Chapter 3 Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

3.1 Traffic and Transportation/Pedestrian and Bicycle Facilities

3.1.1 Affected Environment

3.1.1.1 EXISTING ROADWAY NETWORK

Highway 101, which is a major north-south route along the western coast of the United States, passes through five Bay Area counties—Sonoma, Marin, San Francisco, San Mateo, and Santa Clara. It is the most heavily traveled route in the North Bay Area. In Sonoma County, Highway 101 plays a vital role in intra-county connections and also connects the County with the greater Bay Area. According to Caltrans, the traffic along Highway 101 in the study corridor on an average day in 2003, represented by annual average daily traffic (AADT), ranged from 61,000 to 111,000 vehicles per day (both directions combined), as shown in Figure 3.1-1[1]. By 2030, annual average daily traffic in the corridor is estimated to range from 75,700 to about *121,400* vehicles per day.

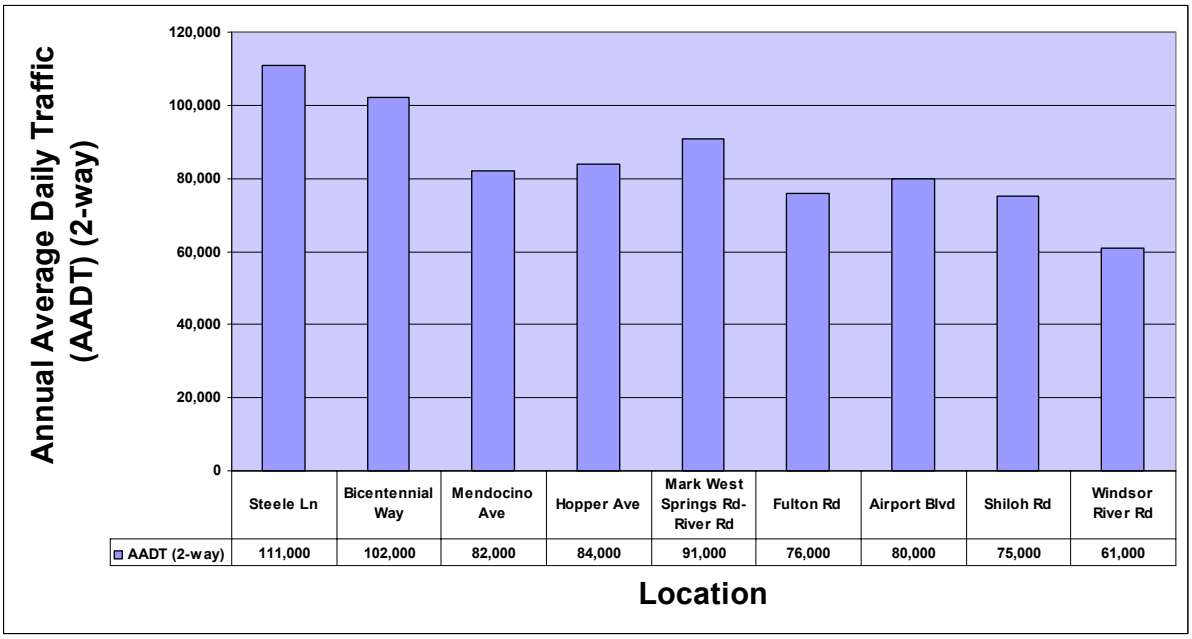


Figure 3.1-1: Caltrans 2003 Annual Average Daily Traffic Volumes on Highway 101

[1] http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2003all.htm

The segment of Highway 101 within the project limits, which is illustrated in Figure 3.1-2, includes eight interchanges: Bicentennial Way, Mendocino Avenue, Hopper Avenue, Mark West Springs Road-River Road, Fulton Road, Airport Boulevard, Shiloh Road, and Windsor River Road-Old Redwood Highway. Local arterials and streets also serve the study area along Highway 101 from Steele Lane to Windsor River Road. The major streets within the study area and vicinity are described below.

- **State Route 12 (SR 12)**, south of the project limits, travels in an east-west direction, extending west from Sebastopol, across the Central Valley, and to the Sierra foothills in the east. SR 12 is the principal route connecting the Santa Rosa area with Sebastopol to the west and Sonoma to the east. SR 12 is a four-lane divided freeway as it crosses Highway 101 and becomes a two-lane conventional highway east and west of Santa Rosa. SR 12 carries an estimated AADT of 69,000.

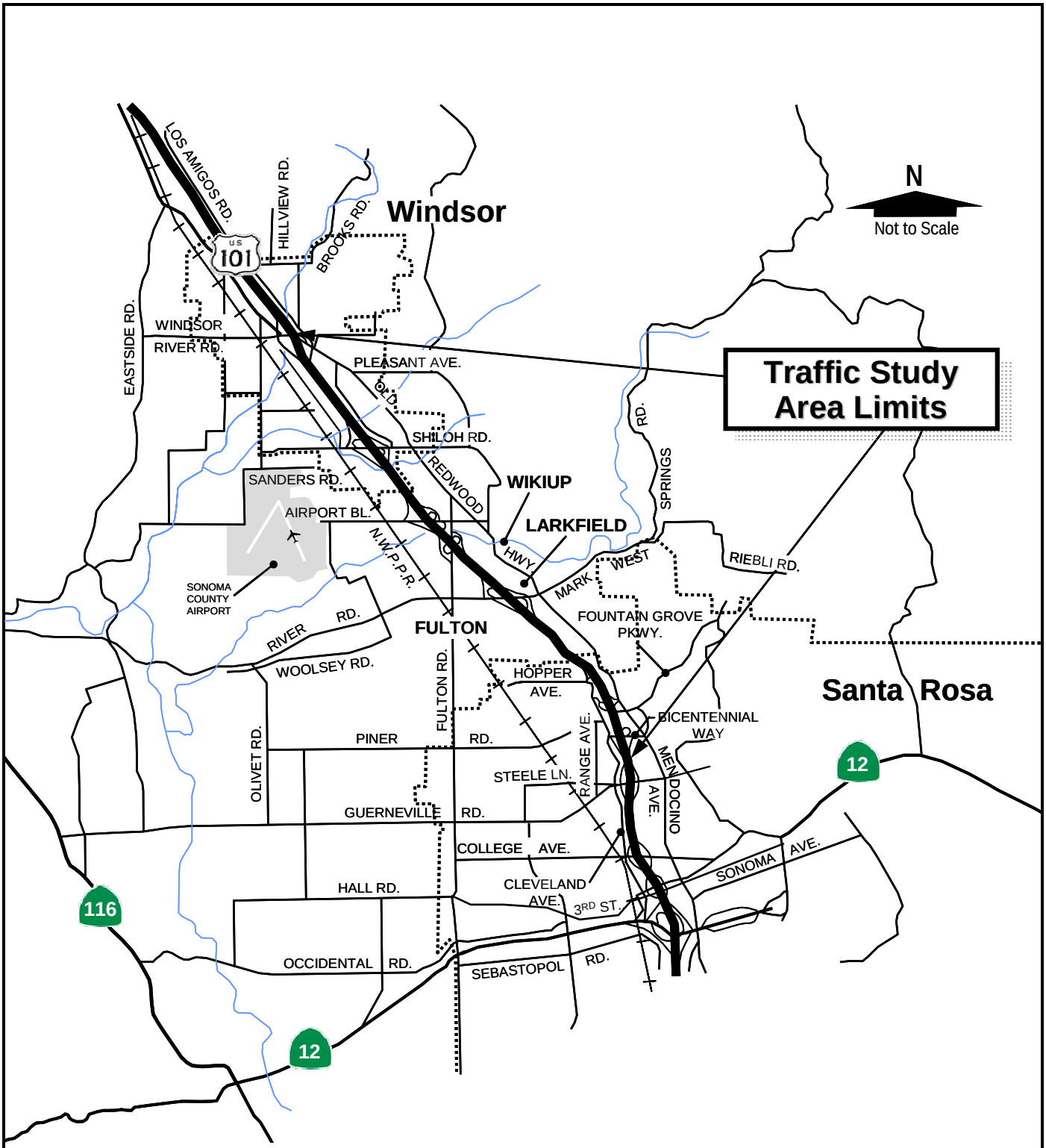
- **Third Street**, located south of the project limits, is an east-west arterial through downtown Santa Rosa that provides access from Highway 101 to the Santa Rosa Civic Center and city and county courthouses, and connects Fulton Road on the west to Mendocino Avenue on the east, both major north-south arterials through the Santa Rosa area. Third Street is a four-lane, two-directional arterial as it crosses Highway 101.

- **College Avenue,** south of the project limits, is an east-west arterial street through central Santa Rosa that also connects Fulton Road and Mendocino Avenue. College Avenue is a four-lane, two-directional arterial as it crosses Highway 101.

- **Steele Lane**, just south of the project limits, is an east-west arterial street through north central Santa Rosa providing access to the Sonoma County Administration Center and connecting to Mendocino Avenue. To the west of Highway 101, Steele Lane connects with Guerneville Road, which provides access between western Santa Rosa, Guerneville and downtown Santa Rosa. At Highway 101, Steele Lane is a five-lane, two-directional arterial with turn pockets carrying approximately 6,900 vehicles per hour (vph) during the peak hour. Three westbound through lanes and two eastbound through lanes are provided.

- **Bicentennial Way** is an east-west arterial street through north central Santa Rosa that provides access to the Sonoma County Administration Center and Kaiser Permanente Medical Center and connects to Mendocino Avenue. At Highway 101, Bicentennial Way is a four-lane, two-way roadway with turn pockets that carries approximately 4,550 vph in the peak hour.

- **Mendocino Avenue** travels in a north-south direction traveling through downtown Santa Rosa and parallels Highway 101 to the east. At the north end of Santa Rosa, Mendocino Avenue becomes Old Redwood Highway. Mendocino Avenue through downtown Santa Rosa is a four-lane, two-directional arterial roadway with turn pockets. At Highway 101, the AADT is approximately 4,600 vph in the peak hour.



Legend:

City Boundary

Railroad

Source: Parsons 2005

S C T A

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

ROADWAY NETWORK WITHIN TRAFFIC STUDY AREA AND VICINITY
Figure 3.1-2

- **Old Redwood Highway** extends in a north-south direction along the east side of Highway 101 and connects Santa Rosa with the communities of Larkfield, Wikiup, and the Town of Windsor. In Windsor, Old Redwood Highway crosses under Highway 101 and continues north along the west side of Highway 101 to Healdsburg. Old Redwood Highway is a four-lane, two-directional arterial roadway with turn pockets that carries approximately 4,600 vph in the peak hour in Santa Rosa and approximately 3,400 vph in the peak hour in Windsor.
- **Cleveland Avenue** extends in a north-south direction along the west side of Highway 101 through Santa Rosa from Third Street (south of the project limit) north to Hopper Avenue. Cleveland Avenue is a four-lane, two-directional arterial roadway with turn pockets.
- **Mark West Springs Road - River Road** travels in an east-west direction across Highway 101. East of Highway 101 it is known as Mark West Springs Road and provides a connection from Highway 101 to Calistoga. West of Highway 101, it is known as River Road and provides a connection to Guerneville and other communities along the Russian River. At Highway 101, Mark West Springs Road—River Road is a two-lane, two-directional roadway carrying approximately 3,700 vph in the peak hour.
- **Fulton Road** travels in a north-south direction. It provides a connection from northern Sonoma County communities to the community of Fulton and serves as a major arterial along the west side of Santa Rosa, connecting SR 12 to the south to Old Redwood Highway on the east side of Highway 101. Fulton Road is a two-lane, two-directional arterial roadway with turn pockets in the vicinity of Highway 101 and widens out to four through lanes as it approaches Santa Rosa.
- **Airport Boulevard** extends in an east-west direction, providing access to the Sonoma County Airport and the surrounding industrial center, and connecting to Old Redwood Highway on the east side of Highway 101. At Highway 101, Airport Boulevard is currently a two-lane, two-directional arterial roadway carrying approximately 3,650 vph during the peak hour.
- **Shiloh Road** extends in an east-west direction and connects to Old Redwood Highway east of Highway 101. Shiloh Road is currently a two-lane, two-directional arterial roadway west of Highway 101, and with four lanes east of Highway 101. Shiloh Road serves as the primary east-west access route across the southern Windsor area. At Highway 101, Shiloh Road carries approximately 3,100 vph during the peak hour.
- **Windsor River Road** extends in an east-west direction and provides access through the central Windsor area west of Highway 101 to Eastside Road, which runs north-south parallel to and east of the Russian River (not shown on figure). At Highway 101, Windsor River Road connects to Old Redwood Highway. Windsor River Road is a four-lane, two-directional arterial roadway with turn pockets and carries approximately 4,000 vph in the peak hour.

3.1.1.2 EXISTING TRAFFIC CONDITIONS ON HIGHWAY 101

Current (year 2002) peak-hour traffic conditions on Highway 101 are discussed in this section. Although the project improvements focus on the 12.3-kilometer (km) or 7.6-mile (mi) stretch of Highway 101 from Steele Lane to Windsor River Road (the project area), the proposed traffic

improvements would affect traffic operations beyond these limits. Similarly, traffic conditions outside of the project limits could affect traffic operations within the immediate project area. For example, congestion on southbound Highway 101, south of the project area, could extend north into the project area. Such traffic conditions could induce long delays and disrupt the southbound traffic within the project area. Consequently, the traffic studies analyzed Highway 101 from Petaluma Boulevard South in Petaluma to north of Windsor River Road in Windsor. This environmental document reports only the traffic conditions on Highway 101 within the project limits, from Steele Lane to Windsor River Road.

Traffic counts for the entire corridor from Petaluma Boulevard South to Windsor River Road indicate that the morning peak hour for the northbound direction is typically between 7:00 and 8:00 a.m. and for the southbound direction is between 8:00 and 9:00 a.m. Along most northbound freeway segments, however, the volumes recorded in the two adjacent hours are within 70 percent of the peak hour volumes. Along most southbound freeway segments, the volumes recorded in the 7:00 to 8:00 a.m. period are within 90 percent of the peak hour volumes. However, at the Windsor River Road ramps, the southbound traffic volumes during the peak hour (8:00 to 9:00 a.m.) are more pronounced than the traffic volumes during the 7:00 to 8:00 a.m. period.

The evening peak hour typically takes place between 5:00 and 6:00 p.m. in the northbound direction, and between 3:00 and 4:00 p.m. in the southbound direction. The evening peak is as mildly pronounced as the morning peak, with northbound volumes only slightly differentiated between 4:00 and 6:00 p.m.

There is no substantial difference in directional flow by time of day, indicating that there is no strong commute pattern either northward or southward. Although one would expect southward commute patterns toward Santa Rosa and San Francisco in the morning and northward patterns in the evening, existing volumes show a more complex pattern. Apparently, work, goods movements, recreation, and other types of travel trips take place in both directions throughout the day among the cities and small towns along Highway 101, including Healdsburg, Windsor, and Santa Rosa and other locations north and south.

Santa Rosa is the main regional employment center in Sonoma County and the majority of Sonoma County commute trips are within the county. Employment in Sonoma County is projected to increase much more rapidly than population, with a 48 percent increase in jobs anticipated between 2000 and 2030. The City of Santa Rosa and other cities and towns in Sonoma County are expecting high job growth rates substantially greater than the expected growth in households. These projections emphasize continued demand for travel along Highway 101 as the primary north-south route to local and regional employment and commercial opportunities. See Sections 3.2, Land Use, Planning, and Growth, and 3.4, Community Impacts, for more information.

Current peak-hour travel times on Highway 101 through the project limits vary from 7.4 to 11.1 minutes, depending upon the direction and peak hour (morning or evening).

Intersection Analysis

The intersections in the project area were categorized into two groups for the analysis: signalized (controlled by traffic signals) and unsignalized (controlled by stop signs). SYNCHRO software was used to analyze both kinds of intersections for this study. Based on the operational characteristics of each intersection—mainly the per vehicle delay at each intersection—the intersections were assigned a level of service ranking from LOS "A" to LOS "F". Level of Service or LOS is a measure used to rate roadway facilities, based on their traffic conditions. The level of service criteria for intersection analysis are presented in Table 3.1-1.

Table 3.1-1: Intersection LOS Definitions

Level of Service	General Description	Criteria for Intersections (control delay per vehicle, sec/veh)	
		Unsignalized	Signalized
A	Traffic flows with very little delay and speeds are optimal. Most vehicles do not stop.	0-10	< 10
B	Traffic flows with very little delay and speeds may be slightly reduced. Very infrequent and short waits at traffic signals. More vehicles stop at intersections than for LOS A.	> 10-15	> 10-20
C	Traffic speeds continue to slow. Some vehicles may stop at this level, although many vehicles still pass through the intersection without stopping.	> 15-25	> 20-35
D	Congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines.	> 25-35	> 35-55
E	Low speeds and traffic back ups at intersections. Often considered to be the limit of acceptable delay.	> 35-50	> 55-80
F	Very slow speeds and congestion. Long traffic backups. Very likely to wait for multiple greens to get through an intersection. This is considered to be unacceptable to most drivers.	> 50	> 80

Source: Highway Capacity Manual

The 12 intersections in the project area are listed below. All are Highway 101 ramp intersections with local streets; three of the 12 intersections are unsignalized intersections as noted below.

1. Guerneville Road/Steele Lane and Highway 101 northbound
2. Guerneville Road/Steele Lane and Highway 101 southbound
3. Bicentennial Way and Highway 101 southbound
4. Mendocino Avenue and Highway 101 northbound
5. Hopper Avenue and Highway 101 southbound
6. Mark West Springs Road and Highway 101 northbound
7. Mark West Springs Road and Highway 101 southbound (unsignalized – stop sign controlled on southbound approach)

8. Airport Boulevard and Highway 101 southbound (unsignalized – stop sign controlled on southbound approach)
9. Shiloh Road and Highway 101 northbound
10. Shiloh Road and Highway 101 southbound (unsignalized – stop sign controlled on southbound approach)
11. Windsor River Road and Highway 101 northbound
12. Windsor River Road and Highway 101 southbound

The results of the analysis show that of the 12 ramp intersections analyzed, eight currently operate at LOS D or better in the morning and evening peak hours. During the morning peak hour, all intersections operate at LOS D or better except the unsignalized intersections at the southbound ramp terminals at Airport Boulevard and Shiloh Road; these operate at LOS F. In the evening peak hour, the unsignalized intersection at the southbound ramp terminal at Mark West Springs Road-River Road operates at LOS F and the Windsor River Road northbound ramp terminal intersection operates at LOS E. All other intersections operate at LOS D or better. See Table H-3 in Appendix H for more details.

Safety

Accident data were obtained for the three-year period from February 1, 1999 to January 31, 2002. The accident data were broken down by direction of travel and by either mainline freeway or ramp segments. The mainline accident data were further summarized for each section of highway between adjacent interchanges. Mainline and interchange accident data summaries are provided in Tables H-4 and H-5 of Appendix H.

Mainline Accident Data

In the northbound direction, the overall accident rates for the project area are lower than reported statewide average rates for similar facilities. A few interchange-to-interchange sections have accident rates that exceed the reported statewide averages. Between Bicentennial Way and Mendocino Avenue, and between Fulton Road and Airport Boulevard, the accident rate for fatal and injury accidents is approximately 30 percent higher than the reported statewide average. In both segments, rear-end collisions, resulting from speeding and following too closely, were the primary type of accident. Neither environmental nor roadway conditions appear to have been a factor. See Figure 3.1-3.

One fatal accident was reported in the northbound direction, south of River Road. The accident was not related to highway conditions, but occurred when the driver fell asleep at the wheel and ran off the road.

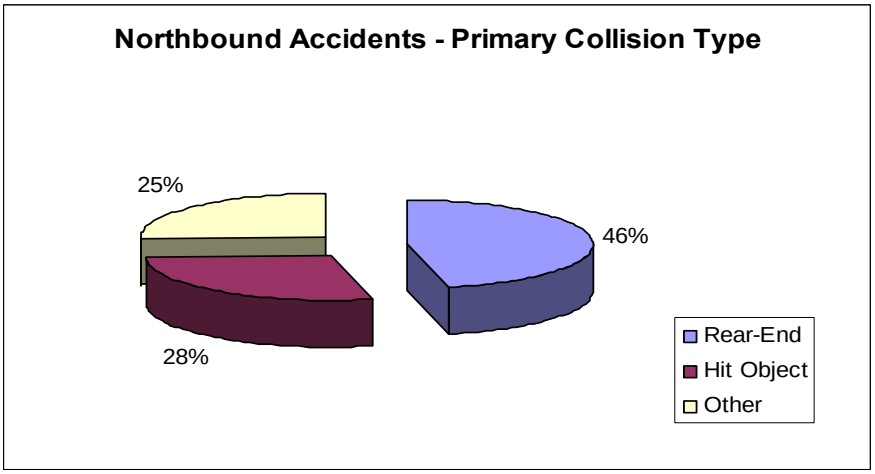


Figure 3.1-3: Percentages of Accidents in the Project Area (Northbound) by Primary Collision Type

While there were no fatal accidents reported in the southbound direction, the overall total accident and injury accident rates southbound exceed the statewide reported average accident rates for similar facilities. Rear-end collisions were the primary collision type cited for southbound accidents at 71 percent, followed by hit objects at 14 percent. See Figure 3.1-4. Rear-end collisions are typically related to congested conditions.

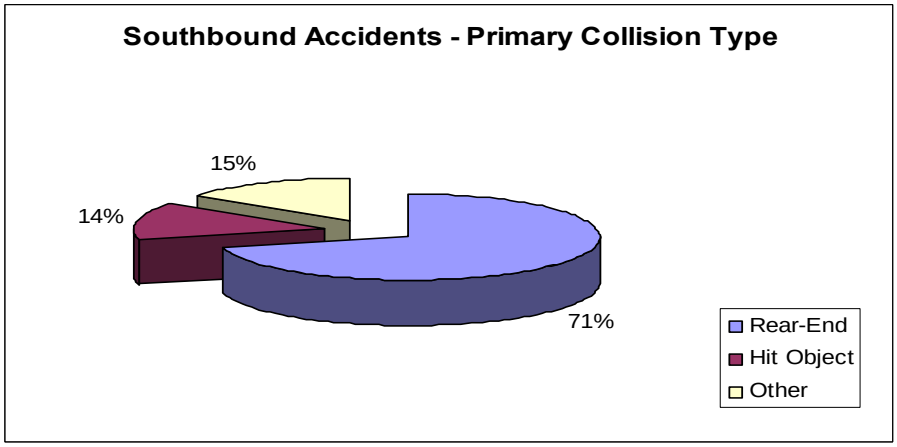


Figure 3.1-4: Percentages of Accidents in the Project Area (Southbound) by Primary Collision Type

North of Airport Boulevard, interchange-to-interchange section accident rates are below the reported statewide average rates for similar facilities. However, south of Airport Boulevard, accident rates for all interchange-to-interchange sections exceeded the reported statewide averages. The highest mainline accident rate in the southbound direction occurred between Bicentennial Way and Steele Lane, a segment that is less than a mile in length. In this segment, 112 accidents, including 44 injury accidents, were reported in the three-year period studied. The injury accident and total accident rates were approximately three times higher than the statewide average rates.

A possible reason for these higher than average statewide rates could be that traffic flow on Highway 101 tends to slow south of Steele Lane as it encounters congestion in the downtown area of Santa Rosa. Therefore, free-flowing vehicles approaching the area north of Steele Lane encounter slower-moving or stopped vehicles. Eighty-six percent of the accidents (96 out of 112 accidents) occurring between Bicentennial Way and Steele Lane involved rear-end accidents caused by speeding or following too closely. In addition, most accidents occurred in clear weather and during daylight hours (mid-morning through evening), indicating that driving conditions were not a significant factor. Seventy-six percent of the accidents occurred on weekdays (Monday *through* Friday), and 55 percent were during the *evening* peak hours between 3:00 and 6:00 *p.m.* Traffic operations south of Steele Lane are expected to improve over the existing conditions in the near term as a result of a related project, the Highway 101 HOV Widening Project from SR 12 to Steele Lane; however, by 2030, congestion in the vicinity of SR 12 will likely spill back north into the project area.

Another freeway segment with an accident rate above the statewide average occurs between Airport Boulevard and Fulton Road in the southbound direction. Of the 33 reported accidents in this section, 61 percent involved rear-end collisions resulting from speeding, following too closely or improper turn movements. This is indicative of problems associated with the short weaving length available between the on- and off-ramps.

Ramp Accident Data

One fatal accident was reported at a ramp intersection—at the northbound off-ramp to east-bound Fulton Road. This occurred when a vehicle merging onto eastbound Fulton Road hit a bicyclist traveling in the wrong direction on Fulton Road at night and without lights.

The highest accident rate for the northern section ramps occurred at the northbound on-ramp from westbound Shiloh Road. It should be noted that this is a low volume on-ramp where only three accidents occurred in a three-year period. High accident rates, approximately three times average, were reported at the northbound off-ramp to eastbound Fulton Road and the southbound off-ramp to Airport Boulevard. Both freeway segments recorded eight accidents each within the three-year period, with a high percentage of rear-end collisions. Some accidents appear to have resulted from vehicles exiting too fast, in conjunction with less-than-standard deceleration lengths. Weather was not an apparent factor.

A review of accident data for the period January 1, 2001 to December 31, 2003 was conducted to see whether there were any substantial changes in accident rates or trends. Three fatal accidents occurred in the southbound direction, and one in the northbound direction. Although the total number of accidents increased, there were no changes of significance in either the fatal plus injury or total accident rates in either direction on Highway 101.

For the ramps, there were significant increases in accident rates at two locations. At the southbound off-ramp to River Road, the accident rates for fatal plus injury and total accidents increased four-fold to over four times the statewide averages. At the southbound on-ramp from eastbound Shiloh Road, the accident rate doubled to just over the statewide average.

3.1.1.3 EXISTING TRANSIT, BICYCLE/PEDESTRIAN, AND PARKING CONDITIONS

Transit Services

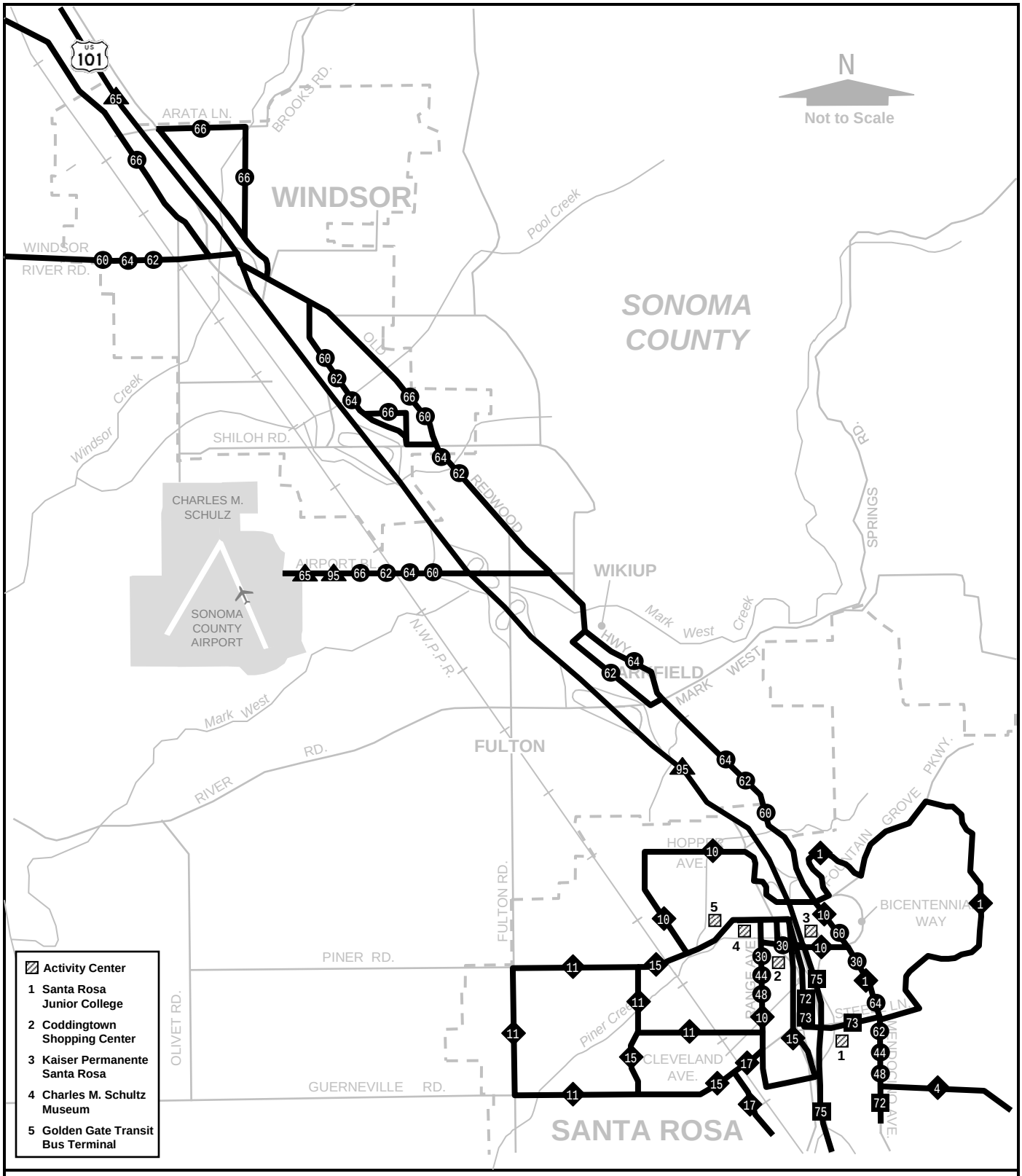
Transit services in the study area are provided by Sonoma County Transit, Golden Gate Transit, and Santa Rosa CityBus Service. The Mendocino Transit Authority operates two bus routes within the study area. Bus routes in the vicinity of the study area are shown in Figure 3.1-5.

Sonoma County Transit. Sonoma County Transit operates a total of 23 bus routes, including six local and two express routes, throughout Sonoma County. Coverage of the nine bus routes in the study area includes the Coddingtown Shopping Center, the Golden Gate Transit Bus Terminal, and the Charles M. Schulz-Sonoma County Airport.

Golden Gate Transit. Golden Gate Transit's 52 bus routes serve cities in Marin County and parts of Sonoma, San Francisco and Contra Costa counties, including the City of Santa Rosa. Four bus routes serve the northern portion of Santa Rosa, mostly along Highway 101 and culminating at the Golden Gate Transit Bus Terminal.

Santa Rosa CityBus. Santa Rosa CityBus provides 16 bus routes for the City of Santa Rosa. Coverage by the six bus routes within the study area includes Santa Rosa Junior College, Kaiser Permanente-Santa Rosa, the Charles M. Schulz Museum and the Golden Gate Transit Bus Terminal.

Mendocino Transit Authority. Mendocino Transit Authority operates 14 bus routes for Mendocino County. Two bus routes operate within the study area and connect with the Sonoma County Airport Express at the Charles M. Schulz-Sonoma County Airport.



Source: Sonoma County Transit, Golden Gate Transit, Santa Rosa CityBus and Mendocino Transit Authority

SCTA

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

BUS ROUTES IN THE STUDY AREA
Figure 3.1-5

Pedestrian Facilities

According to the Sonoma County Transportation and Land Use Coalition, the number of people who commute by walking in Sonoma County is low—only 3.1 percent in 2003. Major pedestrian activity centers within half a mile of the interchanges in the study area are shown in Figure 3.1-6. These activity centers include houses of worship, schools, colleges, governmental facilities, and shopping centers. Walkways and cross paths are provided on many streets near the interchanges, but these facilities, while continuous across Highway 101, are not continuous on all intersecting streets.

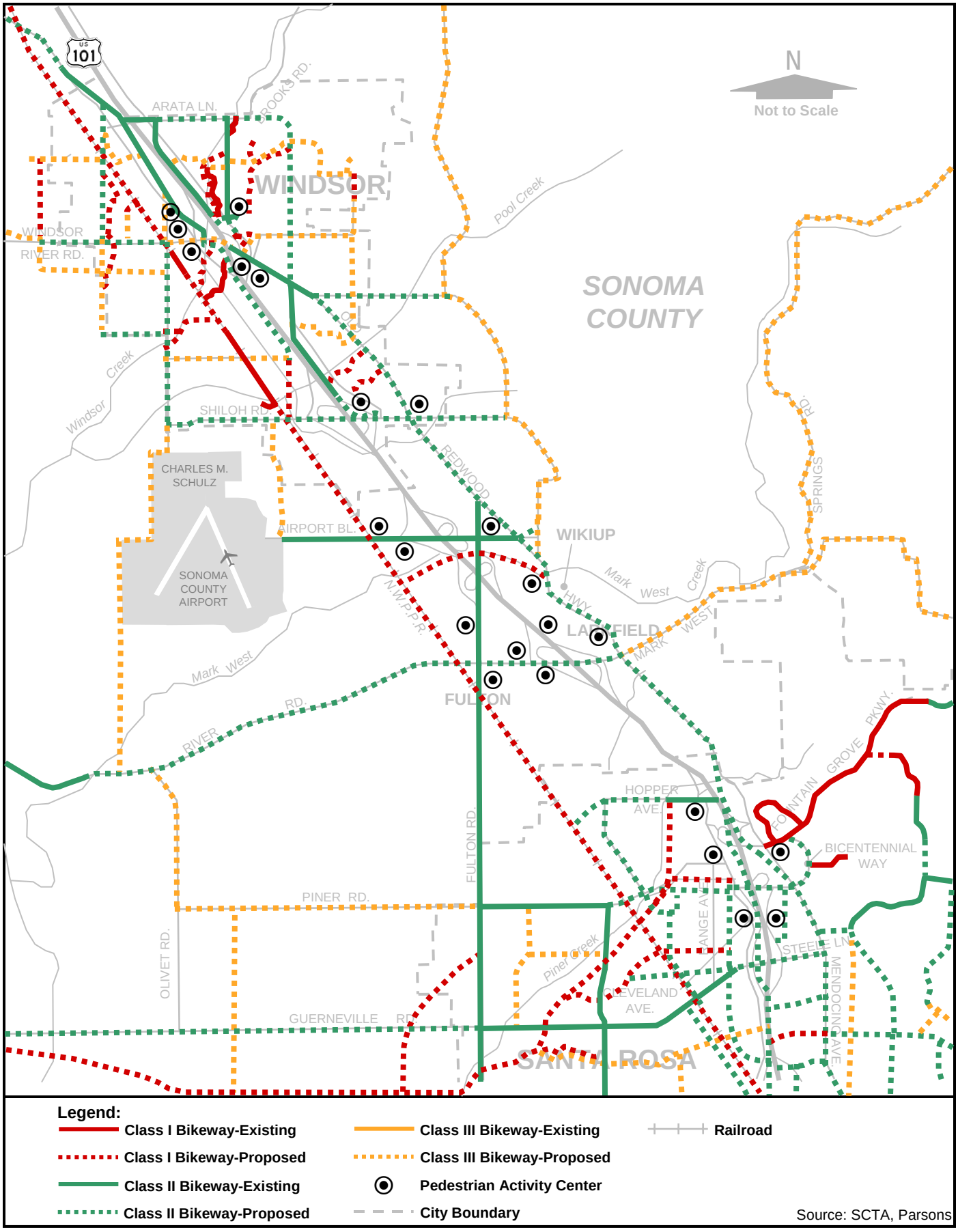
The highway has six roadway/pedestrian crossings and three bridges over waterways within the project limits. Most of these were built when the freeway was constructed, although the Bicentennial Way Overcrossing was added later, and the River Road, Fulton Road, and Airport Boulevard Overcrossing structures were retrofitted in 1996. These structures are summarized from south to north in Table 2.2-1. The Steele Lane and Windsor River Road–Old Redwood Highway roadway/pedestrian crossings are just beyond the project limits to the south and north, respectively.

Bicycle Facilities

According to the Sonoma County Transportation and Land Use Coalition the number of people who commute by bicycling in Sonoma County is low. Bikes were used for only about 1.7 percent of commute trips in 2003. The *Sonoma County Transportation Authority (SCTA) Countywide Bicycle Plan Update* is the countywide planning document for bicycle facilities. The primary goal of the plan is to create a countywide non-motorized transportation system that provides safe and efficient opportunities for bicyclists to access school, work, shopping centers, professional services, and transportation to recreation areas. Bicycle facilities may also serve as recreational paths themselves. Currently there are over 53 km (33 mi) of off-road (Class I) bike paths and 103 km (64 mi) of on-street (Class II) bike lanes in Sonoma County. Bikeway classifications are defined in Table 3.1-2, below.

Table 3.1-2: Bikeway Classifications

Bikeway Class	Definition
Class I Bikeway (Bike Path)	Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross-flow minimized.
Class II Bikeway (Bike Lane)	Provides a striped land for one-way bike travel on a street or highway.
Class III Bikeway (Bike Route)	Provides for shared use with pedestrian or motor vehicle traffic.
Source: Caltrans Highway Design Manual, July 1995.	



SCTA

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

BICYCLE ROUTES AND PEDESTRIAN ACTIVITY CENTERS
Figure 3.1-6

Class I bike paths in the study area include Fountain Grove Parkway and a path along East Windsor Creek from Conde Lane to the Northwestern Pacific (NWP) Railroad right-of-way, which has additional short stretches. Class II bike lanes extend along Hopper Avenue, Fulton Road, Airport Boulevard, Hembree Lane, and Old Redwood Highway from Pleasant Avenue to Lakewood Drive.

Proposed bikeway facilities[2] in the study area include Class I facilities along Piner Creek, west of Highway 101; beneath Highway 101 along Mark West Creek; along Pool Creek, east of Highway 101; along Windsor Creek; Conde Lane, from Highway 101 to the NWP, and along the remaining stretches of the NWP right-of-way. Class II bikeways are proposed on Bicentennial Way, Cleveland Avenue, Guerneville Road, Shiloh Road, Windsor River Road and the remaining portions of Old Redwood Highway; on Mark West Springs/River Road and Conde Lane for the portion parallel to Highway 101, north to Old Redwood Highway. Class III bikeways are proposed along Mitchell Lane, off Conde Lane, and Windsor River Road through the Highway 101 interchange area.

Parking

A total of approximately 4,000 parking spaces are available at locations adjacent to Highway 101 along the study corridor, including shopping centers, industrial complexes and commercial establishments. Table 3.1-3 summarizes current off-street parking in the project vicinity that has some potential to be affected by the proposed project.

Table 3.1-3: Potentially Affected Parking in the Study Area

Location	Total Parking Spaces[1]	Location	Total Parking Spaces[1]
Comfort Inn	125	Eye Care for Animals	10
Baclawski Chiropractic Office	10	Wells Fargo	40
Condiotti Enterprises	50	National Bank of the Redwoods	55
Sonoma County Administrative Center	110	Luther Burbank Center for the Arts	950
Vintner's Inn	100	Master Touch Corporation	15
Thousand Trails Campground	100	Windsor Courtyards	50
Sonoma County Water Agency	1,500	Motel 6	100
Walmart	800	TOTAL	4,015

[1] Estimate of existing parking based on a review of aerial mapping.
Source: Parsons 2005.

3.1.2 Environmental Consequences

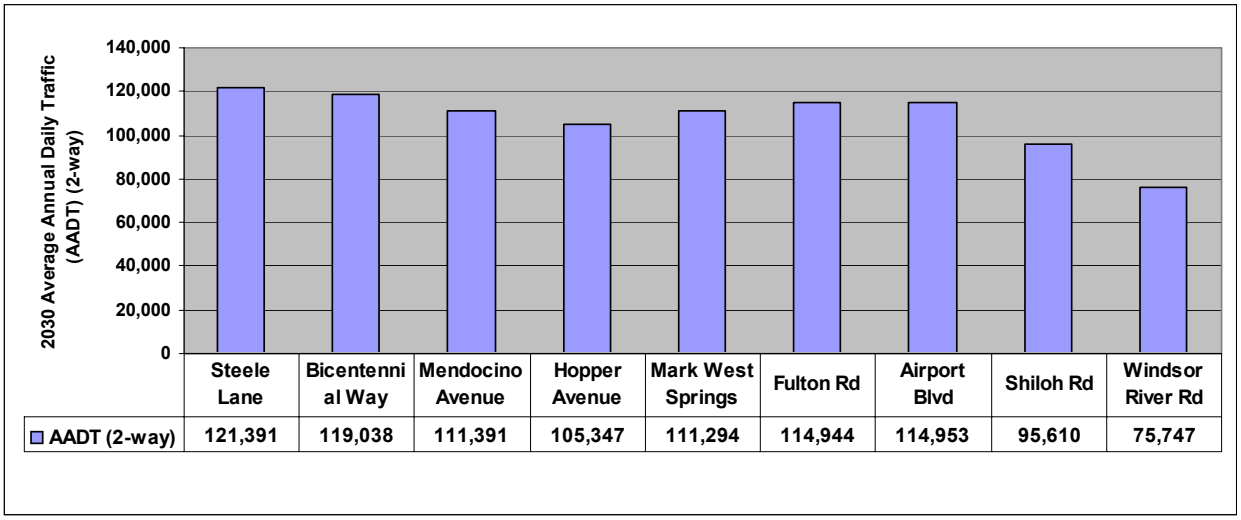
The following sections report anticipated traffic and transportation effects of the No-Build and Build Alternatives. The Build Alternative is the proposed Highway 101 HOV Lane Widening Project. The No-Build Alternative includes all currently planned and/or programmed improvements except the proposed project. The No-Build Alternative therefore assumes that the Marin-Sonoma Narrows, Old

[2] These proposed bicycle facilities are not part of the proposed project.

Redwood Highway to Rohnert Park Expressway, Rohnert Park Expressway to Santa Rosa Avenue (including the Wilfred Avenue Interchange), and SR 12 to Steele lane HOV Lane widening projects (depicted in Figure 1.1-3 and discussed in Section 1.4.3., Related Projects) would all be in place by 2030. The Build Alternative analysis evaluates the effects of the present project in addition to No-Build conditions.

3.1.2.1 2030 PEAK HOUR TRAFFIC CONDITIONS UNDER THE NO-BUILD ALTERNATIVE

In 2030, the annual average daily traffic (AADT) along the Highway 101 study corridor would range from 75,700 to 121,400 vehicles per day (both directions) as shown in Figure 3.1-7. By 2030, without capacity and operational improvements on Highway 101, traffic conditions on the freeway and at the intersections near the freeway *would* deteriorate. The percentage of peak-hour travel demand that could be accommodated by the freeway through the study area would decrease, leading to lower travel speeds, greater travel times, and delays.



	Steele Lane	Bicentennial Way	Mendocino Avenue	Hopper Avenue	Mark West Springs	Fulton Rd	Airport Blvd	Shiloh Rd	Windsor River Rd
AADT (2-way)	121,391	119,038	111,391	105,347	111,294	114,944	114,953	95,610	75,747

Figure 3.1-7: Estimated 2030 Annual Average Daily Traffic Volumes on Highway 101

Low levels of Service (LOS) for mainline segments in the study area show congested traffic conditions which would disrupt traffic flow. Under the No-Build Alternative, the peak hour LOS for mainline segments would vary from LOS C/D to LOS F, for both peak hours in the southbound direction and for the evening peak hour in the northbound direction. Several mainline sections would operate at LOS F indicating stop-and-go conditions or even total breakdown. In the northbound direction during the morning peak, the study area would be less congested and the mainline LOS would vary from LOS C to LOS D.

The following paragraphs describe the projected mainline and intersection operating conditions under the No-Build Alternative. See Tables H-6 and H-7 in Appendix H for detailed tabulations of the information presented in the following paragraphs.

Travel Time

Slower travel speeds mean increased travel times. Travel time is defined as the time taken to travel from one project limit to the other. As shown in Table 3.1-4, without capacity and operational improvements on Highway 101, travel times through the project limits in 2030 would vary from 7.2 to 23.3 minutes, based on direction and peak hour. Travel times would be greatest in the southbound direction, amounting to 20.8 and 23.3 minutes in the morning and evening peak hours, respectively, between the Windsor River Road on-ramp and the Steele Lane off-ramp. Travel times in the northbound direction would be better, about 7.2 and 12.6 minutes respectively, in the morning and evening peak hours between the Steele Lane on-ramp and the Windsor River Road off-ramp. Figure 1.2-2 shows the congested locations on Highway 101, within the project limits, in 2030.

Table 3.1-4: Estimated Travel Time, Delay and Time Savings in 2030 (in minutes)

Alternative	Southbound				Northbound			
	Morning		Evening		Morning		Evening	
	M-Flow	HOV	M-Flow	HOV	M-Flow	HOV	M-Flow	HOV
	Travel Time							
No-Build	20.8	20.8	23.3	23.3	7.2	7.2	12.6	12.6
Build	8.0	7.4	7.8	7.1	7.1	7.0	7.2	7.0
Savings	12.8	13.4	15.5	16.3	0.1	0.2	5.4	5.6
	Delay							
No-Build	13.8	13.8	16.7	16.7	0.6	0.6	5.9	5.9
Build	1.0	0.5	1.2	0.5	0.4	0.5*	0.5	0.5
Savings	12.8	13.4	15.5	16.3	0.2	0.1	5.4	5.5

Values rounded to the nearest decimal.
** An increase in northbound HOV delay of 0.1 minute (7 seconds) when compared to mixed-flow delay is negligible. The HOV lanes provide enough added southbound capacity to prevent congestion from developing.*
Source: Parsons 2005

Delay

Increasing traffic demand results in increased congestion and delays. Delays are defined as the travel time in excess of the free-flow travel time (travel time at a speed of 65 mph). As shown in Table 3.1-4, within the project limits, delays would be highest in the southbound direction, amounting to 13.8 and 16.7 minutes in the morning and evening peak hours, respectively. The delays in the northbound direction would be less, amounting to 0.6 and 5.9 minutes respectively, in the morning and evening peak hours. Figure 1.2-2 illustrates the delays on Highway 101 within the project limits in 2030 under the No-Build Alternative.

The freeway segment with the worst delays within the project limits in 2030 is projected to be in the evening peak-hour in the southbound direction from Airport Boulevard to north of the Windsor River Road Interchange, just beyond the northern project limit. The travel time through the section from the northern project limit to the Airport Boulevard on-ramp would be 19.2 minutes with 16.3 minutes of delay. Under the Build Alternative (see Section 3.1.2.*4*, 2030 Peak Hour Traffic Conditions under the Build Alternative), the travel time and delays through this section would be greatly reduced.

The second worst freeway segment for delay is projected to be in the morning peak-hour in the southbound direction between the Hopper Avenue off-ramp and the Windsor River Road on-ramp. The travel time through this segment would be 19.4 minutes with 13.7 minutes of delays. Under the Build Alternative, the travel time and delays through this section would be reduced.

Intersection Analysis

Intersection geometry within the project limits under the No-Build Alternative would remain the same as the existing intersection geometry. Details of the intersection analysis results are presented in Table H-8 in Appendix H. Under no-build conditions in 2030, all intersections analyzed would operate at LOS D or better except at the following locations:

- Bicentennial Way and 101 southbound – LOS F in evening peak hours;
- Mendocino Avenue and 101 northbound – LOS F in both morning and evening peak hours;
- Mark West Springs Road and 101 northbound – LOS E in morning peak hour;
- Mark West Springs Road and 101 southbound (unsignalized – stop sign controlled on southbound approach) – LOS F in both morning and evening peak hours;
- Airport Boulevard and 101 southbound (unsignalized – stop sign controlled on southbound approach) – LOS F in both morning and evening peak hours;
- Shiloh Road and 101 Northbound – LOS F in morning peak hour;
- Shiloh Road and 101 southbound (unsignalized – stop sign controlled on southbound approach) – LOS F in both morning and evening peak hours; and
- Windsor River Road and 101 northbound – LOS F in both morning and evening peak hours.

3.1.2.2 2030 Transit Conditions under the No-Build Alternative

Without the proposed HOV lane widening and related improvements, peak-period transit operations within the project limits would experience similar congestion and delay conditions as described for no-build traffic operations in 2030. Problem segments along the freeway mainline and at intersections would be as described in Section 3.1.2.1, 2030 Peak Hour Traffic Conditions under the No-Build Alternative.

3.1.2.3 Bicycle/Pedestrian and Parking Conditions under the No-Build Alternative

No substantial adverse impacts to bicycle/pedestrian and parking conditions within the Highway 101 HOV Lane Widening Project area are anticipated as a result of the No-Build Alternative.

3.1.2.4 2030 PEAK HOUR TRAFFIC CONDITIONS UNDER THE BUILD ALTERNATIVE *(PREFERRED ALTERNATIVE)*

The Build Alternative *(Preferred Alternative)* would widen Highway 101 into the median to provide HOV lanes and standard inside shoulders in each direction, and widen along the outside of the highway to provide standard outside shoulders and auxiliary lanes. The existing auxiliary lanes between Steele Lane and Bicentennial Way would be maintained and auxiliary lanes would be added southbound between the Mendocino Avenue on-ramp and the Hopper Avenue on-ramp and northbound between the loop on-ramp at Fulton Road and the loop off-ramp at Airport Boulevard under interchange Option A.

While the new facilities *added under the Build Alternative* would substantially improve traffic operations on Highway 101, especially in the near term, the Build Alternative would not eliminate all of the operational problems that would occur in the study area by 2030. Some southbound mainline segments would be expected to deteriorate in level of service as a result of congestion in the vicinity of SR 12 south of the project area. The next subsection defines the Sonoma County standards that would apply to these impacts, while the following subsections describe anticipated conditions under the Build Alternative.

The average annual traffic demand in the traffic study area in 2030 would range from 75,700 to 121,400 vehicles per day (both directions), as shown in Figure 3.1-7. With capacity improvements, the freeway would be able to serve the projected demand more efficiently than under the No-Build Alternative. Under the Build Alternative (Preferred Alternative), the HOV Lanes would operate at LOS C or better for all directions and peak hours. Adding HOV lanes would not remove all the congestion-related problems in the study area. Even with improved capacity, mixed-flow lane users would still encounter some level of congestion. In the southbound direction, the LOS for mixed-flow lanes would vary between LOS C and LOS E/F for both peak hours, although only one of the 14 southbound segments would operate at LOS F. In the northbound direction, LOS would vary between LOS B to LOS D during both peak hours.

Applicable Traffic Impact Standards

The County's criteria for determining traffic impacts are as follows:

- Vehicle Queues: The 95th percentile queue length exceeds the turn lane storage capacity;
- Signal Warrants: Conditions change to cause an intersection to meet or exceed Caltrans signal warrant criteria;
- Turn Lanes: Traffic volumes increase to a level that meets or exceeds warrants for providing a turn lane on an intersection approach.
- Sight Distance: An intersection is created or traffic is added to an existing intersection approach that has inadequate sight distance based on Caltrans criteria;
- County Signalized Intersection: A signalized intersection is projected to operate at LOS E or F as a result of the project or an intersection that would otherwise operate at LOS E or F and the project results in increased delay of 7.5 seconds or more (LOS E) or 5.0 seconds or more (LOS F).

- County Unsignalized Intersections: An un-signalized or all-way stop controlled intersection as a result of the project or an intersection that would otherwise operate at LOS E or F is projected to operate at LOS E or F and the project results in increased delay of five seconds or more, except that this criterion does not apply to low volume roadways.

Traffic Operations under the Build Alternative

The Build Alternative *(Preferred Alternative)* would generally improve traffic operations on Highway 101 within the project limits. Although the Build Alternative *(Preferred Alternative)* would improve traffic operations for the mixed-flow and HOV lane traffic, operational improvements would be much greater for the HOV lane traffic, which would operate at or near free-flow speeds, even during peak hours. As shown in the following paragraphs, the proposed project would shorten travel times and reduce delays within the project limits. See Tables H-6 and H-7 in Appendix H for detailed tabulations of the information presented in the following paragraphs, which discuss the effects of the improvements for both the mixed-flow and HOV lane traffic.

Travel Time

Table 3.1-4 shows the travel time through the project limits for both the Build *(Preferred Alternative)* and No-Build Alternatives. Under the Build Alternative *(Preferred Alternative)*, with improved travel speeds, the travel time using the HOV lanes through the project limits would shorten to between 7.0 and 7.4 minutes and that for mixed-flow lanes would vary between 7.1 and, 8.0 minutes, depending on the direction and peak hour. In comparison, travel times through the project limits under no-build conditions would vary from 7.2 to 23.3 minutes. This translates to a 2 to 70 percent reduction in travel times, or a savings from 0.2 to 16.3 minutes for the HOV lanes, and a 2 to 66 percent reduction in travel times or savings of 0.1 to 15.5 minutes for the mixed-flow lanes with the Build Alternative *(Preferred Alternative)* in place. The travel times, delay, speeds, and mainline level of service analysis results for the No-Build and Build *(Preferred)* alternatives are presented in Tables H-6 and H-7 in Appendix H.

As shown in Table 3.1-4, during the morning peak hour the travel time in the HOV lanes would be reduced 0.2 minutes in the northbound direction and 13.4 minutes in the southbound direction. The travel time in the mixed-flow lanes would be reduced 0.1 minutes in the northbound direction and 12.8 minutes in the southbound direction. During the evening peak hour, HOV lane travel time would be reduced 5.6 minutes and 16.3 minutes, respectively, in the northbound and southbound directions, while mixed-flow lane travel time would be reduced 5.4 minutes and 15.5 minutes, respectively, in the northbound and southbound directions. As shown in *T*able *3.1-4*, the proposed project would improve travel times considerably in the southbound direction.

