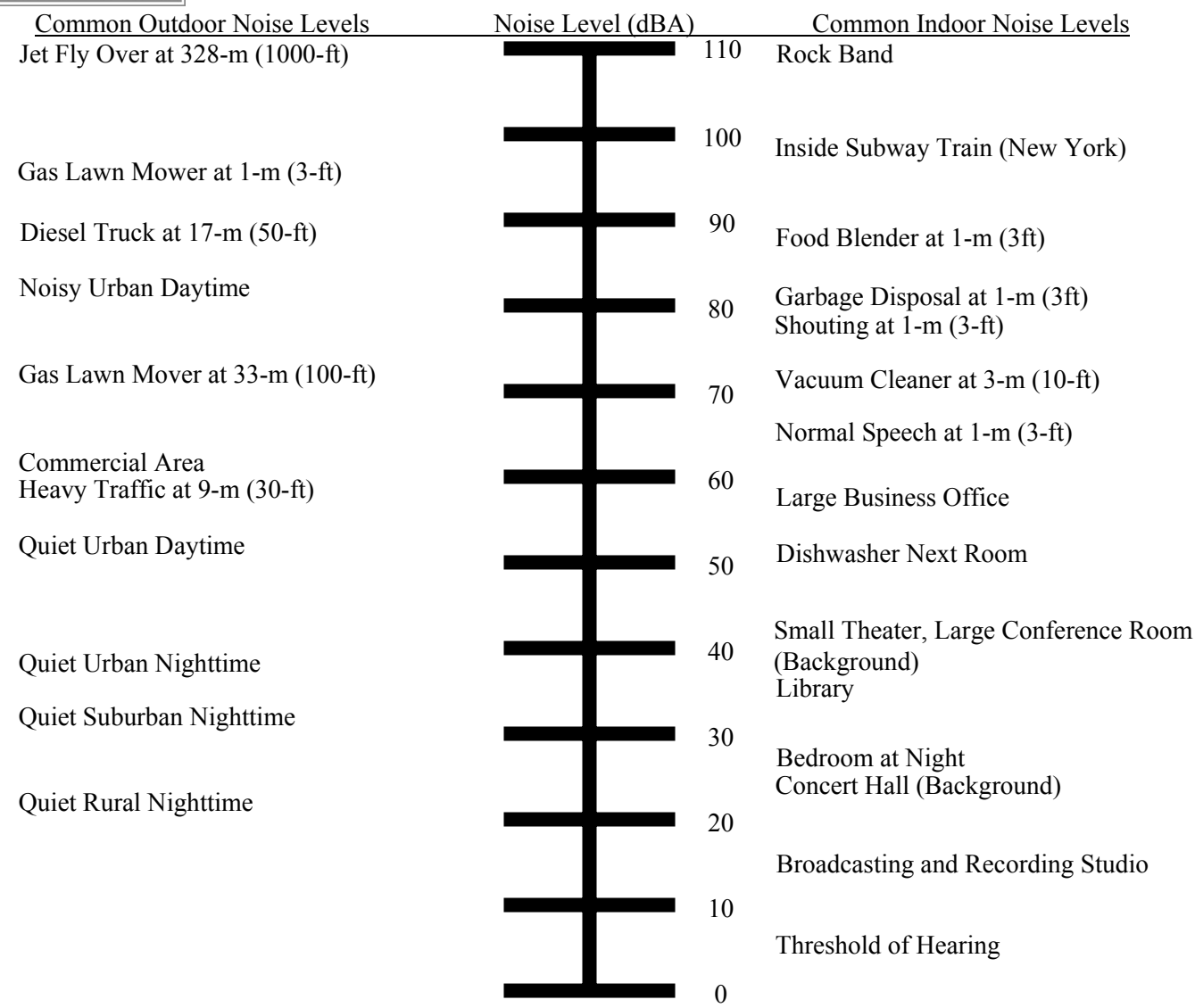
Noise thresholds for State freeway projects are defined in the Traffic Noise Analysis Protocol (TNAP). Caltrans policy requires a cost effectiveness calculation for recommended sound barriers as outlined in the TNAP and the Highway Traffic Noise Abatement of the Project Development Procedures Manual (Caltrans 2000f).