The apparently small difference in travel time savings for HOV lane users and mixed-flow lane users under the Build Alternative *(Preferred Alternative)* belie the real benefits of the HOV lane widening project. There are two primary reasons for the apparent contradiction. First, HOV lane users would realize a substantial travel time reduction, and because the HOV lanes would provide additional highway capacity, motorists in the mixed-flow lanes would also realize substantial travel time savings, compared with No-Build conditions. In sum, all motorists, whether in the HOV lane or the mixed-flow lanes, would benefit. Second, all of the results presented in this document section are for

a one-hour traffic analysis, which is the standard approach for comparing projects. Over a longer peak period the proposed project would encourage additional carpool use.[3]

Under the No-Build Alternative, the freeway segment projected to have the worst travel time in 2030 would be in the evening peak-hour in the southbound direction from Airport Boulevard to north of the Windsor River Road Interchange, just beyond the northern project limit. The travel time through this section from the northern project limit to Airport Boulevard would be 19.2 minutes with 16.3 minutes of delay. Under the Build Alternative *(Preferred Alternative)*, the travel time in the mixed-flow lanes would be 3.7 minutes with only 0.5 minutes of delay, while the travel time for HOV users would be 3.4 minutes with only 0.2 minutes of delay.

Under the No-Build Alternative, the freeway segments with the second worst travel times are projected to be in the morning peak-hour in the southbound direction between the Hopper Avenue off-ramp and the Windsor River Road on-ramp. The travel time through this segment would be 19.4 minutes with 13.7 minutes of delay. Under the Build Alternative *(Preferred Alternative)*, the travel time in the mixed-flow lanes would be 6.3 minutes with only 0.6 minutes of delay, while the travel time for HOV users would be 6.0 minutes with only 0.4 minutes of delay.

Delay

Delay is defined as the travel time in excess of the free-flow travel time (travel time at a speed of 65 mph). As shown in Table 3.1-4, the Build Alternative *(Preferred Alternative)* would reduce delay for HOV lane users within the project limits by 0.1 to 16.3 minutes, a 14 to 97 percent reduction in delay, depending on the peak hour and direction. In the morning peak hour delay in the HOV lanes would be reduced 0.1 minutes in the northbound direction and 13.4 minutes in the southbound direction. In the evening peak hour, delay would be reduced 5.5 minutes and 16.3 minutes, respectively, in the northbound and southbound directions. There would also be reductions in delay for motorists in the mixed-flow lanes compared to the No-Build Alternative. In the morning peak hour the delay in the mixed-flow lanes would be reduced 0.2 minutes in the northbound direction and 12.8 minutes in the southbound direction. In the evening peak hour, delay would be reduced 5.4 minutes and 15.5 minutes, respectively, in the northbound and southbound directions. Figure 1.2-2 and Figure 1.2-3 illustrate the delay under 2030 No-Build and Build *(Preferred Alternative)* conditions.

As noted previously, the difference in delay savings for HOV lane users versus mixed-flow lane users appears small in comparison to the substantial travel time savings and delay reduction benefits that would be experienced by all motorists from the additional Highway 101 capacity provided by the proposed HOV lane project.

Intersection Analysis

Under the No-Build Alternative, where intersection geometry within the project limits would be the same in 2030 as the existing intersection geometry, three intersections would operate at LOS D or

[3] For example, when a two-hour period was analyzed for the 2030 morning peak period under the Build Alternative, the time savings to be gained from using the HOV lane instead of the mixed flow lanes was 41 minutes instead of the 0.6 minutes shown in Table 3.1-5.

better in the morning peak hour, and four would operate at LOS D or better in the evening peak hour, while most intersections would operate at LOS F.

Several intersection improvements are proposed under the Build Alternative *(Preferred Alternative)*. The most extensive intersection improvements are associated with the Airport Boulevard-Fulton Road Interchange complex. The improvements proposed at the intersections of Airport Road and Fulton Road with the Highway 101 ramps include signalizing the intersections and adding left-turn lanes or turn lane pocket modifications at selected intersections. See the *Revised Draft Traffic Operational Analysis Report, June 2005,* for more details on proposed intersection improvements.

Under the Build Alternative *(Preferred Alternative)* in 2030, all intersections within the project limits would operate at LOS C or better with the proposed improvements except for three intersections in the morning peak hour and three intersections in the evening peak hour that would operate at LOS D or E. None of the intersections operating at LOS D, E, or F under No-Build Alternative would be made worse under the Build Alternative *(Preferred Alternative)*. At each intersection location operating below LOS C under the Build Alternative *(Preferred Alternative)*, the intersection would operate at an acceptable LOS or at an improved LOS compared to No-Build conditions and therefore would not constitute an adverse impact. See Table H-9 in Appendix H for detailed intersection analysis results.

Traffic on Local Streets, VHT, and VMT

Traffic diversions to local streets to avoid freeway congestion are common and can cause considerable delay. By 2030, as congestion on the freeway increases, traffic diversion to local streets, such as Old Redwood Highway, Mendocino Avenue, and Fulton Road, would also increase. This increase in "cut-through" traffic would deteriorate conditions on local streets, increasing delay and energy consumption. The Build Alternative *(Preferred Alternative)* would substantially reduce congestion within the project limits that would occur under the No-Build Alternative and would provide incentive for commuter and through traffic to remain on the freeway, freeing arterials and other local streets to serve local traffic.

When there is congestion, vehicles spend more time on a roadway and the vehicle hours of travel (VHT) increase compared to less congested conditions. When vehicles attempt to circumvent freeway congestion by using local roads, the vehicle miles of travel (VMT) increases. Under the Build Alternative *(Preferred Alternative)*, annual countywide VMT would decrease by 4.42 million kilometers (2.75 million miles) and annual countywide VHT would decrease by 925,000 hours compared to the No-Build Alternative. These improvements reflect improved travel conditions and a reduction in freeway traffic diversion onto local streets in the study area with the Build Alternative *(Preferred Alternative)*. Reduced VHT and VMT also translate into reductions in energy consumption. See Section 3.14, Energy.

3.1.2.5 2030 Transit, Bicycle/Pedestrian, and Parking Conditions under the Build Alternative

Transit and Carpooling Conditions

The HOV lanes provided under the Build Alternative *(Preferred Alternative)* would offer dedicated peak hour roadway capacity and a high level of traffic service to transit and carpool vehicles. This

would substantially improve travel times for intercity buses and carpools, which would operate at speeds of approximately 97 km/h (60 mph) in the new HOV lanes. This compares to speeds as low as 11 km/h (7 mph) on congested mixed-flow lanes under the No-Build Alternative and 48 km/h (30 mph) on mixed-flow lanes under the Build Alternative *(Preferred Alternative)*. Not only would transit travel time be reduced but transit schedule reliability would be improved. Carpools and vanpools also would have improved speeds and reduced travel times. The improved speeds and schedule reliability would work as incentives for commuters and other travelers to carpool and/or take advantage of local and express buses that would move freely along the HOV lanes. HOV lanes would support an increase in express bus service from Sonoma County to San Francisco offering faster and more frequent peak-hour transit service for commuters between Sonoma County and downtown San Francisco.

Pedestrian Facilities

It is expected that the safety and accessibility of the Highway 101 corridor and adjacent roadway network for both pedestrians and bicyclists would generally be facilitated by the improvements proposed under the Build Alternative *(Preferred Alternative)*, although few pedestrian facilities would actually be modified with the project. Existing pedestrian activity centers and pedestrian facilities near study area interchanges are described in Section 3.1.1.3, *Existing Transit, Bicycle/*Pedestrian*, and Parking Conditions.* The proposed project would not directly improve existing pedestrian facilities, except at Airport Boulevard where the existing sidewalk would be relocated and constructed to be *compliant with the* Americans with Disabilities Act (ADA).

At all the other interchanges, the Build Alternative *(Preferred Alternative)* would maintain the existing pedestrian facilities. If the project would affect existing pedestrian facilities, the pedestrian facilities would be replaced and the new facilities made ADA compliant. Similarly, if any changes were needed to the local streets that would affect walkways or crosswalks, these facilities would be replaced.

Bicycle Facilities

The Highway 101 HOV Lane Widening Project would not affect bicycle facilities within the project area.

Parking

The Highway 101 HOV Lane Widening Project would not affect any parking in the project area. Temporary construction impacts to parking are discussed in Section 3.16.2, *Traffic and Transportation/Pedestrian and Bicycle Facilities.*

3.1.2.6 2010 Peak Hour Traffic Conditions under the Build and No-Build Alternatives

Substantial population growth within the Highway 101 corridor is expected to occur by 2010. ABAG's *Projections 2005* forecast growth rates between 2000 and 2010 of 10.7 percent for Sonoma County, 22.2 percent for Windsor, and 12.8 percent for Santa Rosa. Traffic volumes within the project limits are projected to increase between 18 and 230 percent depending upon direction and peak hour. Given such an increase in travel demand, 2010 traffic operations were analyzed to show

how the project would operate in the opening year. The Build Alternative *(Preferred Alternative)* is anticipated to operate at acceptable levels of service in 2010 and would in most cases operate better than the No-Build Alternative[4]. The Build Alternative *(Preferred Alternative)* would also improve traffic operations at all the intersections that under the No-Build Alternative would operate at or below LOS E.

Table 3.1-5 shows peak hour travel time and delay in 2010 under the Build Alternative *(Preferred Alternative)*. The Build Alternative *(Preferred Alternative)* would eliminate or reduce congestion within the project limits, compared to no-build conditions in 2010. Benefits would be realized in both the northbound and southbound directions in both the morning and evening peak hours. This is because HOV lane users would be able to bypass congestion in the mixed-flow lanes resulting from a bottleneck in the vicinity of the SR 12 interchange south of the project limits.

Table 3.1-5: Year 2010–Travel Time and Delay in Peak Hour under the Build Alternative *(Preferred Alternative)*–Steele Lane to Windsor River Road

Travel Time–Peak Hour (Minutes)				
	Southbound		**Northbound**	
	AM	**PM**	**AM**	**PM**
Mixed-Flow Lanes	7.1	7.9	7.0	7.1
HOV Lane	7.0	7.0	6.9	7.0
Time Savings for HOV compared to Mixed-Flow Users	0.1	0.9	0.1	0.1
Delay–Peak Hour (Minutes)				
	Southbound		**Northbound**	
	AM	**PM**	**AM**	**PM**
Mixed-Flow Lanes	0.5	1.3	0.3	0.4
HOV Lane	0.3	0.4	0.2	0.3
Source: Parsons / Dowling Associates, 2005				

One of the greatest benefits of the southbound HOV Lanes would be the time savings accumulated over the extended hours of the traffic peak. A primary benefit of the HOV lanes is their value as part of the integrated HOV network along the Highway 101 corridor and their ability to provide travel time savings for longer distance travel. By 2010, in both the north and southbound directions, the *Vehicles eligible to use the* HOV lane would be able to bypass any congestion in the mixed-flow lanes and experience almost no delay between Windsor and the Marin-Sonoma Narrows.

With the improvements proposed by the present and related projects in place, all intersections within the project limits would operate at LOS D or better during the morning and evening peak hours except the Windsor River Road/northbound off-ramp-Lakewood Drive intersection. This intersection would operate at LOS E in the morning peak hour; however, operations would be better with the HOV lanes in place than under no-build conditions.

[4] The 2010 operational analysis is a quantitative analysis for the Build Alternative and a qualitative analysis for the No-Build Alternative.

3.1.3 Avoidance, Minimization, and/or Mitigation Measures

Impacts on traffic under the Build Alternative *(Preferred Alternative)* would be generally beneficial. Traffic operations would be improved in comparison with no-build conditions, and therefore no additional project modifications are needed. The proposed project would not have impacts on pedestrian or bicycle facilities. If pedestrian or bicycle facilities would be displaced or interrupted by project construction, they would be replaced.

3.2 Land Use, Planning, and Growth

3.2.1 Existing and Future Land Use

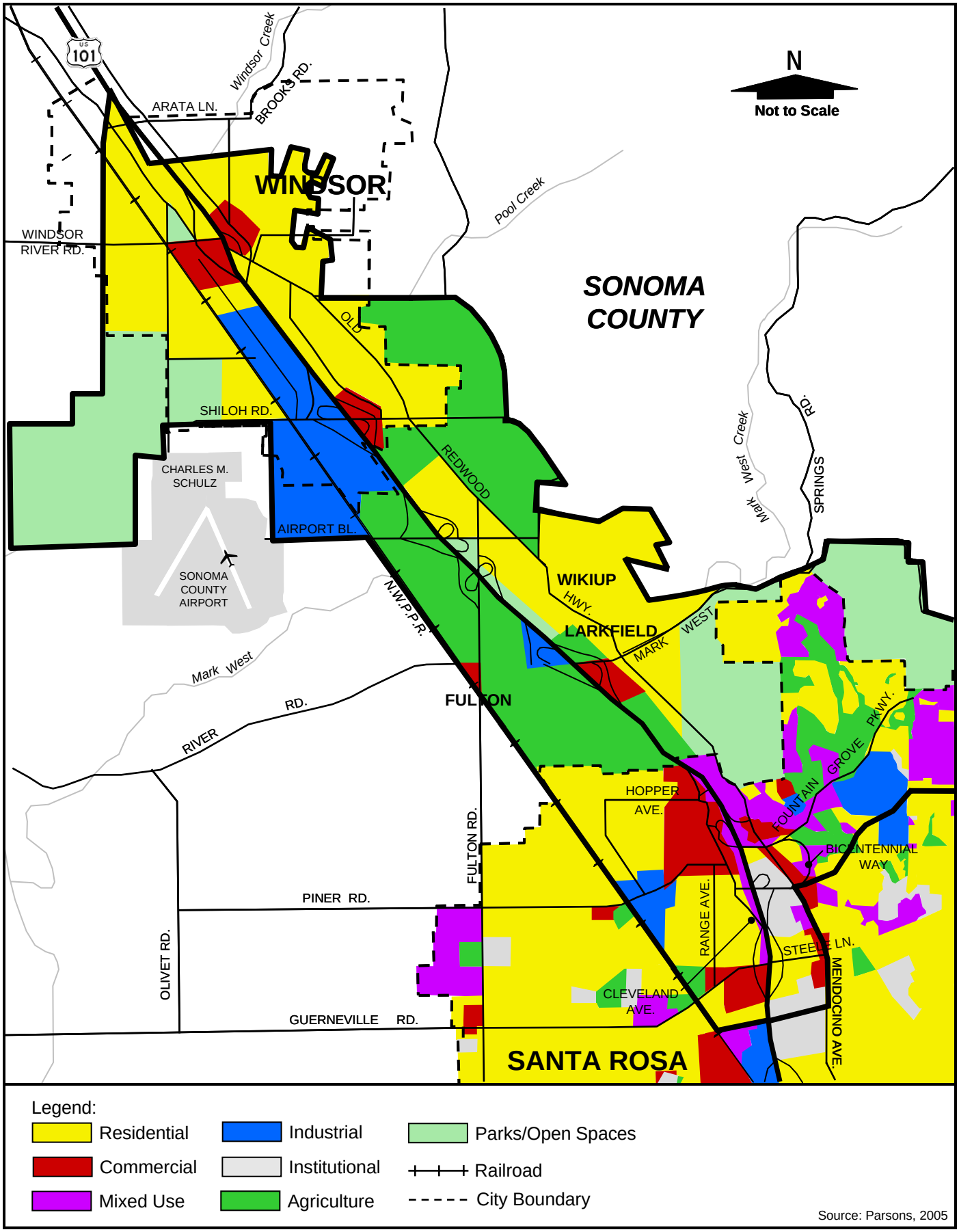
The project setting or "affected environment" is defined as including the immediate project area and the surrounding vicinity. The terms "project area" or "project corridor" refer to the existing Highway 101 corridor as shown in Figure 1.1-1. The regional study area includes portions of Sonoma County, the City of Santa Rosa and the Town of Windsor.

3.2.1.1 AFFECTED ENVIRONMENT

Existing land uses in the vicinity of the Highway 101 Widening Project include agricultural, single- and multi-family residential, industrial, commercial and institutional as described from south to north below and shown in Figure 3.2-1.

In the southern segment of the Highway 101 corridor, from the southern project limit south of the Highway 101/Steele Lane Interchange to the Highway 101/Fountain Grove Parkway Interchange in Santa Rosa, existing land use is mostly commercial with some residential uses to the west and institutional uses to the east. North of the Highway 101/Bicentennial Way Interchange, land uses are mostly residential to the east and commercial to the west. The Sonoma County Administration Center, Main Adult Detention Center and Hall of Justice are located southeast of the Highway 101/ Bicentennial Way Interchange.

Agricultural land uses predominate between the Highway 101/Fountain Grove Parkway Interchange in Santa Rosa and the Highway 101/Mark West Springs Road–River Road Interchange in Larkfield. Industrial uses are located to the west of Highway 101, just north of Fountain Grove Parkway. The *Wells Fargo* Center for the Arts is located southeast of the Highway 101/Mark West Springs Road Interchange.



Source: Parsons, 2005

S C T A

Highway 101 HOV Lane Widening Project:
Steele Lane, Santa Rosa to
Windsor River Road, Windsor

EXISTING LAND USE
Figure 3.2-1

Agricultural land uses are located along both sides of Highway 101 between the Mark West Springs Road–River Road and Airport Boulevard interchanges. A Pacific Gas and Electric (PG&E) substation is located northwest of the Highway 101/Mark West Springs Road–River Road Interchange. The Maddux Ranch Regional Park is located east of Highway 101, just south of Fulton Road. Single-family residential uses are located east of the park.

Land uses between the Highway 101/Airport Boulevard and Highway 101/Shiloh Road Interchanges are predominantly agricultural, with industrial uses located to the northwest. Single-family residences are located northeast of the Airport Boulevard Interchange. Standard Structures Inc., a large industrial firm, is located just southwest of the Shiloh Road Interchange.

East of the highway, between Shiloh Road and the northern project limit, land uses are predominantly single-family residential. West of the highway, just south of the Highway 101/Windsor River Road Interchange, uses are mostly industrial with some commercial and residential.

3.2.1.2 DEVELOPABLE LAND AND DEVELOPMENT TRENDS

Based on the Association of Bay Area Government's (ABAG) *Projections 2005*, Sonoma County is expected to gain over 40,000 households between 2000 and 2030. The City of Santa Rosa is projected to add 20,634 households during this period. The Town of Windsor is expected to have the second highest growth rate in Sonoma County, adding approximately 3,291 households between 2000 and 2030.

Development trends and growth projections consistent with the *Santa Rosa 2020: General Plan* would result in approximately 88,300 total housing units within the city limits, with an estimated population of 210,100. Buildout of all commercial and industrial sites with the City of Santa Rosa would result in approximately 5.5 million square meters (m^2) [59.7 million square feet (ft^2)] of commercial space and 789,000 m^2 (8.5 million ft^2) of industrial space.

The Town of Windsor General Plan projects approximately 3,021 new housing units within the town limits, both in single- and multi-family developments, for a total of about 10,610 housing units. The *Town of Windsor General Plan* indicates that buildout of industrial and commercial sites within the town would result in approximately 1.9 million m^2 (20 million ft^2) of industrial uses and 1.2 million m^2 (13 million ft^2) of commercial uses. Total residential buildout in the Town of Windsor would be nearly 11,000 housing units.

3.2.1.3 MAJOR APPROVED AND ACTIVE PROJECTS

Major approved and active projects in the City of Santa Rosa and the Town of Windsor are listed in Table 3.2-1 and shown in Figure 3.2-2. Approximately 28 projects, including residential, commercial, office, and industrial are under construction, approved or pending approval. The majority of these projects are located in the City of Santa Rosa.

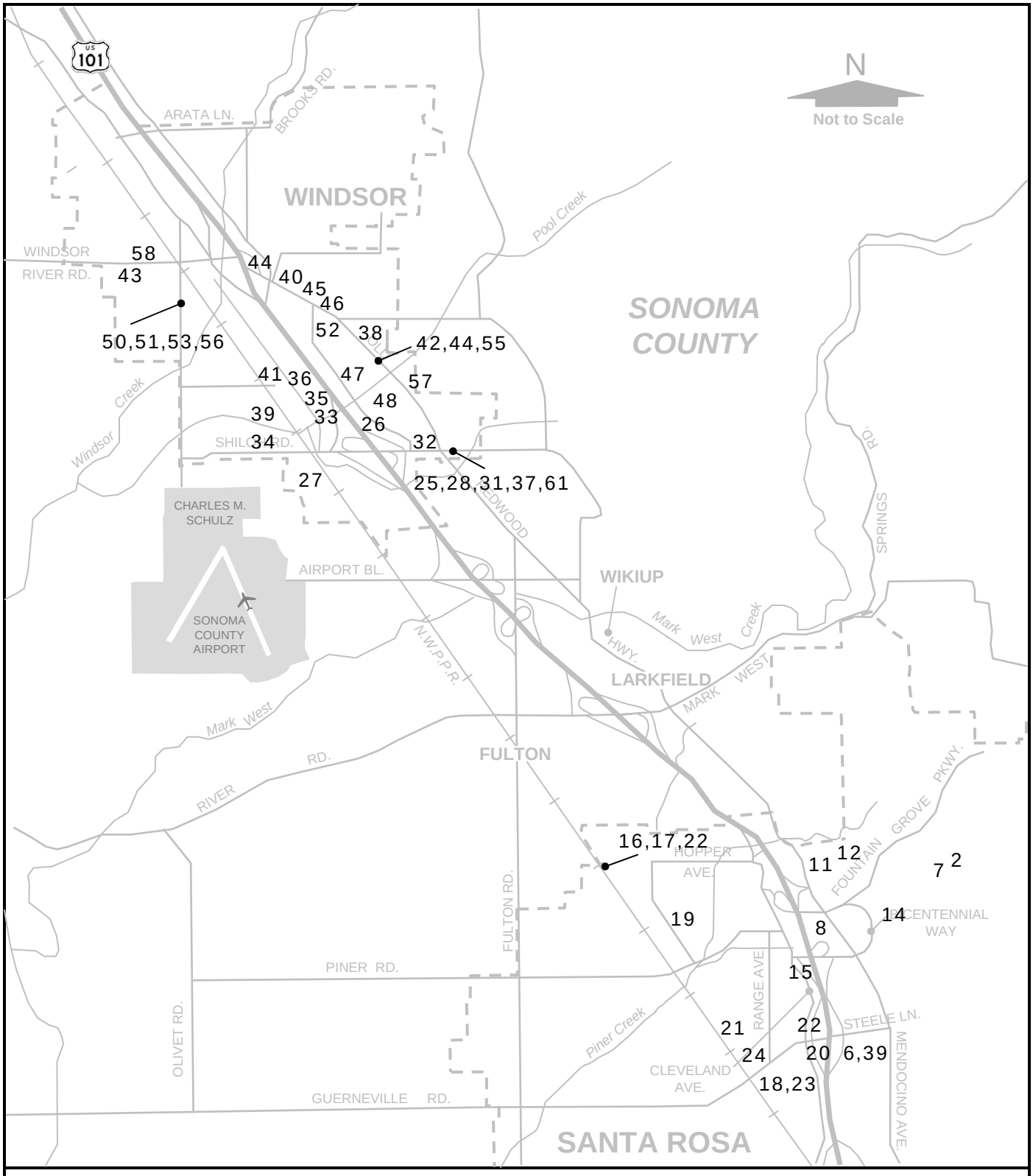
Table 3.2-1: Major Approved and Active Projects in the Study Area

No.	Project Name	Address	Approved hectares/acres	Approved Use	Project Status
Sonoma County (*August* 2007)					
1	Windsor Intermodal Facility	Near Windsor Road, North of Windsor River Road	N/A	Transportation	*Under Construction*
City of Santa Rosa (*July* 2007)					
2	*Chanate Medical Center Phase 2*	*3319 & 3321 Chanate Road*	*1.88 / 4.65*	*Office*	*Approved*
3	*Elliott Condominiums*	*101 Elliott Avenue*	*0.26/0.64*	*Condominium Conversion*	Proposed
4	*Emergency Shelter*	*3324 Chanate Road*	*1.47/3.65*	*Emergency*	*Approved*
5	*Extended Stay Suites*	*3586 Mendocino Avenue*	*3.90/9.65*	*Commercial*	*Approved*
6	*Fire Station No. 11*	*550 Lewis Road*	*0.26/0.64*	*Public or Institutional*	Proposed
7	Fountaingrove Executive Center	3558 Round Barn Cir.	1.85/4.58	Office	Approved
8	Fountaingrove Meadow	3589 Round Barn Blvd.	1.67/4.13	Single Family Attached	Approved
9	*Longs Remodel & Shop Addition*	*2075 Mendocino Avenue*	*1.33/3.28*	*Retail*	*Proposed*
10	*The Arbors*	*3500 Lake Park Drive*	*2.30/5.69*	*Single Family Detached*	*Proposed*
11	*3055 Cleveland Avenue Office Building*	*3055 Cleveland Avenue*	*0.37/0.91*	*Office*	*Approved*
12	*Dennis Lane Subdivision*	*2063 & 2055 Dennis Lane, 3804 Elwin LN*	*0.81/2.00*	*Single Family Detached*	*Proposed*
13	*Harry's Village*	*2056 Dennis Lane*	*0.40/1.00*	*Single Family Detached*	*Proposed*
14	*Jennings Avenue Phase II*	*889 Jennings Avenue*	*0.16/0.40*	*Single Family Attached*	*Proposed*
15	Lands of Furia	3364 Coffey Lane	0.40 / 1.00	*Single Family Detached*	Proposed
16	*Los Robles Condominiums*	*1975 Cleveland Avenue*	*1.43/3.54*	*Single Family Attached*	*Approved*
17	*Orchard Supply*	*2230 Cleveland Avenue*	*1.11/2.74*	*Retail*	*Proposed*
18	*The Crossing at Santa Rosa*	*1627 & 1709 Cleveland Avenue, 1000 Jennings*	*0.89/2.19*	*Multi Family*	*Approved*
19	*West Steele Lane Apartments*	*2045, 2047, & 2049 West Steele Lane*	*0.96/2.36*	*Multi Family*	Approved
Town of Windsor (*April* 2006)					
20	Weiss Incubators	295 Shiloh Road	0.59 / 1.47	Industrial	N/A
21	*Les Schwab Tires*	6*700* Hembree Lane	0.*15* / 0.*36*		N/A
22	*Nase Industrial*	*5750 Skylane Boulevard*	*0.22/0.54 (Bldg. A)* *0.19/0.47 (Bldg. B)*	*Hotel/Retail*	N/A
23	*Shiloh Center Lot 5*	*6450 Hembree Lane*	*0.07/0.17*	*Retail*	*N/A*
24	*Shiloh Center Lot 6*	*6560 Hembree Lane*	*0.07/0.17*	*Restaurant/Retail*	*N/A*
25	*Shiloh Center Lot 7*	*6550 Hembree Lane*	*0.19/0.42*	*Retail*	*N/A*
26	*Shiloh Center Lot 8*	*6580 Hembree Lane*	*0.13/0.33*	*Retail*	*N/A*
27	*Office Depot*	*6400 Hembree Lane*	*0.22/0.55*	*Retail*	*N/A*

Table 3.2-1: Major Approved and Active Projects in the Study Area

No.	Project Name	Address	Approved hectares/acres	Approved Use	Project Status
28	BMW	800 American Way	0.05 / 0.12		N/A
29	Trendwest Resorts	1251 Shiloh Road	4.45/11	Resort Hotel	N/A
30	Denbeste Warehouse	7705 Conde Lane	0.59/1.45	Office Warehouse	N/A
31	Lewis	7975 Cameron Drive	0.05/0.12	Manufacturing	N/A
32	Kentucky Fried Chicken-A&W	6610 Hembree Lane	0.03/0.07	Drive Thru/Restaurant	N/A
33	Robinson	8260 Old Redwood Highway	0.07/0.18	Offices	N/A
34	Airport Business Center	1360 19th Hole Drive	0.03 / 0.07	Mortuary & Caretaker Unit	N/A
35	Moore	8465 Old Redwood Highway	0.20/0.49	Retail	N/A
36	Lewis	7711 Bell Road	0.01/0.26	Manufacturing	N/A
37	Smith Minor Subdivision	7954 Shira Lane	N/A	Single Family Detached	N/A
38	Lissberger Minor Subdivision	825 Windsor River Road	N/A	Single Family Detached	N/A
39	Barker Minor Subdivision	65 Bluebird Drive	N/A	Single Family Detached	N/A
40	Patil Minor Subdivision	87 Cockrobin	N/A	Single Family Detached	N/A
41	Garcia Minor Subdivision	67 Cockrobin	N/A	Single Family Detached	N/A
42	Chiddix Minor Subdivision	280 Billington	N/A	Single Family Detached	N/A
43	Hoffman Minor Subdivision	320 Wilson	N/A	Single Family Detached	N/A
44	Khiroya Minor Subdivision	6490 Old Redwood Highway	N/A	Single Family Detached	N/A
45	Coate Minor Subdivision #2	488 Ginny Drive	N/A	Single Family Detached	N/A
46	Coate Minor Subdivision #3	450 Duncan Drive	N/A	Single Family Detached	N/A
47	Creekside Place	7996 Hembree Lane	N/A	Single Family Detached	N/A
48	Coate Minor Subdivision #4	475 Ginny Drive	N/A	Single Family Detached	N/A
49	Jensen Minor Subdivision	400 Jensen Lane	N/A	Single Family Detached	N/A
50	Silveria	50 Windsor Palms Drive	N/A	Single Family Detached	N/A
51	Faccini	365 Patrick Lane	N/A	Add duplex	N/A
52	Gamber	6440 Old Redwood Highway	N/A	Single Family Detached	N/A
53	McCalligan	750 Windsor River Road	N/A	Single Family Detached	N/A
54	Albertson	595 Jensen Lane	N/A	Single Family Detached	N/A
55	Paul Larsen	180 Windsor River Road	9/ 0.04 / 0.09	Apartment/Retail	N/A
56	Columbo	60 Shiloh Road	9/ 0.04/0.09	Apartment/Retail	N/A

Sources: City of Santa Rosa Community Development Department, *July* 2007
Town of Windsor Planning Department, *April* 2006
Sonoma County Transportation and Public Works Department, *August* 2007



Legend:

City Boundary **Railroad** 5 **Projects Listed in Table 3.2-1**

Source: Santa Rosa Department of Community Development and Town of Windsor Planning Department

S C T A

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

MAJOR APPROVED AND ACTIVE PROJECTS IN THE PROJECT AREA
Figure 3.2-2

3.2.1.4 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would have no long-term substantial effect on land uses in the project area that would be inconsistent with or in addition to planned growth. The location and basic characteristics of transportation facilities would not change.

These conditions would be generally true as well under the Build Alternative *(Preferred Alternative)*, although there would be land use changes associated with the acquisition of property for modifications to existing transportation facilities and construction of new facilities. The proposed project would convert approximately 1.11 ha (2.74 ac) to 2.46 ha (6.08 ac) of land to transportation use. A summary of anticipated land use changes is provided in Table 3.2-2.

Table 3.2-2: Estimated Land Use Changes Anticipated as a Result of the Build Alternative *(Preferred Alternative)*

Land Use Converted	Total Area Converted (Hectares/Acres) — Build Alternative (Including Options at Fulton Road/ Airport Boulevard Interchange Complex[1])			
	NB–A / SB–A	**NB–A / SB–B**	**NB–B / SB–A *(Preferred Interchange Option)***	**NB–B / SB–B**
Agricultural to Transportation	1.11 / 2.74	1.30 / 3.21	1.11 / 2.74	1.30 / 3.21
Vacant or Other to Transportation	0.00 / 0.00	0.00 / 0.00	1.16 / 2.87	1.16 / 2.87
Total	**1.11 / 2.74**	**1.30 / 3.21**	**2.27 / 5.61**	**2.46 / 6.08**

[1] NB–A = Northbound Option A; NB–B = Northbound Option B; SB–A = Southbound Option A; SB–B = Southbound Option B

Source: Parsons 2005

3.2.1.5 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Given the small amounts of land that would be converted to transportation use, no compensation measures are proposed. Discussion focused on agricultural land is in Section 3.3, *Farmlands/Agricultural Lands*.

3.2.2 Consistency with State, Regional, and Local Plans

Planning goals and policies for the study area are guided by the *Sonoma County General Plan (1989)*, the *Sonoma County Comprehensive Transportation Plan for 2004*, the *City of Santa Rosa General Plan*, and the *Town of Windsor General Plan*.

3.2.2.1 AFFECTED ENVIRONMENT

Sonoma County General Plan (1989). Primary goals of the Land Use Element of the *Sonoma County General Plan (1989)* are to coordinate land use with growth projections, the phasing of rural

and urban growth with availability of adequate services, open space separation between cities/communities, opportunities for diverse rural and urban residential environments, the protection of agricultural lands and the preservation of scenic features and biotic resource areas. *The Sonoma County General Plan (2020),* currently in process, will also contain the policies identified above.

Sonoma County Comprehensive Transportation Plan for 2004. The primary goal of the *Sonoma County Comprehensive Transportation Plan for 2004* is to provide a well-integrated circulation system that supports "smart" growth principles and a city-centered growth philosophy, through a collaborative effort of all the cities and the County. Primary objectives to obtain this goal include:

- Focusing commute and through traffic onto Highway 101 and designate major arterial routes to serve primarily as connectors between urban areas, and
- Providing east/west connectivity within each community, including interchange improvements and to improve access to Highway 101.

Sonoma County Airport Industrial Area Specific Plan. Planning goals as set forth by the Specific Plan include:

- Accommodating industrial and other land uses permitted in the planning area with an integrated transportation system incorporating vehicular, rail, pedestrian, and bicycle facilities;
- Treating the Highway 101/Airport Boulevard Interchange as the primary regional access point to the planning area and deferring major improvements to the interchange until warranted by increased traffic volumes; and
- Providing improved future north-south links between Airport Boulevard and River Road to the south and Shiloh Road to the north by providing secondary freeway access to the planning area via the Highway 101/River Road and Highway 101/Shiloh Road interchanges;

City of Santa Rosa General Plan. General land use goals for the City of Santa Rosa as set forth by the General Plan include:

- Fostering a compact, rather than a scattered development pattern, fostering close land use/transportation relationships to promote use of alternative transportation modes;
- Maintaining downtown as the major regional office, financial, civic, and cultural center in the North Bay, and a vital mixed-use center;
- Promoting livable neighborhoods. Ensuring that everyday shopping, park and recreation facilities, and schools are within easy walking distance of most residents;
- Maintaining a diversity of neighborhoods and varied housing stock to satisfy a wide range of needs;
- Maintaining vibrant, convenient, and attractive commercial centers;
- Maintaining the economic vitality of business parks and offices, and Santa Rosa's role as a regional employment center; and

- Protecting industrial land supply and ensuring compatibility between industrial development and surrounding neighborhoods.

Town of Windsor General Plan. Adopted in March 1996, the Town of Windsor General Plan is oriented toward physical development of land uses. Individual land use goals for the Town of Windsor include:

- Making Windsor's unique natural setting central to its identity;
- Encouraging neighborhoods and districts that foster and promoting a friendly, family-oriented community, and support an active, diverse and involved citizenry; and
- Preserving the Town's aesthetic quality and small town atmosphere and improving its overall physical image.

3.2.2.2 ENVIRONMENTAL CONSEQUENCES

Plans, goals and policies of Sonoma County, the City of Santa Rosa and the Town of Windsor that are relevant to the proposed project are summarized in Section 3.2.2.1, *Affected Environment*. The Highway 101 HOV Lane Widening Project is consistent with local planning goals and policies that have been identified in local regional plans and studies. The Build Alternative *(Preferred Alternative)* would be consistent with the stated objectives of these jurisdictions to improve the existing Highway 101 corridor. The No-Build Alternative would not support achievement of these goals.

3.2.3 Growth Inducement

3.2.3.1 REGULATORY SETTING

The California Environmental Quality Act (CEQA) specifically requires that an analysis and discussion of the growth inducement impacts of a project be included as part of an Environmental Impact Report. *The National Environmental Policy Act (NEPA) requires consideration of indirect effects in environmental review. Indirect effects are defined as effects caused by the project and occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).*

3.2.3.2 AFFECTED ENVIRONMENT

The growth inducement *and indirect effect* assessment examines the relationship of the project to economic and population growth or to the construction of additional housing in the project area. It focuses on the potential for a project to facilitate or accelerate growth beyond planned developments, or induce growth to shift from elsewhere in the region *and addresses the following three sets of questions:*

1. What is the reasonably foreseeable growth and land use change without the project? What is it with the project?

2. To what extent will the project influence the overall amount, type, location, or timing of that growth?
3. Will project-related growth put pressure on or cause impacts to environmental resources of concern?

The mechanism by which the proposed project would affect growth would be the region's response to travel time savings during peak commute hours achieved with the project. In the present analysis, the project's influence on area growth and other indirect effects due to travel time savings is considered within the context of other relevant factors such as the relative cost and availability of housing, availability of amenities, local and regional growth policies, and development constraints. The information presented in this section is taken from the technical report, Growth Inducement Study for Highway 101 HOV Lane Widening and Improvements Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor (Parsons 2005).

County Commute Patterns

Santa Rosa is the main regional employment center in Sonoma County. While there are many more jobs in Marin County, San Francisco, and rest of the Bay Area, these employment locations are far enough from Sonoma County residential areas that Santa Rosa dominates the county's employment market. Thus, the majority of Sonoma County commute trips are within the county. Many residents also commute to jobs in Marin and other Bay Area locations. Commuter traffic contributes to vehicle volumes exceeding capacity, resulting in severe congestion and increased travel times along Highway 101 through the project area, mostly during peak hours. The heavy traffic and delays on Highway 101 also lead to traffic spill-over onto local streets, which affects the quality of life in communities along the highway. These traffic issues tend to constrain development and growth, particularly for the more remote areas in the northern portion of the county.

Because the Highway 101 HOV Lane Widening Project would improve traffic conditions and travel times through the project area and vicinity, it would potentially remove this constraint on future growth. The growth inducement analysis evaluated whether the proposed project, individually or when combined with the other HOV lane widening projects in the Highway 101 corridor, would support or lead to unplanned growth. The growth inducing effect of the project on development in these locations was estimated by quantifying project-induced reductions in travel time (enhanced accessibility) to these locations. The enhanced accessibility was then evaluated in context of other factors influencing growth pressures in the areas.

Expected Growth and Land Use Change

The Association of Bay Area Governments (ABAG) is the regional agency with responsibility for defining and projecting land use in the San Francisco Bay Area. ABAG's Projections 2003 define the current land use and expected future regional land use and growth for the region, including the Highway 101 corridor that is the focus of this analysis. The Metropolitan Transportation Commission (MTC) develops corresponding regional travel projections. While not specific to particular transportation improvement projects, ABAG's projections generally assume a dynamic transportation environment in which the regional transportation network is adequate to maintain the economic vitality of the Bay Area. The projections generally balance the growth plans of the local jurisdictions

with the expected economic and demographic trends of the region. MTC's travel projections, on the other hand, are based on specific assumptions about transportation improvements. These two sets of regional projections are used throughout this document, for example, as the basis for the corridor traffic projections in Section 3.1, Traffic and Transportation/Pedestrian and Bicycle Facilities, and for the cumulative impacts analysis in Chapter 4, Cumulative Impacts, as well as the basis for this analysis of growth and other indirect effects.

Because ABAG's Projections 2003 do not specifically include the proposed project, they define the reasonably foreseeable growth and land use change in the corridor without the project. See Chapter 3 of the Growth Inducement Study for Highway 101 HOV Lane Widening and Improvements Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor (Parsons 2005) for population and job projections by corridor jurisdictions. The following section considers the other questions outlined above, including whether the proposed project would cause reasonably foreseeable changes in these land use and growth projections.

3.2.3.3 ENVIRONMENTAL CONSEQUENCES

Eight residential locations as shown in Figure 3.2-3 were selected for testing the growth inducement *or other indirect* effects of the project. These residential locations included the communities of Healdsburg, Windsor, Santa Rosa, Sebastopol, Rohnert Park, Cotati, Penngrove and Petaluma. All of the Highway 101 corridor communities included in the growth inducement*/indirect effects* study are planning for about a 28 percent growth in population by 2030. [5]

The travel time savings for commuters from Windsor and Healdsburg that would be obtained by virtue of the HOV lane project would be about nine minutes, which is the weighted average of the mixed flow and HOV southbound morning and northbound evening savings in peak-hour commute times (12.9 and 5.4 minutes, respectively) based on data presented in Subsection 3.1.2.*4*, 2030 Peak Hour Traffic Conditions under the Build Alternative *(Preferred Alternative)*. Travel time savings for commuters from both these communities to jobs south of Santa Rosa would be slightly greater due to additional positive travel time effects that the Build Alternative *(Preferred Alternative)* would have at the edges of the project area. Since the project's northern terminus is in Windsor, the accessibility to jobs from Windsor is improved moderately, while a less positive effect is felt in Healdsburg. Thus purely in terms of travel time savings, there would be a slight increase in growth pressure in Windsor and to a lesser extent in Healdsburg. Because these increases in growth pressures would be very small, they would be unlikely to cause unplanned growth. Also working against unplanned growth are a variety of other factors, which are discussed following the next paragraph. There would be no travel time savings for commuters from the remaining six residential zones, and therefore, there would be no increase in growth pressures in the other communities.

[5] The growth inducement study was performed in May 2004, prior to the release of ABAG *Projections 2005*. In comparing the 2030 population and employment projections of ABAG *Projections 2005* with ABAG *Projections 2003*, the most substantial change is a 14 percent decrease in projected 2030 Sonoma County population between the 2003 and 2005 projections. There was a slight two percent increase in the projected Sonoma County employment. Because sensitivity tests on the growth inducement results showed no difference in conclusions with *Projections 2005* compared with *Projections 2003*, the study was not redone with *Projections 2005*.

It should be noted that providing HOV lanes would not solve all of Highway 101's congestion problems. Some highway congestion would remain and would gradually build over time. Therefore, the project would have very limited capacity to support growth beyond what is planned in the affected residential areas.

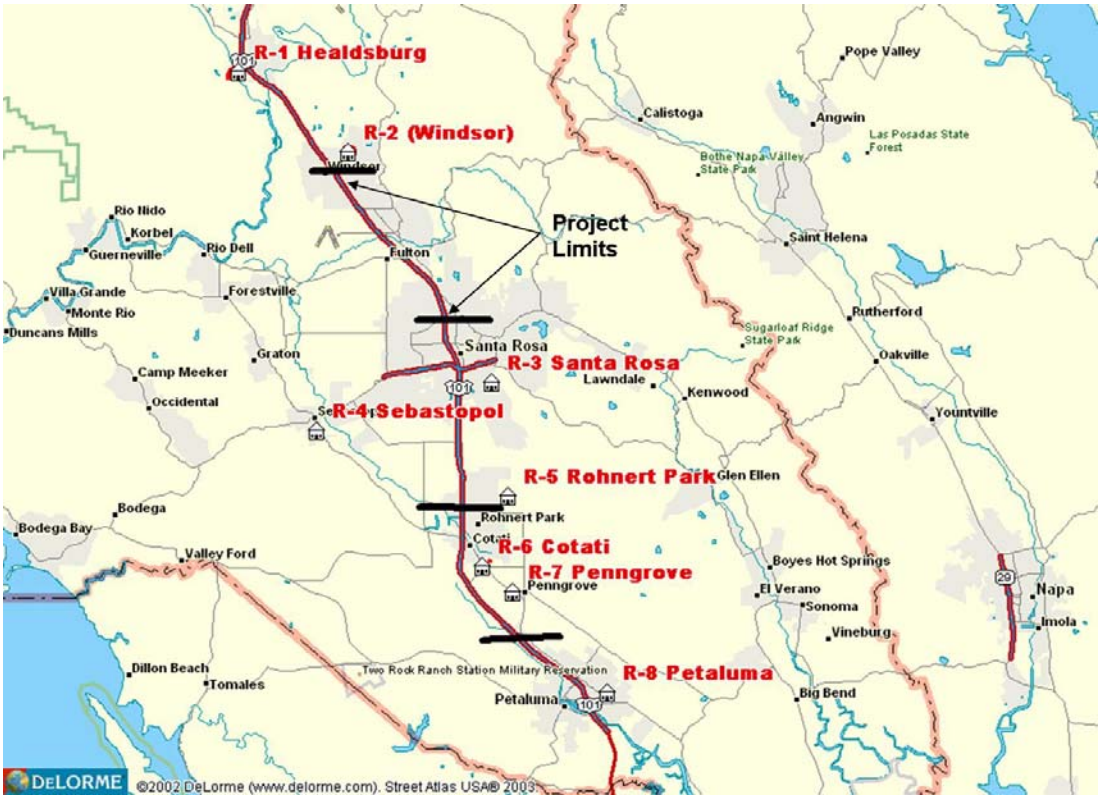


Figure 3.2-3: Residential Areas Studied for Growth Inducement Effects of the Project

Other factors in addition to traffic conditions influence the climate for growth. For example, some corridor communities, such as Windsor, have established Urban Growth Boundaries to define the limits of urbanization for future years. Windsor also plans to manage the amount, type, location, rate, and quality of new development within the town limits (Town of Windsor General Plan, 1995). These types of actions would ensure that the Highway 101 HOV Lane Widening Project would not stimulate unplanned growth.

Other primary factors affecting population growth pressures in outlying residential communities such as Healdsburg or Windsor include the cost of housing and amenities available in the area. Lower housing vacancy rates (see Table 3.4-1) and higher housing costs tend to act as growth deterrents that would outweigh travel time savings.

In summary, growth management policies, as well as moderately high housing prices and low vacancy rates in those areas where commuters would realize the greatest potential travel time savings, when compared to conditions prevailing in other study areas and the rest of Sonoma County, would

tend to discourage accelerated residential growth, even with the improved travel times. The growth inducement study concluded that the Highway 101 HOV Lane Widening Project would support planned growth, but not induce unplanned growth in the area.

3.3 Farmlands/Agricultural Lands

3.3.1 Regulatory Setting

3.3.1.1 FARMLAND PROTECTION POLICY ACT

The Farmland Protection Policy Act (7 Code of Federal Regulation (CFR) Ch. VI Part 658) requires federal agencies to take into account the adverse effects of their projects on farmlands, in part, by requiring an inventory, description, and classification of affected farmlands as well as early consultation with the Natural Resources Conservation Service (NRCS) and processing of Form NRCS–CPA-106 (Farmland Conversion Impact Rating Form).

Farmland means prime or unique farmlands as defined in Section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the U.S. Secretary of Agriculture to be farmland of statewide or local importance.

3.3.1.2 WILLIAMSON ACT

Known formally as the California Land Conservation Act of 1965, the Williamson Act (California Government Code Section 51291) was designed as an incentive to retain prime agricultural land and open space in agricultural use, thereby slowing its conversion to urban and suburban development. The program entails a 10-year contract between the city and an owner of land whereby land kept in agricultural use is taxed on the basis of its agricultural use rather than its market value. Notification provisions of the Act require an agency to notify the Director of the California Department of Conservation of the possible acquisition of Williamson Act contracted land for a public improvement. The local governing body responsible for the administration of the agricultural preserve must also be notified.

3.3.1.3 SONOMA COUNTY GENERAL PLAN (1989)

The main agricultural goal for Sonoma County is to promote a healthy and competitive agricultural industry whose products are recognized as being produced in Sonoma County. Agricultural lands are predominantly in the unincorporated areas of the county. Within the project area, agricultural resources are primarily located from just north of Santa Rosa to south of Windsor.

3.3.1.4 CITY OF SANTA ROSA GENERAL PLAN

Agricultural goals and policies as stated in the *City of Santa Rosa General Plan* aim to conserve agricultural soils by supporting efforts of the Sonoma County Agricultural Preservation and Open Space District to protect and/or acquire prime agricultural land outside of the city's urban growth boundary.

3.3.1.5 TOWN OF WINDSOR GENERAL PLAN

The Town of Windsor's primary agricultural goals are to encourage existing cultivated areas in the County to remain in agricultural production and to protect the rights of existing farms to continue their agricultural operations.

3.3.2 Affected Environment

Existing land uses along the Highway 101 corridor are predominately rural, as described in Section 3.2, Land Use. Agricultural resources in the project area are primarily located along both sides of Highway 101 between just north of Santa Rosa and south of Windsor.

3.3.3 Environmental Consequences

No-Build Alternative. Under the No-Build Alternative, no right of way would be acquired for transportation facilities within the study area; therefore, no farmland would be affected.

Build Alternative. The Build Alternative *(Preferred Alternative)* would require approximately 1.11 hectares (ha) (2.74 acres [ac]) of farmland. Affected farmland would account for approximately 0.002 percent of the total farmland in the county. The locations, Williamson Act status, and size of the affected parcels are summarized in Table 3.3-1.

Table 3.3-1: Farmland Impacts with the Build Alternative *(Preferred Alternative)*

APN#	Location (kilopost/ post mile)	Williamson Act Contract	Farmland Impact (Hectares/Acres)			
			Build Alternative (Including Options at Fulton Road/ Airport Boulevard Interchange Complex[1])			
			NB–A / SB–A	NB–A / SB–B	NB–B / SB–A *(Preferred Interchange Option)*	NB–B / SB–B
059-170-037	41.8 / 26.0	No	0.35 / 0.87	0.44 / 1.09	0.35 / 0.87	0.44 / 1.09
059-230-077	42.1 / 26.2	Yes	0.01 / 0.03	0.02 / 0.04	0.01 / 0.03	0.02 / 0.04
059-230-078	42.3 / 26.3	Yes	0.74 / 1.84	0.84 / 2.08	0.74 / 1.84	0.84 / 2.08
TOTALS			**1.11 / 2.74**	**1.30 / 3.21**	**1.11 / 2.74**	**1.30 / 3.21**

[1] NB–A = Northbound Option A; NB–B = Northbound Option B; SB–A = Southbound Option A; SB–B = Southbound Option B
Source: Parsons 2005

In compliance with the Farmland Protection Policy Act, Parts I and III of Form NRCS-CPA-106 and maps for the proposed project were submitted to the NRCS for its determination of whether any part of the agricultural property that would be acquired for the project site is farmland subject to the Act. The NRCS review and completion on August 17, 2005 of Parts II, IV, and V of the form, indicates that the proposed project would acquire approximately 1.11 to 1.30 ha (2.74 to 3.21 ac) of prime and unique farmland. This represents approximately .0005 percent of the total farmland subject to the Act in Sonoma County.

The total assessment criteria score for the farmland sites is 177. Based on federal regulation 7 CFR 658.4, sites receiving a total score of less than 160 points shall be given a minimal level of consideration for protection and no additional sites need to be evaluated. Sites receiving a total score of 160 or greater, however, shall be given stronger consideration for protection including the evaluation of alternative sites, locations, and/or designs.

The project has been designed to minimize impacts to farmlands within the project corridor. As described in Section 2.3.3, Variations on the Build Alternative *(Preferred Alternative)*, several interchange alternatives were considered to address operational deficiencies at the Fulton Road / Airport Boulevard Interchange Complex. These preliminary design concepts determined that widening primarily on the west side of the highway at the proposed Fulton Road / Airport Boulevard Interchange Complex would result in fewer overall environmental effects and would require considerably less right of way. There would be no effect on farmlands under the No-Build Alternative, however, the No-Build Alternative would not provide HOV lanes, reduce traffic congestion, or address facility and operational deficiencies on the existing roadway. Based on the considerations reported above, it is determined that there is no practicable alternative to the proposed new construction in farmlands at the Fulton Road / Airport Boulevard Interchange Complex. To meet reporting requirements and for data collection purposes, Form CPA-1006 was resubmitted to the NRCS on February 20, 2006. The Farmland Conversion Impact Rating Form along with the Site Assessment Criteria and Point Rating are included in Appendix F.

The Sonoma County Tax Assessor's Office was contacted in March 2005 and confirmed that the Build Alternative *(Preferred Alternative)* would acquire a portion of two parcels of land currently under a Williamson Act contract. The total proposed acquisition of Williamson Act contracted land is 0.75 ha (1.87 ac). The Williamson Act generally requires that a project proponent demonstrate that there is no other land on which it is reasonably feasible to locate a public improvement before converting land under Williamson Act contract. In accordance with Government Code Section 51291(b), the Director of the California Department of Conservation and the Sonoma County Planning Department would be notified prior to acquisition of any farmland under a Williamson Act contract.

3.3.4 Avoidance, Minimization and/or Mitigation Measures

Since adverse impacts to farmlands from the Build Alternative would be minor, no mitigation is proposed.

3.4 Community Impacts

This section identifies and analyzes existing and projected study area social conditions in terms of population characteristics, including household size and composition, ethnicity and income, and employment and labor force; community/neighborhood characteristics including public services and facilities; and circulation and access for groups and populations.

3.4.1 Community Character

3.4.1.1 REGULATORY SETTING

The National Environmental Policy Act of 1969 as amended (NEPA), established that the federal government use all practicable means to ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings [42 U.S.C. 4331(b)(2)]. The Federal Highway Administration in its implementation of NEPA [23 U.S.C. 109(h)] directs that final decisions regarding projects are to be made in the best overall public interest. This requires taking into account adverse environmental impacts, such as, destruction or disruption of human-made resources, community cohesion and the availability of public facilities and services.

Under the California Environmental Quality Act, an economic or social change by itself is not to be considered a significant effect on the environment. However, if a social or economic change is related to a physical change, then social or economic change may be considered in determining whether the physical change is significant. Since this project would result in physical change to the environment, it is appropriate to consider changes to community character and cohesion in assessing the significance of the project's effects.

3.4.1.2 AFFECTED ENVIRONMENT (DEMOGRAPHIC/HOUSEHOLD/NEIGHBORHOOD CHARACTERISTICS)

Demographic characteristics of the affected environment are derived from 2000 U.S. Census Data and *ABAG Projections 2005: Forecasts for the San Francisco Bay Area to the Year 2030.* The study area is defined by census tract block groups adjacent to and within one-half mile of the proposed project alignment, as shown in Figure 3.4-1.

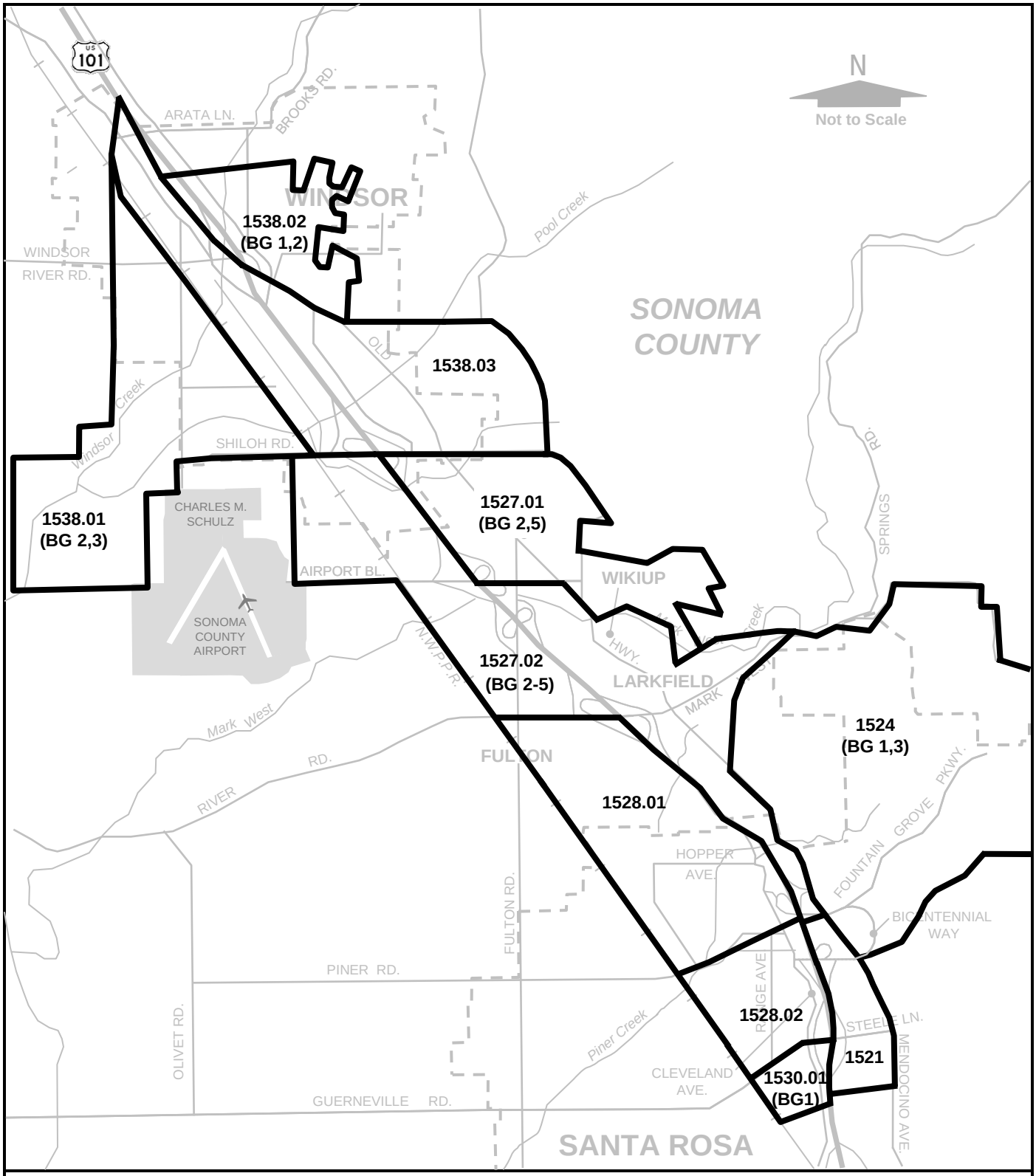
Population, Housing and Employment Growth

Existing and projected population, housing and employment for Sonoma County, the City of Santa Rosa, and the Town of Windsor are shown in Table 3.4-1.

Table 3.4-1: 2000-2030 Population, Housing and Employment Growth

	Population			Households			Employment (Jobs)		
Geographic Area	2000	2030	% Change	2000	2030	% Change	2000	2030	% Change
Sonoma County	458,614	558,400	22%	172,403	213,840	24%	221,490	328,310	48%
City of Santa Rosa	165,849	216,800	31%	62,076	82,710	33%	94,590	152,590	61%
Town of Windsor	22,744	31,700	39%	7,589	10,880	43%	5,960	12,010	102%

Source: *ABAG Projections 2005*



Legend:

Census Tract Boundary **1530.01 Census Tract Number** **(BG 1) Block Group Number**

City Boundary **Railroad**

Source: U.S. Census Bureau

S C T A

Highway 101 HOV Lane Widening Project:
Steele Lane, Santa Rosa to
Windsor River Road, Windsor

SOCIOECONOMIC STUDY AREA
CENSUS TRACTS
Figure 3.4-1

Population and Housing. According to ABAG projections, total population in Sonoma County is expected to grow from 458,614 to 558,400 persons, an increase of 22 percent, between 2000 and 2030. The anticipated growth rates for the City of Santa Rosa and the Town of Windsor would be 31 and 39 percent, respectively. Households are projected to increase commensurately between 2000 and 2030, with a 24 percent increase in Sonoma County, a 33 percent rise in Santa Rosa, and a 43 percent increase in the Town of Windsor.

Employment. Employment in Sonoma County is projected to increase much more rapidly than population, with a 48 percent increase in jobs anticipated between 2000 and 2030. The City of Santa Rosa is expecting a 61 percent increase in employment over the same period. The Town of Windsor expects a 102 percent increase in jobs, which is substantially greater than the expected growth in households. All these projections emphasize continued demand for travel along Highway 101 as the primary north-south route to local and regional employment and commercial opportunities.

Ethnic Mix

An ethnic profile of the existing population is derived from U.S. Census Bureau 2000 data. The ethnic categories used are White, Black or African American, Hispanic, Asian, American Indian and Alaska Native, Native Hawaiian or Other Pacific Islander, Some Other Race and Two or More Races.

As shown in Table 3.4-2 below, ethnic composition within the study area (as identified in Figure 3.4-1) is comparable to that of Sonoma County, City of Santa Rosa and the Town of Windsor, with approximately 25 to 30 percent of residents being part of an ethnic minority group. Persons of Hispanic origin represent the greatest percentage of ethnic minority populations in each respective area.

Table 3.4-2: Ethnic Composition

Geographic Area	Total Persons	White	%	Black or African American	%	Hispanic	%
Study Area	48,921	35,995	74%	668	1%	8,721	18%
Sonoma County	458,614	341,686	75%	6,116	1%	79,511	17%
City of Santa Rosa	147,595	104,581	71%	3,023	2%	28,318	19%
Town of Windsor	22,744	15,989	70%	150	1%	5,364	24%

Geographic Area	Asian	%	American Indian/ Alaska Native	%	Native Hawaiian/ Other Pacific Islander	%	Some Other Race/Two or More	%
Study Area	1,693	3%	442	0.9%	83	0.2%	1,319	3%
Sonoma County	13,786	3%	3,477	0.8%	828	0.2%	13,210	3%
City of Santa Rosa	5,542	4%	1406	1.0%	333	0.2%	4,392	3%
Town of Windsor	503	2%	175	0.8%	30	0.1%	533	2%

Source: 2000 U.S. Census Data

Income

Table 3.4-3 provides information on household income and low-income populations for the study area, Sonoma County, the City of Santa Rosa and the Town of Windsor. The 2000 median household

income in these jurisdictions was $53,076 (Sonoma County), $50,931 (Santa Rosa), and $63,252 (Windsor). The median household income for the study area census tracts was $52,660. Low-income populations represent approximately six percent of the study area, lower than the low-income population levels for Sonoma County and the City of Santa Rosa and slightly higher than that of the Town of Windsor.

Table 3.4-3: Household Income and Percent of Low-Income Populations[6]

Geographic Area	Median Household Income	% Low-Income Populations
Study Area	$52,660	6.2%
Sonoma County	$53,076	7.9%
City of Santa Rosa	$50,931	8.4%
Town of Windsor	$63,252	5.2%

Source: 2000 U.S. Census Data; U.S. Department of Health and Human Services, 1999.

Community/Neighborhood Characteristics

The proposed project would pass through portions of neighborhoods in the planning subareas of Sonoma County, the City of Santa Rosa, and the Town of Windsor. Planning areas and neighborhoods in the project vicinity are described below.

Sonoma County Planning Areas

Santa Rosa Planning Area. The Santa Rosa Planning area includes the City of Santa Rosa and adjacent valleys surrounded by rolling hills and the more mountainous areas of the Sonoma and Mayacamas Mountain ranges. This area of Sonoma County is expected to have absorbed approximately 38 percent of the County's growth through 2005.

Healdsburg Planning Area. The Healdsburg Planning Area is located in north central Sonoma County with the Town of Windsor and the City of Healdsburg being the two urban centers located along the Highway 101 corridor within the planning area. Areas outside the valley floors and lower foothills are relatively inaccessible and sparsely populated. Most employment in the Healdsburg Planning Area is in the agricultural, manufacturing and service industries.

Sonoma County Airport Industrial Area Specific Plan. The Airport Industrial Specific Plan covers the area between the Charles M. Schulz-Sonoma County Airport and Highway 101. Its north and south boundaries are the southwestern border of the Town of Windsor and Mark West Creek, respectively. According to the *Sonoma County Airport Industrial Area Specific Plan,* the plan area will accommodate industrial, commercial and agricultural land uses.

[6] Low-income populations are defined by the 1999 U.S. Department of Health and Human Services guidelines. The poverty threshold established in 1999 was $16,700 for a family of four.

City of Santa Rosa Planning Areas

West Junior College Neighborhood. The West Junior College Neighborhood is located in the southeast portion of the study area in the City of Santa Rosa between Highway 101 to the west, Mendocino Avenue to the east, Steele Lane to the north and College Avenue to the south. Central to the neighborhood is Santa Rosa Junior College. Other facilities in the area include the California National Guard Armory, the California Department of Forestry and Fire Protection Regional Headquarters, the Ridgway Swim Center, and Ridgway Continuation High School.

City of Santa Rosa Neighborhood Associations

Journey's End Mobile Home Owner's Association. The Journey's End Mobile Home Owner's Association represents the interests of tenants residing in the mobile homes located at 3575 Mendocino Avenue, east of Highway 101 and just north of Kaiser Permanente in Santa Rosa.

Town of Windsor Planning Areas

Special Area A. Special Area A in the Town of Windsor is the area bound by Highway 101, Shiloh Road, Windsor Golf Course, and Wilson Lane. According to the *Town of Windsor General Plan,* future development in this area would maximize the full potential of its existing highway access and its future transit access.

Special Area D. Special Area D includes the incorporated and unincorporated areas north and west of Jensen Lane, the unincorporated area south of Pleasant Avenue and the incorporated and unincorporated areas between Jensen Lane and Pleasant Avenue. The *Town of Windsor General Plan* encourages compatibility with active vineyards immediately to the east with most of the area to be developed as residential.

Special Area F (Standard Structures site). Special Area F in the Town of Windsor is the site of Standard Structures Inc., an industrial firm located adjacent to Highway 101 just south of Shiloh Road near the Windsor Golf Course. The *Town of Windsor General Plan* permits outdoor storage for heavy industrial uses for a ten-year period from the adoption of the *General Plan* for this planning area.

Special Area G (North of Shiloh Center site). Special Area G is a 17-acre site located just north of Shiloh Center and the Home Depot off of Shiloh Road. The entire area was initially high-density residential, but since the adoption of the *Town of Windsor General Plan,* a quarter of Special Area G has been reallocated as medium-density residential.

Special Area H. Special Area H is located east of Old Redwood Highway, just north of Esposti Park, near Windsor's eastern border. This area is designated commercial with a low-medium density residential overlay to allow for a mixture of uses.

Special Area I. Special Area I is located in the Old Town Area at the southern end of Bell Road between the Northwestern Pacific Railroad (NWPR) and Windsor Creek. This area provides for a mix of housing and local neighborhood-serving commercial uses.

3.4.1.3 ENVIRONMENTAL CONSEQUENCES

Community cohesion is defined as the degree to which residents have a sense of belonging to their neighborhood or experience attachment to community groups and institutions, as a result of continued association over time. The proposed HOV lanes and related Highway 101 improvements would not constitute any new physical or psychological barriers that would divide, disrupt, or isolate neighborhoods, individuals, or community focal points in the corridor. Because the proposed HOV Lane project would widen Highway 101 primarily within its median, the communities and neighborhoods adjacent to Highway 101 would not experience a disruption in cohesion.

The proposed project would not have an adverse impact on the regional or local economy. The impact of direct and indirect employment added to the regional economy as a result of the proposed project would be positive.

3.4.1.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

As there would be no impacts to neighborhoods or community cohesion, mitigation is not warranted. Measures to mitigate impacts to neighborhoods and businesses as a result of noise and vibration and visual changes are described in their respective sections.

3.4.2 Community Facilities and Public Services

3.4.2.1 AFFECTED ENVIRONMENT

Public services and facilities located in the study area, including police, fire, medical, educational and cultural are described below.

Police Services. Police protection and traffic enforcement in the study area are provided by the Sonoma County Sheriff's Department, California Highway Patrol, and the police departments of the City of Santa Rosa and the Town of Windsor. Precinct stations for the Town of Windsor Police Department and Sonoma County Sheriff are located in the study area at 9291 Old Redwood Highway and 2796 Ventura Avenue, respectively. The Sonoma County Sheriff Helicopter Unit and the North County Detention Facility are also within the study area.

Fire Protection Services. The Sonoma County Department of Emergency Services, the Santa Rosa Fire Department, and the Town of Windsor Fire Protection District provide fire protection services and emergency medical rescue services for the study area. Three fire stations and the California Department of Forestry-Sonoma Air Attack Base are located in the study area.

Hospital and Medical Facilities. Two medical facilities in the City of Santa Rosa are located within the study area: Kaiser Permanente-Santa Rosa and Sutter Medical Center.

Schools. Nineteen public and eight private schools are located in the study area, including two adult education centers and Santa Rosa Junior College. Public schools in the study area are within the jurisdiction of the Santa Rosa City, Piner-Olivet Union, Mark West Union, or Windsor Unified School districts.

Other *Community* Facilities. There are a number of other *community* facilities within the study area, including the Charles M. Schulz Museum, *Wells Fargo* Center for the Arts, Pacific Coast Air Museum and the Windsor Town Hall. Five community centers are in the study area: Steele Lane Community Center, Angela Center, Windsor Senior Center, Windsor Boys and Girls Club, and the Windsor Community Center. Three libraries in Santa Rosa and one in Windsor are located in the study area.

Other Public Facilities. Other public facilities in the study area include three post offices and three transportation facilities, including the Charles M. Schulz – Sonoma County Airport. A California National Guard Armory station is located at 1500 Armory Drive in the study area.

Houses of Worship and Cemeteries. There are 42 houses of worship of various denominations and two cemeteries located in the study area.

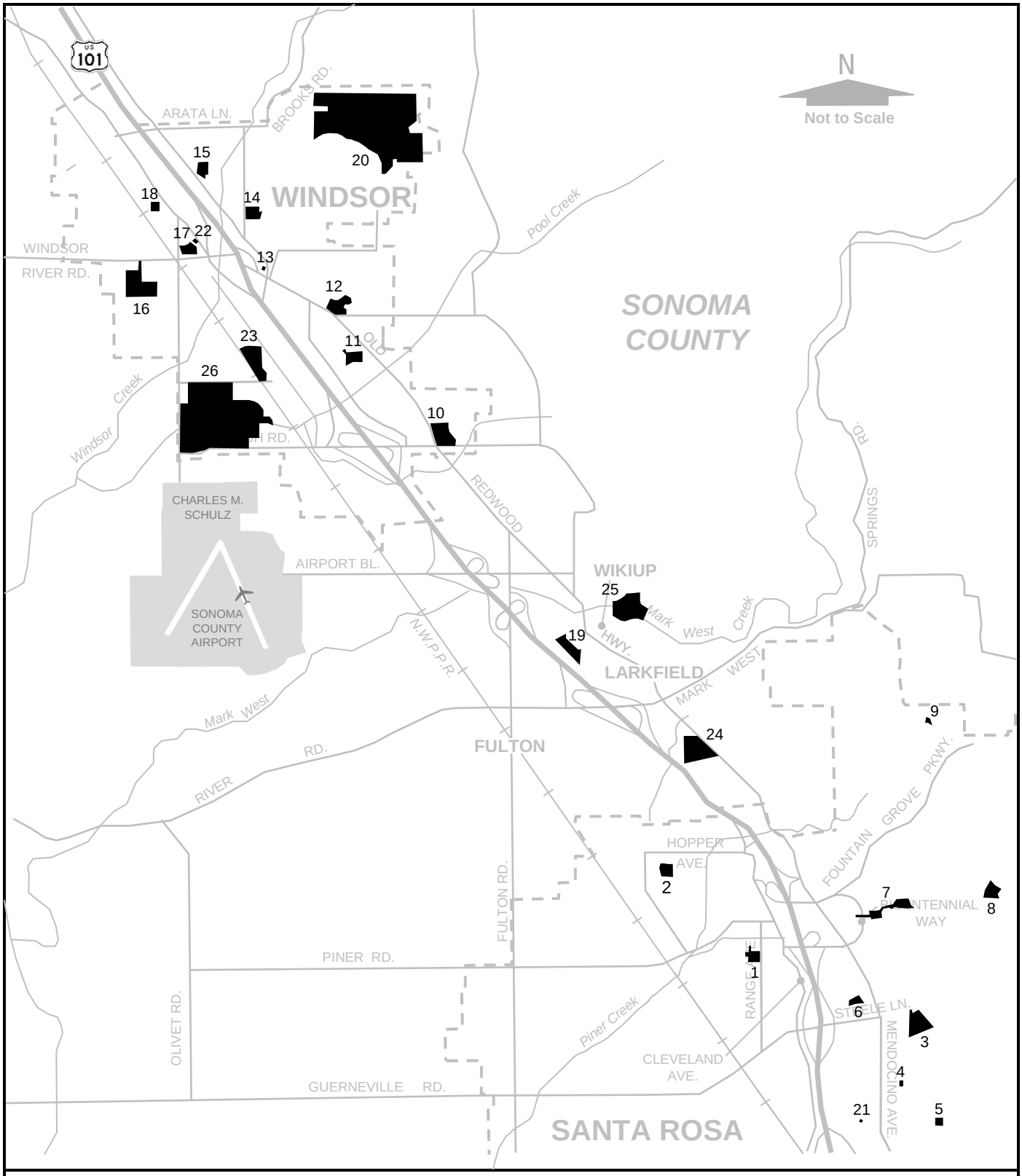
Recreational Facilities. As listed in Table 3.4-4 and shown in Figure 3.4-2, there are 26 park and recreational facilities within the study area. Numbers on the table are keyed to locations shown in the figure. With the exception of the privately owned and operated Wikiup and Windsor Golf Courses, these facilities are operated by Sonoma County's, the City of Santa Rosa's and the Town of Windsor's parks and recreation departments.

Table 3.4-4: Existing Park and Recreational Facilities in the Study Area

No.	Name	Address/Location	No.	Name	Address/Location
	City Parks – Santa Rosa				
1	Bicentennial Park	974 Russell Avenue	6	Steele Lane Park	130 Schurman Drive
2	Coffey Park	1524 Amanda Lane	7	Nielsen Ranch Park	3450 Lake Park Drive
3	Franklin Park	2095 Franklin Avenue	8	Hidden Valley Park	3455 Bonita Vista Drive
4	Humbolt Park	1172 Humbolt Street	9	Fir Ridge Park	3672 Fir Ridge Drive
5	North Park	921 North Street			
	City Parks – Windsor				
10	Esposti Park	6000 Old Redwood Highway	15	Michael A. Hall Park	431 Jane Drive
11	Robbins Park	100 Billington Lane	16	Keiser Community Park	700 Windsor River Road
12	Pleasant Oak Park	302 Sugar Maple Lane	17	Windsor Town Green	9455 Bell Road
13	Pueblo Viejo Park	45 Third Street	18	Los Robles Park	10860 Rio Ruso Drive
14	Lakewood Meadows Park	9150 Brooks Road South			
	Regional Parks – Sonoma County				
19	Maddux Ranch Regional Park	4655 Lavelle Road	20	Foothill Regional Park	1351 Arata Lane
	Athletic Facilities				
21	Ridgway Swimming Center	455 Ridgway Avenue, Santa Rosa	23	Wilson Ranch Soccer Park	7955 Cameron Drive, Windsor
22	Huerta Gym	9291 Old Redwood Highway, Windsor	24	Tom Schopflin Fields	4351 Old Redwood Highway, Sonoma County
	Golf Courses				
25	Wikiup Golf Course	5001 Carriage Lane	26	Windsor Golf Course	1590 Wilson Lane

Source: Parsons 2004

Public Utilities. Water service is provided by the City of Santa Rosa and Town of Windsor. The city and town also provide wastewater collection and treatment within the study area. However, there are no wastewater facilities within the project limits.



Legend:

Parks **City Boundary** **Railroad**

Source: Parsons 2005

S C T A

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

PARKS AND RECREATIONAL FACILITIES
Figure 3.4-2

3.4.2.2 ENVIRONMENTAL CONSEQUENCES

The long-term effect of the proposed project would be to reduce congestion and diversion of freeway traffic to local streets. Thereby, it would enhance accessibility within the greater Highway 101 project area, which would benefit the community facilities identified in Section 3.4.2.1. None of these facilities would be affected by the proposed project. Impacts during the construction phase are described in Section 3.16.4, Community Impacts. Domestic water services, wastewater facilities and solid waste disposal would not be affected by the proposed project, which would not induce unplanned growth or substantially increase stormwater run-off.

3.4.2.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

As there would be no adverse effects on community facilities, no mitigation measures are proposed. Avoidance and minimization measures to be implemented during the construction phase are described in Section 3.16.4, *Community Impacts*.

3.4.3 Relocations

There would be no residential or business relocation as a result of the proposed project.

3.4.4 Environmental Justice

3.4.4.1 REGULATORY SETTING

Executive Order (EO) 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), dated February 11, 1994, calls on federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority populations and low-income populations. The U.S. Department of Transportation (DOT) has published a Final DOT Order to establish procedures for use in complying with EO 12898 for its operating administrations, including FHWA. If disproportionately high and adverse impacts would result from the proposed action, mitigation measures or alternatives must be developed to avoid or reduce the impacts, unless the agency finds that such measures are not practicable.

Impacts and benefits of transportation projects result from the physical placement of such facilities, and also from their ability to improve or impede access to and from neighborhoods and other portions of the region. The environmental justice analysis examines whether ethnic minority and/or low-income populations in the project area would experience disproportionately adverse accessibility or other impacts, and if the impacts experienced by such populations would be inconsistent with the benefits created.

3.4.4.2 AFFECTED ENVIRONMENT

The project study area includes a variety of neighborhoods and a multi-ethnic population. The ethnic composition for the study area, as described in Section 3.4.1, Community Character, is comparable to that of Sonoma County as a whole. The City of Santa Rosa and the Town of Windsor are both slightly more diverse than the study area and County. As shown in Table 3.4-5, approximately

26 percent of all study area residents are members of minority groups. This compares to a 25 percent minority population in Sonoma County. In the City of Santa Rosa and the Town of Windsor, 29 and 30 percent of the population, respectively, are represented by minorities. Table 3.4-5 also shows that the percentage of low-income populations is lower in the study area (approximately six percent) than in Sonoma County or the City of Santa Rosa, with approximately eight percent. The Town of Windsor has the lowest percentage of low-income population with five percent.

Table 3.4-5: Minority and Low-Income Populations in the Study Area

	Study Area	Sonoma County	City of Santa Rosa	Town of Windsor
% Minority	26%	25%	29%	30%
% Low-Income	6%	8%	8%	5%

Source: 2000 U.S. Census Data: U.S. Department of Health and Human Services, 1999.

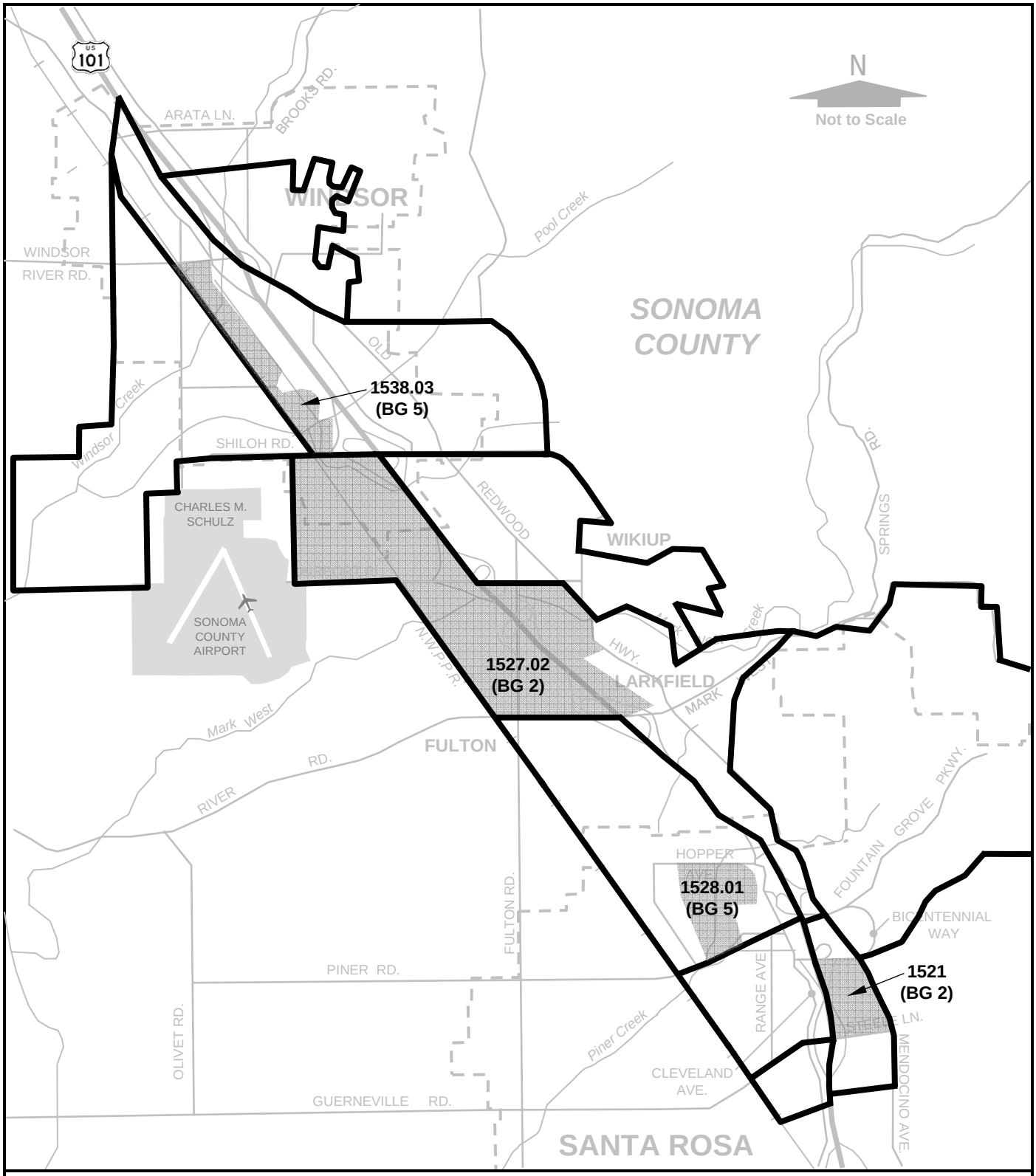
For the purposes of this analysis, the potential for environmental justice impacts was identified when the population in any census tract block group met or exceeded either of the following criteria:

1. The census tract block group contained 50 percent or more minority or low-income populations; or
2. The percentage of minority or low-income populations in any census tract block group was more than 10 percentage points greater than the average in the city and/or county in which the census tract block group is located.

Based on 2000 U.S. Census Data for the study area, populations in six out of 20 census block groups located adjacent to Highway 101 qualify as environmental justice communities based on ethnicity or income level. Low income populations are defined as having a median household income at or below Department of Health and Human Service poverty guidelines. Environmental justice communities are shown in Figure 3.4-3 and described below.

- **Census Tract 1521; Block Group 2** – Located northeast and bordering the Highway 101/Steele Lane Interchange, with a low-income population rate of nearly 18 percent.
- **Census Tract 1527.02; Block Group 2** – Northwest of the Highway 101/River Road – Mark West Road Interchange, with the highest concentration of low-income households (over 24 percent) of the block groups adjacent to Highway 101.
- **Census Tract 1528.01; Block Group 5** – Northwest of the Highway 101/Fountain Grove Parkway-Piner Road Interchange, with the highest percentage (50.4 percent) of ethnic minority populations of all the block groups in the study area.
- **Census Tract 1538.03; Block Group 5 –** Located west of Highway 101 between Shiloh Road and Windsor River Road, with a low-income population rate of nearly 15 percent.

Given that environmental justice communities were identified within the project study area, efforts were made to ensure that these communities were notified of all public informational meetings and the public hearing for this environmental document; see Section 6.1.4, Newspaper Notices and Flyers.



Source: Parsons 2005

S C T A

Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor

ENVIRONMENTAL JUSTICE COMMUNITIES
Figure 3.4-3

3.4.4.3 ENVIRONMENTAL CONSEQUENCES

As discussed in Section 3.4.4.2, Affected Environment, low-income and minority populations are found in the project area. Because the proposed project would alter an already existing freeway, it would not divide an established community. Potential impacts to neighboring populations include added noise impacts. These are impacts typically assessed to determine if there would be disproportionate impacts on low-income or minority populations.

Environmental impacts would be distributed evenly throughout the project area and would not be concentrated in neighborhoods with minority or low-income residents. Noise abatement measures are recommended wherever noise abatement criteria are met and would be expected to prevent disproportionate impacts to any particular area. It is not anticipated that any business or residential displacements would occur.

Based on the foregoing discussion, the proposed project would not cause disproportionately high and adverse effects on any minority or low-income populations as discussed in EO 12898 regarding environmental justice. SCTA has conducted public outreach to communicate with these communities throughout the environmental review process. Community members have provided substantive input into the current project design and construction approach, as discussed more fully in Section 6, Summary of Public and Agency Involvement and Tribal Coordination.

3.4.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Caltrans would abate the long-term noise effects of the project with soundwalls consistent with FHWA noise abatement criteria. Construction phase impacts would be minimized with *best management practices* (BMPs) to control noise and fugitive dust. Detour routes would be planned in coordination with Caltrans, Sonoma County, and the traffic departments of Sonoma County, City of Santa Rosa, and Town of Windsor and would be noticed to emergency service providers, transit operators, and Highway 101 users in advance. These measures would serve to ensure that there would be no disproportionate adverse effects on minority and low-income residents.

3.5 Utilities/Service Systems

3.5.1 Affected Environment

Utilities within the Highway 101 HOV Lane Widening Project area include:

- overhead electrical transmission, fiber optics, and telephone lines; and
- underground electrical, gas, water, sewer, fiber optics, and telephone

Pacific Gas & Electric Company (PG&E) provides gas and electricity service in the study area. AT&T (formerly SBC) maintains the local telephone service and Comcast maintains fiber optic facilities.

3.5.2 Impacts

The majority of the utilities within the project area are transverse crossings that do not present conflicts to the proposed project Build Alternative *(Preferred Alternative)*. Proposed embankment

widening may require extension of existing protective casings for two PG&E gas lines and a water and sewer line owned by the City of Santa Rosa.

In addition, a joint-use pole carrying a PG&E 12 kV overhead electric line and an AT&T telephone line will require relocation to accommodate the proposed highway improvements at the intersection of Airport Boulevard and the northbound ramps, under both interchange options. *A second pole on this line would require relocation under Interchange Option A.*

There are a total of nineteen existing longitudinal utility encroachments within the corridor. A 375 mm City of Santa Rosa sewer line runs parallel to Highway 101 on the east side, crossing the Mendocino Avenue northbound ramps, the latter portion of which is abandoned. Seven overhead electric lines and a joint-use overhead electric/SBC telephone line cross the highway at a skew greater than permissible angle for a transverse crossing and are therefore considered longitudinal encroachments. Similarly, crossings of an underground telephone, two Comcast fiber optic cables and a 75 mm PG&E gas line exceed the permissible skew angle. Other longitudinal encroachments include a 400 mm City of Santa Rosa water line that runs parallel to the mainline at the Bicentennial Way northbound exit loop ramp; a PG&E gas line that runs within the right of way of the River Road southbound exit ramp and a second gas line that runs within the ramp terminal area of the Windsor River Road southbound on-ramp; a 530 mm City of Santa Rosa sewer line that runs parallel to the Airport Boulevard southbound exit ramp, within the right of way; and a 530 mm City of Santa Rosa sewer that runs within the right of way, parallel to the Airport Boulevard northbound on-ramp. Three of the utilities previously mentioned as exceeding the permissible crossing angle - the PG&E gas line, a Comcast fiberoptics line and a 12 kV PG&E overhead electrical - also run within the right of way, parallel to the Airport Boulevard southbound off-ramp. No changes are proposed to any of these utilities; therefore, an exception to *Caltrans'* longitudinal encroachment *policy* will be required for each incidence.

There will be no long-term disruptions in service as a result of utilities being relocated or receiving additional protection.

Construction phase impacts are discussed in Section 3.16.5, Utilities/Service Systems.

3.5.3 Avoidance, Minimization, and/or Mitigation Measures

Design, construction, and inspection of utilities that would need to be relocated for the project would be done in accordance with Caltrans requirements. Where feasible, relocations would be undertaken in advance of project construction. Caltrans would coordinate with the affected service provider in each instance to ensure that work is in accordance with the appropriate requirements and criteria.

In addition, coordination with the utility providers would be initiated during the preliminary engineering phase of the project and would continue through final design and construction. Coordination efforts would plan utility re-routes, identify potential conflicts, ensure that construction of the proposed project minimizes disruption to utility operations, and formulate strategies for overcoming problems that may arise.

Measures to avoid or minimize disruptions to the emergency services and utilities during construction of the project are discussed in Section 3.16.5, Utilities/Service Systems.

3.6 Visual/Aesthetics

The *Visual Impact Assessment* (CirclePoint, August 2006) for the Highway 101 HOV Lane Widening Project was conducted in accordance with the guidelines provided in the *Visual Impact Assessment for Highway Projects* (FHWA, 1981). The visual analysis characterizes the project area in terms of "landscape units," which are distinct segments of the corridor that have a consistent or cohesive visual or physical character, and identifies visual quality, prominent features, and scenic resources within the landscape units. Selected viewpoints along Highway 101 where the project could affect existing visual quality are identified and evaluated. In addition, physical changes attributable to the proposed project that would cause changes to views currently experienced by residents, motorists and other users of the area are evaluated. Avoidance, minimization and/or mitigation measures to address visual effects are described in Section 3.6.5.

3.6.1 Regulatory Setting

NEPA establishes that the federal government use all practicable means to ensure all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings (42 USC 4331[b] [2]). In its implementation of NEPA (23 USC 109[h]), the FHWA directs that final decisions regarding projects are to be made in the best overall public interest, taking into account adverse environmental impacts, including the destruction or disruption of aesthetic values.

Likewise, CEQA establishes that it is the policy of the state to take all action necessary to provide the people of the state "with…enjoyment of aesthetic, natural, scenic and historic environmental qualities." [CA Public Resources Code Section 21001(b)].

3.6.2 Affected Environment

The existing visual environment is characterized by the landscape components (visual resources) and viewer groups within the project area. Visual resources are described in terms of existing visual character and quality. Viewer groups are evaluated in terms of viewer exposure (the ability to see the project area) and viewer sensitivity, which refers to the viewers' concern for scenic quality and their response to change in visual resources.

3.6.2.1 EXISTING VISUAL CHARACTER AND CONTEXT

The Highway 101 HOV Lane Widening project corridor is located in Sonoma County, California, extending through the City of Santa Rosa, Town of Windsor, and unincorporated areas within Sonoma County. The overall visual character of the project area is primarily rural, with open space/agricultural uses and mature native trees bordering the highway within the project limits, with developed areas near the city centers.

A characteristic that distinguishes Sonoma County from many parts of the San Francisco Bay Area is the continued existence of separate, identifiable cities and communities. The presence of open land helps retain the rural character and avoid corridor-style urbanization. These lands may not necessarily be highly scenic in their own right, but they provide visual relief from continuous urbanization and are a special type of scenic border, known as a community separator. The Santa

Rosa/Windsor community separator is located within the project area on the west and east sides of Highway 101 between the urban growth boundaries of the City of Santa Rosa and Town of Windsor, between Shiloh Road and Hopper Avenue. This separator contains large areas of open space with no development and views to the hills to the east and west.

Another distinguishing characteristic of the existing visual setting resides in the redwood trees that line the highway. Redwood trees were planted in clusters at regular intervals to reinforce motorists' perception of the regional landscape character and Highway 101 as the "Redwood Highway." Over the years, the redwoods have become a dominant visual element of the highway corridor.

3.6.2.2 EXISTING VISUAL IMAGE TYPES AND VIEWER GROUPS

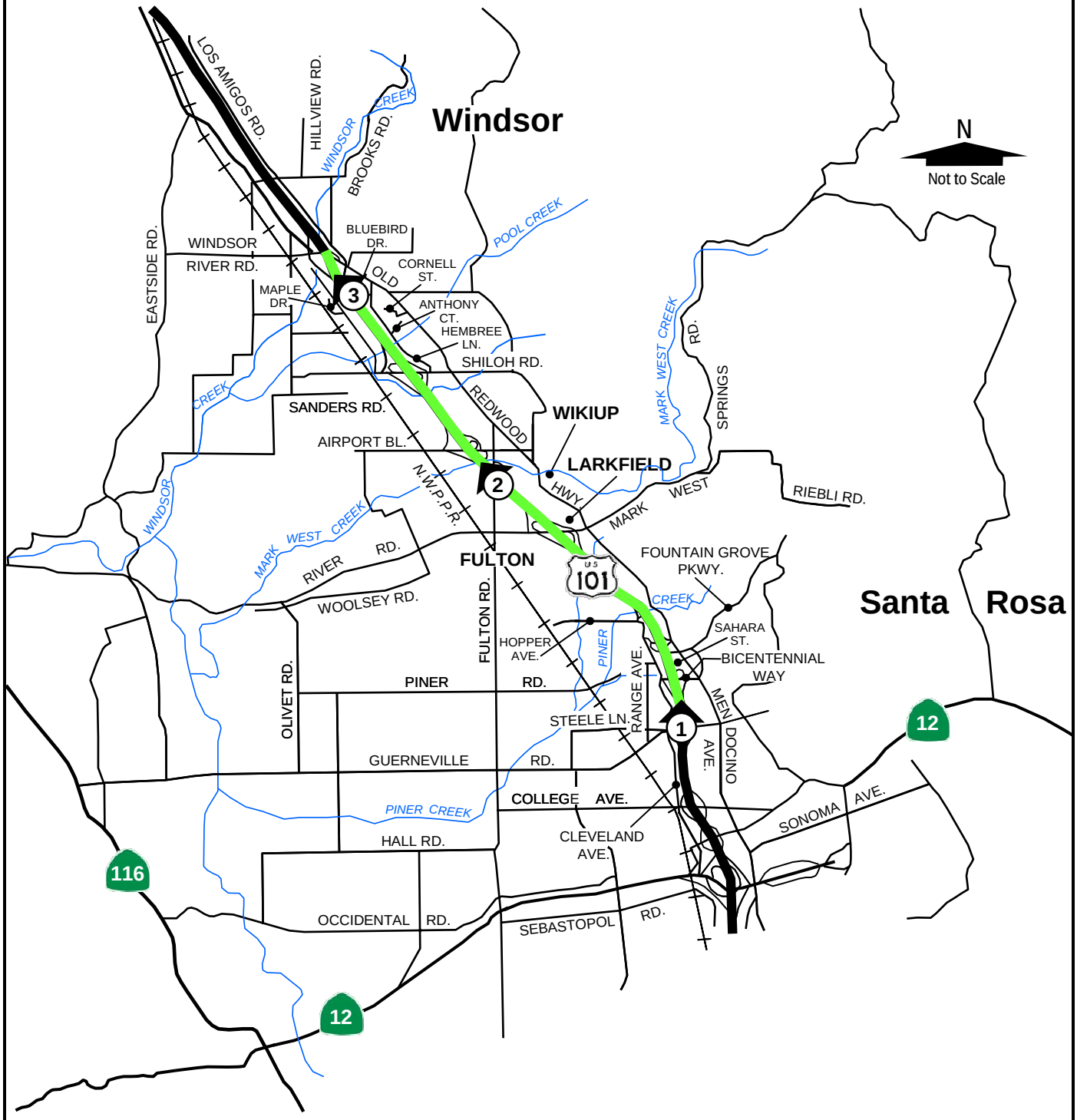
For the purposes of the visual impact assessment, the study area is typically subdivided into landscape units that encompass distinct spatial areas, as described below. Each landscape unit has a distinct visual character based upon the land uses and features that comprise it. These smaller scale land uses or features within each landscape unit are called "image types." Because of the relative visual consistency throughout the Highway 101 corridor, the study area is considered to be located within one landscape unit. Six visual image types are located within the project area: mature trees, agricultural, vineyard, residential, commercial/industrial, and hillsides/distant hills.

"Viewer groups" are generally categorized by their views, either as highway users (from the road) or as highway neighbors (of the road). Three viewer groups were identified within the project area: 1) motorists who use Highway 101 and/or other local streets in the project vicinity as regional roads for commuting or commerce; 2) community viewer types: residents and employees and patrons of commercial uses who have views of Highway 101 from properties along the project corridor; and 3) agricultural employees who have views of Highway 101 from farms along the project corridor.

Motorists would have a low to medium sensitivity to changes in the visual character of the project area. Residents and employees of commercial uses would have high sensitivity to changes in the visual environment at locations along the highway where vegetative screens exist. Seasonal agricultural employees would have a lower sensitivity to visual changes than year-round employees because their exposure to the visual environment would be less frequent.

3.6.2.3 LANDSCAPE UNITS

The project corridor was determined to be one landscape unit (see Figure 3.6-1) based on the general visual consistency of topographical and other distinguishing features within the project area. The existing visual quality of the landscape unit, including image types encompassed within the landscape unit, and viewer groups with a degree of sensitivity to the visual environment are described below and shown in Table 3.6-1.



Source: Parsons 2005

Legend:

1 **Viewpoint Location** **Project Area**

S C T A

Highway 101 HOV Lane Widening Project:
Steele Lane, Santa Rosa to
Windsor River Road, Windsor

VIEWPOINT LOCATIONS
Figure 3.6-1

Table 3.6-1: Summary of the Landscape Unit

Landscape Unit	Description	
Landscape Unit	Image Types	Mature Trees (including redwoods and Valley oaks), Agricultural, Vineyard, Residential, Commercial/Industrial, Hillsides/Distant Hills
	Viewer Groups	Motorists, Community Viewer Types, and Agricultural Employees
	Visual Resources	Mature vegetation along Highway 101; *Wells Fargo* Center for the Arts; commercial, industrial, and residential uses; distant hills.
	Overall Visual Character	Wooded corridor, mature vegetation screens much of the development along Highway 101, and screens views of the highway from adjacent land uses.

Landscape Unit: The predominant visual resources within the landscape unit include mature trees and grassy berms that line the freeway on both sides. The trees vary in size and type, including redwoods and valley oaks, and create a rural, wooded character throughout most of the Highway 101 corridor. Of the approximately *3,604* mature trees that line Highway 101 within the project limits, more than *half*, or about 2,*096*, are redwood trees. There are breaks in the roadside vegetation that expose adjacent uses and visual resources. The *Wells Fargo* Center for the Arts is a *hu*man-made visual resource located on the eastern side of the highway *in the middle section* of the project corridor. The Center has a triangular fountain and a brick colonnade façade. Continuing north on Highway 101, breaks in the vegetation reveal commercial and industrial uses until the highway reaches the Santa Rosa/Windsor community separator. Development of community separators is restricted in Sonoma County; therefore, this area consists of green open space. The Kendall-Jackson Winery is located north of the community separator and west of Highway 101. The winery includes vineyards and a chateau-style winery structure. Commercial centers and the Airport Business Park, which includes a business park sign located in a large vineyard, are evident as the highway continues north. Single-family residences and a trailer park are located east and west of Highway 101, respectively, in the northern section of the project corridor.

Existing Visual Quality

Key viewpoints, as shown on Figure 3.6-1, were identified to represent the visual character of the landscape unit and used to define visual quality. The existing visual quality for the landscape unit was evaluated based on indicators of the level of visual relationships, rather than judgments of physical landscape components. The evaluation was performed for views from the road and of the road. This approach provides a set of three evaluative criteria: vividness, intactness, and unity. These criteria are defined as follows:

Vividness is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns. An example within the study area is the relationship of the vineyards and the background of the distant hills.

Intactness is the visual integrity of the natural and man-made landscape of the immediate environs and its freedom from encroaching elements. An example within the study area is the distinctive relationship of the roadway and the natural roadside vegetation.

Unity is the visual coherence and compositional harmony of the viewshed. The viewshed entails all natural and man-made features found within the normal view range. In man-altered landscapes, unity frequently attests to the careful design or fit of individual components in the landscape. An example within the study area is the way man-made elements such as the residences combine with natural features such as the roadside vegetation which is used as visual screening.

Seven evaluation criteria were applied to measure visual quality: very low, low, moderately low, average, moderately high, high, and very high (FHWA, 1981)

The key viewpoints are typical views that people would have of or from the project, as described below. Table 3.6-2 provides a summary of the existing visual quality for each viewpoint.

Table 3.6-2: Summary of Existing Visual Quality

Viewpoint Number	Setting	Vividness	Intactness	Unity	Overall Visual Quality
1	Looking north towards Bicentennial Way	Moderately High	Average	Average	Average
2	Looking north between Fulton Road and Airport Boulevard	High	Average	Average	Moderately High
3	Looking north, near Windsor River Road	High	Moderately High	Moderately High	Moderately High

Viewpoint 1

This viewpoint is looking north along Highway 101 towards the Bicentennial Way overpass. Mature vegetation with grassy shoulder areas lines both sides of the highway. Tall trees screen the residential and commercial uses from view, and a soundwall is slightly visible, on the east side of the highway. Views of distant hills are obscured by the mature vegetation and Bicentennial Way overpass. Highway 101 and the tall screen of trees on the west side of the highway are co-dominant visual elements in this view. Motorists traveling on Highway 101 are the primary viewer group in this area. However, views of the highway, from adjacent land uses, are screened by dense roadside vegetation.

Visual quality in this segment is characterized by the mature trees that parallel Highway 101, and the roadway itself. The mature trees and the overpass obscure the views of the distant hills. The overpass structure causes a break in the row of trees, disrupting the continuity of mature vegetation which is relatively consistent in size and scale. The overpass, soundwall and highway itself reduce the intactness and unity of the view, resulting in an average rating. However, the mature vegetation is vivid and unique, creating a rural character, and resulting in an average overall visual quality rating.

Viewpoint 1

Viewpoint 2

This viewpoint is located on Highway 101 looking north between Fulton Road and Airport Boulevard. As the motorist travels further north on Highway 101, away from Santa Rosa and toward Windsor, the road becomes more rural in character. Within this view, the large mature redwood trees along both sides of the highway are the dominant visual element. A grassy median with metal-beam guardrails is located between the north and southbound travel lanes. Motorists traveling on Highway 101 are the primary viewer group in this area. However, views of the highway, from adjacent land uses, are screened by dense roadside vegetation.

Visual quality in this segment is characterized by the natural landscape, as it represents the rural character of the area. The large redwood trees that run parallel to the freeway blend with the surrounding trees of varying sizes and types that provide visual contrast and texture. The visual landscape is broken up by highway signage, street lights, and an overpass that detract from the unity and intactness of the view. The combination of trees and hills—although interrupted by the freeway—create a highly vivid scene with average intactness and unity, resulting in a moderately-high overall visual quality rating.

Viewpoint 2

Viewpoint 3

This viewpoint is looking north along Highway 101 towards the Windsor River Road interchange at the northern project limit. In this view, Highway 101 continues straight towards the mature vegetation before veering east in the distance. Mature trees that line both sides of the freeway are the dominant visual elements. A grassy median with metal-beam guardrail separates the north and southbound travel lanes. Motorists traveling on Highway 101 are the primary viewer group in this area. However, views of the highway, from adjacent land uses, are screened by dense roadside vegetation.

Visual quality in this segment is characterized by the natural landscape, reflecting the rural character of the area. The dense trees that run parallel to the freeway blend with the surroundings, as they are characteristic of the varying sizes and types of trees in the area. In this segment, there are fewer highway signs, lights or other man-made elements to detract from the rural character. The combination of trees and hills—although interrupted by the freeway—creates a highly vivid scene with moderately-high intactness and unity, resulting in a moderately-high overall visual quality rating.

Viewpoint 3

3.6.3 Environmental Consequences

The following section analyzes the potential visual impacts of the proposed project within the landscape unit that makes up the project study area. The methodology used to assess visual impacts combines the two principal visual impact components: visual resource change and viewer response to that change. "Visual resource change" is analyzed in terms of visual dominance and other visual effects of facilities that would be constructed under the proposed project, together with the change in visual quality. "Viewer response" to these changes is interpreted on the basis of the viewer types identified. The criteria used to determine effects on viewers include: visual dominance of the project; view obstruction or view expansion; effects on community disruption; viewer orientation; and design quality issues, such as changes in vividness, intactness and unity, as described below.

Visual Dominance refers to the contrast between the proposed improvements and their setting described in terms of vegetation, landform, and structural changes. Dominance is a function of how potentially noticeable the project is to the viewer, ranging from:

- **Inevident** — Project is visible but generally not noticeable.
- **Subordinate** — Project is noticeable, but attracts less attention than other components of the setting.
- **Co-dominant** — Project attracts attention equally with other components of the setting.
- **Dominant** — Project dominates the view and attracts more attention than other components of the setting.

View Obstruction or Expansion is a criterion that may modify the adverse effect expected from the dominance evaluation. In terms of view blockage, existing views may be eliminated as a result of structural or landform additions that may block visual access. Conversely, views may be improved or made newly available as a result of existing structural and landform elements being moved or removed. View obstruction or expansion is categorized as follows:

- **Obstructed view** — Project fully or largely blocks views of notable landscape features or vistas.
- **Partial view obstruction** — Project interrupts or partly screens views of notable landscape features or vistas, but some experience of viewing features or vistas remains.
- **New or expanded view** — Project opens up views of notable landscape features or vistas.

Community Disruption, Orientation and Privacy considerations represent a set of criteria that reflects typical viewer responses and perceptions about the relationship of transportation corridors to the surrounding neighborhood.

Ratings used for determining the extent of impacts are defined as follows:

- **Low or negligible** impacts are minor adverse changes to the existing visual resource, with low viewer response to change in the visual environment.
- **Slightly adverse** impacts are slightly detectable within a localized area with increased viewer response.
- **Medium** impacts are those that are readily apparent with moderate viewer response.
- **High** impacts are highly detectable and would be substantial with a high viewer response level.

An overall determination of adverse and beneficial effects on viewers is based on a combined evaluation of the criteria described above. The ratings used for determining the extent of impacts are defined as follows:

Strongly Beneficial−substantial visual change and considerable increase in the overall visual quality, with the likelihood of strongly positive viewer responses.

Beneficial−moderate degrees of visual change and an increase in the overall visual quality, with the likelihood of positive viewer response.

Minimally Beneficial−tangible visual changes and a minimal increase in overall visual quality, with likelihood of moderately positive viewer responses.

Negligible−little or no visual change and no tangible reduction or increase in visual quality, without negative or positive viewer responses expected.

Minimally Adverse−a tangible degree of visual change and a minimal reduction in overall visual quality, with the likelihood of some moderately negative viewer responses.

Adverse−moderate degrees of visual change and a reduction in the overall visual quality, with the likelihood of negative viewer responses.

3.6.3.1 VISUAL RESOURCE CHANGE

Visual changes as a result of the Build Alternative within the landscape unit are described below.

Landscape Unit: To accommodate the Highway 101 HOV lane widening and related facilities such as soundwalls, mature trees (including redwoods and valley oaks) and other vegetation would require removal, thereby affecting existing visual character and quality. Concerted efforts have been made during preliminary engineering to avoid removal of trees. Trees that would be affected by the widened roadway facilities and soundwalls, or that would be too close to the widened roadway to provide adequate safety clearances, would be removed.

Tree surveys were conducted during the visual impact assessment conducted for this environmental document. Counts were made of all mature trees (10-inch diameter at breast height [dbh] or greater) in the field by a biologist/botanist and an engineer. Estimates of tree loss were made using all practicable avoidance measures, including the use of guard rail adjacent to trees within the required clear recovery zone, and preservation of trees whose root systems would not be threatened by roadway cuts. Additional tree surveys have been conducted since then. These surveys estimated maximum tree loss, and included all trees within the clear recovery zone as well as trees whose roots systems (as approximated by the canopies) were within either cut or fill lines.

Based on the combined results, from 228 to 526 mature trees would be removed under the Build Alternative. Of the mature trees removed, between 171 and 390 are redwoods, representing a maximum of 19 percent of the total redwoods (2,096). These redwood trees are outside of their biological range, do not provide habitat, and do not support redwood populations, however, they are considered important aesthetic resources. These redwoods were planted in clusters along Highway 101 to establish its character as "Redwood Highway."

Avoidance and minimization approaches as identified in Section 3.6.5, Avoidance, Minimization, and/or Mitigation Measures [Visual/Aesthetics], will be incorporated during final design to reduce tree loss below the upper end of the reported ranges.