3.5.2.2 Construction Impacts

Construction activities including, but not limited to, pile driving operations, would be required to conform to latest Standard Specifications listed in Section 7-1.01I of Caltrans Sound Control Requirements. These requirements are meant to minimize the impact from construction noise yet in no way relieve the contractor from complying with local noise ordinances. It is possible that the high levels of noise generated by construction equipment may annoy residents, but it would likely be short-lived at each location. When practical, construction operations that generate noise in sensitive areas would be prohibited on weekends and holidays and limited to between the hours of 7:00 a.m. and 7:00 p.m. on weekdays. Also, where feasible, noise barriers would be constructed as the first order of work to minimize construction noise impacts.

3.5.2.3 Projected Future Noise Levels

No-Build Alternative. Noise levels for the No-Build alternative were estimated to be the same as the measurements for existing noise. Comparing existing noise levels to future no project noise levels shows that residents along Route 101 would not experience a substantial increase in noise if the freeway was not widened.



Relationships Between Decibels (dBA), Energy, and Loudness

Sound Level Change	Human Perception	Relative Energy Change
+ 10 dBA	Twice as Loud	10
+ 5 dBA	Readily Perceptible	3.16
+ 3 dBA	Barely Perceptible	2
+ 0 dBA	Reference	0
- 3 dBA	Barely Perceptible	1/2
- 5 dBA	Readily Perceptible	1/3
- 10 dBA	Half as Loud	1/10
- 20 dBA	1/4 as Loud	1/100
- 30 dBA	1/8 as Loud	1/,1000
- 40 dBA	1/16 as Loud	1/10,000

Figure 3.5-1
Typical Noise Levels for Human Perception

Proposed Alternative. Future peak noise levels are projected as if the project were constructed. The projected future peak noise levels along Route 101with the proposed project without sound barriers would range from 61 to 79 dBA Leq(h) within the residential and school areas, which reflects an estimated increase ranging between one and nine dBA Leq(h). On the other hand, the projected future peak noise levels along Route 101 with the proposed sound barriers of 4.3 m (14 ft) high would range from 62 to 70 dBA Leq(h) within residential and school areas, which reflects an estimated noise reduction of between five and eleven dBA Leq(h). Table 3.5-2 shows the 20 different receptor sites that have been examined for noise impacts by location. For each site, the table shows the existing measured noise levels, the computer projected worst-case noise level under the proposed alternative without a noise barrier, and the computer projected worst-case noise level under the proposed alternative with proposed soundwalls in place. Soundwalls of several different heights are reviewed at each location in order to compare the projected reduction in noise they would have on their respective noise receptors. In each case, the estimated length of the proposed or existing soundwall is shown.

Figure 3.5-2A, Figure 3.5-2B, and Figure 3.5-2C depict each of seven different soundwalls that are recommended to reduce noise levels for each of the receptor sites, as well as the one existing soundwall that would continue to reduce noise levels. At Luther Burbank Elementary School, interior noise was not measured because the exterior "frequent human use" area (playground adjacent to existing soundwall) qualified for noise abatement using the NAC listed above. Soundwalls that are used for exterior noise abatement generally provide a minimum of 20 dBA noise reduction to interior human use spaces such as schools. The Santa Rosa Junior College (SRJC) campus did not qualify for abatement upon initial field inspection because there is a road, landscaping, a wall and a car port between the school and the freeway. The administration at SRJC specifically requested that Lounibus Trade Technical Center be tested for noise. Upon subsequent inspection, it was determined that a soundwall constructed at the exterior area facing the freeway would not yield a minimum required 5-dBA reduction, and therefore would not meet the criteria for a reasonable and feasible attenuation wall. The final determination of reasonable and feasible soundwall construction at recommended locations would be made only after careful and thorough consideration of the appropriate factors by the project engineer, as defined in the Project Development Procedures Manual (PDPM) (Caltrans 1999d). The preliminary noise abatement decision involves two criteria: reasonableness and feasibility. Feasibility is defined as an engineering consideration: a minimum of 5