Trees would be removed in specific locations along the corridor particularly in the Fulton Road/Airport Boulevard and Bicentennial Way interchange areas. At the Fulton Road/Airport Boulevard interchange, tree removal would occur on the east and west side of the highway to accommodate the on/off ramps. Tree removal near the Bicentennial Way interchange would occur primarily on the west side, both north and south of the interchange.

The proposed HOV lane project would also result in the need to construct soundwalls at the northern end of the project to reduce noise levels at nearby residences. Soundwalls would be constructed on the east side of Highway 101 along Hembree Lane from Anthony Court to Cornell Street and from Bluebird Court to East Courtyards. Soundwalls would also be constructed on the west side of Highway 101 along Conde Lane from Maple Drive to Oakfield Lane. Through the Town of Windsor, where soundwalls would be constructed on both sides of the highway, motorists would be visually separated from the natural surroundings.

Although soundwalls would be designed with aesthetic treatments, the loss of vegetation combined with the addition of concrete soundwalls would result in an adverse change to the existing rural, wooded character of the corridor. Construction of the soundwalls would result in a more urbanized visual quality. However, because motorists would move quickly through this relatively short segment (approximately 0.5 miles) of the highway, there would not be a substantial visual change from the existing visual experience. In addition, a retaining wall would be constructed along Cleveland Avenue (south of Bicentennial Way).

Residents and employees of commercial land uses in the southern portion of the project area currently have partially screened views of the highway and would experience only moderate change from the tree removal. The area north of Piner Creek consists primarily of vineyards. Fewer trees exist along this segment of the highway. Tree removal would increase motorists views of the surrounding landscape. Residents and commercial employees would experience moderate changes in the visibility of the highway. In areas where soundwalls are planned, views of the highway would be blocked, a potentially beneficial effect. At some locations, current residential views of fences and mature trees, including redwoods, would be replaced by the concrete soundwall. The soundwall materials would also become a new source of reflective light contributing to glare and heat. Architectural treatments along the proposed soundwalls would soften the visual impact and further increase beneficial visual effects.

Views of the PG&E substation located north of Mark West Springs Road-River Road on the west side of Highway 101 would be more apparent to motorists. The substation is currently screened by mature trees and removal of these trees would result in a substantial visual change. This visual change would be negligible to motorists, however, because they travel quickly through the area. The immediate area around the substation is primarily vineyards with the nearest residences located on the east side of the highway. The substation would be more apparent to these residents. Due to the distance from the substation, this change would be negligible.

3.6.3.2 VISUAL CHANGES AND EFFECT ON VIEWER GROUPS

The following section discusses the impacts of the proposed project at the three viewpoints described in Section 3.6.2.3, Landscape Units.

Viewpoint 1

Within this view, the proposed project would widen the existing highway by paving the 14-m (46-ft) wide median to provide the new HOV lane in each direction, and widening by 0.6 m (2 ft) to the outside to provide standard 3-m (10-ft) outside shoulders. The HOV lane would be 3.6 m (12 ft) wide. A southbound ramp would be added at Bicentennial Way and the northbound Bicentennial Way exit ramp would be widened. As shown in Figure 3.6-2, highway widening to accommodate an HOV lane at this location would require the removal of mature vegetation (including redwood and Valley oak trees) on the west and east side of the freeway. Viewer groups that would be affected by the proposed project include motorists and employees of commercial businesses on the west side of the highway. Removing the mature vegetation that lines the highway would eliminate the dominant visual element within this view for motorists and remove existing visual screening for adjacent

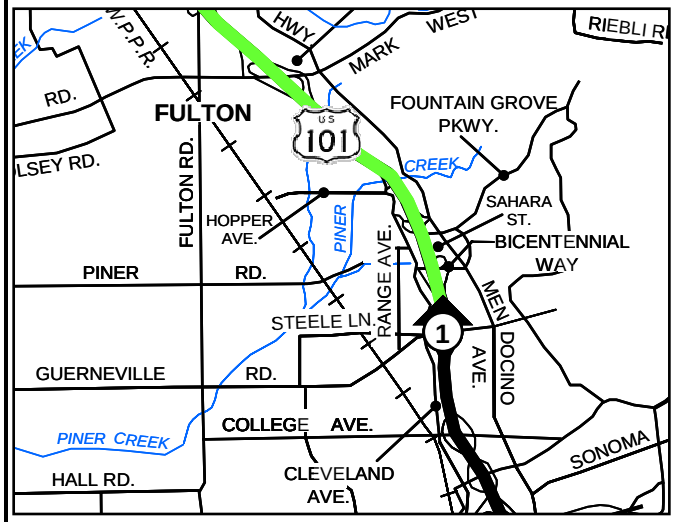
commercial uses. Removal of the redwoods would detract from the "Redwood Highway" identification of Highway 101. This would result in Highway 101 becoming the dominant visual element within the view and constitute an adverse change to the vividness and overall visual quality of the view. This visual change would also result in an adverse change to the intactness and unity of the view. Overall, the project would result in an adverse visual change to the visual quality of the view. Mitigation measures as described in Section 3.6.5, Avoidance, Minimization, and/or Mitigation Measures, would reduce the adverse visual effects to acceptable levels, as shown in Table 3.6-3 below.

Table 3.6-3: Overall Visual Quality Change to Viewpoint 1

Alternative	Visual Dominance of Highway 101	View Obstruction	Community Disruption/ Orientation/ Privacy	Vividness	Intactness	Unity	Overall Visual Quality
Existing/ No-Build Alternative	Co-dominant	N/A	N/A	Moderately High	Average	Average	Average
Build Alternative *(Preferred Alternative)*	Dominant	Partial View Obstruction	Slightly Adverse	Average	Moderately Low	Moderately Low	Adverse
Build Alternative *(Preferred Alternative)* with Mitigation	Co-dominant	Partial View Obstruction	Low or Negligible	Average	Average	Average	Negligible

Existing Condition / No-Build Alternative

Visual Change with Project



Viewpoint 2

Within this view, the proposed project would widen the existing highway by paving the 14.0-m (46-ft) wide median to provide the new HOV lane in each direction, and widening by 0.6 m (2 ft) to the outside to provide standard 3.0-m (10-ft) outside shoulders. The HOV lane would be 3.6 m (12 ft) wide. The project would also require modifications to the Fulton Road/Airport Boulevard interchange, for which there are two options in each of the northbound and southbound directions: Northbound Option A and Option B *(part of Preferred Alternative)*, and Southbound Option A *(part of the Preferred Alternative)* and Option B. In the northbound direction, Option A would widen existing roadways and remove a few of the mature trees. Option B would involve a new ramp requiring a new bridge over Mark West Creek and removal of a larger number of mature trees. In the southbound direction, both Options A and B would require the removal of substantial amounts of vegetation, including many large mature trees, a substantial increase in paved surface, and a retaining wall adjacent to Mark West Creek along the frontage road on the west side of Highway 101. Option B would result in a more dramatic change because, in addition to the removal of mature vegetation, it would involve construction of an elevated overcrossing. Figure 3.6-3 depicts Southbound Option B from this viewpoint. A plan and profile of the elevated overcrossing (Southbound Option B) in relation to surrounding land uses is shown in Figure 3.6-4.

Under all interchange options, removal of the mature vegetation and paving of the median would result in Highway 101 becoming the dominant visual element within the view. This change would be adverse because it would remove the existing visual elements (mature vegetation, grassy median) that contribute to the moderately-high visual quality of this view. Viewer groups that would be affected in this location include motorists and seasonal agricultural workers. Because removal of mature vegetation would also open up motorists' views to the vineyards and riparian area surrounding Mark West Creek on the west side of the highway, the visual changes would be considered only minimally adverse. Seasonal agricultural workers would have increased views of the freeway. The overall effect on visual quality would be minimally adverse. Mitigation measures as described in Section 3.6.5 would reduce adverse visual effects to acceptable levels, as shown in Table 3.6-4 below.

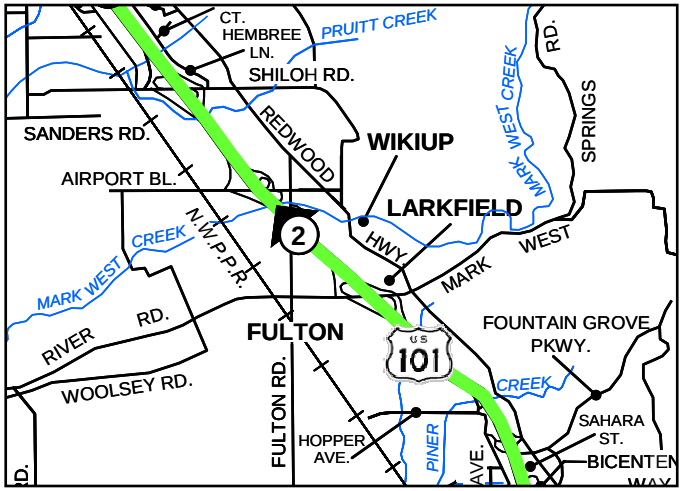
Table 3.6-4: Overall Visual Quality Change to Viewpoint 2

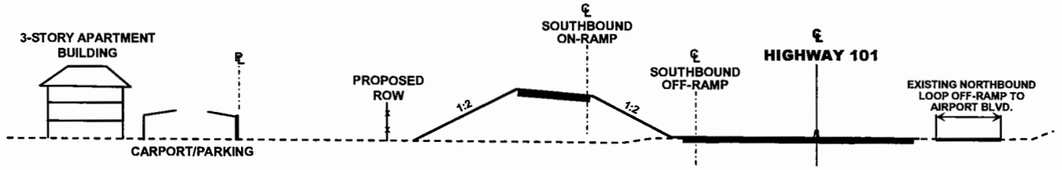
Alternative	Visual Dominance of Hwy 101	View Obstruction	Community Disruption/ Orientation/ Privacy	Vividness	Intactness	Unity	Overall Visual Quality
Existing/ No-Build Alternative	Subordinate	N/A	N/A	High	Average	Average	Moderately High
Build Alternative *(Preferred Alternative)*	Dominant	New or Expanded View	Slightly Adverse	Moderately High	Average	Average	Minimally Adverse
Build Alternative *(Preferred Alternative)* with Mitigation	Co-dominant	New or Expanded View	Low or Negligible	Moderately High	Average	Average	Minimally Adverse

Existing Condition / No-Build Alternative

Visual Change with Project

(Southbound Option B)



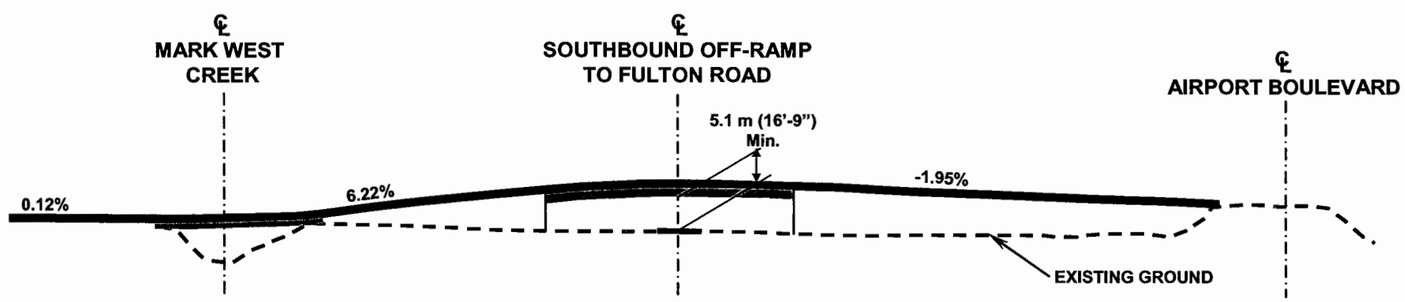


SECTION A-A

Scale 1:200

PLAN

Scale 1:200



Scale 1:200H
1:100V

PROFILE

FULTON ROAD / AIRPORT BOULEVARD INTERCHANGE COMPLEX (SOUTHBOUND OPTION B)
Figure 3.6-4

This page intentionally left blank.

Viewpoint 3

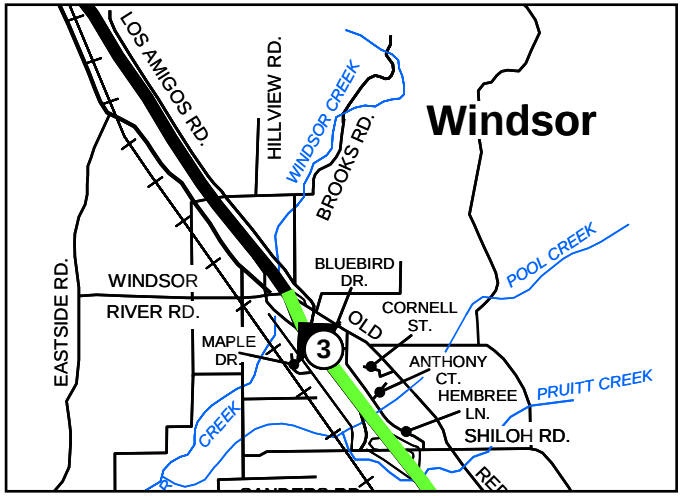
Within this view, the proposed project would widen the existing highway by paving the 14-m (46-ft) median to provide the new HOV lane in each direction, and widening by 0.6 m (2 ft) to the outside to provide standard 3-m (10-ft) outside shoulders. The HOV lane would be 3.6 m (12 ft) wide. As shown in Figure 3.6-5, highway widening to accommodate an HOV lane at this location would require the construction of soundwalls on both sides of the highway to reduce noise levels at adjacent residences. The soundwalls would be 3.7 m (12 ft) to 4.9 m (16 ft) in height and would be constructed of concrete-block materials. Architectural and landscaping treatments on the soundwalls would be implemented (see Section 3.6.5, Avoidance, Minimization, and/or Mitigation Measures). Widening the highway and constructing soundwalls on both sides would require the removal of mature vegetation along the highway and within the grassy median that currently separates the north and southbound lanes. This would be considered a change to the existing visual character because the mature vegetation along the highway and grassy median are the dominant visual elements that contribute to the moderately-high visual quality of this area. Loss of these visual elements would also create an adverse change to the vividness, intactness, and unity of the view. The soundwalls would obstruct motorist views to the surrounding areas and would make Highway 101 the dominant visual element of the view. Views of the highway from adjacent residences would be totally blocked, a potentially beneficial effect. At some locations, existing residential views of fences and mature trees, including redwoods, would be replaced by the concrete soundwall. The soundwall materials would also become a new source of light contributing to glare and heat. As a result, the proposed project would result in an adverse impact on the visual quality of this view. Mitigation measures as described in Section 3.6.5 would reduce adverse visual effects to acceptable levels, as shown in Table 3.6-5 below.

Table 3.6-5: Overall Visual Quality Change to Viewpoint 3

Alternative	Visual Dominance of Hwy 101	View Obstruction	Community Disruption/ Orientation/ Privacy	Vividness	Intactness	Unity	Overall Visual Quality
Existing/ No-Build Alternative	Co-dominant	N/A	N/A	High	Moderately High	Moderately High	Moderately High
Build Alternative *(Preferred Alternative)*	Dominant	Obstructed View	Medium	Moderately Low	Average	Average	Adverse
Build Alternative *(Preferred Alternative)* with Mitigation	Dominant	Obstructed View	Slightly Adverse	Average	Average	Average	Minimally Adverse

Existing Condition / No-Build Alternative

Visual Change with Project



S C T A

Highway 101 HOV Lane Widening Project:
Steele Lane, Santa Rosa to
Windsor River Road, Windsor

VIEWPOINT 3
Figure 3.6-5

3.6.4 Consistency with Scenic/Visual Resource Plans and Policies

The General Plans for Sonoma County, the City of Santa Rosa and Town of Windsor set forth scenic/visual resource goals and policies intended to preserve, enhance, restore and respect scenic vistas and visually important landscapes in each jurisdiction. The proposed project would be generally consistent with relevant scenic/visual resources policies, as shown in Table 3.6-6 below. Avoidance, minimization, and/or mitigation measures are proposed to ensure consistency with local scenic/visual resource goals and policies (see Section 3.6.5).

Table 3.6-6: Consistency with Scenic/Visual Resource Plans and Policies

Sonoma County General Plan	
Goal OS-1: Preserve the visual identities of communities by maintaining open space areas between cities and communities. **Objective OS-1.1:** Preserve important open space areas in the community separators shown on Figures OS-5a through OS-5i of the Open Space Element. **Objective OS-1.2:** Retain a rural character and promote low intensities of development in community separators. Avoid their annexation or inclusion in spheres of influence for sewer and water service providers.	***Consistent.*** The project would not result in a significant loss of acreage between the urbanized areas of Santa Rosa and Windsor, and would therefore not visually affect the community separator between these communities. The project would not result in increased development within the community separators, and would not affect the amount of open space between urbanized areas of neighboring cities. However, the removal of mature vegetation, construction of soundwalls and modification of interchanges would reduce the rural character of this stretch of Highway 101 for motorists and make the highway a more prominent visual element within the community separator.
Objective OS-1.4: Preserve existing specimen trees and tree stands within community separator areas. **Goal OS-2**: Retain the largely open, scenic character of important scenic landscape units. **Goal OS-3**: Identify and preserve roadside landscapes which have a high visual quality as they contribute to the living environment of local residents and to the county's tourism economy.	***Potentially Inconsistent.*** The removal of mature vegetation would result in an adverse visual impact to the community separator (the Highway 101 corridor) within the project area, unless mitigation is incorporated. Mitigation measures that include replacement planting are proposed to reduce inconsistency with this policy. Guardrails shall be installed around selected redwood tree groupings where feasible. Redwood tree clusters *and other mature vegetation will* be re-established *at a 1:1 ratio within the project limits and right of way where feasible.* Additionally, replacement planting will occur near interchanges and points of entry into cities within the project limits.
Goal RC-4: Preserve, sustain and restore forestry resources for their economic, conservation, recreation, and open space values.	***Consistent.*** The proposed project would remove mature vegetation (trees) along the existing roadway. However, these trees do not represent a forestry resource, nor provide economic or recreational value.
City of Santa Rosa General Plan	
OSC-A-7: Encourage preservation of open space in the Community Separators Open Space and Community Separators) between Santa Rosa and neighboring communities. Work with regional agencies to ensure maintenance of the separators as permanent open space.	***Consistent.*** The proposed project would not result in a significant loss of open space within the community separator between the City of Santa Rosa and Town of Windsor.

Table 3.6-6: Consistency with Scenic/Visual Resource Plans and Policies

UD-A-1: Maintain view corridors to natural ridgelines and landmarks, such as Taylor Mountain and Bennett Mountain.	***Consistent.*** Views of the natural ridgelines for motorists traveling on Highway 101 are currently blocked in many places by mature trees. Removal of these trees would open up new views to motorists of ridgelines. In areas where existing vegetation along the highway would be removed and soundwalls constructed, the views of motorists of ridgelines would not change compared to existing conditions.
UD-H-2: Align and construct streets along natural grades. Minimize visibility of streets from other areas within the City.	***Consistent.*** The proposed project would widen an existing highway and would not require substantial grading outside of the right-of-way. However, the removal of mature vegetation, construction of soundwalls and modification of interchanges would make the highway a more prominent visual element within the community.
UD-H-6: Minimize vegetation removal in hillside areas, and preserve large trees that partially screen development or help blend new development into views.	***Potentially Inconsistent.*** The proposed project would require the removal of mature vegetation along Highway 101, which screens the highway from adjacent land uses in many areas. Construction of soundwalls in certain locations would replace the screening provided by the existing vegetation. Mitigation measures that include replacement landscaping are proposed to reduce visual changes associated with the project. Where feasible, important stands of redwood trees would be protected by a metal-beam guardrail.
Town of Windsor General Plan	
I.1.4: Development along the scenic U.S. 101 corridor should be setback from the highway to provide space for landscaping and recreational uses. Such landscaping should be comprehensively planned along with any proposals for soundwalls along the U.S. 101 frontage, to avoid a monotonous visual barrier that conflicts with the objective of providing visual access to the distant hillsides and ridgelines.	***Potentially Inconsistent.*** While this policy primarily deals with the site design of adjacent land development within the Town of Windsor, the proposed project could create situations at existing developments that would be considered inconsistent with this policy. For example, the project would result in the removal of mature vegetation and construction of soundwalls within the Town of Windsor. If not mitigated, this condition would create the "monotonous visual barrier" discouraged by this policy. Mitigation measures that include replacement landscaping are proposed to avoid inconsistency with this policy. Where feasible, vines would be planted and allowed to grow on the soundwalls.
I.1.5*:* Soundwalls should be avoided as much as possible, particularly along identified scenic corridors. Where soundwalls are necessary, they should be designed as attractively as possible.	***Potentially Inconsistent.*** The proposed project would remove existing mature vegetation along Highway 101 and construct a soundwall within the Town of Windsor. Architectural treatments on soundwalls and replacement landscaping would be implemented to avoid inconsistency with this policy. Where feasible, vines would be planted and allowed to grow on the soundwalls.
I.2.6: Lands included within the Town Planning Area that are also within the County-designated Community Separator shall be preserved in open space.	***Consistent.*** The project would not result in a substantial loss of land within the community separator between the Town of Windsor and City of Santa Rosa.

3.6.5 Avoidance, Minimization, and/or Mitigation Measures

A landscaping replacement plan would be implemented and replacement trees planted. It is Caltrans policy to replace vegetation damaged or removed due to highway improvement projects. The landscape replacement plan would be developed by Caltrans with input from Sonoma County and the City of Santa Rosa and Town of Windsor to identify appropriate and feasible locations and species of trees for replacement within or near the project limits. Such replacement locations must meet safety requirements for sight distances, in addition to providing favorable conditions for tree establishment and survival. *Avoidance and minimization approaches will be incorporated during final design to reduce tree loss below the upper end of the reported ranges.* The following mitigation measures are proposed to reduce visual effects of the Build Alternative *(Preferred Alternative)*.

- *In accordance with SCR 17, SB 1334, and Caltrans policies (see Section 3.15.4.1, Trees and other Mature Vegetation), mature* trees *will* be replaced at a ratio of 1:1 *within the project limits and right of way where feasible*.
- Species, size, precise number, location, and spacing of replacement trees would ultimately be determined by Caltrans Office of Landscape Architecture at a future phase of the project.
- Landscape replacement would include landscaping, irrigation, and design elements, such as aesthetic treatments on wall structures that would help to maintain the corridor's existing level of visual quality. Where feasible, vines would be planted and allowed to grow on the soundwalls to help visually integrate them into the overall environment, to reduce glare and the incidence of graffiti. New retaining walls would also be given aesthetic treatment.
- A three-year plant establishment period would be implemented.
- All disturbed areas will be re-vegetated according to Caltrans standards.
- Design exceptions will be prepared to:
  - Reduce the width of the standard "catch line" to minimize the loss of existing desirable vegetation.
- Provide slope rounding on cuts and fills for a more natural appearance.
- Provide aesthetic surface treatments to structures that are consistent with the corridor-wide master plan (to be developed). Sound and retaining walls would be aesthetically treated with color, texture, patterning and planted with vines (where feasible), to reduce glare and deter graffiti.
- Redwood tree clusters *and other mature vegetation will* be reestablished *at a 1:1 ratio* where feasible *within the project limits and right of way*. Additionally, replacement planting will occur near interchanges and points of entry into cities within the project limits.

Additional avoidance and minimization measures to be implemented during the construction phase of the project are discussed in Section 3.16.6, Construction Phase Visual/Aesthetics.

3.7 Cultural Resources

As used in this document, "cultural resources" refers to archaeological and historical resources including, but not necessarily limited to, districts, sites, buildings, structures, and objects. This section of the environmental document discusses the studies performed to identify and evaluate the potential for impacts to such resources.

3.7.1 Regulatory Setting

The primary federal laws dealing with archaeological and historic resources include:

National Historic Preservation Act of 1966 [16 U.S.C. 470 et seq.]:

The National Historic Preservation Act (NHPA), as amended, sets forth national policy and procedures regarding historic properties included in or eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800).

National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.]:

The National Environmental Policy Act (NEPA), the broad environmental law that applies to federal agencies and their activities, includes the preservation of important historic, cultural, and natural aspects of our national heritage within its general policy for environmental protection. Meeting the requirements of Section 106 and the NEPA regulations (40 CFR §1500-1508.28) are separate compliance efforts that require coordination. The Section 106 compliance documents that are prepared to meet the requirements of the National Historic Preservation Act also provide the basis for the required assessment of cultural resources, project alternatives, and historic property impacts in the environmental document prepared pursuant to NEPA.

U.S. Department of Transportation Act of 1966 (49 U.S.C. 303 Section 4[F]):

Transportation projects must comply with the provisions of Section 4(f) of the U.S. Department of Transportation Act (23 CFR 771). Section 4(f) applies to US Department of Transportation projects that involve the "use" (either actual take of land or a less tangible "constructive use") of land from historic properties. A Section 4(f) evaluation, which requires documentation of completion of the Section 106 process, must demonstrate that there is no prudent and feasible alternative to the use, and that all possible planning has been done to minimize harm to Section 4(f) protected resource(s).

California Environmental Quality Act of 1970 (CEQA) [PRC §21000 et seq.]:

Cultural resources are protected by the California Environmental Quality Act (CEQA) (PRC Division 13, Sections 21000-21178), which requires state and local agencies to take into consideration the environmental effects of their actions. Cultural resources that are listed on or determined to be eligible for listing on the NRHP and/or the California Register of Historic Resources (CRHR), as well as city-designated historic resources are protected under CEQA.

Public Resources Code (PRC §5024.1):

Public Resources Code 5024.1 established the California Register of Historic Resources, a listing of historic properties within the state. Section 5024.5 requires state agencies to provide notice to and to confer with the State Historic Preservation Officer (SHPO) before altering, transferring, relocating, or demolishing state-owned historical resources.

3.7.2 Affected Environment

3.7.2.1 ARCHAEOLOGICAL RESOURCES

Archaeological resources possess both scientific and cultural values. The specific site locations are confidential in order to deter vandalism and desecration. Therefore, only generalized locations associated with the proposed project are provided in the following section.

In accordance with both Section 106 of the National Historic Preservation Act and CEQA, Caltrans commenced archaeological investigations by delineating an archaeological Area of Potential Effects (APE) to include the maximum anticipated project footprint for areas that may be disturbed by the proposed project. Certain assumptions have been made, such as two meters (6.56 feet) of anticipated temporary construction easement beyond potential soundwall footing locations.

The Archaeological Survey Report (ASR) that was subsequently prepared documents the efforts to evaluate the potential for buried cultural deposits. This involved a sensitivity analysis for intact buried prehistoric and historic archaeological resources within the APE that relied on published maps, reports and databases from the following sources:

- Historical Resources Information System, Northwest Information Center (NWIC) at Sonoma State University in Rohnert Park (February 2003 and April 2004);
- McCone Hall Library Map Room, University of California, Berkeley (November 2003 and April 2004);
- Bancroft Library, University of California, Berkeley (November 2003 and April 2004);
- Sonoma County Historical Society, Sonoma County Library, Santa Rosa (November 2003);
- National Register of Historic Places (1991);
- California Register of Historical Resources (2004);
- California Historical Landmarks (1996);
- Databases from the U.S. Geological Survey (USGS), California Geological Survey (CGS), and the National Resource Conservation Service (NRCS); and
- Cultural resource studies of locations within or in close proximity to the project APE, conducted within the past decade.

The Native American Heritage Commission (NAHC) in Sacramento was contacted by letter on March 9, 2003 for a search of sacred lands files and for a list of local Native American organizations and individuals. On March 28, 2003, the NAHC indicated that no sacred lands sites were on file for the project area and provided a list of interested parties. On March 28, 2003, a letter was sent to all of the organizations and individuals named on the NAHC list and follow-up calls were made to each of the contacted parties. Native American consultation was conducted over the course of 2004 during quarterly meetings between Caltrans and the Federated Indians of Graton Rancheria. As part of the

consultation effort, the draft ASR was submitted to the Federated Indians for review in February 2005.

To evaluate the potential for buried cultural deposits in the project study area, a surface reconnaissance of the archaeological APE was conducted in April, May, and July 2003. Although much of the ground surface was obscured by freeway pavement, landscaping, and fill; terrain on both sides of the roadway within the archaeological APE was unobstructed and moderate-to-good surface survey conditions allowed for reliable archaeological inspection. Supplemental inspections were conducted in May 2004. An intensive-level survey was accomplished on accessible portions of the archaeological APE by walking parallel transects approximately 8 to 10 meters (26.2 to 32.8 ft) apart. A more cursory field inspection was accomplished for locations where substantial ground disturbance had taken place or where extensive fill was present as a result of past Highway 101 construction and safe access was not possible. Those portions of the archaeological APE that were covered with roadway pavement, parking lots, and commercial buildings, as well as private property for which access was denied, were not inspected.

Prehistoric Archaeological Resources: A record search at the Historical Resources Information System, Northwest Information Center (NWIC) suggests that one site has been documented within the project APE boundaries. Subsequent subsurface investigations at the site location determined that it is not a prehistoric archaeological site. Fourteen recorded sites are located within the project study area (approximately 0.8 to 1.0 km [0.5 to 0.6 mile] from the archaeological APE); temporal or cultural affiliation is documented for only two of these sites. Also, three unsubstantiated ethnographic village locations are reported to be situated approximately 0.4 to 4.0 km (0.25 to 2.5 miles) from the archaeological APE.

Based on a review of the geomorphologic and archaeological record, there initially appeared to be a possibility that buried archaeological resources could be present within the project APE. Portions of the Santa Rosa Plain contain Holocene Age sediments deposited since the earliest known human use of the Sonoma County region. Various depositional processes (alluvial/colluvial sedimentation, stream channel migration, and seismic-induced ground movement) have buried stable land surfaces that could contain prehistoric archaeological deposits. Thus, there was a potential for buried prehistoric archaeological deposits in the valleys that are transected by the Highway 101 project and surroundings. A thorough and systematic program of subsurface testing was therefore conducted, which revealed little likelihood of encountering buried cultural materials within the project APE.

Historic Archaeological Resources: Reviews of project information, late-nineteenth-century and twentieth-century maps, county and local histories, and cultural resource management documents were completed to determine the potential for encountering historical archaeological resources that might be eligible for the NRHP. No known Hispanic or American Period structures, features, or potential historical archaeological sites have been recorded or identified within or immediately adjacent to the archaeology APE.

3.7.2.2 HISTORIC RESOURCES

Historic resources include districts, sites, buildings, structures, and objects included in or eligible for the NRHP. To assess the impacts of the project on historic resources, both a Historic Property Survey Report (HPSR) and Historic Resource Evaluation Report (HRER) were completed for the project.

A Historic Properties Survey Report was submitted to the State Historic Preservation Officer (SHPO) on October 12, 2005. The SHPO concurred in the negative eligibility findings on November 4, 2005. A copy of the SHPO's letter is provided in Appendix E, Agency Correspondece.

The architectural APE includes the area that would be directly affected by construction and generally runs either with or beyond the archaeological APE. An area one parcel deep on all sides immediately adjacent to the proposed right-of-way is allotted to provide for consideration of visual and noise impacts and changes to cultural settings of nearby historic facilities. In some instances, where there are proposed sound walls or raised structures such as overpasses, the proposed architectural APE extends beyond the one parcel limit to account for potential visual effects.

A reconnaissance survey was conducted in the field to account for all buildings, structures, and objects within the APE. This field reconnaissance helped to determine which buildings appeared to be more than 45 years of age and, therefore, would need more detailed study for this project. Data were obtained from the following sources:

- First Real Estate Solutions commercial database;
- U.S. Geological Survey (USGS) topographic maps;
- California State Library;
- Sonoma County Assessor's and Recorder's offices;
- California Department of Transportation Library, Sacramento;
- Caltrans District 4 Maps and Plans Office, Oakland;
- Shields Library at University of California, Davis;
- Petaluma Museum Research Library;
- Solano County Library Annex, Santa Rosa; and
- Healdsburg Museum and Historical Society.

A letter informing interested parties of the Highway 101 HOV Widening project was sent to area planning agencies, local governments, historical societies, and museums on June 25, 2003. A July 15, 2003 response from Sonoma County Landmarks Commission Planner Kathi Jacobs suggested the possibility that one historic resource, the Laughlin House at 418 Aviation Drive in Santa Rosa, might lie within the project area. However, review of the architectural APE indicates that the property would not be affected by the project.

The architectural APE includes 128 buildings, groups of buildings, or structures located within Sonoma County, in the cities of Santa Rosa, Fulton, and Windsor, as well as the unincorporated county lands in-between. The architectural APE contains 12 buildings, groups of buildings, or structures constructed in or before 1957. The remaining buildings, groups of buildings, or structures fall under one of the six property types exempt from evaluation as outlined in Attachment 4 of the

Programmatic Agreement between Caltrans, FHWA, ACHP, and the SHPO, which became effective January 1, 2004.

The 12 evaluated properties are evenly distributed throughout the architectural APE, with just over half located within or in the vicinity of Santa Rosa. The remaining resources are found in or near Windsor. These types of properties are evenly divided between farm properties or parcels that contain remnant farm buildings and residential lots with Ranch- or Minimal Traditional-style houses constructed during the wave of post-World War II development. While all of these resources date to the 20th-century, over half were constructed in the 1940s and 1950s.

Agricultural Properties: Six properties contain buildings that were constructed as part of small farms during the 1910s and 1920s. As the region developed, land was further subdivided and, today, only remnant buildings are extant. Generally, these properties consist of a main residence constructed in one of the popular residential styles of the day such as Craftsman or Folk Victorian, tank houses, and/or various secondary sheds. These former agricultural properties ceased to function as farms in the second half of the twentieth century and, over the subsequent years, many of the farm buildings were heavily modified or demolished and new buildings constructed in their place.

Residential Properties: The remaining six properties consist predominately of modest Ranch-style residences constructed in the 1940s and 1950s on residential-size lots. Typically, these residences are one-story wood frame buildings ranging in size between 1,000 and 1,900 square feet; many have been altered by installation of replacement windows or siding and the construction of modern additions.

The 12 historic-era properties within the architectural APE were evaluated in accordance with applicable sections of NHPA and the implementing regulations of the ACHP as these pertain to federally funded undertakings and their impacts on historic properties. The properties also were evaluated in accordance with Section 15064.5(a) (2)-(3) of the CEQA Guidelines using the criteria outlined in Section 5024.1 of the California Public Resources Code. None of the evaluated properties appears to meet criteria for listing in the National Register of Historic Places or California Register of Historical Resources nor do they appear to be historical resources for the purposes of CEQA. Caltrans has determined that the only other properties present within the architectural APE, including state-owned resources, meet the criteria for Section 106 PA Attachment 4 (Properties Exempt from Evaluation).

3.7.3 Environmental Consequences

3.7.3.1 Impacts on Archaeological Resources

Based on the information collected during field surveys, documentary research, and subsurface testing, it is not anticipated that construction activities would encounter or disturb buried cultural resources. Measures are identified in Section 3.7.4, Avoidance, Minimization, and/or Mitigation Measures, to address late discovery of unanticipated buried cultural deposits.

3.7.3.2 Impacts on Historic Archaeological Resources

As a result of the archival research and field reconnaissance, the project has little or no potential to affect historic archaeological resources. Therefore, no mitigation for such impacts is proposed.

3.7.3.3 IMPACTS ON ARCHITECTURAL RESOURCES

As there are no eligible historic resources, there is no potential for impact to such resources and no mitigation is proposed. *The State Historic Preservation Officer concurred by letter dated 4 November 2005 that the 12 evaluated resources do not meet criteria for listing in the NRHP.*

3.7.4 Avoidance, Minimization, and/or Mitigation Measures

3.7.4.1 PREHISTORIC ARCHAEOLOGICAL RESOURCES

In the unlikely event that previously unidentified buried cultural materials *(post-review discoveries)* are unearthed during construction of the proposed project, Caltrans and FHWA would comply with 36 CFR § 800.13 *(b)(3) and, if applicable, (c) as stipulated in the Section 106 2004 Programmatic Agreement for Federal-aid Highway Programs in California.*

3.8 Hydrology and Floodplains

This section summarizes the regulatory setting, existing environment, potential impacts, and measures to prevent or reduce impacts to hydrologic resources and floodplains as a result of the Highway 101 HOV Lane Widening project. *A Draft Location Hydraulic Study and Floodplain Risk Assessment (MACTEC Engineering and Consulting Inc.) was conducted in November 2006.* Documents reviewed in support of this study include the PSR/PDS, Highway 101 as-built plans, Caltrans strip topographic data, USGS quadrangles, Windsor Area Master Drainage Plan, Sonoma County design criteria, and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) for Sonoma County (*FEMA, 1997*). Supplemental data were gathered during site investigations and meetings with Sonoma County Water Agency staff. The flood hydrograph data used for the hydraulic studies for this environmental document are based on ultimate build-out according to the Sonoma General Plan. However, since ultimate build-out flow rates were not available in the case of Mark West Creek, FEMA flow rates (FEMA, 1997) obtained from a hydraulic model provided by Sonoma County Water Agency (SCWA) were used instead. *Refer to Appendix L for the Location Hydraulic Study forms.*

3.8.1 Regulatory Setting

Executive Order 11988 (Floodplain Management) directs federal agencies to avoid to the extent possible adverse impacts associated with floodplains and to avoid direct or indirect support of incompatible development in floodplains. The FHWA requirements for compliance are outlined in 23 CFR 650, Subpart A. Section 650.111 of the regulations calls for location hydraulic studies to be performed with detailed engineering design drawings to avoid and/or minimize hydrological and floodplain impacts. For work in floodplains that requires permit approval, environmental documentation must explain the impacts the project would have on these areas and on the resources within these areas.

3.8.2 Affected Environment

This section summarizes the surface water, groundwater, and floodplain studies that were carried out in support of this project.

3.8.2.1 HYDROLOGY

Hydrologic Resources: The primary hydrologic resources within the study area include Windsor Creek, East Windsor Creek, Pool Creek, Faught Creek, Pruitt Creek, Mark West Creek, and the Santa Rosa Flood Channel (North, Middle, and South branches). The drainage areas for the stream courses are similar, in that the upper portions of the watersheds are located in hilly terrain that transitions to alluvial valley area. Elevations along the Highway 101 alignment range from approximately 42 meters (m) (140 feet [ft]) to 55 m (180 ft) mean sea level (msl). The watersheds draining to stream courses crossing Highway 101 range in elevation from approximately 42 m (140 ft) to 690 m (2260 ft) msl and all contribute run-off to the Russian River. The portion of Highway 101 that is being widened is located within the alluvial valley areas of these watersheds.

Climate and Precipitation: The climatic characteristics in the vicinity of the project area are typical of basins protected from direct coastal winds by low hills. Precipitation generally occurs during a rainy season that extends from October to April. Summers are typically warm and dry, and winters are mild and wet. The average temperature for the area is approximately 14.4 degrees Celsius (58 degrees Fahrenheit). The average annual rainfall in the project area is approximately 89 centimeters (cm) (35 inches). The upper portions of the watersheds affected by the Highway 101 Widening Project receive up to 140 cm (55 inches) of rainfall annually (SCWA, 1983).

Roadside Drainage: Existing roadside drainage consists primarily of open grass-line swales off the shoulders and within the unpaved highway median. In some locations, the median is paved with a curb to convey roadside drainage to drop inlets and buried pipelines. Some of these drop inlets are constructed immediately above the box culvert conveying a stream course across the highway right-of-way. In these instances, an opening is made in the top of the box culvert and the drop inlet is placed over this opening, conveying roadside runoff directly to the receiving stream.

Cross-Drainage: Drainage is carried across Highway 101 at the following stream crossings: Windsor Creek; East Windsor Creek; Pool Creek; Faught Creek (Pool Creek Tributary); Pruitt Creek; Mark West Creek; Santa Rosa Flood Channel (North, Middle, and South Branches). In the case of culvert crossings of the highway, where these occur, the culverts are continuous from the upstream face of the northbound lanes, through the median, to the downstream face of the southbound lanes. Where bridge crossings are used over the stream course, these typically consist of twin parallel structures, one each for the northbound and southbound roadways. These current cross-drainage facilities have sufficient capacity to handle the design storm runoff flow rates. The 100-year flood elevations are contained in the channels or culverts, as described below.

- Windsor Creek: Windsor Creek originates in the hills east of the Highway 101 alignment and flows in a westerly direction towards the Russian River. It crosses Highway 101 approximately 150 m (500 ft) north of the Windsor River Road overcrossing. The drainage area at this point is approximately 620 ha (2.4 sq mi). Drainage from this watershed is conveyed under the highway

via a 6.1 m x 3.7 m (20 ft x 12 ft) concrete box culvert. The culvert is approximately 128 m (420 ft) in length.

- East Windsor Creek: East Windsor Creek originates in the hills east of the highway and crosses Highway 101 approximately 200 m (660 ft) south of Windsor River Road. The drainage area is approximately 465 ha (1.8 sq mi) and runoff is conveyed under the highway via a 3 m x 3 m (10 ft x 10 ft) concrete box culvert. The culvert is approximately 94 m (308 ft) in length.
- Pool Creek: The headwaters of Pool Creek originate in the hills east of Highway 101. The drainage area at the highway is approximately 985 ha (3.8 sq mi) and runoff is conveyed under Highway 101 via twin bridges. The bridges are approximately 20.5 m (67 ft) long and 12 m (40 ft) wide. The bridges are located approximately 610 m (2,000 ft) north of Shiloh Road.
- Faught Creek: Faught Creek (Pool Creek Tributary No. 35 as identified in the Windsor Area Master Drainage Plan (*SCWA, 1989*)] is immediately south of Pool Creek and drains approximately 180 ha (0.7 sq mi). Flows are conveyed under Highway 101 via a 3.7 m x 2.1 m (12 ft x 7 ft) concrete box culvert. However, development has occurred at the upstream end of the Highway 101 culvert and the upstream portion of the channel has been put into underground piping. The channel daylights several hundred meters east of the highway and continues upstream through a residential development as an open channel. Downstream of Highway 101 the channel is open, except for a short portion which is conveyed under the Shiloh Road off-ramp from southbound Highway 101.
- Pruitt Creek: Pruitt Creek also drains the eastern hills and is conveyed under Highway 101, which spans the creek via a pair of 20.7 m (68 ft) long bridges. The southbound Highway 101 bridge is 12 m (39 ft) wide. The width of the northbound span varies as it encompasses a portion of the off-ramp to Shiloh Road. The bridge is located approximately 370 m (1,200 ft) south of Shiloh Road. The drainage area is approximately 440 ha (1.7 sq mi).
- Mark West Creek: Mark West Creek is by far the most significant stream crossing encountered along the reach of Highway 101 under study. The drainage area at the highway is approximately 9,430 ha (36.4 sq mi). Flows are conveyed under the highway, which crosses the creek on twin 44.5 m (146 ft) long bridge spans. The bridges are midway between Fulton Road and Airport Boulevard.
- Santa Rosa Flood Channel, North Branch: The northernmost branch of the Santa Rosa Flood Channel is located approximately 1,130 m (3,700 ft) south of Mark West Springs Road and drains approximately 52 ha (0.2 sq mi). Runoff is conveyed under the highway via a 76-centimeter (30-inch) circular concrete culvert.
- Santa Rosa Flood Channel, Middle Branch: The middle branch of the Santa Rosa Flood Channel is located approximately 900 m (2,950 ft) north of the Mendocino Avenue overpass and drains approximately 285 ha (1.1 sq mi). Runoff is conveyed under the highway via twin 2.4 m x 1.5 m (8 ft x 5 ft) concrete box culverts. These culverts terminate at a drop structure downstream of the Highway 101 crossing. The downstream end of the drop structure is connected to a 1.8 m (6.0 ft) concrete pipe in which no daylight may be seen. This concrete pipe is through a commercial development and the downstream terminus of the piped system was not identified.

- Santa Rosa Flood Channel, South Branch: The south branch of the Santa Rosa Flood Channel is located near the County Administrative Center approximately 425 m (1,400 ft) north of Steele Lane. Runoff from the approximately 492 ha (1.9 sq mi) drainage area is conveyed under the highway via twin 2.9 m x 2.1 m (9.5 ft x 7 ft) concrete box culverts. The culverts are 96 m (315 ft) long.

Erosion Potential: Many of the stream crossings potentially affected by the Highway 101 Widening Project are protected by sack concrete, which helps to prevent bridge scour at the abutments. In general, the channel sections upstream and downstream of the crossings are heavily vegetated and appear stable. However, the Pruitt Creek channel showed evidence of bank erosion approximately 60 m (200 ft) upstream of the Highway 101 bridges. Also, there appears to be pier scour occurring at the Pool Creek bridge crossings where the bottom of the pier walls and the top of the piles are exposed above the channel bottom.

3.8.2.2 FLOODPLAINS

FEMA Floodplain Designations: The Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) prepared by FEMA for Sonoma County were reviewed to identify areas that would be inundated by a 100-year flood. A 100-year flood*plain is defined as "The area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year. An encroachment is defined as an action within the limits of the 100-year plain."* The FIRMs indicate that the Windsor Creek, East Windsor Creek, Pool Creek, Pruitt Creek, and Mark West Creek floodplains within the Highway 101 immediate area are delineated as Zone X (areas of moderate to minimum flood risk) and Zone AE (areas of 100-year shallow flooding where depths are between one and three feet). The FIRMS delineate the portion of the project within the Santa Rosa corporate City Limits as Zone C, an area of minimal flooding. The FIRMS for the northern, middle, and southern branches of the Santa Rosa Flood Channel are not currently available and additional studies to define the flooding potential will be undertaken during final design. Within these base floodplain zones, Highway 101 is elevated above the floodplain and there is no indication that flood waters overtop the highway.

Of the stream courses in the project area, Mark West Creek has the largest drainage area and is classified as a major waterway for the 100-year (one percent annual chance) design storm recurrence interval. Windsor Creek, East Windsor Creek, Pool Creek, Pruitt Creek, and the middle and south branches of the Santa Rosa Flood Channel are classified as secondary waterways for the 25-year (four percent annual chance) design storm recurrence interval. Faught Creek and the north branch of the Santa Rosa Flood Channel are classified as minor waterways for the 10-year (10 percent annual chance) design storm recurrence interval.

The flood hydrograph data were utilized in the preparation of the hydraulic models for the stream crossings affected by the Highway 101 widening. Only those stream course crossings that have open medians that would be affected hydraulically were analyzed. Crossings that use continuous culverts (i.e. no opening in the median) were not analyzed since the hydraulic condition of these culverts would not be modified as a result of the highway widening.

Flooding Risks: Flooding of the Russian River and its tributaries is mentioned in the FIS (FEMA, 1997). However, detailed review of the FIS does not provide any insight into currently incompatible floodplain development.

3.8.3 Environmental Consequences

3.8.3.1 CROSS-DRAINAGE IMPACTS

Drainages that cross Highway 101 were evaluated for potential impacts against the 100-year flood. The bridges over Pool Creek, Pruitt Creek, and Mark West Creek would be widened to cover the existing open median. Hydraulic impacts may be created by the construction of additional bridge piers in or along the creek channel. Pool Creek uses pier walls for each bridge crossing; these pier walls most likely would be extended to become one continuous pier wall for each bent of the widened bridge crossing. Where circular pier bents are used, as in Pruitt Creek and Mark West Creek, additional piers supporting the widened portion of the bridge would affect the hydraulic conditions at each bridge site. Windsor Creek, East Windsor Creek, and the three branches of the Santa Rosa Flood channel, which have continuous culverts, were not analyzed since the hydraulic condition of these culverts would not be modified as a result of the highway widening.

As Highway 101 is elevated above the 100-year floodplain, crowning of the presently depressed median and addition of concrete median barrier will have no adverse impacts on cross-drainage.

3.8.3.2 FLOODPLAIN IMPACTS

Changes in Water Surface Elevations: Hydraulic analysis was performed for the Build Alternative *(Preferred Alternative)* to assess the potential for impacts to water surface elevations and flood risk for the 100-year flood (MACTEC, 2005). Because the flow rates analyzed are for build-out conditions per county standards, and because there would be negligible changes in water surface elevations for the bridges that would be modified as part of the Highway 101 Widening, no impact on the floodplain would result from the widening. Therefore, no mitigation is proposed.

Impacts on Natural and Beneficial Floodplain Values: The natural and beneficial floodplain values at Windsor Creek, East Windsor Creek, Pool Creek, Pruitt Creek, and Mark West Creek are natural moderation of floods, water quality maintenance, fish and wildlife habitat, plants, open space and natural beauty, and groundwater recharge. The project would not adversely impact these natural and beneficial floodplain values because the project would cause negligible changes in water surface elevations. Therefore, no mitigation measures are proposed.

Support of Incompatible Floodplain Development: Since the Highway 101 HOV Lane Widening Project would widen an existing highway, floodplain encroachment as a result of highway construction has already occurred. Floodplain encroachment as a result of the Highway 101 widening, if any, would not be substantial. Temporary channel obstructions can be expected to occur during construction, but all work in the channel would be expected to occur during the dry season (June 15th to October 15th) per California Department of Fish and Game 1602 Streambed Alteration Agreement requirements (see Section S-6, Agency Permits and Approvals).

The only new highway capacity to be provided by the proposed project is for high occupancy vehicles, carpools, and transit. Thus, the project would not be growth inducing (see Section 3.2.3, Growth) and would not support additional development in the floodplain.

3.8.4 Avoidance, Minimization, and/or Mitigation Measures

3.8.4.1 ROADSIDE DRAINAGE

The roadside drainage will be modified as necessary to accommodate a 25-year design flood with the exception of areas where 100-year floodwaters currently have the potential to overtop the highway. These locations are from the Fulton Road Interchange to north of Pool Creek on the north side of the Shiloh Road Interchange and from approximately 700 m (2,300 ft) south of the Windsor River Road Overcrossing to beyond the northern project limit. Culverts will be repaired or upgraded as necessary, including the previously mentioned deficiencies, and the new drainage facilities coordinated with the stormwater BMPs to provide a consistent and effective drainage system. The BMPs that will become an integral component of the drainage system will include open swales off of the outside shoulders that would be modified to accommodate the widened roadway run-off and detention basins. Where auxiliary lanes and soundwalls are constructed, drainage facilities would be maintained or replaced with a closed drainage system.

3.8.4.2 CROSS-DRAINAGE

Because the culverts span only the width of the existing highway right of way, the culverts would need to be extended to accommodate the widening work. Also, in those instances where the traveled lanes traverse the stream crossing via bridge structures, these bridges will be widened within the median, closing the median. Closing the median would not cause an adverse impact on bridge hydraulics at any crossing; therefore, no mitigation is proposed.

For the three bridge structures slated for widening, slight decreases in water surface elevations were observed. These decreases would range from 0.06 – 0.18 m (0.2 – 0.6 ft) and are the result of improved hydraulic conditions presented by a single, longer structure in comparison to two shorter structures. In addition, it is assumed that the channel banks would be armored for scour protection. This further reduces friction losses through the bridge to values less than those that would result from the open channel section that contains vegetation between the two existing bridge structures. Therefore, no mitigation is indicated.

3.8.4.3 FLOODPLAINS

Since there would be no measurable floodplain impacts, no mitigation is proposed.

3.9 Water Quality and Stormwater Run-off

This section summarizes the regulatory setting, existing environment, potential impacts, and avoidance and mitigation measures proposed to prevent or reduce impacts to water quality from stormwater run-off as a result of the proposed project.

3.9.1 Regulatory Setting

The following federal, state, and local laws, ordinances, and guidelines provide the regulatory context for the project area:

- **Federal Clean Water Act**: The federal Clean Water Act (CWA) is the primary water resources protection statute. Three sections of the CWA, in particular, are the focus of construction-phase compliance. Sections 401 (certification of state water quality standards), 402 (provisions of the National Pollutant Discharge Elimination System [NPDES]), and 404 (discharge of fill material into waters of the United States and wetlands) apply to the proposed project. Sections 401 and 404 (see 3.15, Biological Environment) are related and result in coordinated permitting by the state Regional Water Quality Control Board (RWQCB) and the U.S. Army Corps of Engineers (USACE), respectively, because of the CWA's authorization of state-adopted water quality standards.
- **Clean Water Act, Section 401**: Under Section 401 of the CWA, the RWQCB makes a certification of compliance with state water quality standards for the project. Such certification may involve the imposition of project-specific waste discharge requirements (WDRs). The USACE will not issue a 404 permit without satisfaction of RWQCB Section 401 requirements.
- **Clean Water Act, Section 402**: The California State Water Resources Control Board (SWRCB) implements the National Pollutant Discharge Elimination System (NPDES) program, which was established by EPA to regulate discharges into receiving waters. One requirement of the NPDES program is to file a Construction General Permit for Stormwater Discharges (Water Quality Order 99-08-DWQ) with the State to regulate the discharge of pollutants that arise from construction activities. An NPDES application requires the filing of a Notice of *Construction* (*NOC*) to comply with the Statewide General Permit (see next paragraph). Prior to the start of construction, a Storm Water Pollution Prevention Plan (SWPPP) must be prepared and submitted to the RWQCB. The SWPPP is normally prepared by the construction contractor. It identifies sources of pollutants that may be generated during construction activities and the measures that have been prescribed to reduce the potential for sediment and other pollutants from entering receiving waters.
- **California Department of Transportation** (National Pollutant Discharge Elimination System Permit for Storm Water Discharges): Caltrans requires and has its own NPDES permit (Order No. 99-06-DWQ) to regulate stormwater run-off. As described above, one requirement of the NPDES program is to file a General Permit (Water Quality Order 99-08-DWQ) with the State to regulate the discharge of pollutants into receiving waters.
- **Municipal Separate Storm Sewer System (MS4) Permit**: Section 402 of the CWA also includes provisions relating to Municipal Separate Storm Sewer System (MS4) permits. In

addition to the requirements of the NPDES Construction General Permit, above, construction-phase project impacts must be addressed within the framework of the MS4 permit by means of county-specific MS4 compliance programs that are approved by the RWQCB.