Table 3.5-2. Existing and Future Worst Case Traffic Noise Levels

Receptor Number	Location	Existing Peak Noise (dBA)	Future Build Worst Case Noise Level (dBA)				Recommended Barrier Details		
			Without Barrier (dBA)	Estimated Barrier Height			Barrier Number	Barrier Height	Barrier Length
				3.0-m (~10-ft) (dBA)	3.7-m (~12-ft) (dBA)	4.3-m (~14-ft) (dBA)			
R 1	Burbank Elementary School Tennis Court	74 (E)	79	71	70	68	1	4.3 m (~14 ft)	335 m (~1,100 ft)
R 2	Burbank Elementary School Playground	73 (E)	79	74	72	70			
R 3	Burbank Elementary School Playground	70 (E)	79	74	72	70			
R 4	608 Morgan Street	69 (E)	71	69	67	66	2	4.3 m (~14 ft)	280 m (~919 ft)
R 5	748 Morgan Street	66 (E)	68	65	64	62	3	4.3 m (~14 ft)	410 m (~1,345 ft)
R 6	831 Washington Street	67 (M)	68	64	63	62			
R 7	228 Carrillo Street	64 (E)	-	-	-	-	4	4.9 m (~16 ft) Existing Barrier	
R 8	1214 Ripley Street	66 (E)	-	-	-	-			
R 9	1253 Ripley Street	66 (E)	-	-	-	-			
R 10	1975 Illinois Street	59 (M)	61	-	-	-	No Wall		
R 11	2021 Illinois Street	62 (M)	64	-	-	-			
R 12	2760 Cleveland Avenue (Motel 6)	53 (E, I)	56 (I)	50 (I)	48 (I)	47 (I)	5	4.3 m (~14 ft)	110 m (~361 ft)
R 13	2632 Cleveland Avenue (Super 8)	70 (E)	73	70	68	67			
R 14	108 Ridgeway Avenue	73 (M)	74	68	66	65	6	4.3 m (~14 ft)	320 m (~1,050 ft)
R 15	132 Carrillo Street	68 (E)	69	67	66	64			
R 16	211 Lincoln Street	71 (E)	72	71	68	66	7	4.3 m (~14 ft)	705 m (~2,313 ft)
R 17	137 10th Street	68 (E)	69	65	64	63			
R 18	742 Davis Street	67 (M)	70	65	65	64			
R 19	616 Davis Street	72 (E)	73	68	66	65			
R 20	138 Hazel Street	67 (E)	70	68	67	65	8	4.3 m (~14 ft)	240 m (~787 ft)

Source: Caltrans District 4

Notes: dBA = Noise Decibel Level M = Measured E = Estimated Noise Level I = Interior Noise Level

dBA reduction must be achieved. It may also be affected by non-acoustical factors: safety considerations access requirements, or overall constructability. The preliminary determination of reasonableness is based on the following:

- Cost of abatement, absolute noise levels, change in noise levels, abatement benefits;
- Date of development of affected residents; and
- Life cycle of abatement measures.

A preliminary noise abatement decision is reached based on the above criteria and is reported in this EA/EIR. The final abatement decision incorporates factors of the preliminary reasonableness determination addressed in this document and the public input process as well as a multitude of additional factors including, but not limited to the following:

- Other environmental impacts of abatement construction;
- Social, economic, environmental, legal, and technological factors; and
- Input and comments from residents and local/public agencies.

3.5.2.4 Noise Reduction

Since projected future noise levels at most receptor locations approach or exceed NAC, noise abatement measures must be considered and implemented if found feasible and reasonable. To this end, soundwalls are recommended where they are appropriate. In each case where a soundwall is proposed, it is justified because it reduces noise levels at receptor sites by at least five dBA compared to the future noise levels at these same receptor sites without a soundwall (Caltrans 1998a). Noise barriers must be cost effective as well. Cost effectiveness, final barrier heights and lengths and exact location of noise barriers would be determined during final design.

FHWA stipulates that the views of the impacted residents can be a major consideration in reaching a decision on the reasonableness of abatement measures to be provided. Caltrans would conduct a public meeting during project design to obtain input from impacted residents before construction of noise barriers.