- **California Porter-Cologne Water Quality Control Act**: The California Porter-Cologne Water Quality Control Act of 1969 requires that each Regional Water Quality Control Board within the State formulate and adopt water quality control plans or basin plans for all areas in the region.

3.9.2 Affected Environment

The Highway 101 HOV Lane Widening Project is located within the jurisdiction of the North Coast Regional Water Quality Control Board. Regulations for discharges within this area are included in the Water Quality Control Plan for the North Coast Region (Basin Plan) (December 1993). The affected stretch of highway crosses *10* drainage courses; only one of these drainage courses, Mark West Creek, is included in the most recent 200*6* 303(d) list of impaired water bodies. Local agencies that have jurisdiction over these drainage courses include the City of Santa Rosa, the City of Windsor, and the Sonoma County Water Agency.

Hydrological resources within the project vicinity include Windsor Creek; East Windsor Creek; Pool Creek; Faught Creek; Pruitt Creek; Mark West Creek; the North, Middle, and South branches of the Santa Rosa Flood Channel; and Piner Creek. [p1]These streams, which flow in a westerly direction across the project alignment towards the Russian River, have watershed areas totaling 12,250 hectares (30,270 acres). Each of these watersheds includes an upper (eastern) potion located in relatively hilly terrain and a lower (western) portion located in alluvial valleys. At the southern end of the project area is the South Branch of the Santa Rosa Flood Channel. While the project would not affect this channel, a brief description is provided due to its proximity to the overall project.

These hydrological resources are described below.

Windsor Creek

Windsor Creek crosses Highway 101 approximately 150 m (500 ft) north of the Windsor River Road overcrossing. Drainage from this watershed is conveyed under the highway via a 6.1 m x 3.7 m (20 ft x 12 ft) concrete box culvert. The culvert is approximately 128 m (420 ft) in length. Windsor Creek has a watershed area of 620 ha (2.4 sq mi).

East Windsor Creek

East Windsor Creek crosses Highway 101 approximately 200 m (660 ft) south of Windsor River Road. Drainage is conveyed under the highway via a 3 m x 3 m (10 ft x 10 ft) concrete box culvert. The culvert is approximately 94 m (308 ft) in length. East Windsor Creek has a watershed area of 465 ha (1.8 sq mi).

Pool Creek

Drainage from Pool Creek is conveyed under Highway 101 via twin bridges. The bridges are approximately 20.5 m (67 ft) long and 12 m (40 ft) wide. The bridges are located approximately 610 m (2,000 ft) north of Shiloh Road. Pool Creek has a watershed area of 985 ha (3.8 sq mi).

Faught Creek

Flows from Faught Creek are conveyed under Highway 101 via a 3.7 m x 2.1 m (12 ft x 7 ft) concrete box culvert. Development has occurred at the upstream end of the Highway 101 culvert and the upstream portion of the channel has been put into underground piping. The channel daylights several hundred meters east of the highway and continues upstream through a residential development as an open channel. Downstream of Highway 101 the channel is open, except for the short portion that is conveyed under the Shiloh Road off-ramp from southbound Highway 101. Faught Creek has a watershed area of 180 ha (0.7 sq mi).

Pruitt Creek

Drainage from Pruitt Creek is conveyed via a pair of 20.7 m (68 ft) long bridges. The southbound Highway 101 bridge is 12 m (39 ft) wide. The width of the northbound span varies because it encompasses a portion of the off-ramp to Shiloh Road. The bridge is located approximately 370 m (1,200 ft) south of Shiloh Road. Pruitt Creek has a watershed area of 440 ha (1.7 sq mi).

Mark West Creek

Flows from Mark West Creek are conveyed under the highway via twin 44.5 m (146 ft) long bridge spans. The bridges are midway between Fulton Road and Airport Boulevard. Mark West Creek has a watershed area of 9,430 ha (36.4 sq mi).

Santa Rosa Flood Channel, North Branch

The north branch of the Santa Rosa Flood Channel is located approximately 1,130 m (3,700 ft) south of Mark West Springs Road. Run-off from the northernmost branch is conveyed under the highway via a 76-centimeter (30-inch) circular concrete culvert, 34 m (110 ft) in length. The Santa Rosa Flood Channel, North Branch has a watershed area of 52 ha (0.2 sq mi).

Santa Rosa Flood Channel, Middle Branch

The middle branch of the Santa Rosa Flood Channel is located approximately 900 m (2,950 ft) north of the Mendocino Avenue overpass. Run-off from the middle branch is conveyed under the highway via twin 2.4 m x 1.5 m (8 ft x 5 ft) concrete box culverts. These culverts terminate at a drop structure downstream of the Highway 101 crossing. The downstream end of the drop structure is connected to a 1.8 m (6.0 ft) concrete pipe that runs through a commercial development and the downstream terminus of the piped system could not be located. The Santa Rosa Flood Channel, Middle Branch has a watershed area of 285 ha (1.1 sq mi).

Santa Rosa Flood Channel, South Branch

The south branch of the Santa Rosa Flood Channel is located near the County Administrative Center approximately 425 m (1,400 ft) north of Steele Lane. Run-off is conveyed under the highway via twin 2.9 m x 2.1 m (9.5 ft x 7 ft) concrete box culverts. The Santa Rosa Flood Channel, South Branch has a watershed area of 492 ha (1.9 sq mi).

Piner Creek

Piner Creek is located approximately 1,160 m (3,800 ft) north of Mendocino Avenue. Run-off is conveyed under the highway via a 1.8 m x 1.2 m (6 ft x 4 ft) concrete box culvert. The Piner Creek watershed area is not available from the Sonoma County Water Agency.

3.9.2.1 BENEFICIAL USES OF WATER RESOURCES

The beneficial uses for the hydrologic areas as described within the Basin Plan include groundwater (referring to groundwater of the Santa Rosa Valley), which is used for municipal, agricultural, and industrial supply. *The Santa Rosa and Mark West subsheds of the Middle Russian River have beneficial uses assigned to their surface waters. None of the surface water bodies that cross the alignment have been designated as having beneficial uses however, two miles (3.2 km) west of the project, the Russian River has beneficial uses that include cold and warm freshwater habitat, marine habitat, navigation, migration of aquatic organisms, recreation, fish spawning, rare species, industrial and domestic supply, agriculture supply, groundwater recharge, hydro power generation, commercial fishing and wildlife habitat.*

To date, there are no special requirements or concerns raised by the North Coast RWQCB regarding this project.

3.9.2.2 EXISTING DRAINAGE

Existing pavement drainage flows to open grass-lined swales off the shoulders of Highway 101 and within the unpaved highway median. Because the proposed widening would include median paving and widening of the pavement along the shoulders, the swales currently located in the median would be removed and the drainage would be routed to the outside shoulders of the freeway.

3.9.2.3 WATER QUALITY

Currently, the only stream crossing the freeway within the project area that is listed as an impaired water body is Mark West Creek, which is affected by sedimentation/siltation and temperature. As described in Section 3.9.4.1, Pollutant Removal and Reduction, *treatment BMPs, which will be refined during final design,* would minimize sedimentation/siltation effects on Mark West Creek. The SWPPP would also identify placement of sediment control best management practices (BMPs) as described in Section 3.16.9, Water Quality and Stormwater Run-off.

3.9.2.4 POLLUTANTS

Pollutants found on streets and freeways that could be constituents of stormwater run-off include heavy metals, organic compounds (including petroleum hydrocarbons), sediments, trash, debris, oil, and grease.

3.9.3 Environmental Consequences

3.9.3.1 STORMWATER RUN-OFF

The project would result in *an* increase in impervious surface in the project area (approximately *16* hectares*)*. This can be expected to translate into localized increases in urban run-off. Due to the lag time between the peak run-off from major tributaries in each of the watersheds, and that from the freeway run-off, the peak flow from the freeway *is unlikely to occur when* the watershed peak occurs. This, coupled with the minor increase in impervious surface, would result in an insignificant increase in peak flow in each of the overall watersheds due to this project.

3.9.3.2 WATER QUALITY

As described previously, run-off from highways has been found to contain numerous pollutants, including metals, hydrocarbons, solids, oil, and grease. *The proposed project would result in an increase in impervious surface in the project area. This can be expected to translate into localized increases in urban run-off. Due to the lag time between peak run-off from major tributaries and that from the freeway run-off, the peak flow from the freeway is unlikely to occur when the watershed peak occurs. This, coupled with the minor increase in impervious surface, would result in an insignificant increase in peak flow in the overall watershed due to this project.* These constituents are most highly concentrated in the "first flush" of run-off that occurs from the first major rainstorm in a given period or season. After this first flush, the concentrations of highway pollutants are greatly reduced. Any impacts to water quality to the receiving water body will be addressed through the implementation of BMPs to the maximum extent practicable, in compliance with Caltrans' National Pollutant Discharge Elimination System (NPDES) Permit with the State Water Resources Control Board (SWRCB).

3.9.4 Avoidance, Minimization and/or Mitigation Measures

3.9.4.1 POLLUTANT REMOVAL AND REDUCTION

As described in the Caltrans Storm Water Management Plan (SWMP), BMPs would be designed and implemented to reduce to the maximum extent practicable the discharge of pollutants from the storm drain system. Due to site constraints within the narrow Highway 101 project corridor, the drainage system would have to balance pollutant removal with economic factors related to maintenance, right-of-way, and construction costs. Treatment BMPs for this project *will include biofiltration strips and will be refined during final design*. Run-off from the existing facility will be treated to the maximum extent practicable. These proposed BMPs are included in the estimated project construction costs. The proposed BMPs are from an approved list of BMPs known to be effective at reducing sediments and pollutants from highway run-off and would adequately remove the increased amount of pollutants attributable to this project while also removing a substantial amount of pollutants associated with the existing facility. These BMPs combined with the on-site drainage system would result in a reduction in trash, debris, absorbed hydrocarbons and metals, in the freeway run-off that enters streams and channels crossing the freeway.

Additionally, this project is located in a Municipal Separate Storm Sewer System (MS4) and stenciling would be *provided at all drainage inlets that are in areas accessible to pedestrians.*

3.9.4.2 EROSION CONTROL MEASURES

Permanent erosion control measures also would be used to address site soil stabilization and reduce deposition of sediments in adjacent surface waters. Typical measures that would be applied include the application of soil stabilizers such as hydroseeding, netting, erosion control mats, rock slope protection, and others. Temporary erosion control measures would also be required for the construction phase of the proposed project and are discussed in Section 3.16.9, Water Quality and Stormwater Run-off.

3.10 Geology/Soils/Seismic/Paleontology/Topography

3.10.1 Regulatory Setting

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

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE), from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

Other geologic and seismic issues associated with project improvements *are discussed in this section*. Conclusions are based on published and unpublished data, reports, and maps from federal, state, and county agencies; project files and as-built drawings of previous Caltrans projects in the area; published and online references from Sonoma County, the California Geologic Survey, and the United States Geologic Survey; aerial photos and maps; and a geological reconnaissance of the project area.

3.10.2 Affected Environment

3.10.*2*.1 REGIONAL GEOLOGY

The proposed project lies entirely within the Santa Rosa Plain in central Sonoma County. Elevations range from 43 m (141 ft) mean sea level (msl) at Steele Lane to 35 m (115 ft) msl at Windsor River Road. In general, relief is flat to gently sloping down to the west. Higher relief in the hills to the east results in drainages flowing from east to west across the project area. The Highway 101 alignment was graded in the late 1950s, which resulted in the main traffic lanes being at-grade and road crossings occupying fill embankments leading to overcrossings. The fill embankments are generally 5 m (15 ft) or less in height.

3.10.*2*.2 SOILS AND SEDIMENTS

Within the right-of-way, surface soils generally consist of porous and stiff sandy silts and clays, with lesser dense sands, gravels, and silty sands, representative of alluvium. Poorly consolidated bedrock of the Late Pliocene to Pleistocene Glen Ellen formation is exposed in the hills to the east and underlies the alluvium at depths of up to 32 m (100 ft) (*Huffman and Armstrong*, 1980). The Glen Ellen formation consists of fluvial and volcaniclastic sediments that have been subjected to tectonic influences and folding. Andesite flows and pyroclastic rocks of the Sonoma Volcanics interfinger with the Glen Ellen formation at higher elevations and develop more resistant topographic landforms. Basement bedrock of the Jurassic Cretaceous age Franciscan Assemblage is not exposed in the project vicinity.

3.10.*2*.3 SEISMICITY

The California Coast Range province is characterized by a high level of seismic activity related to the San Andreas system of faults. Faults within this system generally strike northwesterly and exhibit right-lateral, strike-slip displacement. These faults result from the northwesterly movement of the Pacific Plate against the North American Plate. Major active faults have broken the region into numerous fault-bound blocks (an active fault is defined as one that has had surface displacement within the last 11,000 years [Holocene-age]). Much of Sonoma County, including the project site, is located within a relatively intact block bound on the west by the active San Andreas fault and on the east by the active Rodgers Creek/Healdsburg fault system.

Faults within the San Andreas system that could induce strong ground shaking in the project vicinity include the north coast segment of the San Andreas fault (capable of *m*oment *m*agnitude [Mw] 8), the Hayward fault (Mw 7½), and the Rodgers Creek/Healdsburg fault (Mw 7). There is a 27 percent probability that an event magnitude greater than Magnitude 6.7 will occur on the Rodgers Creek/Healdsburg fault within the next 30 years. A controlling earthquake of Mw 7 on the Rodgers Creek/Healdsburg fault could result in an estimated peak ground acceleration of .65 g in the project area. Active faults in the proximity of the project are included in Table 3.10-1.

Table 3.10-1: Major Bay Area Faults, Distance from the Site, and Maximum Earthquake Magnitudes at the Site

Fault Name	Distance in Kilometers (Miles), from *Jennings, 1994*	*Maximum Credible Earthquake (MCE)	Estimate* Peak Ground Acceleration (g) %
San Andreas (North Coast Segment)	32.0 (19.9)	8	0.30
San Andreas (offshore)	35 (21.9)	7	0.17
Maacama	9.0 (5.6)	7 ¼	0.43
Hayward (North Segment)	75.0 (46.6)	7 ½	0.13
Rodgers Creek/ Healdsburg	1.1 (0.7)	7	0.65
West Napa	60.0 (37.3)	6 ½	0.06

* Mualchin, 1996

3.10.2.4 PALEONTOLOGY

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects. (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1935 [20 USC 78]). Under California law, paleontological resources are protected by the California Environmental Quality Act, the California Administrative Code, Title 14, Section 4306 et seq., and Public Resources Code Section 5097.5.

The project area traverses broad, flat areas of the Santa Rosa Plain, which is overlain by unconsolidated surficial Quaternary sediments including alluvium and fan deposits (Huffman and Armstrong, 1980). The area near the Mendocino Avenue overcrossing may be underlain at shallow depth by the Petaluma formation (CDMG, 1988). The fan deposits are derived from bedrock source materials in the hills to the east of the Project including the Glen Ellen formation and Sonoma Volcanics, (USGS 2004) both of which are devoid of any paleontological resources, and, therefore, are of marginal sensitivity. The Petaluma formation, which consists predominately of sandstone and conglomerate, contains detritus from the older (Jurassic-Cretaceous) Franciscan Assemblage and Sonoma Volcanics. The Petaluma formation rarely contains important fossils (USGS, 1983).

North of Mark West Springs Road the surficial fan deposits transition into alluvial deposits, especially near the west flowing drainages. The alluvium appears to represent reworked sediments from the Glen Ellen formation that outcrop in the hills to the east and within the dissected drainages. Since the Glen Ellen formation contains mostly detritus from the Franciscan Assemblage as well as tuffaceaous material from the Sonoma Volcanics (USGS, 1983), the likelihood of fossils being contained within the sediments is very low. Any fossils to be found within the project area are likely to be much degraded and are not expected to have any paleontological significance.

3.10.3 Environmental Consequences

Geologic hazards that may affect the project include landsliding, expansive surficial soils, ground shaking, liquefaction-induced settlement, fault rupture, lateral spreading, and flooding. These geologic hazards are briefly described below.

3.10.*3*.1 LANDSLIDING

Because a majority of the Highway 101 corridor within the project limits is of low relief, landsliding is not a major geological hazard to the proposed project. A few landslides have been mapped in the hills to the east, but these do not pose an imminent hazard because of their distance from the project. The closest mapped landslide is located outside of the highway right of way approximately 76.2 m (250 ft) away from the project in the vicinity of the Mendocino Avenue interchange and the graded slopes show no evidence of movement. No work is proposed that could be anticipated to affect the stability of the landslide. All other mapped landslides in the hills to the east are generally more than a mile away from the project area.

3.10.*3*.2 EXPANSIVE SURFICIAL SOILS

The Santa Rosa Plain contains expansive surface soils. These soils may extend down 2 m (6.6 ft) or more. It is possible that some expansive soils remain following the initial grading of the four-lane freeway. Because expansive soil is subject to volume changes with seasonal changes in moisture content, certain structures or pavements could be damaged if placed directly on these expansive "adobe" soils.

3.10.*3*.3 GROUND SHAKING

The principal seismic hazard to the proposed project is the potential for moderate to severe ground shaking from earthquakes occurring on one or more regional active faults. The San Andreas fault system has displayed considerable activity in the past and is considered likely to induce strong ground shaking within the project vicinity in the future, particularly along the Rodgers Creek/Healdsburg fault, the controlling fault in this system (see Section 3.10.1.3, Seismicity).

3.10.*3*.4 LIQUEFACTION-INDUCED SETTLEMENT

Liquefaction typically occurs in loose, cohesionless, saturated, granular soils below the groundwater table. Liquefaction hazard susceptibility mapping of the greater San Francisco Bay has shown that the entire project site has a moderate to high potential for liquefaction. Based on a review of available local soil borings, it appears that a large portion of the project area is underlaid by potentially liquefiable soils. Settlements of about 2.5 cm (less than 1 inch) could occur on pavements and embankments. Concrete structures, including bridges that are pier-supported at depth, should not settle appreciably.

3.10.*3*.5 LATERAL SPREADING

Lateral spreading is a phenomenon associated with liquefaction where lateral movement of a soil embankment occurs along a free face. There is a possibility that this situation may occur at any of the major creek channel crossings, including Mark West Creek, Pool Creek, and Pruitt Creek where liquefaction hazard is the greatest. The consequences would be potential failure of the abutments to the bridges, possible exceedance of lateral capacities of the bridge pile supports, and potential blockage of creek flows with soil deposits.

3.10.*3*.6 FAULT RUPTURE

Historically, fault rupture accompanying severe earthquakes has generally occurred along preexisting fault traces. The closest active fault, the Rodgers Creek/Healdsburg fault, is 1.1 kilometers (0.7 miles) away, in the vicinity of the Old Redwood Highway on-ramp. A secondary splay extends to less than 0.5 kilometers (0.3 miles) from Highway 101. This fault is not considered potentially active. Fault-related ground rupture is not likely to occur at the project site.

3.10.4 Avoidance, Minimization and/or Mitigation Measures

To avoid, minimize, and/or mitigate geologic and seismic hazards in the proximity of the project, site specific investigations, seismic hazard engineering analysis, and engineering recommendations for retaining walls, expansive soil treatment, cuts and fills, and bridge foundation elements would be

conducted during final design using Caltrans Guidelines for Geotechnical Foundation Investigations and Reports. Specifications for construction would conform to the Caltrans Standard Specifications.

3.10.4.1 EXPANSIVE SURFICIAL SOILS

Expansive clays are prevalent in the upper soil zones in the study area. These types of soils require special treatment if exposed at roadway subgrade level and if used for compacted fills. To minimize the potential for settlement or damage from expansive soils, it is recommended that existing soils be over-excavated a minimum of 0.5 m (1.6 ft) below pavement subgrade and backfilled with select non-expansive fill. Lime treatment of expansive soil subgrade is an acceptable alternative. Fills should be placed in thin, loose lifts and be well compacted.

Several creek crossings are proposed for widening, including the Pruitt Creek, Pool Creek, and Mark West Creek bridges. Existing soil borings for these structures are available and indicate stiff clays and sandy silts over dense alluvial sands and gravels. Suitable abutment and intermediate pier foundations could be either deep spread footings, drilled piers, or driven piles.

Implementation of these actions or a combination of these actions would be explored during the final design and construction process when site-specific subsurface investigations, borings, and field mapping would be performed.

3.10.4.2 GROUND SHAKING

The maximum credible earthquake (MCE), defined as the largest earthquake reasonably likely to occur under presently known conditions, is used to determine the safety evaluation for freeway design. To minimize the potential damage from ground shaking, structures associated with this project must meet MCE standards, as established by the Caltrans Office of Earthquake Engineering. The MCE for this project is a magnitude 7.0 earthquake on the controlling Rodgers Creek/Healdsburg fault. All project structures would be designed to this MCE in accordance with current Caltrans design standards.

3.10.4.3 LIQUIFACTION-INDUCED SETTLEMENT

To minimize potential liquifaction impacts associated with the proposed project, stone columns, sub-excavation, dynamic compaction, or de-watering methods would be implemented during construction. The most suitable method(s) would be selected based on site-specific subsurface investigations to identify the potential for liquifaction. The investigations are typically conducted during the final design phase of a project.

3.10.4.4 LATERAL SPREADING

Site specific engineering recommendations to minimize impacts from lateral spreading would be incorporated into the final design plans and construction contract documents. Angled piles may be needed to lessen lateral pressures of creek banks to resist lateral spreading.

3.10.4.5 FAULT RUPTURE

Site specific seismic hazard engineering analysis would be conducted during the final design phase and construction process to minimize the impacts of fault rupture.

3.11 Hazardous Wastes/Materials

3.11.1 Regulatory Setting

Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health and land use.

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

- *Community Environmental Response Facilitation Act (CERFA) of 1992*
- *Clean Water Act*
- *Clean Air Act*
- *Safe Drinking Water Act*
- *Occupational Safety & Health Act (OSHA)*
- *Atomic Energy Act*
- *Toxic Substances Control Act (TSCA)*
- *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)*

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

Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976, and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper disposal of hazardous material is vital if it is disturbed during project construction.

This section summarizes potential impacts from hazardous wastes that could expose construction workers or the general public to health risks and that may require the implementation of special soil and/or groundwater management procedures. Section 3.16.10, *Hazardous Wastes/Materials,* discusses the potential impacts of hazardous materials that may be used or stored in conjunction with construction activities.

3.11.2 Affected Environment

Data sources used to identify previous and current land uses that could contribute to the contamination of the project area include the following:

- The Initial Site Assessment (ISA) for the Project Study Report (PSR) prepared for the Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor;
- The Site Investigation Report for the Highway 101 HOV Lane Widening Project: Wilfred Avenue to Route 12, pertinent because of the project's proximity to the current project corridor;
- Property-specific reviews of properties identified in the Steele Lane to Windsor Road ISA as having the potential to impact the project area;
- Field or drive-by reconnaissance of the project area and vicinity; and
- Project files and as-built drawings of previous Caltrans projects in the area.
- Federal and state environmental "record sources" (e.g. the Federal Superfund list, a list of registered underground storage tanks [USTs]), to identify the locations of known hazardous waste sites in the project vicinity.

3.11.2.1 IDENTIFIED HAZARDOUS WASTE SITES

Based on a review of the ISA for the PSR prepared for the Highway 101 HOV Lane Widening Project: Steele Lane, Santa Rosa to Windsor Road, Windsor, no specific properties were identified as having the potential to impact the project. The ISA did indicate that the project area has potential soil and groundwater contamination issues due to leaking underground storage tanks (LUSTs), hazardous waste material releases adjacent to the state highway, and aerial deposition of lead from motor vehicle exhaust.

Because specific properties were not identified in the PSR or the ISA, a review and evaluation of an environmental regulatory database report from Environmental Data Resources, Inc. (EDR, 2003) also was conducted. This report, previously obtained for the Sonoma Marin Area Rail Transit (SMART) project that runs along the west side of the Highway 101 corridor, identifies properties that have had hazardous waste releases to the environment and are located within one mile of the railroad track. The location and status of these properties were evaluated to assess their potential to impact the current project.

Of the evaluated properties, four were identified as having the potential to affect subsurface conditions along the corridor, warranting additional assessment. A review of North Coast Regional Water Quality Control Board (RWQCB) regulatory files was carried out for each of these properties. A summary of the file review identifying each site, address, location within the project area, the type of hazardous material found, and its potential risk to the proposed project's scope and schedule, is presented in Table 3.11-1. The classification of each property as high-, moderate-, or low-risk is based on the type of operation, proximity to the widening alignment, anticipated hydrogeologic gradient, field observations, and historical and regulatory information. The classification criteria are as follows:

- **High Risk:** Properties with known or probable soil/groundwater contamination (e.g. LUSTs) and properties where remediation is incomplete or undocumented.
- **Moderate Risk:** Properties with identified or potential soil contamination (e.g. LUSTs), where remediation is in progress or groundwater contamination does not appear to be migrating.
- **Low Risk**: Properties that have completed remediation or have historically used only small amounts of known contaminants (e.g., Resource Conservation and Recovery Act Information System [RCRIS], small quantity generators, or underground storage tanks [USTs]).

Table 3.11-1: Hazardous Waste Sites/Incidences With Potential to Affect Subsurface Conditions along the Highway 101 HOV Lane Widening Project Corridor

Identified Property	Property Address	Property Location	Hazardous Material	Risk Assessment
Shell Facility	777 Steele Lane, Santa Rosa	Approximately 30 meters (100 feet) east of the corridor (Station 238+60)	Release from a gasoline UST; some contaminated soil; groundwater investigation ongoing.	Low Risk
Shell Facility	3453 Cleveland Avenue, Santa Rosa	Approximately 100 meters (330 feet) west of the corridor (Station 257+00).	Release from a gasoline UST; some contaminated soil; some remediation activities completed; groundwater monitoring ongoing.	Low Risk
Texaco Facility	4601 Old Redwood Highway, Santa Rosa	Approximately 600 meters (1,970 feet) east of the corridor (Station 28+90).	Release from a gasoline UST. Extraction and monitoring of groundwater ongoing.	Low Risk
Former Ecodyne Cooling Facility	930 Shiloh Road, Windsor	Approximately 400 meters (1,310 feet) west of the corridor (Station 331+20).	Release from a gasoline UST and release of wood treatment chemicals to the soil and groundwater. Extensive remediation has been performed, consisting of groundwater extraction and injection of compounds to treat hexavalent chromium. Portions of the facility have been capped with asphalt. Release to groundwater is confined to just beyond property's east boundary.	Low Risk

Source: MACTEC Engineering and Consulting, 2005.

3.11.2.2 LEAD-BASED PAINT AND ASBESTOS

The proposed build alternative includes upgrading several undercrossings and overpasses. Due to the age of these structures, hazardous wastes consisting of lead-based paint and asbestos may be present in the building materials. Lead-based paint (LBP) and asbestos in good condition do not present an immediate health risk; however, lead particles and asbestos fibers could be emitted to the air during demolition or renovation activities.

Lead-Based Paint

Lead oxide and lead chromate commonly were used in paints until 1978, when regulations limited the allowable lead content in paint; therefore, exterior painted surfaces of the bridge crossings have the potential to contain LBP. Lead is a suspect carcinogen, a known teratogen (i.e., it has the potential to cause birth defects), and a reproductive toxin.

Asbestos-Containing Materials

Asbestos, a known human carcinogen, was commonly used in construction materials until the 1980s, when it was phased out. Therefore, utility lines, bridge expansion joints, concrete-asbestos water lines, and other bridge building materials have the potential to contain asbestos.

Naturally Occurring Asbestos

Naturally occurring asbestos is not expected to affect the proposed project as no outcroppings of bedrock containing asbestos were identified.

3.11.2.3 AERIALLY DEPOSITED LEAD

Various studies have been performed in the Bay Area that have identified aerially deposited lead (ADL) in soils near roadways, attributed to the use of lead in gasoline, a practice that was phased out beginning in the mid-1970s. Typically, ADL exists in the top *0.61* m (*two ft*) of soil in unpaved shoulder and median areas of many freeway corridors.

In addition, any yellow traffic paint, yellow thermoplastic paint/tape, or markings placed prior to 1990 contain lead chromate as the pigment, which, when removed, might generate heavy metal *contaminated waste* that exceeds the threshold established by Title 22 California Code of Regulations.

3.11.3 Environmental Consequences

Reconnaissance and investigation of the project corridor identified various hazardous waste issues associated with the proposed project, described below.

3.11.3.1 HAZARDOUS WASTE RELEASES

No properties immediately adjacent to the project corridor were identified that exhibited obvious signs of hazardous wastes or waste releases. All of the hazardous waste sites identified in the corridor are currently undergoing monitoring or remediation and pose only a low risk to the proposed project.

3.11.3.2 LEAD-BASED PAINT AND ASBESTOS

Field reconnaissance in the project area identified four bridges and overcrossings with the potential to contain LBP and/or asbestos, as follows:

Mendocino Avenue Overcrossing: Caltrans Bridge No. 20-179. Potential for the presence of asbestos-containing materials in joint caulking compounds between concrete slabs.

Mark West Creek Bridge: Caltrans Bridge No. 20-180. Potential for the presence of asbestos-containing materials in joint caulking compounds between concrete slabs. Observed spray paint (graffiti) is unlikely to be LBP given its recent age.

Pruitt Creek Bridge: Caltrans Bridge No. 20-181. Potential for the presence of asbestos-containing materials in joint caulking compounds between concrete slabs.

Pool Creek Bridge: Caltrans Bridge No. 20-181. Potential for the presence of asbestos-containing materials in joint caulking compounds between concrete slabs.

3.11.3.3 AERIALLY DEPOSITED LEAD

Based on a review of the Site Investigation Report performed for the Wilfred Avenue to Route 12 project, selected because site conditions for this portion of Highway 101 are expected to be similar to those of the present project, it is anticipated that soil with elevated lead concentrations would be encountered during the project improvement activities. In addition, the presence of yellow traffic stripes and pavement markings in the project area creates a potential for the release of airborne contaminants during construction and renovation, which would pose a possible health risk to construction workers and residents.

3.11.4 Avoidance, Minimization, and/or Mitigation Measures

Protective measures to reduce or eliminate hazardous wastes-related impacts are described below.

3.11.4.1 HAZARDOUS WASTE RELEASES

The following general avoidance and prevention measures are proposed based on information identified to date:

- Construction contractor(s) would be required to prepare and implement a Worker Health and Safety Plan (to be approved by Caltrans prior to onset of construction activities).
- Construction contractor(s) would be required to prepare a *S*torm *W*ater *P*ollution *P*revention *P*lan (SWPPP) to be approved by Caltrans prior to the onset of construction activities.
- Any contaminated groundwater that is encountered during construction would be handled in accordance with the water quality provisions outlined in Section 3.9*, Water Quality and Stormwater Run-off,* of this document.
- In the event that a previously undocumented hazardous waste site or underground storage tank is uncovered during construction, Caltrans would consult with the appropriate federal and state regulatory agencies to determine what action, if any, is appropriate.
- Contract special provisions would be written and construction plans prepared so that any contaminated soil excavated during construction would be handled and disposed of in accordance with applicable federal and state laws, regulations, rules, and policies.

3.11.4.2 LEAD-BASED PAINT AND ASBESTOS

Sampling activities in locations where LBP or asbestos-containing materials are anticipated (including the Mendocino Avenue Overcrossing, Mark West Creek Bridge, Pruitt Creek Bridge, and

Pool Creek Bridge) would be conducted to identify whether potential hazards exist and whether special precautions are necessary during bridge/overcrossing renovation and or/demolition. During the course of demolition or renovation activities, construction contractors and/or Caltrans would follow regulations requiring the abatement of LBP and asbestos-containing materials to prevent exposure to nearby residents and workers.

Prior to any demolition work or upgrading or reconstruction of existing *bridge structures*, an asbestos-containing materials (ACM) survey would be conducted for these structures. In addition, any other structure (e.g., retaining or sound walls) requiring demolition would be tested for ACM prior to demolition. The ACM survey would be performed by an inspector who is Asbestos Hazardous Emergency Response Act (AHERA) certified under Toxic Substances Control Act (TSCA) Title II and California Occupational Safety and Health Administration (Cal OSHA) certified under Section 1529 of the California Code of Regulations. Prior to demolition, a notification along with the results of the ACM survey would be submitted to the Bay Area Air Quality Management District as part of the permitting process.

3.11.4.3 AERIALLY DEPOSITED LEAD

Sampling activities in locations where elevated lead concentrations are anticipated or petroleum hydrocarbon-contaminated soil and groundwater could be encountered would be conducted to identify whether potential hazards exist and whether special handling of soil is required. Short-term impacts of soil excavation would be mitigated through implementation of *b*est *m*anagement *p*ractices (BMPs), which may include preparation of a soils management plan (SMP) or *a* section of the Worker Health and Safety Plan to prevent exposure of workers to potentially hazardous excavated soils and to comply with applicable waste handling and disposal regulations if offsite disposal of soil/rock is necessary. If ADL- or petroleum hydrocarbon-contaminated soil were present, a variance for re-use of soil could be *invoked* through the DTSC if contamination meets the extractable and total lead/petroleum hydrocarbon thresholds. The RWQCB would also need to be notified and provisions for the re-use and storage of ADL- and petroleum hydrocarbon-contaminated soil would need to be addressed in the *contract plans and specifications and in the* SWPPP prepared by the contractor for the project.

It is recommended that *shallow* samples of soil be collected and analyzed for total lead. Any sample exceeding *400* milligrams/kilogram (mg/kg) should be tested *using the* Toxicity Characteristic Leaching Procedure (TCLP). Any soil containing 5 milligrams per liter (mg/l) or more of lead *according to the TCLP* is considered a Resource Conservation and Recovery Act (RCRA) hazardous waste and, therefore, would be subject to specific standards for transportation, treatment, storage, and disposal. Caltrans *and SCTA* would consult with DTSC and the San Francisco RWQCB regarding the *specifics* of the variance and management of lead-contaminated soil. A detailed work plan and a sampling and testing program would be prepared in accordance with Caltrans guidelines during the design phase of the project.

3.12 Air Quality

This section reports the results of the *Air Quality Impact Technical Report* (Terry A. Hayes Associates 2005) and the *Mobile Source Air Toxics Analysis Technical Memorandum* (*Terry A. Hayes Associates 2007*) prepared for the project.

3.12.1 Regulatory Setting

Air quality in the United States is governed by the federal Clean Air Act (CAA). In addition to being subject to the requirements of CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act (CCAA). At the federal level, the CAA is administered by the United States Environmental Protection Agency (USEPA). In California, the CCAA is administered by the California Air Resources Board (CARB) at the state level and by the Air Quality Management Districts at the regional and local levels. The proposed project is located within the Bay Area Air Quality Management District (BAAQMD).

USEPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS), which are required under the 1977 CAA and subsequent amendments. USEPA regulates emission sources that are under the exclusive authority of the federal government and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for meeting the state requirements of the federal CAA, administering the CCAA, and establishing the California Ambient Air Quality Standards (CAAQS). The CCAA requires all air districts in the state to endeavor to achieve and maintain the CAAQS, which are generally more stringent than the corresponding federal standards.

The BAAQMD is primarily responsible for assuring that the national and state ambient air quality standards are attained in the San Francisco Bay Area. The BAAQMD has jurisdiction over an approximately 5,600-square-mile area, commonly referred to as the Bay Area Air Basin (BAAB). The District's boundary encompasses most of the nine Bay Area counties: Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County and southern Sonoma County. The discussion of project air quality setting and effects refers primarily to conditions within the BAAB, which from both the federal and state regulatory perspectives is considered one geographic entity.

3.12.1.1 National and State Ambient Air Quality Standards

State and federal standards for major air pollutants are summarized in Table 3.12-1. Primary standards were established to protect the public health. Secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare. Since the CAAQS are more stringent than the NAAQS, the CAAQS are used as the standard in the air quality analysis for the Highway 101 HOV Lane Widening Project.

Attainment Status

Under CAA and CCAA requirements, areas are designated as either attainment or non-attainment for each criterion pollutant based on whether the NAAQS or CAAQS have been achieved. Areas are designated as non-attainment for a pollutant if air quality data show that a state or federal standard for the pollutant was violated at least once during the previous three calendar years. Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as non-attainment. Under the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3, PM_{10}, and $PM_{2.5}$. Under the CAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3.

Table 3.12-1: State and National Ambient Air Quality Standards

Pollutant	Averaging Period	California		Federal	
		Standards	Attainment Status	Standards	Attainment Status
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	Non-attainment	0.12 ppm (235 µg/m^3)	Non-attainment
	8 hour	--	--	0.08 ppm (157 µg/m^3)	Non-attainment
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	Non-attainment	150 µg/m^3	Attainment
	Annual Arithmetic Mean	20 µg/m^3	Non-attainment	50 µg/m^3	Attainment
Fine Particulate Matter ($PM_{2.5}$) [1]	24 hour	--	--	65 µg/m^3	Attainment
	Annual Arithmetic Mean	12 µg/m^3	Non-attainment	15 µg/m^3	Attainment
Carbon Monoxide (CO)	8 hour	9.0 ppm (10 mg/m^3)	Attainment	9.0 ppm (10 mg/m^3)	*Maintenance*
	1 hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	*Maintenance*
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	--	0.053 ppm (100 µg/m^3)	Attainment
	1 hour	0.25 ppm (470 µg/m^3)	Attainment	--	--
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	--	0.03 ppm (80 µg/m^3)	Attainment
	24 hour	0.04 ppm (105 µg/m^3)	Attainment	0.14 ppm (365 µg/m^3)	Attainment
	1 hour	0.25 ppm (655 µg/m^3)	Attainment	--	--

[1] The Federal air quality standard for $PM_{2.5}$ was adopted in 1997. Presently, no methodologies for determining impacts relating to $PM_{2.5}$ have been developed or adopted by federal, state, or regional agencies. Additionally, no strategies or mitigation programs for $PM_{2.5}$ have been developed or adopted by Federal, State, or regional agencies.

Source: California Air Resources Board and United States Environmental Protection Agency, January 2003.

Carbon Monoxide (CO)

Carbon monoxide (CO), a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhausts release most of the CO in urban areas. CO dissipates relatively quickly, so ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO

concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. The BAAB is in attainment for CO at both the federal and state levels.

Ozone (O_3)

Ozone (O_3), a colorless toxic gas, is the chief component of urban smog. O_3 enters the blood stream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting growth. O_3 forms in the atmosphere through a chemical reaction between reactive organic gases (ROG) and nitrogen oxides (NO_X) under sunlight. Motor vehicles are the major sources of ROG and NO_X. O_3 is present in relatively high concentrations within the Bay Area air basin. Under the CAA and the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2), a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like O_3, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NOx and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10} (see discussion of PM_{10} below). The BAAB is in attainment for NO_2.

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is a product of high-sulfur fuel combustion. The main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. Industrial chemical manufacturing is another source of SO_2. SO_2 is an irritant gas that attacks the throat and lungs. SO_2 concentrations have been reduced to levels well below the state and national standards, but further reductions in emissions are needed to attain compliance with standards for sulfates and PM_{10}, of which SO_2 is a contributor. The BAAB is in attainment for SO_2 at both the federal and state levels.

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

Particulate matter consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Respirable particulate matter (PM_{10}) refers to particulate matter less than 10 microns in diameter, about one/seventh the thickness of a human hair. Fine particulate matter ($PM_{2.5}$) refers to particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. Major sources of PM_{10} include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands; and atmospheric chemical and photochemical reactions. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as SO_2, NO_X, and volatile organic compounds. The Sonoma County portion of the BAAB is a non-attainment area for PM_{10} and $PM_{2.5}$ under the CCAA.

Lead

Prior to 1978, mobile emissions were the primary source of lead in air. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95 percent. Currently, industrial sources are the primary source of airborne lead. Since the proposed project does not contain an industrial component, lead emissions were not analyzed in the air quality assessment. The potential for aerially deposited lead to be in soils along Highway 101 is discussed in Section 3.11, Hazardous Waste/Materials.

3.12.1.2 AIR QUALITY PLANS

The BAAQMD, in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), is responsible for preparing air quality plans pursuant to the CAA and CCAA. Under the CAA, State Implementation Plans (SIPs) are required for areas that are designated as non-attainment for O_3, CO, NO_X, SO_X, or PM_{10}. For the BAAB, a SIP is required for O_3 since the region is currently designated as a Federal Non-attainment Area for O_3. The most current SIP is called the Bay Area 2001 Ozone Attainment Plan, which was adopted by the MTC, ABAG, and BAAQMD in October 2001. CARB adopted this Plan in November 2001, and EPA approved the associated emissions budget in February 2002.

Whereas the SIP is prepared pursuant to the CAA, the Bay Area Clean Air Plan (CAP) is prepared to meet the requirements of the CCAA. The CAP is the region's plan for reducing ground-level ozone. The CAP identifies how the BAAB would meet the state O_3 standard by its attainment date. The 2000 CAP focuses on identifying and implementing control measures that would reduce O_3. It was adopted by the BAAQMD in December 2000.

3.12.1.3 AIR QUALITY CONFORMITY

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to CAA requirements. Transportation conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. A conformity determination demonstrates that total emissions projected for a plan or program are within the emissions limits ("budgets") established by the air quality plan or SIP and that transportation control measures (TCMs) are implemented in a timely fashion. Conformity applies to transportation plans, transportation improvement programs (TIPs), and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in non-attainment or maintenance areas. Section 176 of the CAA specifies that no federal agency may approve, support, or fund an activity that does not conform to the applicable implementation plan. FHWA and FTA jointly make conformity determinations within air quality non-attainment and maintenance areas to ensure that federal actions conform to the "purpose" of SIPs. In late 1993, USEPA promulgated final rules for determining conformity of transportation plans, programs, and projects. These final rules, contained in 40 CFR Part 93, govern the conformity assessment for the proposed project.

3.12.2 Affected Environment

3.12.2.1 CLIMATE

The Bay Area is characterized by cool, dry summers and mild, wet winters. Temperature in the project area and its vicinity averages approximately 58 degrees Fahrenheit annually, with an average maximum summer temperature of approximately 82 degrees Fahrenheit and an average minimum winter temperature of approximately 38 degrees Fahrenheit. The Eastern Pacific High, which is a strong persistent anticyclone, is the major influence on the climate in the area. The area experiences little precipitation during the summer months, when a high-pressure cell prevents storms from affecting the California coast. During the winter, the high-pressure cell weakens and shifts southward. Storms occur more frequently and winds are usually moderate. Total precipitation in the project area averages approximately 30.2 inches annually.

Low wind speeds and temperature inversions contribute to the buildup of air pollution. Low wind speed contributes to the buildup of air pollution because it allows more pollutants to accumulate in the air within a period of time. The highest air pollutant concentrations in the Bay Area generally occur during inversions, when temperature increases as altitude increases, thereby preventing air close to the ground from mixing with the air above it. As a result, air pollutants are trapped near the ground.

3.12.2.2 AIR MONITORING DATA

The BAAQMD monitors air quality conditions at various locations throughout the Bay Area Air Basin. The closest air monitoring station to the project area is the Santa Rosa–5th Street monitoring station, which is approximately 1.6 miles south of the project area. Historical data from the Santa Rosa–5th Street monitoring station were used to characterize existing conditions within the vicinity of the proposed project area and to establish a baseline for estimating future conditions with and without the proposed project.

Criteria pollutants monitored at the station include O_3, CO, NO_2, $PM_{2.5}$, and PM_{10}. SO_2 is not monitored at this monitoring station or at any of the other monitoring stations in Sonoma County. A summary of the data recorded at the monitoring station during the 2001 *to* 2003 period is shown in Table 3.12-2. The CAAQS and NAAQS for the criteria pollutants are also shown in the table. As Table 3.12-2 indicates, criteria pollutants CO and NO_2 did not exceed the CAAQS or NAAQS between the years 2001 and 2003. O_3 exceeded the state one-hour standard once during the 2001 *to* 2003 period. $PM_{2.5}$ exceeded the federal 24-hour standard once during the period, and PM_{10} exceeded the state 24-hour standard on five days during the period.

Table 3.12-2: 2001 *to* 2003 Criteria Pollutant Violations: Santa Rosa – 5th Street Monitoring Station

Pollutant	Standard Exceedance	2001	2002	2003
Ozone (1 hour)	Maximum 1-hr concentration (ppm) Days > 0.12 ppm (Federal 1-hr standard) Days > 0.09 ppm (State 1-hr standard)	0.086 0 0	0.077 0 0	0.096 0 1
Ozone (8 hour)	Maximum 8-hr concentration (ppm) Days > 0.08 ppm (Federal 8-hr standard)	0.063 0	0.060 0	0.079 0
Carbon Monoxide	Maximum 8-hr concentration (ppm) Days > 9 ppm (Federal 8-hr. standard) Days > 9.0 ppm (State 8-hr standard)	2.40 0 0	2.10 0 0	1.77 0 0
Nitrogen Dioxide	Maximum 1-hr concentration (ppm) Days > 0.25 ppm (State 1-hr standard)	0.057 0	0.054 0	0.055 0
$PM_{2.5}$	Maximum 24-hr concentration (µg/m^3) Days > 65 µg/m^3 (Federal 24-hr standard)	75.9 1	50.7 0	38.8 0
PM_{10}	Maximum 24-hr concentration (µg/m^3) Estimated days > 150 µg/m^3 (Federal 24-hr standard) Estimated days > 50 µg/m^3 (State 24-hr standard)	78.1 0 3	63.6 0 2	36.3 0 0

Source: California Air Resources Board.

3.12.2.3 BACKGROUND CARBON MONOXIDE (CO) CONDITIONS

CO concentrations are typically used as an indicator of conformity because CO levels are directly related to vehicular traffic volumes, the main source of air pollutants. A review of data from the Santa Rosa–5th Street monitoring station for the 2001 *to* 2003 period indicates that the average eight-hour background CO concentration is approximately 2.3 ppm. Assuming a typical persistence factor of 0.6, the estimated one-hour background concentration is approximately 3.9 ppm. The existing eight-hour background concentration does not exceed the state and federal eight-hour CO standard of 9.0 ppm. Additionally, the existing one-hour background concentration does not exceed the state and federal one-hour CO standards of 20.0 ppm and 35.0 ppm, respectively.

3.12.2.4 SENSITIVE RECEPTORS

The following categories of people, as identified by the CARB, are considered most sensitive to air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. Locations that may contain a high concentration of these sensitive population groups are called sensitive receptors and include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. Six representative sensitive receptors have been identified within a quarter-mile of the Highway 101 project limits. They include:

- Windsor Public Library (library – 9291 Old Redwood Highway, Windsor)
- Chancellor Place (retirement/convalescent homes – 907 Adele Drive, Windsor)
- Windsor Creek Elementary School (elementary school – 8955 Conde Lane, Windsor)
- Little School House (daycare center – 270 Mark West Station Road, Windsor)
- Sonoma Academy (high school – 50 Mark West Springs Road, Santa Rosa)
- Brighton Gardens of Santa Rosa (retirement/convalescent homes – 300 Fountain Grove Parkway, Santa Rosa)

In addition to the sensitive receptors listed above, residential uses are also located within a quarter-mile of the project limits.

3.12.3 Environmental Consequences

3.12.3.1 METHODOLOGY

CARB's EMFAC2002 emissions factor model and Caltrans' CALINE4 dispersion model were used to determine air quality impacts. Caltrans' Transportation Project-Level Carbon Monoxide Protocol was used to determine CO impacts. A quantitative analysis was conducted for this project because the traffic report identified certain roadway segments within the project area would have future level-of-service (LOS) E or F under the Build Alternative *(Preferred Alternative)*. These roadway segments were analyzed to determine whether the project would result in any CO violations. Emissions and concentrations related to lead were not analyzed because the proposed project does not contain lead emissions sources. A qualitative PM_{10} hot spot analysis was conducted in accordance with 40 CFR 93.123 (b)(4), because the USEPA has not released modeling guidelines on how to perform qualitative PM_{10} hot spot analysis.

In addition to the criteria air pollutants for which there are NAAQS, USEPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act (CAA). MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. Available tools do no enable prediction of project-specific health effects of the emission changes associated with the proposed project.

The six pollutants of interest for MSAT analysis are diesel particulate matter (DPM), acrolein, acetaldehyde, formaldehyde, benzene, and 1,3-butadiene.

FHWA issued MSAT assessment guidance in February 2006. According to the guidance, if a proposed project's AADT is great than or equal to 140,000 vehicles, a quantitative analysis is required. Since the AADT for the Highway 101 project is less than this, a qualitative analysis was performed.

The proposed project would have an adverse impact if:

- Daily operational emissions were to exceed the BAAQMD operational emissions thresholds for CO, ROG, NO_X, or PM_{10} as shown in Table 3.12-3.
- Operational emissions were to exceed federal emissions thresholds for ROG or NO_X, as shown in Table 3.12-4.
- Project-related traffic were to cause CO concentrations at roadway segments to violate the CAAQS or NAAQS for either the one- or eight-hour period as shown in Table 3.12-1.

Table 3.12-3: BAAQMD Daily Operational Emissions Thresholds

Criteria Pollutant	Pounds Per Day
Carbon Monoxide (CO)	550
Reactive Organic Gas (ROG)	80
Nitrogen Oxides (NO_X)	80
Particulates (PM_{10})	80

Source: Bay Area Air Quality Management District.

Table 3.12-4: Federal Emissions Thresholds for Nonattainment Areas

Pollutant	Pounds per Day[1]	Tons per Year
ROG	270	50
NO_X	550	100

[1] Federal thresholds are expressed in tons per year. For ease of comparison, Federal thresholds have been converted to pounds per day.
Source: United States Code of Federal Regulations, Title 40, Part 93.

3.12.3.2 IMPACT ANALYSIS

The No-Build Alternative assumes no major construction on Highway 101 through the project limits other than normal maintenance, rehabilitation, and repair. The roadway improvements and maintenance are not anticipated to generate any new vehicle trips and, thus, would not affect the region's vehicle miles of travel (VMT). Since regional VMT is not anticipated to increase, changes in vehicle emissions are not anticipated. No substantial increase is expected in CO concentrations at sensitive receptor locations. PM_{10} concentrations are not anticipated to increase. No impact is anticipated.

In addition, the amount of MSATs emitted would be proportional to the VMT assuming that other variables, such as fleet mix, are the same for both.

The Highway 101 HOV Lane Widening Project would also not generate any new vehicle trips and, thus, would not increase vehicle emissions. Therefore, no substantial impacts associated with operational emissions are anticipated for the Build Alternative *(Preferred Alternative)*.

The MSAT analysis compared emissions for the Build and No-Build Alternatives. The MSATs analysis concluded that the project-related increase in VMT would lead to higher MSAT emissions for the Build Alternative along the highway corridor, with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase also is offset somewhat by lower MSAT emission rates due to increased speeds and reductions in congestion.

The USEPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources. 66 FR 17229 (March 29, 2001). In its rule, USEPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, its national low emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline

sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel particulate matter emissions by 87 percent. Thus, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

To provide a worst-case simulation of CO concentrations within the area, CO concentrations were calculated for nine roadway segments predicted to have LOS E or F in 2030 under the Build Alternative (Preferred Alternative). At each roadway segment, traffic-related CO contributions were added to background CO conditions for the year 2010, which represents the opening year of the project and the year 2030, when traffic volumes in the project area are expected to stabilize. The proposed project would not cause CO concentrations to exceed the state or federal standards, and therefore, no substantial impact related to CO concentrations would occur under the Build Alternative (Preferred Alternative).

Road dust is the primary source of operational $PM_{2.5}$ *and* PM_{10} emissions for the proposed project. The project would not generate new vehicle trips. Additionally, the project is anticipated to improve the flow of vehicles and reduce conjestion at nearby roadways. $PM_{2.5}$ *and* PM_{10} concentrations are not anticipated to increase and no impact is anticipated.

3.12.4 Avoidance, Minimization, and/or Mitigation Measures

No adverse impacts are anticipated, and therefore, no minimization or mitigation measures are recommended.

3.12.5 Transportation Conformity Analysis

FHWA cannot approve funding for project activities beyond preliminary engineering unless the project is in conformity with USEPA transportation conformity regulations (40 CFR Part 93). The criteria that the Build Alternative *(Preferred Alternative)* must satisfy are discussed below. The federal conformity criteria are applicable only to operations emissions. They do not apply to construction emissions.

§93.110 The conformity determination must be based on the latest planning assumptions.

ABAG and MTC are the Metropolitan Planning Organizations responsible for determining areawide population and employment forecasts, modeling regional travel demand, and formulating the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP). Assumptions used in the transportation and traffic analysis for this project, upon which the microscale CO and regional criteria pollutant analyses are based, are derived from ABAG's most recently adopted population, employment, travel, and congestion estimates. Traffic forecasts for the proposed project were developed using the Sonoma County travel demand.

§93.111 The conformity determination must be based on the latest emission estimation model available.

Emission estimates are based on the CARB EMFAC 2002 model. Caltrans CALINE4 model was used for CO modeling. The EMFAC2002 and CALINE4 models are the most recent models approved by USEPA.

§93.112 The conformity determination must be made according to the consultation procedures of this rule and in the applicable implementation plan, and according to the public involvement procedures established in compliance with 23 CFR Part 450. The conformity determination must be made according to §93.105(a)(2) and (e) and the requirements of 23 CFR Part 450.

The proposed project would follow the consultation procedures in 23 CFR Part 450, 40 CFR Part 51, and 40 CFR Part 93 (§93.105(a)(2) and (e)) before making its conformity determination. The environmental document for the proposed project would be available for public review and comment prior to adoption.

§93.114 There must be a currently conforming transportation plan and TIP at the time of project approval.