3.5.3 Mitigation Measures

Because predicted future noise levels are anticipated to exceed State/Federal standards, soundwalls are recommended. Soundwall recommendations are preliminary, and are subject to change during the final design phase of the project. The views of agencies with jurisdiction and of the affected residents would be a major consideration in reaching a decision on the reasonableness of recommended abatement measures.

SONOMA 101 WIDENING

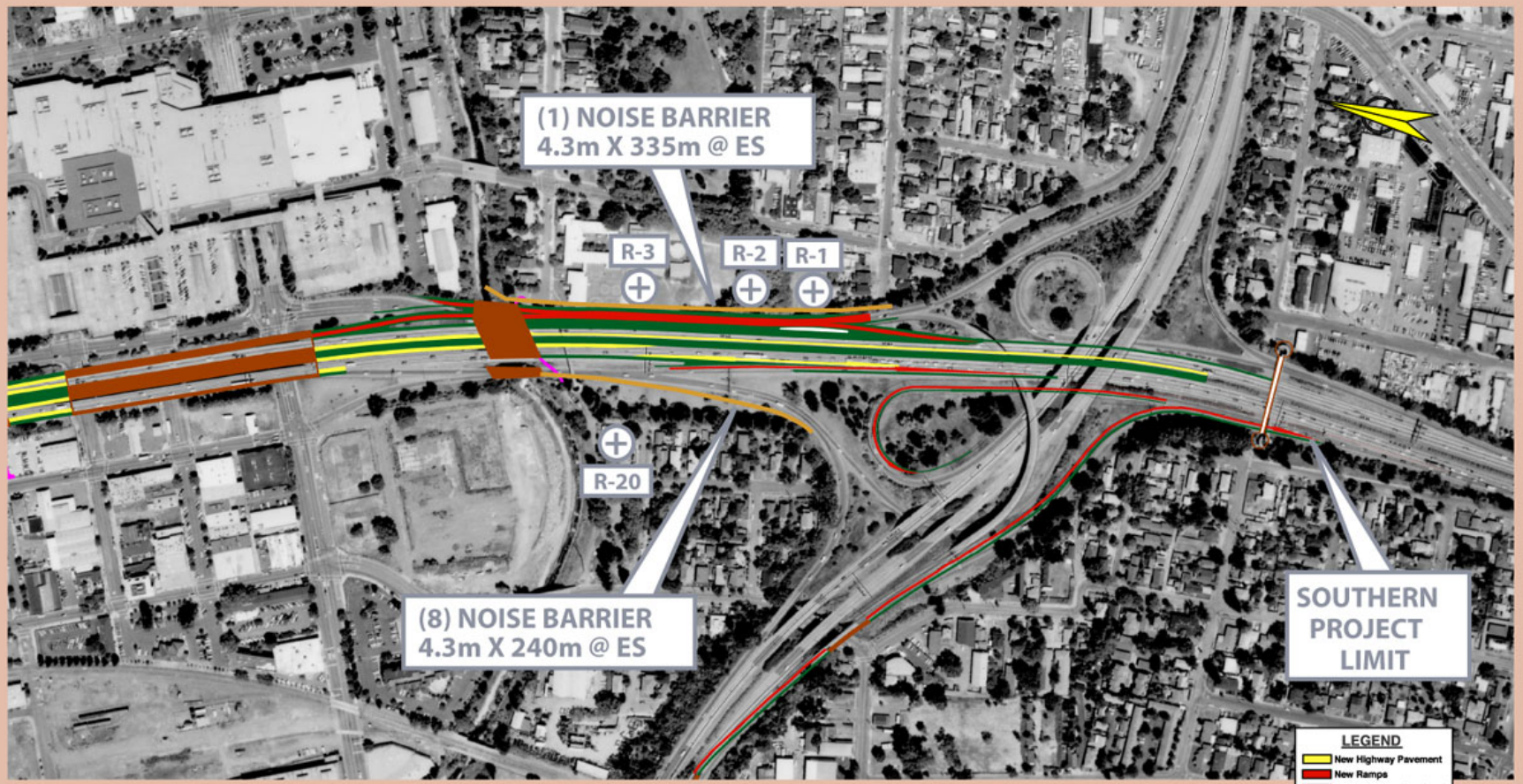


Figure 3.5-2A: Receptor and Proposed Barrier Locations

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AudioVisual Multimedia Graphics CT1179 06/2003

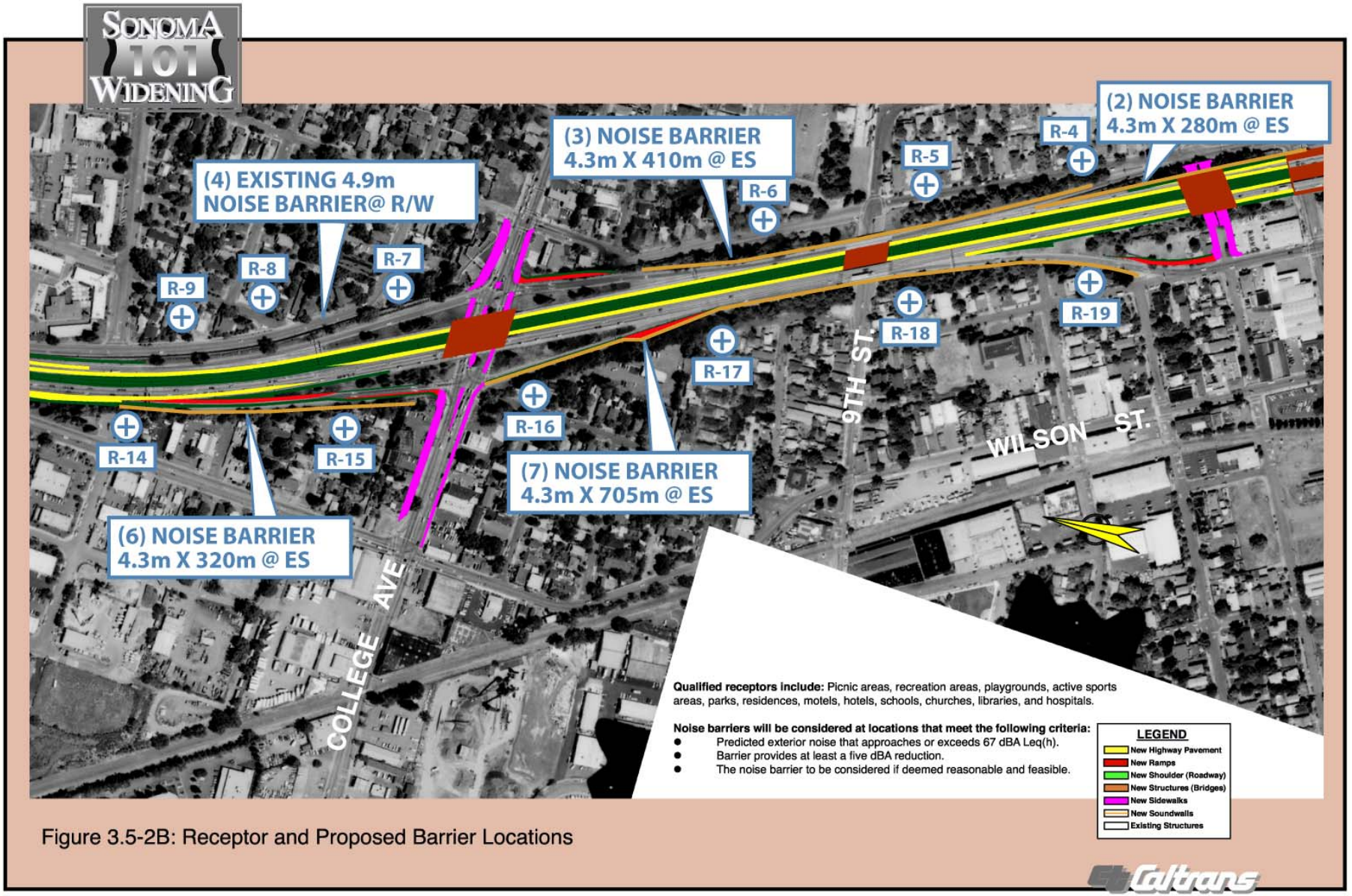

Figure 3.5-2B: Receptor and Proposed Barrier Locations