The most recent RTP in the project area is the *Transportation 2030 Plan*. The most recent TIP is the 2005 TIP. The *Transportation 2030 Plan* was adopted by MTC in February 2005. The proposed project is included in the *Transportation 2030 Plan* and the 2005 TIP. The 2005 TIP was adopted by MTC on July 28, 2004. FHWA made its conformity determination for the *Transportation 2030 Plan* on March 17, 2005 and the 2005 TIP on October 4, 2004.

§93.115 The proposed project must come from a conforming transportation plan and TIP.

The proposed project is included in the financially constrained portion of the Transportation 2030 Plan and 2005 TIP.

§93.116 The proposed project would not cause or contribute to any new localized CO, $PM_{2.5}$ or PM_{10} violations or increase the frequency or severity of any existing CO, $PM_{2.5}$ or PM_{10} violations in CO, $PM_{2.5}$, and PM_{10} non-attainment and maintenance areas.

CO concentrations under the Build Alternative *(Preferred Alternative)* are the same or slightly lower than those under the No-Build conditions. One-hour CO concentrations under the 2030 Build Alternative *(Preferred Alternative)* would range from approximately 0.8 ppm to 1.1 ppm at worst-case sidewalk receptors. The Build Alternative *(Preferred Alternative)* eight-hour CO concentrations are anticipated to range from approximately 0.5 ppm to 0.7 ppm. None of the analyzed roadway segments are anticipated to exceed the state and federal one- and eight-hour CO standards. Qualitatively, the proposed project would not have adverse effects on $PM_{2.5}$ *and* PM_{10} levels as the proposed project would not increase the frequency or severity of existing $PM_{2.5}$ *and* PM_{10} violations.

§93.117 The proposed project must comply with $PM_{2.5}$ *and* PM_{10} control measures that are contained in the applicable implementation plan.

$PM_{2.5}$ and PM_{10} control measures are not available for the San Francisco Bay Area since the BAAQMD does not have an implementation plan for *$PM_{2.5}$ and* PM_{10}. The No-Build and Build *(Preferred)* Alternatives would not change VMT in the region. However, the proposed project would improve roadway conditions, which would result in lower *$PM_{2.5}$ and* PM_{10} concentrations. If a federal *$PM_{2.5}$ or* PM_{10} attainment plan were required in the future, Caltrans would identify appropriate control measures for *$PM_{2.5}$ and* PM_{10} emissions.

Based on the above, the proposed project satisfies USEPA's project-level conformity requirements (40 CFR Part 93). *Refer to Appendix K for the conformity determination.*

3.13 Noise

3.13.1 Regulatory Setting

The FHWA and Caltrans guidelines establish methods and criteria for evaluating and mitigating highway traffic noise effects in compliance with the National Environmental Policy Act (NEPA). These noise analysis methods and abatement criteria are also in compliance with the requirements stemming from the California Environmental Quality Act (CEQA). *The work plan for this project's noise study was approved in January 2004.*

State and Federal Guidelines for Noise Impact Evaluation

The noise impact evaluation criteria for the proposed project are in agreement with the Noise Abatement Criteria (NAC) established by the FHWA in *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR Part 772, 2004) and criteria adopted by Caltrans in *Traffic Noise Analysis Protocol* (Protocol) (Caltrans, *2006*). For residential land uses, parks, schools, and hospitals, the FHWA outdoor noise criterion is 67 dBA, and the interior noise criterion is 52 dBA. Table 3.13-1, Activity Categories and Noise Abatement Criteria, shows noise criteria for these and other land use categories.

According to the Protocol, traffic noise impacts occur when one or both of the following occurs: 1) the project results in a substantial noise increase; 2) predicted noise levels approach or exceed the NAC. A traffic noise impact will also occur when the predicted noise levels of the project approach within 1 dBA or exceed the Noise Abatement Criteria shown in Table 3.13-1. Noise abatement measures are considered for this project when predicted future peak hour traffic noise levels are equal to or exceed 66 dBA.

Table 3.13-1: Activity Categories and Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA Leq(h)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports 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: 23 CFR Part 772, 2004

The Caltrans Protocol states that if it is predicted that there would be traffic noise impacts, all reasonable and feasible noise abatement measures must be identified and implemented. The abatement must provide a minimum of 5 dBA noise reduction to be considered feasible. Additional feasibility criteria include topography, access requirements (for driveways, ramps, etc.), the presence of local cross streets, other noise sources in the area, and safety considerations.

Greater noise reductions are encouraged as long as they can be achieved under the reasonableness guidelines. The overall reasonableness of noise abatement is determined by considering a multitude of factors including but not necessarily limited to the following:

A. Cost of the abatement
B. Absolute noise levels
C. Change in noise levels
D. Noise abatement benefits
E. Date of development along the highway
F. Life cycle of abatement measure[1]
G. Environmental impacts of abatement construction
H. Views (opinions) of affected residents
I. Input from the public and local agencies
J. Social, economic, environmental, legal, and technological factors

[1] It is normally not considered reasonable to construct a wall where planned future use would limit its useful life to less than 15 years.

The cost of the abatement for residential areas is compared to a calculated Reasonable Allowance per Residence. Noise abatement that exceeds the cost allowance is not considered reasonable. *The determination of "reasonableness" of each of the barriers is based on cost and number of benefitted residences for each sound wall. The reasonable allowance is considered to be the maximum amount that should reasonably be spent and noise abatement and is used for comparative purposes only.* Normally, noise abatement is not designed for the second-floor level. However, noise abatement designed to provide a 5 dBA noise reduction for the second-floor level without exceeding the modified allowance is considered within the scope of reasonableness. (Caltrans *2006*)

The Protocol identifies four scenarios under which noise impacts or abatement considerations for a project may need to be re-analyzed. These scenarios, quoted from Section 1.4.3 of the Protocol, are as follows:

a) There has been a significant change in project design concept and /or scope from that of the most recent environmental analysis, or

b) A significant period of time has passed since the most recent environmental analysis, generally considered to be three years between project milestones, e.g. Record of Decision to Right of Way Certification, or

c) An undeveloped land becomes planned, designed and programmed, after the analysis, but before the date of public knowledge, or

d) An undeveloped land becomes developed after the date of public knowledge (disclosure of impacts, if any, but abatement not considered).

Noise Barriers and Noise Reflection

The construction of noise barriers (soundwalls) sometimes generates concern that single or parallel noise barrier configurations will provide surfaces that "bounce" noise, and thus increase noise levels for some receivers. Studies show that single barrier configurations (barriers on one side of the highway only) reflect noise toward the opposite side of the highway. The noise increase on the opposite side, however, is typically 1 to 2.4 dBA, which is barely perceptible to the human ear. Noise reflection between parallel noise barriers (barriers running along opposite sides of the highway) can slightly degrade the performance of each barrier. The Protocol specifies that the ratio of the distance between opposite barriers to the height of the barriers ("width-to-height ratio") should be at least ten to one to avoid a noticeable degradation in performance.

3.13.2 Affected Environment

3.13.2.1 NOISE FUNDAMENTALS

Noise is an unexpected or undesired sound. Most noise in the project area is traffic related. Noise is transmitted by pressure waves through the atmosphere (sound waves) and is defined by these characteristics:

- ***Frequency*** refers to the length of a single sound wave, or how many sound waves pass one point in one second (cycles per second). Frequency determines the pitch of the sound – from low to high. The unit for frequency is Hertz (Hz). The human ear can detect sound in the range of 16 (low) to 20,000 (high) Hertz.
- ***Amplitude*** is the height of the sound wave and determines the intensity of sound. A high amplitude sound wave sounds louder than a sound wave of the same frequency at low amplitude. The units are decibels (dB) and are described logarithmically. Therefore, a doubling of wave height does not result in a doubling of decibels; instead, a doubling of sound energy results in a 3 dB increase in sound.

The average healthy ear can barely perceive noise level changes of 3 dB or less. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as being twice or half as loud. As discussed previously, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy would result in a barely perceptible change in sound level.

Humans perceive the same amplitude as louder at some frequencies than at others. In measuring sound, to account for the frequency response of the human ear, adjustments are applied at differing frequencies to reflect the average individual's sensitivity to sound. For noise associated with traffic and similar human activity, these adjustments are referred to as A-scale weighting. Noise levels are reported in terms of A-weighted decibels, or dBA. Figure 3.13-1 shows typical A-weighted noise levels.

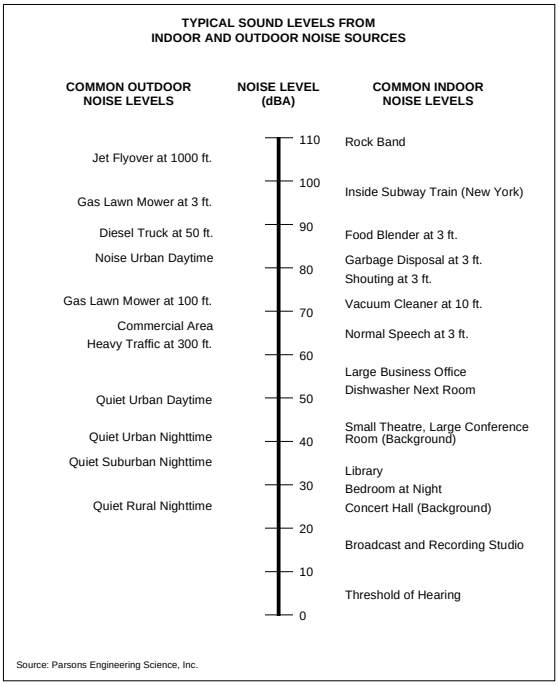


Figure 3.13-1: Typical A-Weighted Noise Levels

Noise levels in our daily environment fluctuate over time. Various terms have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in Caltrans/FHWA traffic noise analysis:

- ***Equivalent Sound Level (Leq)*** represents an average of the sound energy occurring over a specified period. Leq is, in effect, the steady-state sound level that, in a given period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The Noise Abatement Criteria (NAC) used by Caltrans and FHWA use an Leq that averages A-weighted sound over a one-hour period of time. This Leq is referred to as Leq(h).
- ***Maximum Sound Level (Lmax)*** is the highest instantaneous sound level measured during a specified period.
- ***Insertion Loss (I.L.)*** is the actual noise level reduction at a specific receiver due to construction of a noise barrier between the noise source (traffic) and the receiver. Generally, it is the net effect of the soundwall attenuation and the loss due to ground effects.

As sound travels over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

Geometric spreading - The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line rather than a stationary point. From a line source, the sound level attenuates (drops off) by 3 dB per doubling of distance from the source.

Ground absorption – Most often, the noise path between the highway and the observer is very close to the ground. When this ground path is reflective like a parking lot or a smooth body of water, no ground attenuation is assumed. If, however, the path is acoustically absorptive (like soft dirt, grass, or scattered bushes and trees), it is assumed that the sound drops off an additional 1.5 dB per doubling of distance.

Atmospheric effects - Atmospheric conditions, such as wind or air temperature, can have a substantial effect on noise levels when noise receptors are located more than 60 m (200 ft) from a highway.

3.13.2.2 EXISTING HIGHWAY 101 NOISE LEVELS

Noise measurements were conducted in the project vicinity from April 26 through April 30, 2004. During that time, sensitive land use areas and the location and height of existing property walls were identified. All noise measurements were conducted in accordance with the FHWA guidelines outlined in *Measuring of Highway Related Noise* (FHWA-DP-96-046).

Existing noise levels in the project corridor were measured at 17 locations representing sensitive land uses, such as homes, businesses, and motels. Short-term measurements were made at 10 of these locations, while long-term measurements were conducted at seven locations. The dominant noise source at all measurement sites was traffic on Highway 101. Local street traffic contributed to noise at some of the measurement sites, but was substantially less than the highway traffic noise. Short-term measurements were 20 minutes each in duration. Long-term measurements were for a minimum of 24 hours, during which the noise level data were stored at 20-minute intervals. The interval data were stored in the instrument's internal memory, which allowed the highest traffic noise hour to be identified during data analysis and graphical examination of the results.

Short-term measurements were adjusted to the peak-hour traffic-noise level by comparison with the highest noise level of a nearby long-term measurement. In addition, a calibration "K" factor was applied at three locations where unknown attenuation factors could not be properly modeled (Caltrans 1998). The first location was at measurement location LT1, which was modeled as receptor R4. This receptor is on the northbound side of Highway 101 just before the Bicentennial Way off-ramp. The modeled level was substantially higher than the measured level. In addition, the modeled results for receptors R16 and R18 were substantially higher than the measured results at R18 (short-term measurement site ST4) and caused the predicted future traffic noise level to be unrealistically high compared to the existing noise level. For these reasons, a "K" factor of -2.9 was applied to R4 and a "K" factor of -4.0 was applied to R16 and R18. For all other receptor locations, the differences between measured and modeled noise levels were within a range of -0.4 and +1.6 dB, which is acceptable and within the accuracy and sensitivity of the model. Three short-term sites and three long-term sites were used for model calibration. The adjusted short-term peak hour traffic noise levels range between 58 and 81 dBA and are summarized in Table 3.13-2, Short-Term Noise Measurement Results. A summary of the long-term noise monitoring results is shown in Table 3.13-3, Long-Term Noise Measurement Results.

The monitoring results indicate that existing traffic noise levels already approach or exceed the NAC at many locations along the project alignment. According to the long-term monitoring results, the peak noise hours occur during the morning commute at locations along both sides of Highway 101. Noise levels are lower during the evening commute hours. Monitoring locations are shown on Figure A (Sheets 1 through 16) in Appendix A.

Table 3.13-2: Short-Term Noise Measurements Results

Site No.	Street Address, City	Land Use[1]	Noise Abatement Category (Criterion)[2]	Meter Location	Measurement Dates	Start Time	Measured L_{eq}, dBA[3]	Adjusted Peak-Hour L_{eq}, dBA[4]	Adjusted using Long-Term Site
ST1	2760 Cleveland Avenue, Santa Rosa	Motel	B (67)	Near Bldg.	4/27/04	9:45 AM	77.0	81	LT1
ST2	3112 Loretta Way, Santa Rosa	MH	B (67)	Rear Yard	4/28/04	8:10 AM	57.8	61	LT3
ST3	101 Fountain Grove Parkway, Santa Rosa	Hotel	B (67)	Near Bldg.	4/28/04	8:40 AM	62.3	62	LT2
ST4	4221 Alba Lane, Santa Rosa	SFR	B (67)	Front Yard	4/28/04	9:15 AM	60.8	61	LT2
ST5	100 Vineyard View, Santa Rosa	SFR	B (67)	Front Yard	4/28/04	10:15 AM	60.0	61	LT4
ST6	4350 Barnes Road, Santa Rosa	Motel	B (67)	Near Bldg.	4/28/04	11:30 AM	58.6	60	LT4
ST8	5257 Whispering Creek Drive, Shiloh	MH	B (67)	Rear Yard	4/28/04	3:19 PM	57.1	58	LT5
ST9	7087 Hastings Place, Shiloh	SFR	B (67)	Rear Yard	4/29/04	2:06 PM	63.8	66	LT6
ST10	206 Courtyard East Lane, Windsor	MFR	B (67)	Side Yard	4/29/04	3:50 PM	64.7	65	LT6
ST11	8946 Oakfield Lane, Windsor	SFR	B (67)	Side Yard	4/29/04	5:02 PM	64.6	67	LT7

Notes:
1 - SFR = Single-family Residential; MFR = Multi-Family Residential; MH = Mobile Home Park.
2 - According to Caltrans Traffic Noise Analysis Protocol.
3 - All short-term measured noise levels are a 20-minute L_{eq}.
4 - Measurements conducted during off-peak hours were adjusted to the peak-hour L_{eq} based on a comparison with long-term noise levels which were measured at a nearby measurement site, listed in the last column.

Source: Parsons 2005.

Table 3.13-3: Long-Term Noise Measurements Results

Site No.	Street Address, City	Land Use[1]	Noise Abatement Category (Criterion)[2]	Meter Location	Measurement Dates	Start Time	Duration, No. of Hours	Measured Peak Hour Leq, dBA[3]	Peak-Hour Start Time
LT1	699 Russell Avenue, Santa Rosa	SFR	B (67)	Rear Yard	4/26 – 4/27	5:00 PM	25	66	7 AM, 6 PM
LT2	562 Angelus Street, Santa Rosa	MH	B (67)	Rear Yard	4/26 – 4/28*	1:40 PM	48	63	7 AM
LT3	4201 Coffey Lane, Santa Rosa	SFR	B (67)	Front Yard	4/27 – 4/28	6:00 PM	25	71	6 AM
LT4	4420 Lavell Road, Santa Rosa	SFR	B (67)	Side Yard	4/27 – 4/28	5:00 PM	26	67	6 AM, 6 PM
LT5	490 Mark West Station Road, Windsor	SFR	B (67)	Rear Yard	4/28 – 4/29	2:40 PM	27	78	4 PM
LT6	7873 Dove Lane, Windsor	SFR	B (67)	Rear Yard	4/28 – 4/29	5:20 PM	25	64	3 PM – 4 PM
LT7	8178 Willow Street, Windsor	MH	B (67)	Rear Yard	4/28 – 4/29	6:30 PM	24	71	7 AM

Notes:
1 - SFR = Single-family Residential; MFR = Multi-Family Residential, MH = Mobile Home Park.
2 - According to Caltrans Traffic Noise Analysis Protocol.
3 - The highest measured hourly noise level recorded during the long-term measurement period.
* - There is a break in the measurement intervals due to power failure.

Source: Parsons 2005.

3.13.3 Environmental Consequences

Noise impacts are assessed by comparing the future (year 2030) Build Alternative *(Preferred Alternative)* condition with the existing condition. The greatest noise generation from a roadway is when volumes are high and speeds are still close to free flow; this "worst case" condition is referred to as Level of Service C (LOS C) by traffic engineers. To approximate the worst case LOS C scenario for the Year 2030 Build *(Preferred Alternative)* condition, the noise analysis assumed freeway volumes of 1,800 vehicles per lane per hour traveling at approximately 105 km/h (65 mph). The volumes used for the HOV lanes were 1,500 vehicles per lane per hour at a speed of 105 km/h (65 mph). The projected traffic volumes for the year 2030 were used for ramps, but capped at 1,000 vehicles per lane per hour to maintain the greatest noise generation potential. The speeds used for ramp traffic were 56 km/h (35 mph) for straight ramps and 32 km/h (20 mph) for loop ramps.

Table 3.13-4, Predicted Future Noise and Barrier Analysis*,* summarizes the results of the predicted levels at the representative receptor locations. The predicted Build Alternative *(Preferred Alternative)* peak hour Leq(h) at the representative receptors ranges from 60 to 78 dBA, exceeding the NAC at most locations. At some locations, Build Alternative *(Preferred Alternative)* noise levels would be 3 dBA less than those of the No-Build Alternative, due to the median barrier. Noise levels at receptor locations R35, R35A, and R35B differ under *Southbound* Options A *(preferred)* and B for the Fulton Road and Airport Boulevard interchange complex *with Southbound Option A having greater impact on these receptors*. The Caltrans highway noise prediction computer model, SOUND 2000, PC Version 3.2, was used for the noise computations. This model is based on the highway traffic noise prediction method specified in FHWA-RD-77-108 (FHWA, 1978). Noise abatement measures considered are described in Section 3.13.4, Avoidance, Minimization and/or Mitigation Measures.

3.13.4 Avoidance, Minimization, and/or Mitigation Measures

Table 3.13-4, Predicted Future Noise and Barrier Analysis, lists predicted noise levels without barriers (soundwalls) and with barriers of various heights. Recommended barrier heights and locations are shown on Figure A (Sheets 1 through 16) in Appendix A. All barrier heights and locations are based on preliminary engineering. The tables and descriptions in this section include some locations where soundwalls are not feasible and others where soundwalls would not meet the Caltrans criteria for calculated Reasonable Allowance per Residence. *Refer to Table 3.13-5 for the preliminary reasonableness determination for all soundwalls.* The plan drawings in Figure A in Appendix A show only soundwalls that are considered both feasible and reasonable. *The noise barrier determinations presented herein are preliminary; the identification of reasonable and feasible noise abatement maybe refined during final design. F*inal decisions concerning noise barriers will be made upon completion of the project design and public involvement processes.

Table 3.13-4: Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS Leq(h), dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R3	I	76 E	74	74	-2	B (67)	A/E	74	--	74	--	74	--	74	--	74	--	
R5A	HM	71 E	69	69	-2	B (67)	A/E	69	--	69	--	69	--	69	--	69	--	No Barrier
R5	HM	67 E	65	65	-2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R4	SFR	67 M-LT1	64	65	-2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R6 C	MH	69 E	72	72	3	B (67)	A/E	70 T	2	69	3	67 R	5	67	5	65	7	S252 / East side ROW
R6A S	MH	65 E	68	69	4	B (67)	A/E	68	1	67	2	67 T,R,5	2	66	3	65	4	
R7	MH	63 M-LT2	66	67	4	B (67)	A/E	67	0	67	0	67	2	66	3	65	4	No Barrier
R8	MH	65 E	68	68	3	B (67)	A/E	68	0	68	0	67	2	66	3	65	4	
R9	MH	60 E	66	65	5	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R9A	MH	61 M-ST2	67	67	6	B (67)	A/E	67	--	67	--	67	--	67	--	67	--	No Barrier
R10	MH	57 E	63	64	7	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R12	HM	63 E	65	65	2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R11	HM	62 M-ST3	65	66	4	B (67)	A/E	66	--	66	--	66	--	66	--	66	--	
R13A	HM	58 E	61	62	4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R13	HM	57 E	60	60	3	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R13B	HM	60 E	63	64	4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R14	HM	66 E	68	68	2	B (67)	A/E	68	--	68	--	68	--	68	--	68	--	No Barrier

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** Soundwall heights are chosen to achieve a particular top-of-barrier elevation from the ground at that location.

Table 3.13-4 (Cont'd): Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS $L_{eq(h)}$, dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER $L_{eq(h)}$, dBA	Build WITHOUT BARRIER $L_{eq(h)}$, dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) $L_{eq(h)}$, dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.
R15A	SFR	64 E	66	67	3	B (67)	A/E	65	2	64	3	63 T	4	62 R	5	61	6	West side ROW & shoulder[7]
R17A	SFR	69 E	71	72	3	B (67)	A/E	69	3	67	5	66 T	6	65 R,5	7	63	9	
R17 C	SFR	73 E	75	75	2	B (67)	A/E	71	4	69 T	6	67	8	66 R,5	9	65	10	
R19	SFR	73 E	75	75	2	B (67)	A/E	70 T	5	69	6	67 R,5	8	66	9	64	11	
R21	SFR	71 M-LT3	73	73	2	B (67)	A/E	69	4	68 T	5	66 R	7	65	8	64	9	
R23	SFR	72 E	74	75	3	B (67)	A/E	70	5	68 T	7	67 R,5	8	66	9	65	10	
R25	SFR	66 E	68	69	3	B (67)	A/E	68	--	68	--	68	--	68	--	68	--	No Barrier
R16	SFR	57 E	59	60	3	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R18	SFR	61 M-ST4	63	64	3	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R20	COM	68 E	70	71	3	C (72)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R22	SFR	61 M-ST5	64	65	4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R24	SFR	63 E	66	67	4	B (67)	A/E	67	--	67	--	67	--	67	--	67	--	
R27	SFR	60 E	64	65	5	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R29	HM	60 M-ST6	64	64	4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R26A	SFR	67 M-LT4	72	72	5	D (--)	NONE	70	2	68	4	67	5	66	6	65	7	East side ROW & shoulder[7]
R26 C	SFR	67 E	72	72	5	B (67)	A/E	70	2	69	3	67	5	66 T	6	65 R,5	7	
R28	SFR	64 E	69	69	5	B (67)	A/E	68	1	67	2	66	3	65 T	4	64 R	5	
R28A	SFR	63 E	66	67	4	B (67)	A/E	66	1	65	2	64	3	64 T	3	63	4	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** Soundwall heights are chosen to achieve a particular top-of-barrier elevation from the ground at that location.

Table 3.13-4 (Cont'd): Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS $L_{eq(h)}$, dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER $L_{eq(h)}$, dBA	Build WITHOUT BARRIER $L_{eq(h)}$, dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) $L_{eq(h)}$, dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.	$L_{eq(h)}$	I.L.
R30	SFR	70 E	69	70	0	B (67)	A/E	70	--	70	--	70	--	70	--	70	--	No Barrier
R32	SFR	65 E	65	65	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
Airport Boulevard to SB 101 On Ramp Option A																		
R35A	MFR	63 E	66	65	2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	West side shoulder of frontage road and shoulder of Airport Bl.[7]
R35 C	MFR	65 E	68	66	1	B (67)	A/E	62 T	4	61 R	5	61	5	60	6	59	7	
R35B	MFR	64 E	67	65	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
Airport Boulevard to SB 101 On Ramp Option B - Braided Ramp																		
R35A	MFR	63 E	66	63	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R35	MFR	65 E	68	64	-1	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R35B	MFR	64 E	67	64	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R37	MH	58 M-ST8	64	64	6	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	No Barrier
R34	SFR	71 E	69	70	-1	B (67)	A/E	69	1	68	2	66 T	4	65 R	5	64	6	East side ROW[7]
R36	SFR	73 E	72	72	-1	B (67)	A/E	70	2	69 T	3	67	5	66 R,5	6	65	7	
R38 C	SFR	78 M-LT5	77	77	-1	B (67)	A/E	73 T	4	70	7	68	9	66	11	65 R,5	12	
R38A	SFR	72 E	71	72	0	B (67)	A/E	70	2	69	3	67 T	5	66	6	65 R,5	7	
R38B	SFR	69 E	68	68	-1	B (67)	A/E	67	1	66	2	65 T	3	64	4	63 R	5	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** Soundwall heights are chosen to achieve a particular top-of-barrier elevation from the ground at that location.

Table 3.13-4 (Cont'd): Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS Leq(h), dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R50 C	SFR	70 E	70	71	1	B (67)	A/E	69	2	68	3	67 T	4	67	4	66 R	5	East side ROW and shoulder[7]
R50A S	SFR	69 E	69	70	1	B (67)	A/E	68	2	67	3	66 T	4	66	4	66 R,5	4	
R52	SFR	66 M-ST9	66	67	1	B (67)	A/E	-- W	--	-- W	--	66	1	66	1	64	3	No Barrier
R54	SFR	67 E	67	67	0	B (67)	A/E	-- W	--	-- W	--	66	1	65	2	65	2	
R54A S	SFR	67 E	68	68	1	B (67)	A/E	-- W	--	-- W	--	64	4	63	5	62	6	
R56	SFR	66 E	66	67	1	B (67)	A/E	-- W	--	-- W	--	66	1	66	1	65	2	
R56A S	SFR	66 E	66	67	1	B (67)	A/E	-- W	--	-- W	--	65	2	64	3	63	4	
R58B S	SFR	69 E	71	70	1	B (67)	A/E	67	3	66	4	65	5	64 R,5	6	62	8	S344 / East side ROW
R58A S	SFR	71 E	73	72	1	B (67)	A/E	68	4	67	5	66 T	6	65 R,5	7	63	9	
R58	SFR	70 E	71	71	1	B (67)	A/E	68	3	68	3	67 T	4	66 R	5	65	6	
R60B S	SFR	68 E	68	69	1	B (67)	A/E	66	3	65	4	64 R	5	63	6	62	7	
R60 C	SFR	76 E	78	77	1	B (67)	A/E	70 T	7	68	9	67 R,5	10	65	12	64	13	
R60A S	SFR	70 E	70	71	1	B (67)	A/E	68	3	67	4	66 T,R	5	64	7	63	8	
R62A S	SFR	68 E	69	69	1	B (67)	A/E	67	2	66	3	65 T	4	63	6	62	7	
R62	SFR	74 E	75	75	1	B (67)	A/E	70 T	5	68 R,5	7	67	8	65	10	64	11	
R51	COM	64 E	66	67	3	C (72)	NONE	65	2	64	3	63	4	62	5	62	5	S343 / West side ROW and shoulder
R53	COM	65 E	69	69	4	C (72)	NONE	66	3	65	4	64	5	63	6	62	7	
R55	SFR	72 E	75	75	3	B (67)	A/E	69 T	6	68	7	67 R,5	8	65	10	64	11	
R55A	SFR	66 E	69	70	4	B (67)	A/E	67 T	3	66	4	65 R,5	5	63	7	64	6	
R57 C	SFR	74 E	77	77	3	B (67)	A/E	70 T	7	68	9	67	10	66 R,5	11	64	13	
R57A	SFR	67 E	70	71	4	B (67)	A/E	68	3	67	4	67 T	4	66 R	5	66	5	
R64	SFR	65 E	67	68	3	B (67)	A/E	-- W	--	-- W	--	-- W	--	67	1	66	2	No Barrier
R66	SFR	64 M-LT6	66	67	3	B (67)	A/E	-- W	--	-- W	--	-- W	--	67	0	65	2	
R68	SFR	64 E	66	67	3	B (67)	A/E	-- W	--	-- W	--	-- W	--	67	0	67	0	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
W - There is an existing soundwall in these areas. Therefore, the predicted noise levels are not shown for wall heights that are the same or lower than the existing wall height.

Table 3.13-4 (Cont'd): Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS Leq(h), dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R59	MH	66 E	69	70	4	B (67)	A/E	67	3	67	3	66 T	4	66	4	65 R	5	
R61	MH	68 E	71	72	4	B (67)	A/E	68	4	67 T	5	66	6	65	7	65 R,5	7	
R63 C	MH	72 E	75	75	3	B (67)	A/E	69 T	6	67	8	66	9	65	10	64 R,5	11	
R65	MH	70 E	73	74	4	B (67)	A/E	68	6	67 T	7	65 R	9	64	10	63	11	S353 / West side ROW
R67	MH	71 E	74	74	3	B (67)	A/E	69 T	5	67	7	66 R,5	8	65	9	64	10	
R67A S	MH	66 E	69	70	4	B (67)	A/E	66	4	65 T	5	63	7	63	7	62	8	
R69	MH	71 M-LT7	74	74	3	B (67)	A/E	69	5	68 T	6	66 R	8	65	9	64	10	
R71	MH	69 E	72	72	3	B (67)	A/E	68	4	67 T	5	65 R	7	64	8	63	9	
R73	COM	71 E	72	72	1	C (72)	A/E	70	2	69	3	67	5	67	5	66	6	
R70A S	SFR	68 E	71	72	4	B (67)	A/E	71	1	70	2	69 T	3	67	5	67	5	
R70	SFR	74 E	77	77	3	B (67)	A/E	76	1	75 T	2	72	5	70	7	69 R,5	8	
R72	SFR	74 E	76	77	3	B (67)	A/E	74	3	73 T	4	71	6	69	8	67 R	10	S352 / East side ROW & shoulder
R72A S	SFR	68 E	70	70	2	B (67)	A/E	69	1	69	1	67 T	3	66	4	65	5	
R74 C	SFR	74 E	77	77	3	B (67)	A/E	75 T	2	73	4	71	6	69	8	67 R	10	
R74A S	SFR	67 E	70	70	3	B (67)	A/E	69	1	67	3	67 T	3	66	4	64	6	
R76	SFR	74 E	75	76	2	B (67)	A/E	71 T	5	69 R	7	69	7	66	10	65	11	
R78	MFR	66 E	66	67	1	B (67)	A/E	-- W	--	-- W,T	--	-- W	--	65	2	64	3	East side ROW & shoulder[7]
R80	MFR	65 M-ST10	65	66	1	B (67)	A/E	-- W	--	-- W,T	--	-- W	--	66	0	65	1	
R82	MFR	66 E	66	67	1	B (67)	A/E	-- W	--	-- W,T	--	-- W	--	65	2	64	3	
R84 C	MFR	73 E	73	73	0	B (67)	A/E	71	2	70 T	3	68	5	67	6	66 R,5	7	S358 / East side ROW; S360 / East side bridge shoulder[6]
R84A	MFR	70 E	70	70	0	B (67)	A/E	68	2	67	3	66 T	4	65	5	65 R,5	5	
R86A	SFR	67 E	67	68	1	B (67)	A/E	66	2	65	3	64 T	4	63 R	5	62	6	
R86B	SFR	69 E	69	69	0	B (67)	A/E	67	2	66	3	65 T	4	64 R	5	63	6	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
W - There is an existing soundwall in these areas. Therefore, the predicted noise levels are not shown for wall heights that are the same or lower than the existing wall height.
** Soundwall heights are chosen to achieve a particular top-of-barrier elevation from the ground at that location.

Table 3.13-4 (Cont'd): Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING[1] PEAK HR. NOISE LEVELS Leq(h), dBA[3]	PREDICTED PEAK HOUR NOISE LEVELS[1]														BARRIER NO. / LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R75	SFR	64 E	65	66	2	B (67)	A/E	64	2	63 T	3	62	4	61	5	61 R,5	5	S359 / West side shoulder of S.B. HWY 101 & Windsor River Rd. On-ramp to S.B. HWY 101
R77 C	SFR	65 E	66	67	2	B (67)	A/E	65	2	64	3	63 T	4	62	5	62 R,5	5	
R79	SFR	67 M-ST11	68	68	1	B (67)	A/E	67	1	66	2	65	3	64	4	63 T,R	5	
R81	MOT	67 E	68	68	1	B (67)	A/E	68	--	68	--	68	--	67	--	67	--	No Barrier
R83	MOT	65 E	66	66	1	B (67)	A/E	66	--	66	--	66	--	66	--	66	--	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel; I - Institutional; COM - commercial.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** Soundwall heights are chosen to achieve a particular top-of-barrier elevation from the ground at that location.

Table 3.13-5: Summary of Recommended Barriers and Barrier Allowances

Barrier No.	Receptor No.	No. and Type of Benefited Receptors[1]	Barrier Location	Approximate Hwy 101 Station	Barrier Height/Total Length	Reasonable Barrier Allowance[2]	
						Per Residence	Per Wall
S252	R6	2 Mobile Homes	East side ROW	251+20 to 252+20	3.7 m (12 ft) / 99 m (325 ft)	$42,000	$84,000
S277	R15A, R17, R17A, R19, R21, R23	7 SFR	West side ROW & shoulder	274+15 to 280+40	4.3 m (14 ft) 3.7 m (12 ft) / 637 m (2,090 ft)	$46,000	$322,000
S294	R26, 26A, R28	3 SFR	East side ROW & shoulder	292+00 to 295+00	4.9 m (16 ft) 4.3 m (14 ft) / 300 m (984 ft)	$44,000	$132,000
S311 (Ramp Option A)[3]	R35A, R35, R35B	5 MFR	West side shoulder of frontage road & Airport Blvd. shoulder	310+20 to 312+60	3.7 m (10 ft) / 261 m (856 ft)	$38,000	$190,000
S316	R34, R36, R38, R38A, R38B	8 SFR	East side ROW	314+00 to 319+00	4.3 m (14 ft) 4.9 m (16 ft) / 496 m (1,627 ft)	$48,000	$384,000
S338	R50, R50A	1 SFR	East side ROW & shoulder	337+60 to 339+00	4.9 m (16 ft) / 145 m (477 ft)	$40,000	$40,000
S343	R51, R53, R55, R57, R57A	5 SFR	West side ROW	341+70 to 344+15	3.7 m (12 ft) 4.3 m (14 ft) / 255 m (836 ft)	$48,000	$240,000
S344	R58, R60, R62	17 SFR	East side ROW	342+00 to 346+30	4.3 m (14 ft) 3.7 m (12 ft) 3.0 m (10 ft) / 430 m (1,411 ft)	$46,000	$782,000
S352	R70A, R70, R72, R72A, R74, 74A, R76	18 SFR	East side ROW & shoulder	349+65 to 356+50	4.9 m (16 ft) 4.3 m (14 ft) 3.0 m (10 ft)/ 694 m (2,277 ft)	$48,000	$864,000

Notes:

1 – Type of Benefited Receptor: SFR = Single Family Residences; MFR = Multi Family Residential Units; MH = Mobile Homes; HM = Hotel/Motel.

2 – Reasonable Barrier Allowance per Caltrans' Traffic Noise Analysis Protocol.

3 – Option B eliminates the need for Soundwall S311.

4 – The total cost is for Ramp Option A. The total cost for Braided Ramp Option B would be the total shown minus the cost of Soundwall S311.

Table 3.13-5 (Cont'd) – Summary of Recommended Barriers and Barrier Allowance

Barrier No.	Receptor No.	No. and Type of Benefited Receptors[1]	Barrier Location	Approximate Hwy 101 Station	Barrier Height/Total Length	Reasonable Barrier Allowance[2]	
						Per Residence	Per Wall
S353	R59, R61, R63, R65, R67, 67A, R69, R71, R73	42 Mobile Homes	West side ROW	349+80 to 357+00	4.9 m (16 ft) 4.3 m (14 ft) 3.7 m (12 ft) / 724 m (2,376 ft)	$48,000	$2,016,000
S358	R84, R84A, R86A. R86B	3 SFR 8 MFR	East side ROW	356+50 to 359+00	4.9 m (16 ft) / 249 m (816 ft)	$42,000	$462,000
S360			East side shoulder	358+55 to 360+15	4.3 m (14 ft) / 159 m (521 ft)		
S359	R75, R77, R79	11 SFR	West side shoulder of S.B. Hwy 101 & shoulder of Windsor River Rd. On ramp to S.B. Hwy 101	356+70 to 360+00	4.9 m (16 ft) 4.3 m (14ft) / 327 m (1,072 ft)	$38,000	$418,000
Totals		44 MH 73 SFR 13 MFR			4,775 m (15,666 ft)		$5,934,000[4]

Notes:

1 – Type of Benefited Receptor: SFR = Single Family Residences; MFR = Multi Family Residential Units; MH = Mobile Homes; HM = Hotel/Motel.

2 – Reasonable Barrier Allowance per Caltrans' Traffic Noise Analysis Protocol.

3 – Option B eliminates the need for Soundwall S311.

4 – The total cost is for Ramp Option A. The total cost for Braided Ramp Option B would be the total shown minus the cost of Soundwall S311.

Locations Where Soundwalls Would Meet Feasible and Reasonable Criteria

Soundwall S344 would be located on the right-of-way along the east side of Highway 101, north of Shiloh Road, between stations 342+00 and 346+30. This soundwall would reduce traffic noise at 17 single-family residences, represented by receptors R58, R60, and R62. The proposed wall would be 430 m (1,411 ft) in length and would range in height from 3.0 m (10 ft) to 4.3 m (14 ft). Figure A-14 in Appendix A shows the location of the soundwall and the receptors.

Soundwall S352 would be located on the right-of-way along the east side of Highway 101, south of Old Redwood Highway, between stations 349+65 and 355+00. This soundwall would reduce traffic noise at 18 single-family residences, represented by receptors R70, R70A R72, R72A, R74, R74A, and R76.

The width-to-height ratio of the parallel soundwalls, S352 and S353, would be 9.5 along a short segment where the highway crosses over a creek (from station 349+65 to 350+10). Therefore, reflective noise may be an issue, but only in the creek area. See Section 3.13.1, Regulatory Setting,

for further discussion of the width-to-height ratio as it relates to noise reflection and noise barriers. The proposed soundwall would be 694 m (2,277 ft) in length and would range in height from 3.0 m (10 ft) to 4.9 m (16 ft). Figures A-15 and A-16 in Appendix A show the location of the proposed soundwall and the receptors.

Soundwall S353 would be located on the right-of-way along the west side of Highway 101, south of Windsor River Road, between stations 349+80 and 357+00. The proposed soundwall would reduce traffic noise at 42 mobile homes, represented by receptors R59, R61, R63, R65, R67, R67A R69 and R71. A commercial waterslide park, represented by receptor R73, is also in the vicinity and would be protected by soundwall S353. However, because it is a commercial property, this park is not listed as a benefited receiver.

As described above under Soundwall 352, reflective noise may be an issue in a small area where the highway crosses a creek. The proposed soundwall would be 724 m (2,376 ft) in length and would range in height from 3.7 m (12 ft) to 4.9 m (16 ft). Figures A-15 and A-16 in Appendix A show the location of the soundwall and the receptors.

Soundwall S359: Soundwall S359 would be located along the west shoulder of the Windsor River Road on-ramp to southbound Highway 101, between stations 356+70 and 360+00. This soundwall would reduce traffic noise at 11 single-family residences, represented by receptors R75, R77, and R79.

This soundwall would be 327 m (1,072 ft) in length and would range in height from 4.3 m (14 ft) to 4.9 m (16 ft) high. Figure A-16 in Appendix A shows the location of the proposed soundwall and the receptors.

Locations Where Soundwalls *W*ould Exceed Reasonable Allowance

Soundwalls at the following receptor locations would achieve a 5-dbA reduction in traffic noise and be feasible to construct, but would not be cost-effective as determined by Caltrans' Reasonable Allowance per Residence. (Reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting*, and are shown in Table 3.13-5*.) The receptor locations for these areas are discussed below and are shown in Appendix A, Build Alternative Plan Drawings.

Receptors R6, R6A represent two mobile homes at the south end of the Journey's End mobile home community, located on the east side of Highway 101, north of Bicentennial Way and the Kaiser Permanente facility. The soundwall required to abate highway traffic noise for these two receptors would be 100 m (328 ft) long and would exceed reasonable allowance standards. See Figure A-2 in Appendix A.

Receptor R14 is a motel with an exterior pool area located behind a parking lot and retail buildings. It is located on the west side of Highway 101 just south of Hopper Avenue. The soundwall required to abate highway traffic noise for this single receiver would be over 300 m (984 ft) in length and hence not practical. See Figure A-4 in Appendix A.

Receptors R15A, R17, R17A, R19, R21, and R23 represent seven single-family residences along the west side of Highway 101. The soundwall required to abate highway traffic noise for these seven residences would be 637 m (2,089 ft) long. See Figures A-5 and A-6 in Appendix A.

Receptors R24 represents an isolated single-family residence located on Lavell Road, approximately 100 m (328 ft) east of the main lanes of Highway 101. This area was not considered for noise abatement because the soundwall required to abate highway traffic noise for the single receiver would be over 200 m (660 ft) long. See Figure A-7 in Appendix A.

Receptor R25 represents a single-family residence located on the west side of Highway 101 and approximately 75 m (246 ft) from the right-of-way. The area was not considered for noise abatement, because the soundwall required to abate highway traffic noise for the single receiver would be over 200 m (660 ft) long. See Figure A-6 in Appendix A.

Receptors R26, R26A, and R28 represent three single-family residences along the east side of Highway 101.[2] The soundwall required to abate highway traffic noise for these three residences would be 300 m (984 ft) long. Thus, a soundwall at this location would exceed reasonable allowance standards. See Figure A-8 in Appendix A.

Receptor R30 represents a single-family residence located on Fulton Road, east of Highway 101. The area was not considered for noise abatement, because the soundwall required to abate highway traffic noise for this single receiver would be over 280 m (920 ft) long. Figures A-9A and A-9B show the location of this receptor.

Receptor R35 (Fulton Road and Airport Boulevard Interchange Complex, Southbound Option A, *element of preferred alternative*) represents an apartment complex on the west side of Highway 101, south of and adjacent to Airport Boulevard. A soundwall at this location would exceed the reasonable allowance standards. Figure A-10A in Appendix A shows the location of the receptors.

Receptors R34, R36, R38, R38A, and R38B represent eight single-family residences on the east side of Highway 101, north of East Airport Boulevard. The soundwall required to abate highway traffic noise for these eight residences would be about 500 m (1,640 ft) long. Thus, a soundwall at this location would exceed reasonable allowance standards. See Figures A-10A, A-10B, A-11A and A-11B in Appendix A.

Receptor R50, R50A represents one single-family property on the southern end of a development along the east side of Highway 101, north of Shiloh Road where an existing berm wall ends that provides protection from traffic noise for other properties in the development. The soundwall required to abate highway traffic noise for this single receiver would be 145 m (476 ft) long and hence would exceed reasonable allowance standards. See Figure A-13 in Appendix A.

[2] It was not possible to conduct noise measurements at R26 due to dog noise and unsecured conditions. Therefore, a nearby location, Receptor R26A, was selected to represent outdoor use areas of receptor R26, which is considered to have a similar existing traffic noise level as R26A. Receptor R26A is shown on the Build Alternative Plan Drawings in Appendix A, along with Receptors R26 and R28.

Receptor R54A represents four properties in front of an access opening in an existing wall at a single-family residential development, north of Shiloh Road on the east side of Highway 101. The soundwall required to abate highway traffic noise for this one receiver would be over 300 m (985 ft) long. Thus, a soundwall at this location would exceed reasonable allowance standards. See Figure A-14 in Appendix A.

Receptors R51, R53, R55, R57 and R57A represent five single-family residences on the west side of Highway 101, south of Conde Lane. The soundwall required to abate highway traffic noise for these receptors would be 255 m (837 ft) long and would exceed reasonable allowance standards. See Figure A-14 in Appendix A.

Receptors R84, R84A, R86A and R86B represent eight multi-family residences at the northern end of the Courtyard East Apartments and three single-family residences to the north of the complex, on the east side of Highway 101 south of Old Redwood Highway. Two soundwalls would be required to abate highway traffic noise for these receptors. The first would be 249 m (817 ft) in length on the right-of-way along the east side of Highway 101, and the second would be 159 m (522 ft) long along the east shoulder of northbound Highway 101 on the embankment approach to the Old Redwood Highway Undercrossing. These two walls would exceed reasonable allowance standards. See Figure A-16 in Appendix A.

Areas Where Noise Abatement Is Not Warranted or Feasible

Some areas along the proposed project corridor would not receive noise impacts of sufficient magnitude to warrant abatement, and other areas would receive impacts requiring consideration of abatement for which abatement does not appear feasible. State guidelines for reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting*, and preliminary reasonableness determination for all soundwalls are shown in Table 3.13-5*. Such areas have been discussed below and where applicable, an explanation as to why abatement is not warranted or feasible has been provided. Receptor locations are shown in Appendix A, Build Alternative Plan Drawings.

Receptor R3 represents the Empire College facilities on the west side of Highway 101. In this area, Cleveland Avenue runs parallel to Highway 101 and is located between the highway and the receptor. No apparent outdoor use areas are associated with this institutional land use; therefore, the college was not considered for noise abatement. Figure A-2 in Appendix A shows the location of this receptor.

Receptor R4 represents a group of single-family residences clustered just south of Bicentennial Way on the east side of Highway 101. The buildings are approximately 85 m (280 ft) from the right-of-way, with a vacant field between the receptor and the highway. A long-term measurement (LT1) was taken at R4. Due to its distance from Highway 101, future traffic noise at this area would not approach or exceed the NAC and would not require noise abatement. Figure A-2 in Appendix A shows the location of this receptor.

Receptors R5 and R5A represent a motel located in the southwestern quadrant of the intersection of Highway 101 and the Bicentennial Way overpass. The motel has an exterior pool area behind the building with a limited view to Highway 101. Noise abatement was not considered because the future

traffic noise level at the pool area, represented by R5, does not approach or exceed the NAC. This is due to its distance from Highway 101 and because the line of sight to the freeway is partially blocked by the motel building. Figure A-2 in Appendix A shows the location of these receptors.

Receptors R7 and R8 are within the Journey's End mobile home park where there is an existing 4.3-meter (14-foot) high block wall along the east Highway 101 right-of-way. The future traffic noise would approach or exceed the NAC at these locations. Increasing the existing wall height to 4.7 m (16 ft) would not provide a minimum reduction of 5 dBA of the traffic noise. Extending the north end of the existing block wall would not achieve the minimum noise reduction, as at the south end (at S252), since the Mendocino Avenue embankment partially blocks the line of sight to Highway 101. Therefore, no soundwall is recommended for the north end. Figure A-3 in Appendix A shows the location of these receptors.

Receptors R9, R9A and R10 represent the Coddingtown Mobile Estates mobile home park located behind a retail center on the west side of Highway 101, north of Bicentennial Way. These receptors are approximately 135 m (445 ft) from the right-of-way of Highway 101 and are partially shielded by intervening commercial buildings. A short-term measurement (ST2) was taken at R9A. The results of this measurement shows that the shielding provided by the buildings is substantial, and hence a soundwall at this location would not be warranted. Figure A-3 in Appendix A shows the location of these receptors.

Receptor R12 represents the Sandman Motel on the west side of Highway 101 near the corner of Cleveland Avenue and Industrial Drive. The motel has an exterior pool area behind the existing restaurant building towards the back of the motel property. There is no view to Highway 101 from the pool area, which is the only outdoor use area. A soundwall at this location would not be warranted due to the distance of the receptor from the highway and its blocked line-of-sight to the highway. Figure A-3 in Appendix A shows the location of the receptor.

Receptor R11 represents the Fountain Grove Inn and Conference Center on the east side of Highway 101, north of Fountain Grove Parkway. A short-term measurement (ST3) was taken at R11. This receptor has a single small exterior use area with a table and chairs adjacent to the hotel parking lot. Due to the elevated topography and distance from Highway 101, a soundwall would not abate future traffic noise levels. Figure A-3 in Appendix A shows the location of the receptor.

Receptors R13, R13A, and R13B represent the exterior patio and spa areas for the Hilton Resort Hotel. These areas are elevated approximately 130 m (425 ft) above the highway. The future traffic noise level does not approach or exceed the NAC at these exterior use areas due to their distance and elevation from Highway 101. Figure A-3 in Appendix A shows the location of these receptors.

Receptors R16 and R18 represent two single-family residences on Alba Lane, on the east side of Highway 101 at a distance of over 85 m (279 ft) from the right-of-way. A short-term measurement (ST4) was taken at R18. The future traffic noise would not approach or exceed the NAC at these locations. Figure A-5 in Appendix A shows the location of the receptors.

Receptor R20 represents a fine arts performance center (commercial land use) located on the east side of Highway 101, south of Mark West Springs Road, and is approximately 50 m (164 ft) from the

right-of-way. Although the future traffic noise approaches the NAC, there are no exterior use areas associated with this property; therefore, the location was not considered for noise abatement. Figure A-6 in Appendix A shows the location of the receptor.

Receptor R22 represents a cluster of single and multi-family residences located on the east side of Highway 101, near Mark West Springs Road, approximately 185 m (607 ft) from the main lanes of the highway. A short-term measurement (ST5) was taken at R22. Future traffic noise would not approach or exceed the NAC at these land uses. Figure A-7 in Appendix A shows the location of the receptor.

Receptor R27 represents one single-family residence approximately 155 m (509 ft) from the right-of-way of Highway 101, south of River Road. The future traffic noise would not approach or exceed the NAC for this receptor. Figure A-7 in Appendix A shows the location of the receptor.

Receptor R29 represents Vinters Inn, located approximately 180 m (591 ft) from Highway 101 and south of River Road. A short-term noise measurement (ST6) was taken at R29. The future traffic noise would not approach or exceed the NAC for this receptor. Figure A-7 in Appendix A shows the location of the receptor.

Receptor R32 represents a single-family residence located on Fulton Road, east of Highway 101. The future traffic noise would not approach or exceed the NAC at receptor R32. Figures A-9A and A-9B in Appendix A show the location of the receptor.

Receptors R35, R35A, and R35B (Fulton Road and Airport Boulevard Interchange Complex, Southbound Option B) represent an apartment complex on the west side of Highway 101, south of and adjacent to Airport Boulevard. Future traffic noise would not approach or exceed the NAC at these receptors due to the noise attenuation provided by Option B, which would feature a braided ramp on substantial fill that would block the line-of-sight to a major portion of the Highway 101 mainline. Hence, noise abatement was not considered at this location. Figure A-10B in Appendix A shows the location of the receptors.

Receptor R37 represents the Stonegate Mobile Home Park located on Whispering Creek Drive. A short-term noise measurement (ST8) was taken at R37. The future traffic noise would not approach or exceed the NAC at this receptor. Figure A-10B in Appendix A shows the location of the receptor.

Receptors R52, R54, R54A, R56, and R56A represent a single-family residential development, north of Shiloh Road, on the east side of Highway 101. An existing 3 m (10 ft) high berm/wall combination along this development was considered in the noise impact analysis. This development would be affected by future traffic noise levels that approach or exceed the NAC. The minimum noise reduction requirement of 5 dBA would not be met at receptors that are already protected by the existing wall, even if the height of the wall were increased from 3 m (10 ft) up to 4.9 m (16 ft). Figure A-14 in Appendix A shows the location of the receptors.

Receptors R64, R66, and R68 represent a development of single-family residences on Dove Lane, with rear yards that are adjacent to the Highway 101 right-of-way on the east side, north of Hembree Lane. An existing 3.7 m (12 ft) high concrete wall along the right-of-way of this development was

considered in the noise analysis. Although this development would be affected by future traffic noise levels, the minimum noise reduction requirement of 5 dBA would not be met by increasing the height of the existing wall from 3.7 m (12 ft) to 4.9 m (16 ft). Figures A-14 and A-15 in Appendix A show the location of the receptors.

Receptors R78, R80, and R82 represent the Courtyard East Apartments, which are south of Old Redwood Highway on the east side of Highway 101. An existing 3.7 m (12 ft) high berm/wall combination along this development was considered in the noise impact analysis. A short-term noise measurement (ST10) was taken at R80. Although this development would be affected by future traffic noise levels, the required minimum noise reduction of 5 dBA would not be achieved, even by increasing the height of the existing wall from 3.7 m (12 ft) to 4.9 m (16 ft). Figure A-16 in Appendix A shows the location of the receptors.

Receptors R81 and R83 represent a new motel development that was under construction, south of Windsor River Road on the west side of Highway 101, at the time of the noise analysis. Although this development would be affected by future traffic noise levels, the location of exterior uses is not known and could not be properly modeled for future traffic noise impact. Figure A-16 in Appendix A shows the location of the receptors.