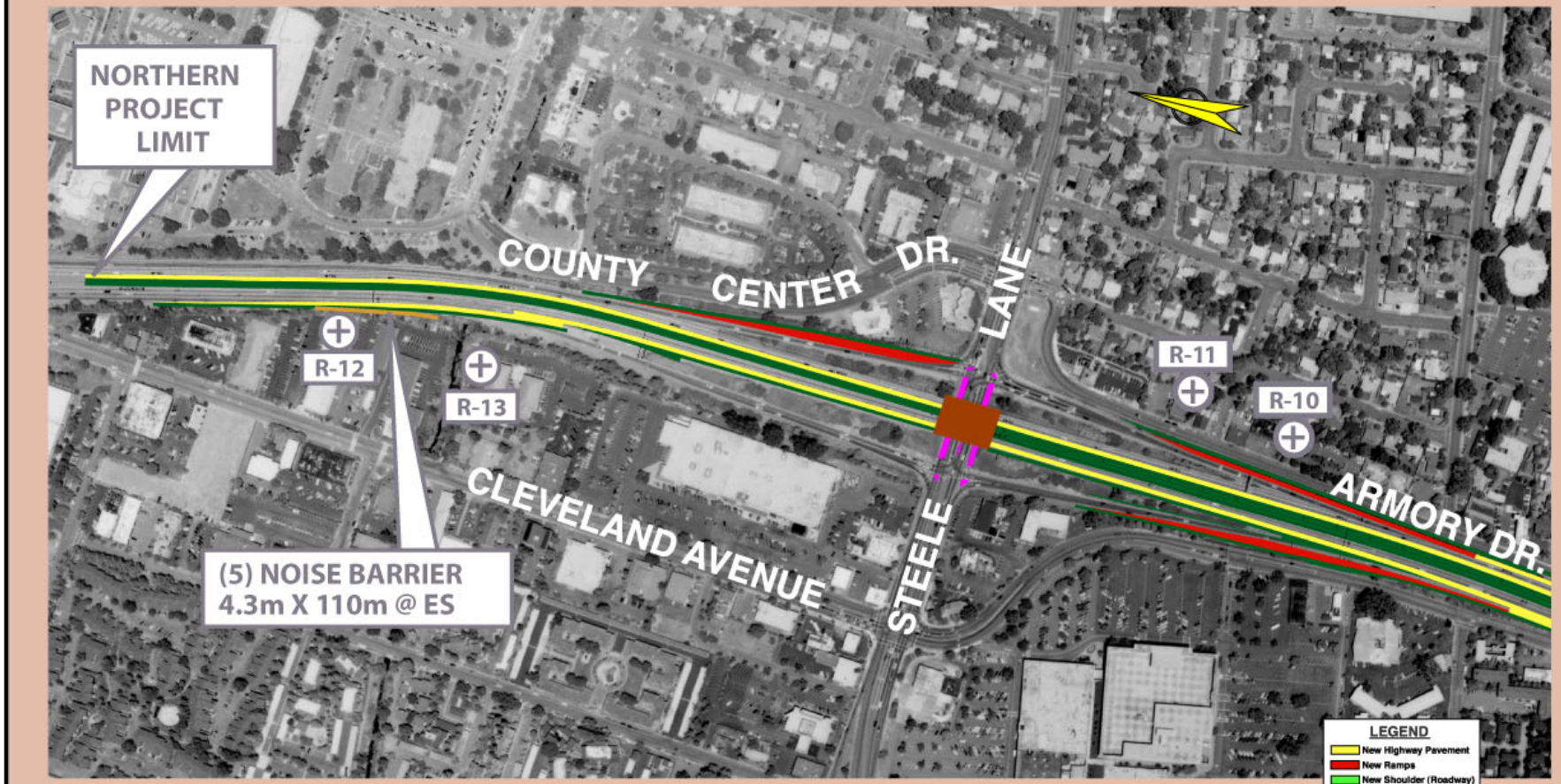

Figure 3.5-2C: Receptor and Proposed Barrier Locations