3.14 Energy

As the impact of the project in context of the countywide travel model is too small to demonstrate substantial energy impacts, in accordance with Caltrans' Standard Environmental Reference Guidelines,[3] a qualitative energy analysis was conducted. The information presented in this section is taken from the technical memorandum, *Technical Memorandum on Energy Impacts for the Highway 101 HOV Lane Widening and Improvements Project: Steele Lane, Santa Rosa to Windsor River Road, Windsor* (Parsons 2005).

The energy impacts of transportation projects are typically divided into two components: (1) the direct energy required for ongoing operations, in this case, the use of petroleum-based fuels and alternative fuels for motor vehicle travel within the project area, and (2) the indirect energy required to produce the materials for and to carry out construction of the project. In the long term, the direct, or operating, energy requirements are usually greater and of primary importance. This discussion, therefore, focuses on the direct energy requirements for ongoing Highway 101 operations with and without the proposed project.

By 2030, without capacity improvements to Highway 101, congested traffic conditions would prevail through the project limits; the freeway would be unable to serve the projected demand. Due to insufficient mainline capacity for the forecast volumes, bottlenecks and queues would develop at certain locations along the mainline. Low travel speeds and long delays would be prevalent during peak hours. Such congested traffic conditions contribute to inefficient energy consumption as

[3] Source: http://www.dot.ca.gov/ser/vol1/sec3/physical/ch13energy/chap13.htm

vehicles use extra fuel while idling in stop-and-go traffic or moving at slow speeds on a congested roadway.

The Build Alternative *(Preferred Alternative)* would improve average travel speeds and thereby reduce average travel times during both morning and evening peak hours. Improved travel speeds would translate to a two to 70 percent reduction in travel time. The Build Alternative *(Preferred Alternative)* would reduce overall delays by up to 16 minutes, depending on the peak hour (morning and evening) and direction of travel.

By removing bottlenecks in the study area, reducing delays and improving travel times, the Build Alternative also would reduce traffic diversion to local streets ("cut-through" traffic) by commuters who under no-build conditions, would divert to local streets to avoid bottlenecks and traffic queues on the mainline.

The Build Alternative *(Preferred Alternative)* would reduce the countywide vehicle miles traveled (VMT) and countywide vehicle hours traveled (VHT) when compared to the No-Build Alternative.[4] Under the Build Alternative *(Preferred Alternative)*, annual countywide VMT would decrease by 4.4 million kilometers (2.8 million miles) and annual countywide VHT would decrease by one million hours when compared to the No-Build Alternative. These reductions reflect the improved travel times and reduced delays under the Build Alternative *(Preferred Alternative)*. Because vehicle energy consumption is directly proportional to VMT, lower VMT under the Build Alternative *(Preferred Alternative)* translates to energy savings.

The HOV lanes provided under the Build Alternative *(Preferred Alternative)* would offer dedicated peak hour capacity and a high level of traffic service to transit and carpool vehicles. This would substantially improve travel time for intercity buses and carpooling commuters as they would operate at speeds of approximately 97 kph (60 mph) in the new HOV lanes. This compares to speeds as low as 11 kph (7 mph) in congested mixed flow lanes under the No-Build Alternative. Not only would transit travel time be reduced but transit schedule reliability would be improved. Carpools and vanpools also would have improved speeds and reduced travel times. The improved speeds and schedule reliability could be incentives for commuters and other travelers to carpool and/or take advantage of local and express buses that would move freely along the HOV lanes. A shift by more commuters into HOVs would lead to further energy savings.

Such improvements in traffic operations under the Build Alternative *(Preferred Alternative)* would reduce direct (operating) energy use, whether in the form of petroleum fuels or alternative sources of energy, compared to higher fuel consumption under the No-Build Alternative. The proposed project is therefore anticipated to have a beneficial effect on direct energy use compared to the No-Build Alternative. No energy mitigation measures would be needed.

[4] The countywide VMT represents the total distance traveled by all vehicles in Sonoma County and countywide VHT represents the total hours traveled by all vehicles in Sonoma County.

3.15 Biological Environment

A *Natural Environment Study* (NES) (Parsons 2006), *Wetland Delineation Report (March 2007), Initial Site Assessment for the California Tiger Salamander and California Red-legged Frog* (Parsons 2003), a *California Red-legged Frog Report* (Parsons 2005), and a Habitat Quality Evaluation Report (HQE) (Parsons 2007) were prepared for the Highway 101 HOV Lane Widening Project. The studies consisted of a comprehensive records and literature search, a reconnaissance survey of the entire project corridor, habitat assessment and protocol surveys for special-status species, and a delineation/assessment of wetlands and other waters of the United States (U.S.). A *Focused Corridor Biological Assessment for the Sonoma County Distinct Population Segment (DPS) of the California Tiger Salamander* (Parsons 2004) and a *Biological Assessment for Vernal Pool Plant Species* (Parsons 2005) were prepared and submitted to the U.S. Fish and Wildlife Service (USFWS) to initiate formal consultation under Section 7 of the Federal Endangered Species Act. A *Biological Assessment for Fish Species* was also prepared and was submitted to the National *Oceanic and* Atmospheric Administration Fisheries Service (NOAA Fisheries) *in August 2007* to initiate consultation under Section 7 for potential impacts to fish species under NOAA Fisheries jurisdiction. This section of the environmental document presents findings of these reports and studies for vegetation and wildlife communities, wetlands and other waters of the U.S., threatened and endangered species, and invasive species.

3.15.1 Natural Communities

This section of the document discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. This section also includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act are discussed in Section 3.15.3, Threatened and Endangered Species. Wetlands and other waters are also discussed in Section 3.15.2, Wetlands and Other Waters of the U.S.

3.15.1.1 AFFECTED ENVIRONMENT

Land uses along the Highway 101 HOV Lane Widening Project are primarily rural and agricultural, as described in Section 3.2.1, Existing and Future Land Use. Vegetation is mostly ruderal/disturbed, non-native grassland, ornamental landscape planted with coast redwood *(Sequoia sempervirens),* and agricultural planted with grapes *(Vitis vinifera);* there are few remaining natural areas. Various waterways traverse the corridor, some in concrete-lined channels or culverts and others in their natural watercourse.

Six biological communities occur in the vicinity of the project corridor: non-native annual grassland; ruderal/disturbed, including ornamental landscape and agriculture; seasonal and freshwater emergent wetlands; willow riparian scrub; coyote brush scrub; and North Coast black cottonwood riparian

forest. Preliminary investigations indicate that it is highly unlikely that the project area contains vernal pools or Santa Rosa Plain listed plants. Protocol-level presence/absence surveys *for these special-status plant species were performed during 2006 and 2007 with negative findings.* Special-status plant species are discussed further in Section 3.15.3.2, *Affected Environment*.

A description of each community and its associated wildlife assemblage is provided below.

Non-Native Grassland

This community is found on fine-textured, usually clay soils, which may range from moist, possibly even waterlogged during the rainy season, to very dry during the dry season. It is primarily composed of non-native annual grasses although native annual forbs ("wildflowers") may also be present during years of favorable precipitation. Non-native grassland communities are found in the valleys and foothills throughout much of California. Characteristic species include wild oats *(Avena* spp.), bromes *(Bromus* spp.), Italian ryegrass *(Lolium multiflorum)*, California poppy *(Eschscholzia* californica), lupine (*Lupinus* spp.), and baby blue-eyes (*Nemophila menziesii*).

Grasslands provide foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles. Wildlife species typically associated with grasslands include western skink *(Eumeces skiltonianus)*, Pacific gopher snake *(Pituophis melanoleucus catenifer)*, common garter snake *(Thamnophis sirtalis)*, deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), mule deer (*Odocoileus hemionus*), western meadowlark (*Sturnella neglecta*), and savannah sparrow (*Passerculus sandwichensis*). Grasslands also provide important foraging habitat for raptors such as the American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), and red-tailed hawk (*Buteo jamaicensis*).

Non-native grassland was found in the vicinity of the Shiloh Road and Fulton Road interchanges.

Ruderal/Disturbed, Including Urban Ornamental Landscape and Agriculture

A distinguishing characteristic of urban habitats is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries. Native and introduced animal species that are tolerant of human activities often thrive in urban habitats. These species include western fence lizard *(Sceloporus occidentalis)*, barn swallow *(Hirundo rustica)*, European starling *(Sturnus vulgaris)*, house sparrow *(Passer domesticus)*, house finch *(Carpodacus mexicanus)*, house mouse *(Mus musculus)*, raccoon *(Procyon lotor)*, striped skunk *(Mephitis mephitis)*, and Virginia opossum *(Didelphis virginianus).*

Common weeds found along the project corridor included Italian ryegrass, wild oats, tall mustard (*Sisymbrium altissimum*), Harding grass (*Phalaris aquatica*), bristly ox-tongue (*Picris echioides*), sow thistle (*Sonchus asper*), wild lettuce (*Lactuca serriola*), and paniculate willow-herb (*Epilobium brachycarpum*). Ornamental landscape plants associated with these weeds included periwinkle (*Vinca major*), English ivy (*Hedera helix*), oleander (*Nerium oleander*), and coast redwood (*Sequoia sempervirens*).

Ruderal/disturbed vegetation and ornamental landscaping are the primary biological communities along the project corridor. Agricultural areas in the project vicinity include several vineyards and an organic vegetable farm.

Seasonal and Freshwater Emergent Wetlands

Seasonal wetlands, including the aquatic environments of the floor of flood control channels, are often formed when ditches and depressions are excavated. Freeway ditches develop into seasonal wetlands by becoming populated by plants species such as semaphore grass *(Pleuropogon californicus),* spikerush *(Eleocharis macrostachya),* water knotweed *(Polygonum lapathifolium),* water evening primrose *(Ludwigia peploides),* pennyroyal *(Mentha pulegium),* rabbitsfoot grass *(Polypogon monspeliensis),* barnyard grass *(Echinochloa crusgalli),* and eragrostoid sedge *(Cyperus eragrostis).* These plant species are either low-growing, tenacious perennials that tolerate the annual maintenance activities being carried out in the channels and ditches, or are annuals that tolerate seasonal wetness and mowing, but later produce seed for the next season. The edges of such wetlands are often dominated by non-native annual weeds including annual ryegrass *(Lolium multiflorum),* alkali mallow, peppergrass *(Lepidium latifolium),* and bristly ox-tongue *(Picris echioides).*

Freshwater marshes are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds as well as a variety of mammals, reptiles, and amphibians. Species that could use these areas in the project vicinity include Pacific tree frogs *(Hyla regilla),* bullfrogs *(Rana catesbeiana),* red-winged blackbird *(Agelaius phoeniceus),* song sparrow *(Melospiza melodia),* yellow warbler *(Dendrocia petechia),* voles *(Microtis* spp.), shrews *(Sorex* spp.), and deer mouse.

Seasonal and freshwater emergent wetlands occur at the ditches and equalizers at the Fountain Grove interchange, at Piner Creek and adjacent wetlands, at the ditch near Lavelle Road, at Pruitt Creek, and at the tributary to Windsor Creek. No vernal pools or swales were apparent in the project vicinity. Vernal pool indicator species were observed on private land adjacent to the project corridor, however, permission to enter the property was denied.

Willow Riparian Scrub

This community is found on relatively fine-grained alluvial soils and clays located in the floodplains of sub-perennial streams along canyons and creeks of the Coast Ranges. Characteristic species include red willow *(Salix laevigata)* and shining willow *(S. lucida* ssp. *lasiandra).*

Examples of wildlife that may occur in this community include Pacific tree frog, bushtit *(Psaltriparus minimus),* Wilson's warbler *(Wilsonia canadensis),* black phoebe *(Sayornis nigricans),* Anna's hummingbird *(Calypte anna),* spotted towhee *(Pipilo maculatus),* raccoon, Virginia opossum, European starling, American crow *(Corvus brachyrhynchos),* Western scrub jay *(Aphelocoma californica),* house finch, house mouse, and Norway rat *(Ratus norvegicus).*

Willow riparian scrub occurs in the southeast quadrant of the Bicentennial Way interchange, the Fountain Grove interchange, north of Hopper Avenue, at Coffey Lane, north of the Fulton Road interchange near Mark West Creek, north of the Shiloh Road interchange near the tributary to Pool Creek, and at the Old Redwood Highway interchange.

Coyote Brush Scrub

Considered by some ecological workers as the northern version of soft chaparral, coyote brush scrubs are most prevalent on coastal slopes. However, inland scrubs that are dominated by *Baccharis* species are often associated with old disturbed sites, and thus may reflect a seral stage in the development of woodlands from bare ground. The dominant species is coyote brush *(Baccharis pilularis* ssp. *consanguinea)* but may also include species of buck brush *(Ceanothus* species), poison oak *(Toxicodendron diversilobum),* and cow parsnip *(Heracleum lanatum),* together with a whole host of annual forbs and grasses.

Coyote brush scrub provides foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles (see section on non-native grassland).

Coyote brush scrub occurs at the Mark West Springs Road interchange.

North Coast Black Cottonwood Riparian Forest

This community is found on fine-grained alluvia soils located on bottomlands, floodplains, gravel bars and perennial stream banks. The overstory is generally dominated by black cottonwood *(Populus trichocarpa),* willows *(Salix* spp.) and red alder *(Alnus rubra),* with older stands containing shade-tolerant conifers such as grand fir *(Abies grandis),* douglas fir *(Pseudotsuga menziesii),* and western red cedar *(Thuja plicata).* Understory plants can include twinberry *(Lonicera involucrata),* western sword fern (*Polystichum munitum*), snowberry (*Symphoricarpos mollis*), and salmonberry (*Rubus spectabilis*).

North Coast black cottonwood riparian forest provides a wide range of resources to wildlife, such as movement and migration corridors, cover (nesting, resting, thermal, etc.), water, and a variety of foraging opportunities. Examples of wildlife that may occur in this community include western toad *(Bufo boreas),* pacific treefrog, bushtit *(Psaltriparus minimus),* Wilson's warbler *(Wilsonia canadensis),* black phoebe, great horned owl *(Bubo virginianus),* european starling *(Sturnus vulgarus),* american crow *(Corvus brachyrhynchos),* western scrub jay *(Aphelocoma cali/arnica),* raccoon, Virginia opossum, dusky-footed woodrat *(Neotoma fuscipes),* deermouse, and hoary bat *(Lasiurus cinereus).*

North coast black cottonwood riparian forest occurs near Mark West Creek.

3.15.1.2 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new highway construction that would involve impacts to the biological environment. *Permanent* project effects on natural communities that would result from the Highway 101 HOV Lane Widening Project Build Alternative *(Preferred Alternative)* are shown in Table 3.15-1. Impacts would vary with northbound or southbound options A or B at the Fulton Road/Airport Boulevard Interchange Complex. *However, Northbound Option B and Southbound Option A have been chosen as elements of the Preferred Alternative.* Impacts for all four possible combinations are shown in the table.

Table 3.15-1: Impacts to Natural Communities for the Build Alternative (Preferred Alternative) (hectares/acres)

Affected Natural Communities	Total Area of Impact (Hectares/Acres) — Build Alternative (Preferred Alternative) (including Options at Fulton Road/ Airport Boulevard Interchange Complex) [1]			
	NB-A/SB-A	NB-A/SB-B	NB-B/SB-A *(preferred)*	NB-B/SB-B
Ruderal/Disturbed	17.0 ha/ 42.0 ac	17.0 ha/ 42.0 ac	17.0 ha/ 42.0 ac	17.0 ha/ 42.0 ac
Non-native Grassland	0.01 ha/ 0.03 ac	0.01 ha/ 0.03 ac	0.37 ha/ 0.91 ac	0.37 ha/ 0.91 ac
Seasonal/Freshwater Emergent Wetland/Open Water	0.086 ha/ 0.212 ac	0.085 ha/ 0.210 ac	0.086 ha/ 0.212 ac	0.085 ha/ 0.210 ac
Willow Riparian Scrub	0.26 ha/ 0.64 ac	0.24 ha/ 0.60 ac	0.32 ha/ 0.79 ac	0.30 ha/ 0.75 ac
Coyote Brush Scrub	0.0002 ha/ 0.0005 ac	0.0002 ha/ 0.0005 ac	0.0002 ha/ 0.0005 ac	0.0002 ha/ 0.0005 ac
North Coast Black Cottonwood Riparian Forest	0.25 ha/ 0.62 ac	0.30 ha/ 0.74 ac	0.31 ha/ 0.76 ac	0.36 ha/ 0.88 ac

[1] NB – A = Northbound Option A; NB – B = Northbound Option B; SB – A = Southbound Option A; SB – B = Southbound Option B

Source: Parsons 2005

Ruderal/Disturbed

The HOV lane project would affect 17.0 ha (42.0 ac) of ruderal/disturbed vegetation at various locations along the Highway 101 corridor within the project limits.

Non-native Grassland

Approximately 0.37 ha (0.91 ac) of non-native grassland located primarily near Mark West Creek would be affected by the proposed project.

Willow Riparian Scrub

Approximately 0.32 ha (0.79 ac) of willow riparian scrub located along Piner Creek and the Piner and Pool Creek tributaries would be affected.

Seasonal/Freshwater Emergent Wetland/Open Water

The proposed project would *permanently* affect *0.086 ha (0.212 ac)* of seasonal and freshwater emergent wetlands and open water in ditches and equalizers near the Fountain Grove Interchange, at the tributaries to Piner and Windsor Creeks, and at Mark West, Pruitt and Pool Creeks. *Pursuant to Executive Order 11990, Protection of Wetlands, a Wetlands Only Practicable Alternative Finding is presented in Appendix M.*

Coyote Brush Scrub

The Build Alternative *(Preferred Alternative)* would affect 0.0002 ha (0.0005 ac) of coyote brush scrub habitat in the vicinity of River Road.

North Coast Black Cottonwood Riparian Forest

Approximately 0.*31* ha (0.*76* ac) of North Coast black cottonwood riparian forest in the vicinity of Mark West Creek would be affected by the proposed project.

3.15.1.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The project has been designed to use existing right of way to the greatest extent feasible, thus avoiding or reducing new construction in natural habitat areas. The majority of the widening would be accomplished within the existing roadway median. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right of way takes and natural community impacts. Linear patches and disjunct segments of ruderal/disturbed vegetation and non-native grassland and a small patch of coyote brush scrub would be permanently affected by Highway 101 project construction. These losses are not considered to be substantially adverse because other vegetation community areas within the project vicinity are of higher quality and would be used by wildlife as an alternative and preferable habitat source. Mitigation measures for impacts to willow/riparian and North Coast black cottonwood riparian forest vegetation communities affording habitat for special-status species and to jurisdictional wetlands and other waters of the U.S. are described in their respective sections on the following pages.

3.15.2 Wetlands and Other Waters of the United States

3.15.2.1 REGULATORY SETTING

Three primary regulations apply to undertakings that may affect wetlands or other waters of the United States, as follows:

Section 404, Clean Water Act

As established in Section 404 of the Clean Water Act (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) has authority over the identification of wetlands and other waters of the U.S. in the project vicinity, including their jurisdiction, determination of area affected by the project, and type of permits and conditions required. Section 404 prohibits the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. In order for a project that affects wetlands to be approved and a permit to be obtained, it must be demonstrated that the proposed project is the least environmentally damaging. A "no net loss of wetland acreages or values" policy is established for mitigation of wetland impacts.

The USACE also administers the Habitat Quality Evaluation (HQE) process. This process was developed by the Sonoma County Vernal Pool Task Force[1] with the purpose of identifying wetland areas in the Santa Rosa Plain that potentially contain rare plant and animal species. These areas are further studied for their potential to be used for wetland and rare species protection, wetland creation, restoration or enhancement.

[1] The Vernal Pool Task Force was composed of federal, state, and local agencies, local development and agricultural interests, and local environmental groups.

Section 401, Clean Water Act

Concurrent with the determination of a project's qualifications for an USACE permit is certification of the project's compliance with California State water quality standards as regulated by the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. The water quality certification may include waste discharge requirements.

Section 1600 et. Seq., California Fish and Game Code

Actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement ("1602 permit") with the California Department of Fish and Game (CDFG) in accordance with Section 1600 and following of the California Fish and Game Code. The Streambed Alteration Agreement effectively applies to any construction work between the banks of a stream or within the floodplain of a waterway. The agreement typically establishes seasonal limits or work windows for construction activities that may affect a streambank *as well as conditions to avoid and minimize or compensate for unavoidance effects*.

3.15.2.2 AFFECTED ENVIRONMENT

A delineation of potential jurisdictional wetlands and other waters of the U.S. in the Highway 101 HOV Lane Widening project vicinity was conducted on April 15; May 6, 13, 15, 21; June 18, 19; July 16, 17, 29, 30, 2003; *and from April to July 2006* in accordance with the Routine On-Site Determination Method as defined by the USACE. This delineation *was* submitted to the USACE *on April 9, 2007* for jurisdictional determination.

The *potentially* jurisdiction*al* features that were delineated along Highway 101 are shown on the Wetland Delineation Maps in Appendix G. Jurisdictional wetlands are determined by the presence of three indicators: wetlands soils, wetlands vegetation, and hydrology, or period of *saturation*. Other waters of the U.S. must possess a defined bed and bank and an ordinary high water mark (OHWM).

The wetland delineation also served to demonstrate the absence of vernal pools in the project area. Protocol-level presence/absence surveys for vernal pool listed plant species were completed during 2006 and 2007 to complete the Habitat Quality Evaluation (HQE) process as required pursuant to the "1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may Affect Four Endangered Plant Species of the Santa Rosa Plain, California" (1998 Plant Programmatic Opinion) (Service 1998) and the Santa Rosa Plain Conservation Strategy. These surveys indicated that none of the four listed vernal pool plant species occur within the immediate project vicinity.

3.15.2.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new highway construction that would affect wetlands or other waters of the U.S. in the project corridor. *T*he proposed project Build Alternative *(Preferred Alternative)* would permanently affect *0.086 ha (0.212 acres)* of wetlands and other waters of the U.S. Both permanent and temporary (construction phase) impact areas are shown on the Wetland Delineation Maps in Appendix G. Table 3.15-2 reports the amount of wetland *and* other waters resources within the project limits that would be permanently or temporarily filled *with each*

combination of Northbound and Southbound options for the Fulton Road/Airport Boulevard Interchange. However, Northbound Option B and Southbound Option A have been chosen as elements of the Preferred Alternative.

Table 3.15-2: Impacts to Wetlands and Other Waters of the U.S. from the Highway 101 HOV Lane Widening Project: Santa Rosa to Windsor

Fulton/Airport Interchange Option	Impact Areas	Permanent (hectares/acres)	Temporary (hectares/acres)
Northbound Option A with Southbound Option A	Wetlands	*0.078/0.193*	*0.062/0.153*
	Other Waters of the U.S.	*0.007/0.018*	*0.118/0.290*
	Total Wetlands/Waters	***0.085/0.211***	***0.18/0.443***
Northbound Option B with Southbound Option A *(preferred)*	Wetlands	*0.078/0.193*	*0.062/0.153*
	Other Waters of the U.S.	*0.008/0.019*	*0.206/0.508*
	Total Wetlands/Waters	***0.086/0.212***	***0.268/0.661***
Northbound Option A with Southbound Option B	Wetlands	*0.078/0.193*	*0.063/0.153*
	Other Waters of the U.S.	*0.007/0.017*	*0.087/0.214*
	Total Wetlands/Waters	***0.085/0.21***	***0.15/0.367***
Northbound Option B with Southbound Option B	Wetlands	*0.078/0.193*	*0.062/0.153*
	Other Waters of the U.S.	*0.007/0.018*	*0.175/0.432*
	Total Wetlands/Waters	***0.085/0.211***	***0.237/0.585***

Source: Parsons, 2006

There would be no difference in impacts to wetlands as a result of the Fulton Road/Airport Boulevard Interchange options. Permanent impacts to waters of the U.S. also would not vary greatly, regardless of which Fulton/Airport Interchange option would have been chosen as part of the Preferred Alternative. The overall difference would be less than 0.0008 ha/0.0020 ac of waters of the U.S. The different options are considered here consistent with Clean Water Act Section 404(b)(1) guidelines to identify the least environmentally damaging alternative. Also see Section 2.2.3.2, Interchange Improvements, Southbound Option A and Southbound Option B, and Figures A- Sheets 10A to 12A and 10B to 12B.

Southbound Option A has been identified as part of the Preferred Alternative. It has slightly greater impacts on waters of the U.S. than Southbound Option B (0.0920 ha/0.2273 ac compared with 0.0606 ha/0.1497 ac of permanent and temporary construction phase impacts), but it has several other advantages that make it a more prudent and practicable option than Southbound Option B. Southbound Option A requires less additional right of way than B and is less visually obstructive because it would be constructed on one level. Option A would avoid the braided ramps and additional structure to carry the Airport Boulevard on-ramp over the Fulton Road off-ramp. Also, Southbound Option A offers greater ease of staging construction to maintain traffic.

Northbound Option B has been identified as part of the Preferred Alternative. Northbound Option A would be lesser impacting on Mark West Creek (0.0021 ha/0.0052 ac compared with 0.0899 ha/0.221 ac of permanent and temporary construction phase impacts) and also would not require additional right of way. It is less advantageous for traffic operations, however.

Northbound Option A would result in a short (250 m/820 ft) auxiliary lane between the Fulton Road on-ramp and the off-ramp, and would retain the less-than-desirable loop exit ramp. Because Northbound Option A would retain a mainline weave movement, freeway traffic operations would not be as advantageous, but the loop approach to Airport Boulevard would provide a right turn for the dominant northbound-to-westbound traffic movement. Under Northbound Option B, this heavy traffic movement would be by left turn.

Northbound Option B would provide a new diagonal off-ramp to Airport Boulevard that would improve traffic operations, but it would require a new bridge over Mark West Creek with additional impacts to waters of the U.S., as quantified above. Also, Northbound Option B would result in slightly greater temporary impacts to waters of the U.S. than Option A.

Caltrans is currently preparing a Project Study Report (PSR) to replace the overcrossing structure at Airport Boulevard. The replacement bridge would likely be located on the north side of the existing structure. This may permit a northbound diagonal exit ramp to Airport Boulevard with an auxiliary lane from the northbound Fulton Road loop on-ramp, thereby avoiding the need to close the on-ramp or to construct a new bridge over Mark West Creek. In this case, Northbound Option B would not be more environmentally damaging than Option A. Because the PSR studies are still underway, and the outcome will affect the ramp configuration, the identification of the least environmentally damaging configuration should be postponed until its compatibility with the replacement overcrossing structure can be determined.

It is recommended that impacts and benefits of these options be reassessed consistent with Section 404 guidelines once the PSR is completed and available to determine which option is least environmentally damaging.

Based on the *potential maximum* amount of total permanent impacts to wetlands, *i*t is anticipated that the project *will require* a *nationwide* permit. It is also anticipated that a Section 1602 Streambed Alteration Agreement with the CDFG would be required prior to construction.

3.15.2.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Each element of the project was designed to have *its* least possible impacts on wetlands and waters of the U.S. The majority of the widening would occur in the median of the roadway. Side slopes steeper than standard would be constructed at several locations to minimize right-of-way takes and impacts to wetlands and other waters of the U.S. Compensation requirements for impacts to wetlands and other waters of the U.S. will be determined through consultation with the USACE and Regional Water Quality Control Board, which will establish the mitigation ratio and other measures to be implemented, based on its review of this *Environmental Assessment/Final Environmental Impact Report,* the *Wetlands Delineation Report,* and the *Natural Environment Study/Biological Assessment.* Compensation measures will be identified for both permanent and temporary (construction phase) impacts of the project to ensure no net loss of wetlands. Caltrans*/SCTA will* purchase wetland creation/enhancement credits at an USACE-approved mitigation bank *to ensure no net loss*.

3.15.3 Threatened and Endangered Species

Special-status plant and wildlife species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. For purposes of this environmental document, candidate threatened or endangered species were addressed in the same manner as listed species, since they could be listed during later stages of project development.

3.15.3.1 REGULATORY SETTING

A variety of laws seek to identify, avoid, minimize and mitigate for impacts to special-status wildlife and plant species, as summarized in the following paragraphs.

Federal Endangered Species Act

The Secretary of the Interior and the Secretary of Commerce are responsible under the *f*ederal Endangered Species Act of 1973 (ESA) for identifying endangered and threatened species and their critical habitat, carrying out programs for species conservation, and rendering opinions regarding the impact of proposed federal actions on endangered species. The ESA also outlines what constitutes unlawful taking, importation, sale, and possession of endangered species and specifies civil and criminal penalties for unlawful activities.

Biological assessments are required under Section 7(c) of the ESA if listed species or critical habitat may be present in the area affected by any major construction activity conducted by, or subject to issuance of a permit from, a federal agency as defined in Part 404.02. Under Section 7(a)(3) of the ESA, every federal agency is required to consult with the United States Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) on a proposed action if the agency determines that its undertaking may affect an endangered or threatened species.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The MBTA also prohibits disturbance or harassment of nesting migratory birds at any time during their breeding season.

California Endangered Species Act

The California Endangered Species Act (CESA, Fish and Game Code Sections 2050-2098) establishes State policy to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The Fish and Game Commission is charged with establishing a list of endangered and threatened species. State agencies must consult with the California Department of Fish and Game (CDFG) to determine if a proposed project has the potential to jeopardize the continued existence of listed endangered, threatened, or candidate species.

The CDFG Code defines "take" (Section 86) and prohibits “taking” of species that are listed under the CESA, or fully protected under CDFG Code Sections 3511, 4700, and 5050. Significant impacts are

defined as: a) direct mortality; b) permanent or temporary loss of occupied habitat that would result in mortality to or reduced productivity of at least one individual of the species; c) avoidance of biologically important habitat for substantial periods resulting in mortality to or reduced productivity of at least one individual of the species.

Section 2081 of the CDFG Code allows "take" of a species listed under the CESA. Take is defined as any act that involves direct mortality or other actions that may result in adverse impacts when attempting to take individuals of a listed species. Under Section 2081, CDFG may issue a permit to authorize take for scientific, educational or management purposes, or take that is incidental to otherwise lawful activities.

California Fish and Game Code Native Plant Protection Policy

The goal of the California Native Plant Protection Policy (Policy) is to preserve, protect, and enhance endangered or rare plants of the state (Section 1900). Native plants are defined as plants that grow in a wild uncultivated state and which are normally found native to the plant life of the state (Section 1901). The California Fish and Game Commission may adopt regulations governing the taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants.

All state departments and agencies shall, in consultation with CDFG, use their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the identification, delineation, and protection of habitat critical to the continued survival of endangered or rare native plants (Section 1911).

California Fish and Game Code Sections 1600

As described in Section 3.15.2.1, actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement ("1602 permit") with the CDFG in accordance with Section 1600 of the California Fish and Game Code. The Streambed Alteration Agreement establishes time periods for construction and other conditions designed to protect streambed habitat areas, maintain flows, and minimize harm to wildlife.

3.15.3.2 AFFECTED ENVIRONMENT

The USFWS and NOAA Fisheries were contacted for their listings of threatened, endangered, and candidate species that may occur in the project vicinity. Copies of the letters and listings received from each of these agencies *are* included in Appendix E. *The USFWS' online service was consulted in September 2007 to determine that there have been no updates to critical habitat and listed species affecting the project.* Studies and field surveys were performed for all special-status species with potential to be present within the proposed Highway 101 project vicinity. Survey results for plants, wildlife and jurisdictional features are addressed in the NES, BAs, *and Habitat Quality Evaluation Report (HQE) in detail*. The discussion below focuses on the results of studies conducted for 25 special-status plant species; four fish species, the Russian River tule perch, coho salmon, steelhead, and chinook salmon; three special-status amphibian species, the CTS, northern red-legged frog, and foothill yellow-legged frog; two special-status reptile species, the western and northwestern pond

turtle; and three special-status bird species, the western yellow-billed cuckoo, white-tailed kite and loggerhead shrike, all of which have potential to occur in the project area.

Special-status Plant Species

Twenty-five special-status plant species were identified to have potential to occur in the project area, as listed in Table 3.15-3 Special-status Plant Species.

Preliminary botanical surveys resulted in negative findings for all special-status plants. It is unlikely that these species exist within the project area. No vernal pools or swales were apparent in the project vicinity. *Protocol-level p*resence/absence surveys *were conducted during 2006 and 2007 pursuant to the 1998 Plant Programmatic Opinion (Service 1998) and the Santa Rosa Plain Conservation Strategy and corroborate the negative findings of the preliminary surveys.*

Special-status Wildlife Species

Russian River Tule Perch: The Russian River tule perch (*Hysterocarpus traski pomo*) is currently confined to the Russian River and its tributaries in Sonoma and Mendocino counties. Russian river tule perch require clear, flowing water and abundant cover. Although they will feed in shallow waters, they generally require deep pools for refuge and feeding. They are also very sensitive to stream pollution and tend to be absent from turbid, slow-moving water. The decline of Russian River tule perch in recent years has been attributed primarily to habitat alteration due to dams on the Russian River that have increased turbidity and decreased water quality. The Russian River tule perch is currently listed as a species of concern by both the federal government and the CDFG.

Pacific Salmon and Trout: Steelhead and Coho Fisheries: Pacific salmonids and trout are anadromous fish. Anadromous is defined as those fish species that move from sea (saltwater) to fresh water for reproduction. The life cycle of anadromous salmonids entails hatching in cool headwater tributaries of large river systems and moving out to saltwater as young fish. In the ocean they grow rapidly to adults. Upon reaching maturity they return to hatching streams to spawn, typically followed by death.

Successful spawning, incubation, and juvenile rearing require clean, coarse, well-oxygenated gravels free of fine sediments. Excessive accumulations of sediment fines reduce the hatching success of eggs and retard embryo and juvenile growth. Upon emerging from gravel, juveniles (fry) remain in cool, shaded, clean water with resting and escape habitat and ample invertebrates available for food through late summer and fall. Spawning and juvenile rearing usually occur along upper reaches of smaller tributaries with suitable habitat. As fry reach the smolt phase, they migrate downstream, typically March through June annually.

Each of the salmonid species has genetically distinct populations (runs), termed evolutionarily significant units (ESU) associated with each major tributary. The ESU serves as an alternative definition for "distinct population segments" under the federal Endangered Species Act (NOAA Fisheries 2002a). Due to differing life history strategies, management considerations and conservation threats, each ESU is treated as a separate species.

Table 3.15-3: Special-status Plant Species

Species		Status			Habitat	Rationale for Determination of No Presence
		Federal	State	CNPS		
Sonoma alopecurus	*(Alopecurus aequalis* var. *sonomensis)*	FE	--	1B	P	Marginal habitat present – no plants observed.
Bent-flowered fiddleneck	*(Amsinckia lunaris)*	FSLC	--	1B	P	Marginal habitat present- no plants observed.
Clara Hunt's milk-vetch	*(Astragalus clarianus)*	FE	ST	1B	P	Marginal habitat present- no plants observed.
Big-scale balsamroot	*(Balsamorhiza macrolepis* var. *macrolepis)*	FSLC	--	1B	P	Marginal habitat present- no plants observed.
Sonoma sunshine	*(Blennosperma bakeri)*	FE	SE	1B	P	Marginal habitat present- no plants observed.
Bolander's reedgrass	*(Calamagrostis bolanderi)*	FSLC	--	4	P	Marginal habitat present- no plants observed.
Thurber's reedgrass	*(Calamagrostis crassiglumis)*	FSC	--	2	P	Marginal habitat present- no plants observed.
Swamp harebell	*(Campula californica)*	--	--	1B	A	No suitable habitat present- no plants observed.
White sedge	*(Carex albida)*	FE	SE	1B	P	Marginal habitat present- no plants observed.
Pitkin Marsh Indian paintbrush	*(Castilleja uliginosa)*	--	--	1A	A	No suitable habitat present- no plants observed.
Dwarf downingia	*(Downingia pusilla)*	--	--	2	P	Marginal habitat present- no plants observed.
Hayfield tarplant	*(Hemizonia congesta* ssp. *Leucocephala)*	--	--	3	P	Potential habitat present- no plants observed.
Burke's goldfields	*(Lasthenia burkei)*	FE	SE	1B	P	Marginal habitat present- no plants observed.
Legenere	*(Legenere limosa)*	FSC	--	1B	P	Marginal habitat present- no plants observed.
Sebastopol meadowfoam	*(Limnanthes vinculans)*	FE	SE	1B	P	Marginal habitat present- no plants observed.
Marsh microseris	*(Microseris paludosa)*	FSLC	--	1B	P	Marginal habitat present- no plants observed.
Baker's navarretia	*(Navarretia leucocephala* spp. *Bakeri)*	FSC	--	1B	P	Marginal habitat present- no plants observed.
Many-flowered navarretia	*(Navarretia leucocephala* ssp. *Plieantha)*	FE	SE	1B	P	Marginal habitat present- no plants observed.
North Coast semaphore grass	*(Pleuropogon hooverianus)*	FSC	ST	1B	P	Marginal habitat present- no plants observed
White beaked-rush	*(Rhynchospora alba)*	--	--	2	A	No suitable habitat present- no plants observed.
California beaked-rush	*(Rhynchospora californica)*	FSC	--	1B	A	No suitable habitat present- no plants observed.
Brownish beaked-rush	*(Rhynchospora capitellata)*	--	--	2	A	No suitable habitat present- no plants observed.
Round-headed beaked-rush	*(Rhynchospora globularis* var. *globularis)*	--	--	2	A	No suitable habitat present- no plants observed.
Showy Indian clover	*(Trifolium amoenum)*	FE	--	1B	P	Marginal habitat present- no plants observed.
Saline clover	*(Trifolium depauperatum* var. *hydrophilum)*	FSLC	--	1B	P	Marginal habitat present- no plants observed.

Habitat: ***A*** = *Absent*, no further work needed. **P** = *Present*, general habitat is present and species may be present. **Federal Status:** FE = listed as endangered under Endangered Species Act; FSLC = federal species of local concern; FSC = species of concern identified by USFWS**. State Status:** SE = listed as endangered under the California Endangered Species Act; ST = listed as threatened under the California Endangered Species Act. **California Native Plant Society Listing Categories (CNPS 2001):** 1A = plant species that are presumed extinct in California; 1B = plant species that are rare, threatened, or endangered in California and elsewhere; 2 = plant species that are rare, threatened, or endangered in California, but are more common elsewhere; 3 = plant species that lack the necessary information to assign them to a listing status; 4 = plant species that have a limited distribution or that are infrequent throughout a broader area in California.

Three salmonid species consisting of *two* ESUs of salmonid fisheries have suitable habit *in streams* within the *general vicinity of the* project area: coho salmon *(Oncorhynchus kisutch)* - Central California Coast ESU; steelhead *(Oncorhynchus mykiss)* - Central California Coast ESU; and chinook salmon (*Oncorhynchus tshawytscha*) - California coastal ESU, as described below.

Coho Salmon: The Central California coast coho salmon is federally listed as threatened by the NOAA Fisheries and state listed as endangered by CDFG. Primary distribution of the coho salmon is the American and Sacramento rivers and other drainages northward from San Francisco Bay to Alaska. There are some minor coho runs documented for Santa Cruz County. Historically, coho salmon were never common in the Sacramento Valley or generally as far south as the Bay Area. *All streams in the project area are included in the critical habitat for Coho. However,* Coho salmon *juveniles* have recently been recorded in Mark West Creek *only*.

Steelhead: The Central California coast steelhead is federally listed as threatened by NOAA Fisheries. Steelhead are migratory trout, saltwater-tolerant, and may include resident (non-migratory), potamodromous (migratory within drainage up to estuarine waters only), or anadromous (migrate to open ocean) life histories. Regardless whether resident or migratory, adults return to hatching sites to spawn after one to three years. Unlike other Pacific salmon species, adults do not necessarily die after spawning; up to 20 percent of adults live to repeat the breeding cycle three or four times.

Central California coast steelhead spawning runs begin in late October and continue through May, with peak migration from mid-December through mid-April. Eggs hatch in about two to three weeks. Hatching young may remain at the hatch site or disperse immediately, but generally remain in headwaters for about one year before moving out to salt water. Spawning and juvenile rearing usually occurs along upper reaches of smaller tributaries with suitable habitat. As fry reach the older juvenile phase, they migrate downstream, typically during March through June.

Suitable habitat for spawning and juvenile rearing exists in all five streams expected to be impacted by the proposed project and steelhead juveniles have been found in each stream. Critical habitat includes Mark West , Pruitt, Pool, and Windsor Creeks, but not Piner Creek.

Chinook Salmon: The California coastal chinook salmon are federally listed as threatened by the NOAA Fisheries.

Ecologically, chinook salmon are big river fish and require large waterways and stable flows for their life cycle requirements. Within Sonoma County, only the Russian River, Sonoma and Carriger creeks are known to support chinook fisheries. Within the project area, suitable habitat for the chinook salmon occurs only at Mark West Creek, a tributary to the Russian River.

Chinook salmon ESUs occur in large coastal streams and rivers from the San Francisco Bay-Sacramento River drainage northward. The Central Valley fall/late-fall run has historically been the most abundant population while California chinook ESUs have shown long-term declines since 1967. Recent optimal ocean conditions and hatchery releases have increased abundance of this ESU;

however, NOAA Fisheries (2002a) is considering listing this ESU as threatened due to doubts that hatcheries can augment population numbers. Hatchery stocks in the Bay Area have augmented natural runs, especially the fall/late fall ESU; however, hatchery stocks of chinook salmon, regardless of ESU, are not protected under terms and conditions of state and/or federal endangered species acts.

Watersheds in the project area have been proposed for designation as critical habitat for chinook salmon.

California Tiger Salamander: The California tiger salamander (CTS), *(Ambystoma californiense)* is federally listed as threatened in the Santa Barbara, Sonoma, and Central California Distinct Population Segment (DPS) and state-listed as a 'species of special concern'. A member of the family Ambystomatidae, the CTS is a large, terrestrial salamander with a broad, rounded snout. Coloration of the CTS varies, but in general, it is black above with large pale yellow to white spots along the sides. Adults reach a length of three to five inches. CTS are restricted to grasslands, oak savannah, and edges of mixed forest plant communities throughout their range. CTS use three distinct habitats during three different stages of their life cycle: breeding habitat, upland aestivation habitat, and movement or dispersal habitat.

Critical habitat for CTS has not been designated; therefore, none will be adversely affected by the project.

The proposed project corridor is located approximately four miles north and east of the nearest known CTS record. There are no historical or recent sightings of CTS within the project limits. Drift fence surveys conducted during the 2003 survey season also detected no CTS. The Alton Preserve, a man-made preserve, located approximately two miles west of the project corridor, contains vernal pools that could provide CTS breeding habitat. If CTS do use these pools at Alton Preserve, it is highly unlikely that they migrate to the project vicinity due to the presence of substantial barriers to movement, including a railroad corridor, existing urban developments, roads, and streams. There is a stock pond located west of Conde Lane near the proposed project's northern terminus, but there are no CTS sightings from this vicinity.

Habitat assessment and protocol-level drift fence and pitfall trap surveys were conducted during 2003 to determine the presence of CTS. Subsequent to the surveys, the Santa Rosa Plain Conservation Strategy (Strategy) was published by the Santa Rosa Plain Conservation Strategy Team, which is made up of representatives of government agencies and interested parties. Consultation regarding impacts to CTS was conducted and compensation measures were identified in accordance with the Strategy. See Section 3.15.3.4, Avoidance, Minimization, and/or Mitigation Measures.

The U.S. Fish and Wildlife Service issued its No-jeopardy Biological Opinion with compensation and minimization measures on October 18, 2006, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.) (Act).

Northern Red-legged Frog: The northern red-legged frog *(Rana aurora aurora)*, a CDFG species of special concern, occupies the northwestern corner of California, north to southern British Columbia, west of the Cascade crest, mainly at low altitudes. It breeds in cool ponds or slow-moving streams,

lakes, ditches, and ponds close to vegetation. This frog can live in forests far from open water during moist conditions. Degradation or loss of habitat, as well as predation and competition from bullfrogs are the main threats facing the northern red-legged frog. Within the project area, suitable habitat for the frog occurs only at Mark West Creek. CNDDB records show no occurrence of northern red-legged frog within two miles of the project area. Previous sampling for aquatic biota with the City of Santa Rosa's Incremental Recycled Water Project identified no northern-red legged frogs during 10 years of sampling at Mark West Creek.

Foothill Yellow-legged Frog: The foothill yellow-legged frog (*Rana boylii*) is a moderate-sized highly variably colored frog, but usually dark to light gray, brown, green or yellow with a somewhat mottled appearance. Foothill yellow-legged frogs require shallow, flowing water, preferentially in small to moderate-sized streams with at least some cobble-sized substrate. They are infrequent or absent in habitats where introduced aquatic predators (i.e., various fishes and bullfrogs) are present, probably because their aquatic developmental stages are susceptible to such predators. In California, *R. boylii* was historically distributed throughout the foothill portions of most drainages from the Oregon border to the San Gabriel River. The foothill yellow-legged frog is considered both a federal and state species of special concern in the Coast Ranges north of the Salinas River. *Rana boylii* still occurs at many localities in coastal drainages north of the Salinas River system in California. CNDDB records show no occurrence of foothill yellow-legged frog within two miles of the project. Previous sampling for aquatic biota with the City of Santa Rosa's Incremental Recycled Water Project identified no yellow-legged frogs during ten years of sampling at Mark West Creek.

Western and Northwestern Pond Turtle: The western pond turtle *(Clemmys marmorata)* historically occurred along the Pacific coast, principally west of the Cascade-Sierra Nevada-Peninsula Mountains, with the Central Valley hosting the highest densities. Decline of this species is attributed to conversion of native wetlands to urban and agricultural uses. Preferred habitat includes ponds, lakes or sloughs isolated from streamflow, but may include streams and associated riparian habitats. The western pond turtle is a species of management concern by CDFG. *Suitable habitat for the western pond turtle occurs in the project area at Mark West, Piner, and Paolin Creeks.*

The northwestern pond turtle *(Clemmys marmorata marmorata)* is a subspecies of the western pond turtle that ranges from the Oregon-Washington border to central California, where it intergrades with the southwestern pond turtle *(Clemmys marmoratapallida).* Northwestern pond turtles inhabit a range of aquatic habitats with abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges. Due primarily to loss of aquatic habitat, this subspecies has declined through 75 to 80 percent of its historic range and is classified as a species of concern by both the USFWS and CDFG. The northwestern pond turtle historically occurred throughout the Steele Lane to Windsor River Road project area, but had only three recorded occurrences within the project area between 1992 and 1996, and none since 1996. Within the proposed project area, suitable habitat for the northwestern pond turtle occurs only at Mark West Creek.

Western Yellow-billed Cuckoo. The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a slender brown bird with white underparts. In flight, its wings show rufous or cinnamon color, and its tail shows black with white spots. The western yellow-billed cuckoo is

considered an endangered species by the CDFG. Although the cuckoo nests in walnut and almond orchards in California, its natural nesting habitat is in cottonwood-tree willow riparian forest. The nest typically is on the horizontal branch of a tree willow in a location hidden from view from the ground or surrounding trees. Riparian areas within the project vicinity provide suitable nesting habitat for western yellow-billed cuckoo. Historically, the cuckoo was known to breed in all regions of California except the central and northern Sierra Nevada, the Great Basin, and the Colorado Desert. Now, the bird likely is found only along the upper Sacramento Valley portion of the Sacramento River, the Feather River in Sutter County, the south fork of the Kern River in Kern County, and along the Santa Ana, Amargosa, and lower Colorado rivers.

This bird is threatened by loss and degradation of its habitat. Adverse impacts to cuckoo habitat are attributed to clearing of land for urban and suburban development and for agriculture, human disturbance (e.g., illegal camping), fire in riparian habitat, OHVs, livestock trampling and grazing on tree saplings, invasion of non-native plants (e.g., tamarisk and giant reed), flood control projects, pumping of groundwater, and diversion of surface water.

White-tailed Kite: The white-tailed kite (*Elanus leucurus*) was threatened with extinction in the early part of the twentieth century but has since recovered and is now found in virtually all California lowlands west of the Sierra Nevada. Although California currently holds the largest population of white-tailed kites in North America, the species is still considered rare and is listed as a federal species of concern during breeding season and afforded fully protected status by the CDFG.

White-tailed kites are most often found in areas surrounded by open habitat such as lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas. White-tailed kites breed and winter in low densities throughout central and into northern California. The CNDDB has a record of one breeding pair approximately 18.5 km northwest of the project limits, however, nesting and foraging habitat occurs along the Highway 101 corridor in several locations.

Loggerhead Shrike: The loggerhead shrike (*Lanius ludovicianus*) is a predatory songbird that is resident in the project area. It is identified as a species of concern for USFWS and a species of special concern by CDFG and is protected under the Migratory Bird Treaty Act. Under CEQA guidelines, rare species must be considered in project planning regardless of formal listing as endangered or threatened. The loggerhead shrike qualifies as it is considered rare, restricted in distribution, or declining throughout its California range according to CDFG.

Loggerhead shrikes prefer open habitat characterized by forbs and grasses interspersed with low shrubs, widely-spaced trees, and bare ground. Prairies, grasslands, pastures, fencerows or shelterbelts, mowed road rights-of-way, abandoned railroad rights-of-way, cemeteries, golf courses, open woodlands, farmsteads, and old orchards are examples of the types of habitats where loggerhead shrikes most commonly occur. Scattered shrubs or trees, particularly dense, thorny species, are typically used for nesting and hunting perches. As opportunistic predators, loggerhead shrikes feed on a wide variety of prey, including insects, small mammals and birds, reptiles, amphibians, and occasionally carrion.

Loggerhead shrikes are adaptable to urban environments and may occur anywhere along the Highway 101 corridor as long as preferred habitat characteristics and abundant prey supplies are present.

3.15.3.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new highway construction that would involve impacts to special-status plant and wildlife species. Impacts of the proposed project Build Alternative *(Preferred Alternative)* on special-status species are reported in the following paragraphs.

Special-status Plant Species

Preliminary botanical surveys for vernal pool and other special-status plant species were conducted during 2003. Avoidance and mitigation measures were developed in consultation with USFWS pursuant to the 1998 Plant Programmatic Opinion (Service 1998). Formal consultation with USFWS was initiated on October 26, 2004 and a No-jeopardy Biological Opinion was issued by USFWS on October 18, 2006. Protocol-level presence/absence surveys for vernal pool plant species were completed during 2006 and 2007 to complete the HQE process pursuant to the 1998 Plant Programmatic Opinion (Service 1998) and the Santa Rosa Plain Conservation Strategy. These investigations verified that vernal pool plant species do not exist within the immediate project area. Protocol-level presence/absence surveys for other special-status plant species were also conducted in 2006 and 2007 with negative findings.

Special-status Wildlife Species

Russian River Tule Perch: The proposed project would permanently affect up to *0.0052* ha (*0.0012* ac) of aquatic habitat at Mark West Creek that provide suitable habitat for Russian River tule perch.

Pacific Salmon and Trout: Coho Salmon, Steelhead and Chinook Salmon: The proposed project would permanently affect up to *0.0065* ha (*0.0016* ac) of aquatic habitat at Mark West Creek, *Pruitt, and Pool Creeks* that provide suitable habitat for Coho salmon, steelhead, and Chinook salmon. The proposed roadway improvements could impact these sensitive species by direct take; destruction of reproduction or seasonal habitat; increased run-off of sediments that could degrade bottom habitat and water quality; and construction of barriers to fish movement. *The proposed project may affect and is likely to adversely affect listed fish species.*

A Biological Assessment for coho salmon, steelhead and chinook salmon was submitted to NOAA Fisheries in August 2007 to initiate formal consultation pursuant to Section 7 of the Federal Endangered Species Act (FESA). In October 2007, NOAA Fisheries returned its No-jeopardy Biological Opinion incorporating project conditions and measures to minimize harm to federally-listed fish species.

The California Department of Fish and Game (CDFG) was provided the NES and BA to determine if the NOAA Fisheries Biological Opinion and conditions and measures to minimize harm to the species are consistent with the California Fish and Game Code and whether any additional measures are

required to prevent harm to the Russian River tule perch. To date, no comments from CDFG have been received.

California Tiger Salamander: The project has been designed to avoid impacts to natural areas insofar as feasible, and avoidance measures would be implemented during construction. The project *may* affect but *is not likely to* adversely affect the CTS.

Formal consultation with the USFWS *under Section 7 of FESA was initiated on October 26, 2004 regarding impacts of the proposed project on CTS. Consultation in accordance with the Santa Rosa Plain Conservation Strategy was completed in 2006.* The USFWS *reviewed* the NES/BA and returned its No-jeopardy Biological Opinion identifying project conditions and measures to minimize harm to the species. The USFWS *N*o-jeopardy Biological Opinion *was issued on October 18, 2006; a copy is provided in Appendix E, Agency Correspondence. Receipt of the Biological Opinion completes consultation requirements regarding CTS.* The CDFG *was provided* the NES/BA *to* determine if the USFWS biological opinion and conditions and measures to minimize harm to the species are consistent with the California Fish and Game code. *To date, no comments from* CDFG *have been received.*

Northern Red-legged Frog: The proposed project would permanently affect *0.0034* ha (*0.0084* ac) of aquatic habitat at Mark West Creek that provides suitable habitat for northern red-legged frog. This is the same area that special-status fish species, described above, could inhabit.

Foothill Yellow-legged Frog: Due to the absence of foothill yellow-legged frogs from the project corridor, no impacts are expected.

Western and Northwestern Pond Turtle: The proposed project would permanently affect up to *0.0047* ha (*0.0116* ac) of aquatic habitat at Mark West *and Piner Creeks* that provide suitable habitat *for* western and northwestern pond turtle.

Western Yellow-billed Cuckoo: Although riparian habitat in the project area is suitable for the cuckoo, there are no known occurrences of this species anywhere near the project area. The species was not observed during wildlife surveys and it is highly unlikely to be present in the project area; therefore, no impacts are expected.

White-tailed Kite, Loggerhead Shrike, and Other Migratory Birds: The CNDDB identifies no occurrences of white-tailed kite within two miles of the project area and no white-tailed kites were seen during field surveys; however, suitable nesting habitat exists in the riparian forest in the project vicinity. Loggerhead shrikes and other migratory birds are adaptable to urban environments and may occur anywhere along the project corridor as long as preferred habitat characteristics and abundant prey supplies are present. Project construction and the conversion of previously undeveloped areas would cause the loss of potential habitat for white-tailed kite and loggerhead shrike as well as more common migratory birds that are protected by the Migratory Bird Treaty Act (MBTA). There is abundant alternative foraging and nesting habitat in the general area. Preconstruction mitigation measures will be implemented as described in Section 3.15.3 to ensure no take of individual nests, eggs, or young of the species.

3.15.3.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following avoidance, minimization, and mitigation measures *will* address the special-status species impacts identified in the foregoing section.

Special-status Plant Species

Compensation for the loss of listed plants for this project, based on the 2003 surveys, and the 2006 Biological Opinion is 4.38 ha (10.83 ac). Given the negative findings of the 2006 and 2007 surveys, this compensation may be reduced pending further consultation with USFWS. To ensure no take of such plant species, additional plant surveys are also recommended prior to construction during the bloom period for each of the plant species.

Special-Status Wildlife Species

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding impacts to natural habitats in the project area that provide habitat for special-status wildlife species. Potential for presence and impacts to special-status wildlife species is limited primarily to four fish species, three amphibian species, and two reptile species. Construction phase avoidance, minimization and/or mitigation measures are described in Section 3.16.13.2 for special-status wildlife species that may enter project drainage.

Russian River Tule Perch and Pacific Salmon and Trout: Coho Salmon, Steelhead, and Chinook Salmon: *Measures as specified in the October 19, 2007 NOAA Fisheries Biological Opinion will be incorporated in the project to ensure that threatened and endangered fishes, their habitat (including critical habitat) and designated Essential Fish Habitat (EFH) in project area streams are not likely to be adversely affected. Project design will be consistent with the California Salmonid Stream Habitat Restoration Manual (CDFG 2003), which provides measures to ensure fish passage and to enhance or restore riparian habitat; the Recovery Strategy for Coho Salmon (CDFG 2004); Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001); and with the NMFS Southwest Region's Habitat Protection Policy (NMFS 1991).*

Riparian habitat will be restored *at no less than a 1:1 ratio in accordance with the USACE and CDFG permits (see Section S.7, Agency Permits and Approvals Required) to be obtained during the final design phase of the project.*

Northern Red-legged Frog, Foothill Yellow-legged Frog, Western and Northwestern Pond Turtle: Preconstruction surveys for these species, as described in Section 3.16.13, will be conducted at Mark West Creek. In the unlikely event that individual northern red-legged frogs, foothill yellow-legged frogs, western or northwestern pond turtles are encountered, they would be moved immediately to a pre-approved relocation site that is a minimum of 100 m (330 ft) downstream from the construction area boundary.

California Tiger Salamander: *Consultation with USFWS to determine appropriate compensation measures for impacts to California Tiger Salamander (CTS) areas was completed in October 2006.*

Caltrans/SCTA will compensate for the loss of 6.36 ha (15.72 ac) of CTS habitat with the acquisition and preservation in perpetuity of 1.27 ha (3.14 ac) of habitat for CTS. Compensation will be achieved by the purchase of credits in a conservation bank approved by USFWS to sell CTS credits in Sonoma County, consistent with the methodology described in the Santa Rosa Plain Conservation Strategy. The site used for conservation must meet or exceed the minimum performance standards/suitability requirements set forth in the Biological Opinion issued on October 18. 2006; see Appendix E, Agency Correspondence.

Payments for the mitigation credits shall be made prior to groundbreaking. USFWS will be provided with the appropriate documents indicating that credits have been purchased, specifically including the amount of credits purchased based on the actual area affected by the proposed project.

3.15.4 Trees and Other Mature Vegetation

3.15.4.1 REGULATORY SETTING

California State Senate Concurrent Resolution No. 17

California State Senate Concurrent Resolution No. 17 was filed with the Secretary of State on September 1, 1989. This resolution addresses the protection of native Valley/Coast live oak woodlands with respect to land use/transportation planning projects. The resolution specifically calls for State agencies to "preserve and protect native oak woodlands to the maximum extent feasible," or "provide for replacement plantings where designated oak species are removed from oak woodlands."

California State Senate Bill 1334

California State Senate Bill 1334 was filed with the Secretary of State on September 24, 2004. The bill outlines oak woodland mitigation options for counties to achieve feasible and proportional habitat mitigation under CEQA. If a county determines that a project within its jurisdiction may result in a significant effect to oak woodlands, the county shall require one or more mitigation alternatives as outlined in the bill to mitigate the effect of the conversion of oak woodlands.

Sonoma County Tree Protection Ordinances

The following Sonoma County ordinances apply to trees in County jurisdiction:

- The Sonoma County Tree Protection Ordinance No. 4044 establishes general provisions and construction standards to ensure that projects shall be designed to minimize the destruction of protected trees. Protected trees (greater than nine inches), their protected perimeters and whether they are to be retained or removed are to be clearly shown on all improvement plans. Applicants are required to comply with the conditions established in the Ordinance and are encouraged to use a qualified specialist to establish tree protection methods. The Ordinance also states that the Valley Oak (*Quercus lobata*) shall receive special consideration in the design review process to the extent that mature specimens shall be retained to the fullest extent feasible.
- The Sonoma County Valley Oak Ordinance No. 4991 defines Valley Oak sizes and mitigation options for removal of valley oaks. A written notice must be filed at least five days prior to removal.

- The Sonoma County Heritage Tree Ordinance No. 3651 provides for the identification and protection of designated heritage trees. The Ordinance requires approval and mitigation for removal of designated heritage trees.

3.15.4.2 AFFECTED ENVIRONMENT

Trees and other mature vegetation are located along the edge of Highway 101 at various locations throughout the project corridor. Mature trees in the corridor consist primarily of redwoods, with some Monterey Pines, eucalyptus, and oak trees. Consistent with the regulatory setting above, this section focuses on oak trees in the project vicinity. Existing redwood trees along Highway 101 are considered aesthetic resources because they were planted when the highway was originally constructed and are outside of their biological range, do not provide habitat, and do not support redwood populations, yet offer scenic amenity to the highway corridor. Therefore, redwood trees and other ornamental vegetation along the project corridor are discussed in Section 3.6, Visual/Aesthetics.

Existing trees within the project limits are grouped into two classifications:

- Mature trees, which have trunks greater than 25 cm (10 in) in diameter at breast height; and
- Trees/vegetation of relatively small size, which have trunks from 2.5 cm to 25 cm (one to 10 in) in diameter at breast height.

3.15.4.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in construction that would affect trees in the Highway 101 corridor. The proposed project would require removal of *up to* 77 *v*alley oaks; 26 of these trees are classified as mature. *Between 25 and 67 c*oast live oaks would be removed by the proposed project; *between* 11 *and 30* of these trees are classified as mature.

3.15.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The project has been designed to use existing right of way to the greatest extent feasible in order to reduce impacts to mature trees in the project area. The majority of the widening occurs in the median of the roadway. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right of way and impacts to mature trees. Mature oak trees would be replaced *where feasible* within the project *limits and* right of way *at a ratio of 1:1*. Caltrans and their contractors would comply with Federal, State and Sonoma County quarantine regulations related to Sudden Oak Death (SOD) and the disposal and transport of vegetation debris. Caltrans would comply with the conditions established in the Sonoma County Tree Protection Ordinance prior to removal of any trees outside of the State right of way and within County jurisdiction. *Avoidance and minimization approaches as identified in Section 3.6.5 will be incorporated during final design to reduce tree loss below the upper end of the reported ranges.*

3.15.5 Invasive Species

3.15.5.1 REGULATORY SETTING

On February 3, 1999, President Clinton signed Executive Order 13112, which directs the agencies of the executive branch of the federal government to work to prevent and control the introduction and spread of invasive species. Species that are likely to harm the environment, human health, or the economy are of particular concern. The executive order builds on the National Environmental Policy Act (NEPA) of 1969, the Federal Noxious Weed Act of 1974, and the Endangered Species Act of 1973 to prevent the introduction of invasive species; provide for their control; and take measures to minimize economic, ecological, and human health effects.

Invasive species, with respect to a particular ecosystem, are defined as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to the ecosystem and is likely to cause economic or environmental harm or harm to human health.

Under the executive order, a federal agency cannot authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless all reasonable measures to minimize risk of harm have been analyzed and considered. Complying with the executive order means that federal-aid and Federal Lands Highway Program funds cannot be used for construction, revegetation, or landscaping that purposely includes the use of known invasive plant species.

The executive order established a National Invasive Species Council, and until an approved national list of invasive plants is defined by the council, "known invasive plants" are defined as those listed on the official noxious weed list of the state in which the activity occurs.

The following discussion complies with Executive Order 13112.

3.15.5.2 AFFECTED ENVIRONMENT

Highway 101 between Steele Lane and Windsor River Road consists of a four-lane freeway. Adjacent land use is primarily rural and agricultural, with sing1e- and multi-family residential, commercial and industrial uses near the city centers. Vegetation is mostly ruderal/disturbed, ornamental landscape planted with coast redwood *(Sequoia sempervirens),* and agricultural planted with grapes *(Vitis vinifera);* there are few remaining natural areas. A variety of waterways traverse the corridor, some in excavated ditches or culverts and others in natural bottom channels or their natural watercourse. Soils in the project corridor are varied and consist of strongly cemented old valley floor alluvial soils, or clayey alluvial soils derived from mixed sedimentary, volcanic ash, or basic rock sources.

3.15.5.3 ENVIRONMENTAL CONSEQUENCES

The Highway 101 corridor provides opportunities for the movement of invasive species through the landscape. Invasive plant and animal species can move on vehicles and in the loads they carry. Weed seed can be inadvertently introduced into the corridor during construction on equipment and through the use of mulch, imported soil or gravel, or sod. Some invasive plant species might be

deliberately or inadvertently planted in erosion control, landscape, or wildflower projects. The Highway 101 corridor is adjacent to a variety of private lands. Many of these adjacent lands have weed problems, and the highway and local roadway rights of way provide corridors along which these noxious and exotic weeds can spread. Implementation of avoidance and minimization efforts, as described below, would ensure that the proposed project would not contribute to the spread of invasive species.

3.15.5.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

To prevent or minimize any introduction or spread of invasive species in the project area, the following methods will be incorporated into the construction specifications:

- Using high pressure water blasting or steam cleaning methods, clean all earthmoving equipment of dirt, mud, and seed residue before initially entering the project area.
- Avoid any unnecessary disturbance of project areas known to be infested with noxious weeds.
- Minimize soil disturbance within right of way.
- If soil disturbance outside slope stake limits is necessary, keep disturbed area to a minimum, monitor and control disturbed areas and topsoil stockpiles for growth of weed species subject to control, and re-vegetate in accordance with the landscape plans or other project specifications when disturbance is no longer necessary.
- Control weeds with pre-emergent, selective and nonselective herbicides. Inspect and monitor erosion control and other disturbed soils throughout construction. Inspect and monitor landscaping/seeding during the vegetation re-establishment period.
- Include payment for equipment cleaning under bid item for mobilization.
- Construction contractor shall comply with federal, State and Sonoma County quarantine regulations related to SOD and the disposal and transport of vegetation debris.

To prevent or minimize any introduction or spread of invasive animal species in the project area, the construction specifications will require that the contractor adopt sanitation and exclusion methods for preventing spread of invasive species, such as the following:

- Restrict use of contaminated soils and fills,
- Require pest-free forage and mulch and weed-free sod,
- Wash construction equipment.

3.16 Construction Impacts

3.16.1 Construction Stages, Schedule, and Work Hours

To minimize disruption to the traveling public, it is anticipated that the Highway 101 HOV Lane Widening Project would be constructed in stages. The following paragraphs present a feasible and reasonable method of construction staging for the purposes of identifying and evaluating construction impacts. Specific construction staging requirements would be defined during the final design process

and an actual construction staging plan would be developed by the contractor. It is anticipated that construction of this project would take approximately two years to complete. The construction contract would be followed by a replacement planting contract that would require approximately six months to complete and would include a three-year plant establishment period.

Each construction stage would maintain two lanes of traffic on Highway 101 in each direction and all existing bicycle and pedestrian access would be maintained throughout the construction period, except during critical short-term construction activities requiring closure to perform construction or for safety reasons.

Lane closures for this project would be made during non-peak travel periods. Closures would require advance approval by the Resident Engineer and would be allowed only during periods of low traffic defined through traffic studies made during the design phase in support of the construction project.

Most of the work could be done during daylight hours, but some nighttime work would be necessary to permit temporary closures for tasks that could interfere with mainline traffic or create safety hazards. Examples of these tasks include placing and removing temporary construction barriers, placing pre-cast bridge segments, or connecting or conforming ramps to the mainline or local streets.

A Transportation Management Plan (TMP) would be developed, in conjunction with the local jurisdictions. The TMP would provide advance notice to motorists and transportation and emergency service providers of information on construction activities and durations, detours, and access issues during each stage of construction. The TMP would identify services to facilitate the safe implementation of the construction project such as increased California Highway Patrol presence during critical construction operations and increased Freeway Service Patrol during peak travel periods. It would also include a public information program to provide motorists with advance notice of information related to the construction activities and durations, temporary closures and detours.

Temporary nighttime lane closures and/or detours would be required for activities such as placing and removing temporary concrete barriers to separate construction work areas and traffic. Some short-term closures (closures of a few hours to a few days) of existing interchange ramps may be necessary during some construction activities such as constructing conforms between existing and new roadways, paving operations, and lane striping. Advance notice would be provided of ramp closures, and traffic would be detoured to the adjacent interchanges for these periods. To maintain traffic on Highway 101 and local streets, construction activities requiring traffic lane or ramp closures would not be permitted at adjacent interchanges of Highway 101 at the same time.

In general, the construction staging for the mainline widening would require four stages. Stage 1 would construct the new southbound roadway and structures in the median. Once the median area roadway and structures are complete, Stage 2 would begin with shifting the southbound traffic to the newly constructed roadway in the median, and construction of the southbound outside lanes and shoulders would be performed. Stage 3 would shift southbound traffic to the newly completed southbound roadway, northbound traffic would be shifted to the median, and construction of the remaining northbound mainline outside lane and shoulder work would begin. Stage 4 would shift

northbound traffic to its permanent location and construct remaining smaller elements of work such as the concrete median barrier.

Retaining walls would be constructed with the associated widening work in each stage and soundwalls would be constructed as early in each stage as practicable to help mitigate construction noise.

The Airport/Fulton Interchange Complex modifications would require the most complex staging on the project due to the combination of ramp reconfiguration and grade changes. However, the new ramp structure work can be completed without the need for detours during construction, and the proximity of alternative ramps will result in only minor out-of-direction travel through the Airport/Fulton intersection when ramp closure and detouring is necessary.

3.16.2 Traffic and Transportation/Pedestrian and Bicycle Facilities

3.16.2.1 Environmental Consequences

The following subsection discusses anticipated construction phase effects on traffic, pedestrian, and bicycle access. Section 3.16.1, Construction Stages, Schedule and Work Hours, discusses the conditions that might affect access during construction.

During the construction phase of the project, traffic in the vicinity of the Highway 101 interchanges or along the Highway 101 mainline in the project area could be disrupted by construction equipment and vehicles. Traffic on Highway 101 may also be affected by trucks hauling construction materials and debris. Each construction stage would maintain two lanes of traffic on Highway 101 in each direction and bicycle and pedestrian access would be maintained throughout the construction period, except during critical short-term construction operations requiring closure to perform construction or for safety reasons. Most work on the freeway would be performed in work areas separated from the moving traffic by temporary concrete barriers.

Some minor detours would be required on the ramps and connecting streets during such short-term closures. During construction of conforms of the ramps to the mainline, which would occur at night, traffic would be detoured to the adjacent interchanges. Most of the work could be done during daylight hours, but some nighttime work would be required to permit temporary closures for tasks that could interfere with mainline traffic or create safety hazards. Examples of these tasks include placing and removing temporary construction barriers, placing pre-cast bridge segments, or connecting or conforming ramps to the mainline or local streets.

Construction activities for the project are not expected to have substantial impact on the availability of parking. Impacts to non-motorized traffic would be similar to those affecting motorized traffic. Bicycles and pedestrians are prohibited on the Highway 101 right-of-way, but all detours of roadways that permit these modes of travel would include provisions for maintaining pedestrian and bicycle access during construction. Ramps meeting ADA requirements would be installed in sidewalks at all crosswalks affected by the project.

3.16.2.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Construction staging plans would be developed to minimize impacts to existing roadways. Contractors would be required to coordinate activities with commute schedules to minimize impacts to highway traffic in the corridor. Closure of one or more lanes for construction activities will be limited to late night and weekend hours when traffic is at a minimum.

The project TMP would include a public information program to provide motorists and transportation and emergency service providers with information related to construction activities and durations, temporary closures and detours. The SCTA would coordinate with Caltrans and the local jurisdictions to provide the public with advance notice of any proposed traffic detours and their duration.

Construction crews would follow established safety practices, including using flaggers, to protect work crews in the construction zone not working behind a temporary concrete barrier. Provisions would be incorporated into the construction contracts to designate areas for construction worker parking and to avoid parking impacts to residential or business areas.

Construction haul routes would utilize Highway 101 during non-peak hours to the greatest extent practicable to avoid traffic impacts to residential or business areas.

3.16.3 Farmlands/Agricultural Lands

It is not anticipated that construction activities would disturb agricultural land, crops or soils. Permanent effects on agricultural land in the project area are described in Section 3.3, *Farmlands/Agricultural Lands.*

3.16.4 Community Impacts

Construction of the Highway 101 HOV Lane Widening Project would involve temporary short-term lane closures or detours in the vicinity of the project. These are expected to have little or no effect on the ability of community members to access public services and facilities in the area. The primary effect would be the need for emergency vehicles to observe any short-term road closures and temporary construction detours. A Traffic Management Plan (TMP) would be developed by the construction contractor to address maintenance of traffic and emergency services delivery during construction. One element of the TMP would be to provide advance notice of and coordinate with emergency service providers regarding such short-term closures and detours. Construction-phase detours and road closures and the TMP were described in Section 3.16.2, Transportation and Traffic/ Pedestrian and Bicycle Facilities.

Temporary construction easements would be required during construction of noise walls between Shiloh Road and Old Redwood Highway, temporarily affecting residential properties along the east side of Highway 101. No substantial adverse effects are anticipated, and therefore no mitigation is necessary beyond best management practices. As described in Section 3.16.6, Visual/Aesthetics, the construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. Dust control during

construction is discussed in Section 3.16.11, Air Quality. Noise control measures relating to the construction of the proposed project are discussed in Section 3.16.12, Noise.

3.16.5 Utilities/Service Systems

It is anticipated that utility relocation work would be performed in advance of the Highway 101 HOV lane widening work. However, some utilities may require protection in place during construction of the roadway improvements. Caltrans would coordinate with all utility providers during the preliminary engineering and design phases of the project so that effective design treatments and construction procedures are incorporated to avoid adverse impacts to existing utilities and traffic during construction. Nonetheless, the potential exists for construction activities to encounter unexpected utilities within the area of roadway improvements. In addition, utility relocations may require short-term, limited interruptions of service. No interference to existing utility services is anticipated during the realignment of the overhead power transmission lines because PG&E would put customer loads on alternate lines until the connections are re-established.

If unexpected underground utilities are encountered, the construction contractor would coordinate with the utility provider to develop plans to address the utility conflict, protect the utility if needed, and limit service interruptions. Any short-term, limited service interruptions of known utilities would be scheduled well in advance and appropriate notification provided to users.

Caltrans would also coordinate with emergency service providers, and through the public information program, to avoid emergency service delays by ensuring that all providers are aware well in advance of road closures or detours.

3.16.6 Visual/Aesthetics

All construction activities for the project would involve the use of a variety of construction equipment, stockpiling of soils and materials, and other visual signs of construction. While construction activity would be evident to corridor residents and employees/employers at businesses in the project area, these visual changes would be short-term. The construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. No substantial adverse impacts are anticipated, and therefore, no mitigation is necessary beyond best management practices, as described above. Dust control during construction is discussed in Section 3.16.11, Air Quality.

3.16.7 Cultural Resources

3.16.7.1 ARCHAEOLOGICAL IMPACTS

As described in Section 3.7, Cultural Resources, a systematic and thorough program of subsurface investigation has been conducted in addition to secondary research to identify buried cultural resources. As a result of these efforts, it is not anticipated that construction activities would disturb buried cultural materials. In the unlikely event that buried cultural resources are inadvertently discovered during any ground-disturbing activities, Caltrans and FHWA would comply with 36 CFR

800.13 *(b)(3) and if applicable, (c), as stipulated in the 2004 Programmatic Agreement for Federal-aid Highway Programs in California* regarding *post-review* discoveries.

3.16.7.2 HISTORIC ARCHITECTURAL IMPACTS

No construction-phase adverse impacts to historic architectural resources are anticipated. There are no eligible historic resources in the project vicinity that could be affected by construction activities.

3.16.8 Hydrology and Floodplains

3.16.8.1 IMPACTS

The Highway 101 HOV Lane Widening Project would involve construction over seven water bodies: East Windsor Creek; Pool Creek; Faught Creek; Pruitt Creek; Mark West Creek; and the north and middle branches of the Santa Rosa Flood Channel. Construction associated with waterway crossings could cause temporary changes in water volume or flow and increased siltation, sedimentation, erosion, and water turbidity from bankside activities and construction access.

3.16.8.2 MITIGATION

A Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented, in accordance with Section 402 of the federal Clean Water Act, as amended. One purpose of the SWPPP is to identify areas of concern related to construction within or close to major waterways. As part of the requirements for the SWPPP, best management practices (BMPs) would be identified to be used during construction to minimize the effect of construction activities on waterways. Recommended construction-period BMPs include:

1. Scheduling construction during the non-rainy season.
2. Monitoring the forecast for rainfall; adjusting the construction schedule to allow implementation of soil stabilization and sediment treatment controls before the onset of rain.
3. Minimizing disturbance of stream crossings by selecting the narrowest crossing, avoiding steep and unstable banks or highly erodible soils, selecting equipment that reduces the amount of pressure exerted on the ground (e.g. using wide or high flotation tires, dual tires, tracked machines, etc), and using overhead or aerial access for transporting equipment across streams whenever possible.
4. Limiting temporary stream crossings to culverts or bridges if the stream crossing remains during the rainy season.
5. Continuously monitoring pumps and incorporating a standby pump for pumped diversion of in-stream flows. Employing velocity dissipation at the outlet as necessary to control erosion.
6. Sizing diversion channels and/or culverts to accommodate a minimum 10-year storm event if placed within the channel during the rainy season.
7. Isolating work areas within the waterway from the flow using sheet piling, k-rails, rip rap berms, or other methods of isolation.
8. Keeping equipment used in a waterway leak-free.

9. Stabilizing waterway embankments where necessary using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, etc.
10. Protecting all drainage systems (culvert entrances, inlets, etc) from debris and sediment laden waters.
11. Washing the fines (using water from a water truck or hydrant) back into the interstitial spaces of the existing gravel and cobbles if in-channel disturbance of fines (sand and silt sized particles) occurs.

3.16.9 Water Quality and Stormwater Run-off

3.16.9.1 IMPACTS

The Highway 101 HOV Lane Widening Project would involve construction over seven water bodies: East Windsor Creek; Pool Creek; Faught Creek; Pruitt Creek; Mark West Creek; and the north and middle branches of the Santa Rosa Flood Channel. Construction would involve cut and fill earthwork, asphalt paving, lengthening of culverts, bridge construction, retaining wall construction, site clearing, and landscaping. Each of these construction activities could have deleterious effects on the surrounding watershed and streams if stormwater and non-stormwater pollution controls were not in place during the time of construction. Another construction-phase impact would be the discharge of construction-related pollutants, including pollutants from stormwater and non-stormwater discharges.

3.16.9.2 MITIGATION

The contractor would prepare a SWPPP to identify construction-*site* BMPs to reduce water quality impacts. The SWPPP would emphasize: 1) standard temporary erosion control measures to reduce sedimentation and turbidity of surface run-off from disturbed areas, 2) personnel training, 3) scheduling and implementation of BMPs throughout the various construction phases and during various seasons, 4) identification of BMPs for non-stormwater discharge such as fuel spills, and 5) mitigation and monitoring throughout the construction period. The plan would be submitted to Caltrans and the Regional Water Quality Control Board.

During construction, erosion control procedures would be used such as the placement of mulch on all disturbed areas, fiber rolls along slopes, silt fences at the boundaries of the construction site, stabilized construction entrances and exits equipped with tire washing capability, and check dams placed strategically to reduce flow velocity and to filter flows in defined drainage-ways.

Construction over and adjacent to waterways would include special construction BMPs to minimize the debris deposition into those waterways, as follows:

- Demolition and construction over and adjacent to waterways would be accomplished using non-shattering methods that would not scatter debris (for example, wrecking balls would not be acceptable).
- Platforms would be placed under/adjacent to bridges over waterways to collect debris.

- Watertight curbs or toe-boards on bridges over waterways would be provided to contain spills and prevent materials, tools, and debris from falling from the bridge.
- Materials adjacent to waterways would be secured to prevent discharges via wind.
- Attachments would be placed on construction equipment such as backhoes to catch debris from small demolition operations.
- Accumulated debris and waste from demolition would be stockpiled away from the waterway.
- Work areas within the waterway would be isolated from the flow using sheet piling, k-rails, rip rap berms, or other methods.
- Drip pans would be used during equipment operation, maintenance, cleaning, fueling and storage for spill prevention. Drip pans would be placed under all vehicles and equipment placed on bridges when expected to be idle for more than 1 hour.
- Equipment would be kept in a leak-free waterway.
- Waterway embankments would be stabilized, using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, and other stabilization methods, as necessary.
- All drainage systems (such as culvert entrances and inlets) would be protected from debris and sediment laden waters.
- Logs of all storm and spill events would be kept.

Groundwater may be encountered during excavation work for the cross culvert extensions. Early discussions with permitting agencies such as the County and the Regional Water Quality Control Board would be initiated during the final design phase to discuss requirements for handling and disposal of groundwater water during construction. The groundwater would be tested for potential contamination as a part of the Hazardous Waste Site Investigation to be conducted during the final design phase. Handling and disposal requirements of the groundwater would be based upon the level of contaminants reported in the Site Investigation Report.

3.16.10 Hazardous Wastes/Materials

3.16.10.1 IMPACTS

Two principal types of hazardous wastes or materials may cause impacts during construction: (1) hazardous materials used during the construction process, and (2) hazardous wastes that are generated during construction. Construction phase impact may be caused by hazardous material used for construction and hazardous wastes that are generated during the construction process. Section 3.11, Hazardous Waste/Materials, discusses the potential for encountering pre-existing hazardous wastes within the project area and identifies appropriate mitigation measures.

Some hazardous materials, including fuels and motor oils, paints, cleaners, degreasers, and insulating materials, would be used during construction. While many of these materials are commonly used, they are considered hazardous materials (fuels, for example, are flammable) based on their physical properties, and improper handling could endanger workers and the public or result in contamination of soil and/or water.

The degree of hazard associated with these impacts on human or environmental receptors would depend upon the chemical properties, concentrations, or volumes of contaminants; the nature and duration of construction activities; and contaminant migration pathways. The largest potential exposure risk is to the construction workers.

3.16.10.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

An approved Worker Health and Safety Plan (WH&SP) would address any hazardous materials handling during construction activities pursuant to Title 8 of the California Code of Regulations regarding workers' safety and the use of protective equipment during excavation, moving, or handling or contaminated soil or water. The WH&SP would establish measures to avoid or minimize potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan also would address avoidance and minimization of worker and environmental exposure to contaminant migration via surface water run-off pathways by implementation of comprehensive measures to control drainage from excavations. In addition, the WH&SP would address handling, storage, and disposal of any hazardous materials used in the construction process. Since construction workers are in the closest proximity to potential hazards, a plan that avoids impacts to construction workers would provide adequate protection for surrounding residents, workers, and the traveling public.

3.16.11 Air Quality

3.16.11.1 IMPACTS

The BAAQMD's approach to the analysis of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. PM_{10}, which is primarily emitted from earthmoving activities, is the pollutant of greatest concern with respect to construction activities. Under appropriate construction controls, *air* pollutant emissions *from* construction activities *would be minimized*.

Construction of the Build Alternative would consist of six *distinct activities* over approximately two years, from 2009 to 2011: 1) clearing and grubbing; 2) earthwork; 3) construction of structures; 4) construction of retaining walls and sound walls; 5) paving; and 6) finishing. Pollutant emissions would be generated from the following construction activities:

1. Clearing and grubbing,
2. Grading and excavation,
3. Mobile emissions related to construction worker travel to and from project sites,
4. Mobile emissions related to the delivery and hauling of construction supplies and debris to and from project sites, and
5. Fuel combustion by on-site construction equipment.

The South Coast Air Quality Management District's (SCAQMD) construction emissions calculation formulas were used to estimate construction emissions. Table 3.16.11-1, Construction Emissions, shows the estimated emissions associated with each phase of construction for the five criteria

pollutants. *Reactive organic gases (ROG) are organic chemical compounds that have high enough vapor pressures under normal conditions to vaporize and enter the atmosphere.*

Table 3.16.11-1: Construction Emissions

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
1. Clearing & Grubbing	25	7	84	14	64
2. Earthwork	30	8	97	16	68
3. Structures	45	10	130	23	53
4. Retaining Walls & Soundwalls	36	9	106	19	52
5. Paving	32	8	103	17	71
6. Finishing	18	5	67	11	18

Source: Terry A. Hayes Associates LLC, 2005.

3.16.11.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Caltrans will develop a Construction Emissions Mitigation Plan that would include measures such as the following:

- All active construction areas shall be watered at least twice daily.
- All trucks hauling soil, sand, and other loose materials shall be covered and shall maintain at least two feet of freeboard.
- All unpaved access roads, parking areas, and staging areas at the construction site shall be watered at least three times daily or shall be applied with non-toxic soil stabilizers.
- All paved access roads, parking areas, and staging areas at the construction site shall be swept daily with water sweepers.
- Streets shall be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas that are inactive for ten days or more).
- Exposed stockpiles of dirt, sand, or debris shall be enclosed, covered, watered at least twice daily, or applied with non-toxic soil binders.
- Traffic speeds on unpaved roads shall be limited to 15 miles per hour.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways.
- Operations on any unpaved surfaces shall be suspended during "Spare the Air" days.
- Vegetation in disturbed areas shall be replanted as quickly as possible.
- Tires or tracks of all trucks and equipment leaving the site shall be washed.
- Excavation and grading activities shall be suspended when winds exceed 25 miles per hour.
- Construction equipment shall use cool exhaust recirculation.

Table 3.16.11-2 shows estimated construction emissions with mitigation applied.

Table 3.16.11-2: Construction Emissions With Mitigation

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
Clearing & Grubbing	3	1	51	14	30
Earthwork	4	1	58	16	32
Structures	5	1	78	23	24
Retaining Walls & Soundwalls	4	1	63	19	24
Paving	4	1	62	17	34
Finishing	3	1	40	11	8

Source: Terry A. Hayes Associates LLC, 2005.

3.16.12 Noise

Noise at the construction sites would be intermittent and would vary in intensity at different areas of the project site. The degree of construction noise would vary also with types of construction activities.

3.16.12.1 Regulatory Setting

During the construction period, contractors would be required to comply with the noise ordinances of the cities of Windsor and Santa Rosa:

Town of Windsor – Windsor limits construction activities to the hours between 7:00 *a.m.* and 7:00 *p.m.*, Monday through Friday, and 8:00 *a.m.* to 7:00 *p.m.* on Saturdays. Construction is not permitted on Sundays unless authorized by the Planning Commission or Town Council (Windsor, 2004).

City of Santa Rosa – The city does not have any specific regulations that limit construction activities to certain hours of the day. However, the noise ordinance of the municipal code limits the noise level of machinery and equipment to within five decibels above the background ambient noise level when averaged over a 15-minute period. If the ambient noise levels are lower than the base ambient levels listed in Table 3.16.12-1, then the base levels in the table shall be used as the ambient level (Santa Rosa, 2004).

Table 3.16.12-*1*: Base Ambient Noise Levels for the City of Santa Rosa

Community Zone	Time	Base Ambient Level, dBA
Single-family residential	7 a.m. – 7 p.m. 7 p.m. – 10 p.m. 10 p.m. – 7 a.m.	55 50 45
Multi-family residential	7 a.m. – 10 p.m. 10 p.m. – 7 a.m.	55 50
Office and Commercial	7 a.m. – 10 p.m. 10 p.m. – 7 a.m.	60 55
Intensive Commercial	7 a.m. – 10 p.m. 10 p.m. – 7 a.m.	65 55
Industrial	Anytime	70

Source: City of Santa Rosa, 2004.

3.16.12.2 IMPACTS

Long-duration construction noise exposures are difficult to quantify due to the intermittent nature of construction noise. Highway construction is accomplished in several different phases, during which some receptors near the highway may be exposed to high noise levels. Table 3.16.12-2 lists the calculated noise level for typical construction activities that could be expected in the project area.

3.16.12.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following control measures would be implemented to minimize noise disturbances at sensitive receptors during construction:

Equipment Noise Control

- Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators intact and operational. All construction equipment would be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.) (Caltrans, 1999).
- Ensure that all idling equipment is turned off.

Administrative Measures

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times of least sensitivity for receptors.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to unavoidable construction noise. Provide frequent activity updates of all construction activities.

Application of the mitigation measures will reduce construction noise at the sensitive receptors; although, a temporary increase in noise would likely occur.

Table 3.16.12-2: Construction Operation Noise Levels

No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA [1]	Houry Equivalent Noise Levels at 30 m, dBA [1]
Clear and Grub				
1	Excavator	83	80	74
1	Backhoe	75	72	66
4	Heavy Duty Dump Trucks	73	70	64
	Overall $L_{eq}(h)$		82	76
Bridge Demolition				
1	Front Loader	76	73	67
1	Hoe Ram	89	86	80
4	Heavy Duty Dump Trucks	73	70	64
	Overall $L_{eq}(h)$		87	81
Retaining Walls				
1	Backhoe	75	72	66
1	Bormag BMP 851	80	77	71
1	Conrete Pump	74	71	65
1	Compressor	68	65	59
3	Ready Mix Trucks	72	69	63
4	Medium Duty Dump Trucks	77	74	68
2	Flatbed Truck	70	67	61
	Overall $L_{eq}(h)$		84	78
Paving				
1	Grader	75	72	66
1	Water Truck	77	74	68
1	Vibratory Roller	78	75	69
1	Compactor	76	73	67
1	Concrete Pump	74	71	65
3	Ready Mix Trucks	72	69	63
1	Asphalt Paver	79	76	70
1	Asphalt Roller	78	75	69
1	Sweeper	79	76	70
4	Medium Duty Dump Trucks	73	70	64
2	Flatbed Truck	70	67	61
	Overall $L_{eq}(h)$		85	79

No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA [1]	Houry Equivale Noise Leve 30 m, dB
Earthwork				
1	Excavator	83	80	74
1	Backhoe	75	72	66
1	Front Loader	76	73	67
1	Dozer	85	82	76
1	Trencher	80	77	71
4	Heavy Duty Dump Trucks	73	70	64
	Overall $L_{eq}(h)$		86	80
Structures				
1	Excavator	83	80	74
1	Backhoe	75	72	66
1	Bormag BMP 851	80	77	71
1	Crane	78	75	69
1	Concrete Pump	74	71	65
1	Compressor	68	65	59
1	Bridge Deck Paver	77	74	68
2	Flatbed Truck	75	72	66
1	Pile Driver	80	77	71
4	Medium Duty Dump Trucks	73	70	64
3	Ready Mix Trucks	81	78	72
	Overall $L_{eq}(h)$		88	82
Misc.				
1	Front Loader	76	73	67
1	Dozer	79	76	70
2	Medium Duty Dump Trucks	73	70	64
	Overall $L_{eq}(h)$		79	73

Notes: Calculated construction noise levels assume that all equipment operates for six hours out of an eight hour day. Calculations also assume that all equipment are operated at full load 70 % of the time.
1 - Predicted noise levels are from the center of the construction activity.
Source: Parsons 2005

3.16.13 Biological Resources

3.16.13.1 IMPACTS

This section focuses on the short-term, temporary impacts of constructing the Build Alternative *(Preferred Alternative)* on biological resources in the project vicinity. Permanent impacts and mitigation measures are addressed in Section 3.15, Biological Environment.

Natural Communities

Temporary effects on natural communities that would result from the Build Alternative *(Preferred Alternative)* are shown in Table 3.16.13-1. Impacts would vary with northbound or southbound options A or B at the Fulton Road/Airport Boulevard Interchange Complex. *Although Northbound Option B and Southbound Option A have been chosen as elements of the preferred alternative, i*mpacts for all four possible combinations are shown in the table.

Table 3.16.13-1: Temporary Impacts to Natural Communities for the Build Alternative (Preferred Alternative) (hectares/acres)

Affected Natural Communities	Total Area of Impact (Hectares/Acres)			
	Build Alternative (including Options at Fulton Road/ Airport Boulevard Interchange Complex) [1]			
	NB-A/SB-A	NB-A/SB-B	NB-B/SB-A *(preferred)*	NB-B/SB-B
Ruderal/Disturbed	13.0 ha/ 32.5 ac	13.0 ha/ 32.5 ac	13.0 ha/ 32.5 ac	13.0 ha/ 32.5 ac
Non-native Grassland	0.05 ha/ 0.13 ac	0.05 ha/ 0.13 ac	0.10 ha/ 0.25 ac	0.10 ha/ 0.25 ac
Seasonal/Freshwater Emergent Wetland/Open Water	*0.180 ha/ 0.443 ac*	*0.150 ha/ 0.367 ac*	*0.268 ha/ 0.661 ac*	*0.237 ha/ 0.585 ac*
Willow Riparian Scrub	0.08 ha/ 0.20 ac	0.08 ha/ 0.20 ac	0.06 ha/ 0.15 ac	0.08 ha/ 0.75 ac
Coyote Brush Scrub	0.006 ha/ 0.014 ac	0.006 ha/ 0.014 ac	0.006 ha/ 0.014 ac	0.0002 ha/ 0.014 ac
North Coast Black Cottonwood Riparian Forest	0.20 ha/ 0.50 ac	0.25 ha/ 0.63 ac	0.26 ha/ 0.65 ac	0.31 ha/ 0.78 ac

[1] NB – A = Northbound Option A; NB – B = Northbound Option B; SB – A = Southbound Option A; SB – B = Southbound Option B

Source: Parsons 2005

Wetlands and Other Waters of the United States

The project has the potential to temporarily affect *0.062* ha (*0.153* ac) of jurisdictional wetlands and *0.206* ha (*0.509* ac) of other waters of the U.S., or 0.*268* ha (0.*662* ac) total wetlands/waters. Impacts would vary with *N*orthbound or *S*outhbound *O*ptions A or B at the Fulton Road/Airport Boulevard Interchange Complex. *Although, Northbound Option B and Southbound Option A have been chosen as elements of the preferred alternative, i*mpacts for all four possible combinations are shown *in* Table 3.15-2 in Section 3.15.2, Wetlands and Other Waters of the U.S. Avoidance and minimization measures are proposed in Section 3.15.2.4.

Threatened and Endangered Species

As described in Section 3.15, Biological Environment, suitable habitat for four special-status fish species, coho salmon, steelhead, *and* chinook salmon occurs in the project area at Mark West, *Piner, Pruitt, and Pool* Creeks. *Approximately 0.83 ha (2.04 ac) of riparian habitat providing instream cover and food resources for salmonids will be temporarily impacted by direct and indirect effects from construction. In addition, suitable habitat for the Russian River tule perch occurs in the project area at Mark West, Pool, and Windsor creeks.* Avoidance and minimization measures, including best management practices, are proposed *in Section 3.16.13.2, Avoidance, Minimization, and/or Mitigation Measures [Biological Resources]* to avoid incidental take of individuals and minimize impacts to their habitat (See Section 3.16.13.2, below).

No evidence of foothill yellow-legged frog, northwestern pond turtle was observed in the project area; however, suitable habitat for these species occurs within Mark West Creek *in addition to Piner and Paulin creeks for the western pond turtle*, which could be affected during construction activities. Avoidance and minimization measures, including pre-construction surveys, are proposed to avoid incidental take of individuals and minimize impacts to the species' habitat. If project activities cannot avoid the bird breeding season, pre-construction surveys are proposed for white-tailed kite and loggerhead shrike, as well as other migratory bird species.

Areas with potential to contain California tiger salamander (CTS) occur along Highway 101 within the project limits. Avoidance and minimization measures, including pre-construction surveys, are proposed to avoid incidental take of CTS and minimize impacts to CTS habitat (see Section 3.16.13.2, Avoidance, Minimization, and/or Mitigation Measure [Biological Resources]).

No special-status plants were identified in the project vicinity during preliminary field studies *and protocol-level presence/absence surveys*. It is not anticipated that special-status plants would occur in the project vicinity at the time of construction. Pre-construction *surveys during the bloom period* are also recommended for these plant species to ensure that no harm to the species would occur during construction.

3.16.13.2 Avoidance, Minimization, and/or Mitigation Measures

Construction phase impacts would be avoided or minimized by using *methods outlined in the Biological Opinion and* Caltrans standard specifications, and BMPs that have been established for construction of State highway facilities (Caltrans 1995). Procedures are identified with respect to individual biological resource issues in the following paragraphs.

Natural Communities

Willow Riparian Scrub and North Coast Black Cottonwood Riparian Forest. Avoidance measures to minimize construction-phase effects on willow riparian scrub and North Coast black cottonwood riparian forest would consist of identifying, marking, and protecting trees with protective orange fencing to avoid disturbance or accidental intrusion by workers or equipment.

Wetlands and Other Waters of the U.S.

The following avoidance measures would be included in the project specifications and special provisions to avoid or minimize effects on wetlands/other waters of the U.S.:

- Construction within wetlands and drainages would be avoided during the rainy season to prevent excessive siltation and sedimentation;
- Materials and fluids generated by construction activities would be placed at least 30 meters (100 feet) from wetland areas or drainages until they could be disposed of in accordance with applicable regulations; and
- All natural communities and wetland areas located outside of the construction zone that could be affected by construction activities would be temporarily fenced off and designated as Environmentally Sensitive Areas (ESAs) to prevent accidental intrusion by workers and equipment.

Wetland habitats that are temporarily lost or disturbed due to project construction would be restored on-site to preconstruction conditions. Revegetation would be with native species such as cattails *(Typha* spp.), *Juncus* spp., or *Cyperus* spp. Any revegetation would be carried out by a contractor qualified in habitat restoration.

Special-Status Plant Species

Protocol-level presence/absence surveys for special-status plant species *were conducted with negative findings for vernal pool and other special-status plant species* as described in Section 3.15.3.2, Affected Environment*:* Special-status Plant Species. *The following terms and conditions would be included in the project specifications and special provisions:*

- *The resident engineer shall maintain a copy of the Biological Opinion onsite whenever construction is taking place. The resident engineer's name and telephone number shall be provided to USFWS at least 30 calendar days prior to groundbreaking of the project.*
- *All project-related vehicle traffic shall be restricted to established roads and other designated areas.*
- *Project-related vehicles shall observe a 15-miles/hour (24 kilometers/hour) speed limit within project areas, except on County roads, and State and federal highways. To the maximum extent possible, night-time construction should be minimized. Off-road traffic outside the designated project areas shall be prohibited.*
- *All equipment will be maintained such that there will be no leaks of fluids such as gasoline, oils, or solvents.*

- *The construction area shall be delineated with highly visible temporary fencing at least four feet (1.2 meters) in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment onto any sensitive areas during project work activities. Such fencing shall be inspected and maintained daily until completion of the project.*
- *All food-related trash items must be disposed of in closed containers and removed at least once every day from the entire project site.*

Special-Status Wildlife Species

Russian River Tule Perch: Avoidance and minimization measures, as described above for coho salmon, steelhead and chinook salmon, would be sufficient to protect Russian River tule perch.

Northern Red-legged Frog, Foothill Yellow-legged Frog, and Western and Northwestern Pond Turtle: Avoidance and minimization efforts, including preconstruction surveys, would be implemented to avoid construction-related impacts to northern red-legged frog, foothill yellow-legged frog, and western and northwestern pond turtle, as described below.

- BMPs would be implemented during all phases of construction.
- The construction contractor shall furnish a biologist qualified to survey for northern red-legged frogs, foothill yellow-legged frogs, and western and northwestern pond turtles.
- Twenty-four hours prior to construction activities, the project areas would be surveyed by the qualified biologist for northern red-legged frog, foothill yellow-legged frog, and western and northwestern pond turtle. Surveys of the project area would be repeated if a lapse in construction activity of two weeks or greater should occur.
- A Worker Environmental Awareness Program would be conducted *by the contractor* to provide construction personnel with information on their responsibilities with regard to the northern red-legged frog, foothill yellow-legged frog, and western and northwestern pond turtle.
- A permitted biological monitor shall be on-call and capable of responding to the work site within one hour.
- If individual northern red-legged frogs, foothill yellow-legged frogs, western or northwestern pond turtles are encountered, they would be moved immediately to a site that is a minimum of 100 meters from the construction area boundary. The relocation site would be determined prior to commencement of construction activities.
- If northern red-legged frogs, foothill yellow-legged frogs, western or northwestern pond turtles are encountered during construction, all activities shall cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.

White-tailed Kite, Loggerhead Shrike and Other Migratory Birds:

- If project activities cannot avoid the bird breeding season (generally February 1 through August 31), focused pre-construction breeding surveys will be conducted for white-tailed kite and loggerhead shrike, as well as other species protected under the MBTA.

- Surveys shall be conducted in all areas that may provide suitable nesting habitat by a suitably qualified ornithologist to be furnished by the contractor.
- Surveys would include areas within 500 feet of the construction area that provide potential nesting habitat (access permitting).
- No more than two weeks before construction, a survey for nesting would be conducted by a qualified ornithologist.
- If nesting birds are identified, occupied nests would not be disturbed during the nesting season (February 1 through August 31 for raptors; March 1 through August 31 for other species), including a minimum 250-foot buffer zone around any occupied nest, 150 feet for other non-special status passerine birds, and up to 500 feet for raptors.
- Construction-related activities would not be allowed within the buffer zone until the young have fledged.
- For activities that occur outside the bird breeding season (generally September 1 through February 28), such surveys would not be required.

Threatened and Endangered Species

Pacific Salmon and Trout: Coho Salmon, Steelhead and Chinook Salmon: *The construction contractor shall adopt BMPs that NOAA Fisheries, USFWS, and CDFG believe would help avoid jeopardizing the continued existence of the species, including:*

- *A "Dewatering and Fish Relocation Plan" will be provided to NOAA Fisheries for review 30 days prior to the start of dewatering and fish relocation activities. This plan will outline cofferdam construction, channel diversion construction design and methods, dewatering, and fish relocation methods.*
- *A qualified biologist will be retained with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. These biologists will be qualified to conduct fish collections in a manner which minimizes potential risks to listed salmonids. A Statement of Qualifications for all biologists who will be employed on the project shall be provided to NOAA Fisheries for review 30 days prior to any onsite project construction (or demolition) related activities.*
- *The biologist will monitor the construction site during placement and removal of cofferdams and channel diversion-related activities to ensure that any adverse effects to salmonids are minimized.*
- *Pumps used to dewater the work area shall be equipped with screens that meet NOAA Fisheries screening criteria outlined in the Biological Opinion located in Appendix E of this document.*
- *An annual summary report will be provided to NOAA Fisheries within 90 days of the completion of fish relocation and monitoring activities each year.*
- *Written notification will be provided to NOAA Fisheries at least 14 days prior to commencement of in-channel bridge construction, or over channel bridge demolition.*
- *Any NOAA Fisheries employee(s) or any other person(s) designated by NOAA Fisheries will be allowed to accompany field personnel to visit the construction sites during project construction.*

- *Loss of vegetation and delivery of sediments to streams will be minimized through the creation of buffer zones where the project crosses through riparian areas. Construction activities, such as staging, stockpiling of materials or equipment, and equipment movement will be limited to locations outside of riparian areas, where possible. Riparian areas will be identified as ESAs and will be clearly marked with fencing.*
- *Construction and grading that would affect Mark West, Pool, Pruitt, Piner, and Windsor creeks (and associated drainages), or upland areas that might erode into the creek or drainages, would be restricted to the period from June 15 to October 15.*
- *A Storm Water Pollution Prevention Plan (SWPPP) will be implemented to minimize storm water and groundwater pollution caused by construction activities. The SWPPP will outline erosion control measures and other BMPs to control and prevent to the maximum extent practicable the discharge of pollutants to surface and water and groundwater.*
- *All coho salmon, steelhead and chinook salmon present in dewatered areas will be captured and transported to bedrock pools located 330 meters (1,000 ft) downstream from Highway 101 by a NOAA Fisheries approved biologist.*
- *Cofferdams will be installed to dewater the construction area and convey water downstream or into side channels away from the work area via a bypass pipe.*

California Tiger Salamander. *Avoidance and minimization efforts will be implemented to avoid construction-related impacts to CTS, as described below.*

- *All required BMPs will be in place during construction.*
- *Construction will be limited to the dry season (June 1 through October 31) in aquatic habitat when drainages and wetlands would be either dry or at their lowest water level to minimize impacts to aquatic resources including the potential for take of breeding/migrating CTS. CTS habitat that can be avoided during construction will be flagged and designated as an Environmentally Sensitive Area. All construction personnel will avoid these areas.*
- *A qualified biologist(s) shall be onsite during all activities that may result in the take of CTS. The biologist shall have oversight over implementation of all the Terms and Conditions of the Biological Opinion, and shall have the authority to stop project activities, through communication with the resident engineer, if any of the requirements associated with these Terms and Conditions are not being fulfilled. The biologist(s) shall be given the authority to stop any work that may result in the take of this listed animal species. If the biologist(s) exercises this authority, USFWS and CDFG shall be notified by telephone and electronic mail within one working day.*
- *Pre-construction surveys shall be conducted by a USFWS-approved biologist for CTS.*
- *The onsite biologist monitor will check for animals under any equipment before the start of work each morning.*
- *Only USFWS-approved biologist(s) familiar with the biology and ecology of CTS shall capture or handle this listed species.*
- *Biologists shall take precautions to prevent introduction of amphibian diseases to the action area by disinfecting equipment and clothing as directed in the October 2003 California tiger*

salamander protocol titled, Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander.

- *To prevent inadvertent entrapment of CTS during construction, all excavated, steep-walled holes or trenches more than two feet (0.61 meters) deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist should immediately place escape ramps or other appropriate structures to allow the animal to escape, or USFWS and/or CDFG shall be contacted by telephone for guidance. USFWS shall be notified of the incident by telephone or electronic mail within one working day.*
- *No canine or feline pets shall be permitted in the action area.*
- *No plastic mono-filament netting or similar material shall be used.*
- *An employee education program covering the California tiger salamander must be conducted by the contractor before groundbreaking.*

3.16.14 Construction Employment

Given the size of the Bay Area economy, neither the No-Build nor the Build *(Preferred)* alternatives would result in substantial changes to regional socioeconomics beyond current regional planned and forecasted growth. The Build Alternative *(Preferred Alternative)* would result in a temporary increase in construction related employment, as described below.

3.16.14.1 METHODOLOGY AND IMPACTS

Table 3.16.14-1 provides an estimate of the number of employment positions and level of economic activity created by the expenditure of construction funds for the No-Build and Build *(Preferred)* Alternatives. Estimates are based in part on an input/output study of construction activity in Texas by the Federal Highway Administration (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the San Francisco Bay Area region and would also follow the labor and material markets for transportation-related construction.

With respect to job creation, FHWA found nationally in the early 1980s that a one million dollar investment in transportation construction would directly generate 10 on-site, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.5 PYE positions to reflect inflation through 200*6*. When off-site, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full time PYE positions created rises to about 11.0, adjusting for inflation, for each one million dollars of highway investment.

Compared with the No-Build Alternative, capital costs for construction of the Build Alternative *(Preferred Alternative)* would be *$133.2* million, exclusive of right-of-way. Construction expenditures would generate approximately 700 on-site full-time construction positions (PYE) and

approximately 1,500 total positions (PYE), including direct, indirect, and induced, as compared to the No-Build Alternative.

The impact of this direct and indirect employment added to the regional economy would be positive.

3.16.14.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

As the impacts are beneficial, no mitigation is proposed.

Table 3.16.14-1: Impacts from Construction Investment in the Highway 101 HOV Widening Project: Steele Lane to Windsor River Road (millions of 2007 dollars)

Alternative	Construction Value*	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				On-Site	Total
Build Alternative Option NB - A / SB - A	*$132.1*	*$229.57*	*$60.81*	700	*1,500*
Build Alternative Option NB - A / SB - B	*$134.2*	*$233.22*	*$61.78*	700	1,500
Build Alternative *(Preferred Alternative)*– Option NB - B / SB - A	*$133.2*	*$231.49*	*$61.32*	700	1,500
Build Alternative Option NB - B / SB - B	*$135.3*	*$235.14*	*$62.29*	700	1,500
No-Build Alternative	N/A	N/A	N/A	N/A	N/A

* Construction impacts are based on preliminary estimates for construction value, which exclude right-of-way costs and include design, construction management, and agency costs.

N/A =Not Applicable

Sources:
A.L Politano and Carol J. Roadifer, Regional Economic Impact Model for Highway Systems, *Transportation Research Record 1229*, Transportation Research Board, Washington D.C., 1989. (Model adjusted to reflect inflation.)
Parsons, 2007.