Chapter 2 Affected Environment, Environmental Consequences, and Avoidance, Minimization and/or Mitigation Measures

2.1 Human Environment

2.1.1 Land Use

The land use and social environment study area is the immediate project area and surrounding vicinity. It includes portions of Alameda County and the cities of Dublin, Pleasanton, and Livermore.

2.1.1.1 Existing and Future Land Use

Affected Environment

This section identifies existing regional land use and area plans and policies that apply to lands in the immediate project area and the surrounding vicinity. The proposed project would extend from the Hacienda Drive interchange in the City of Pleasanton to east of Greenville Road in the City of Livermore.

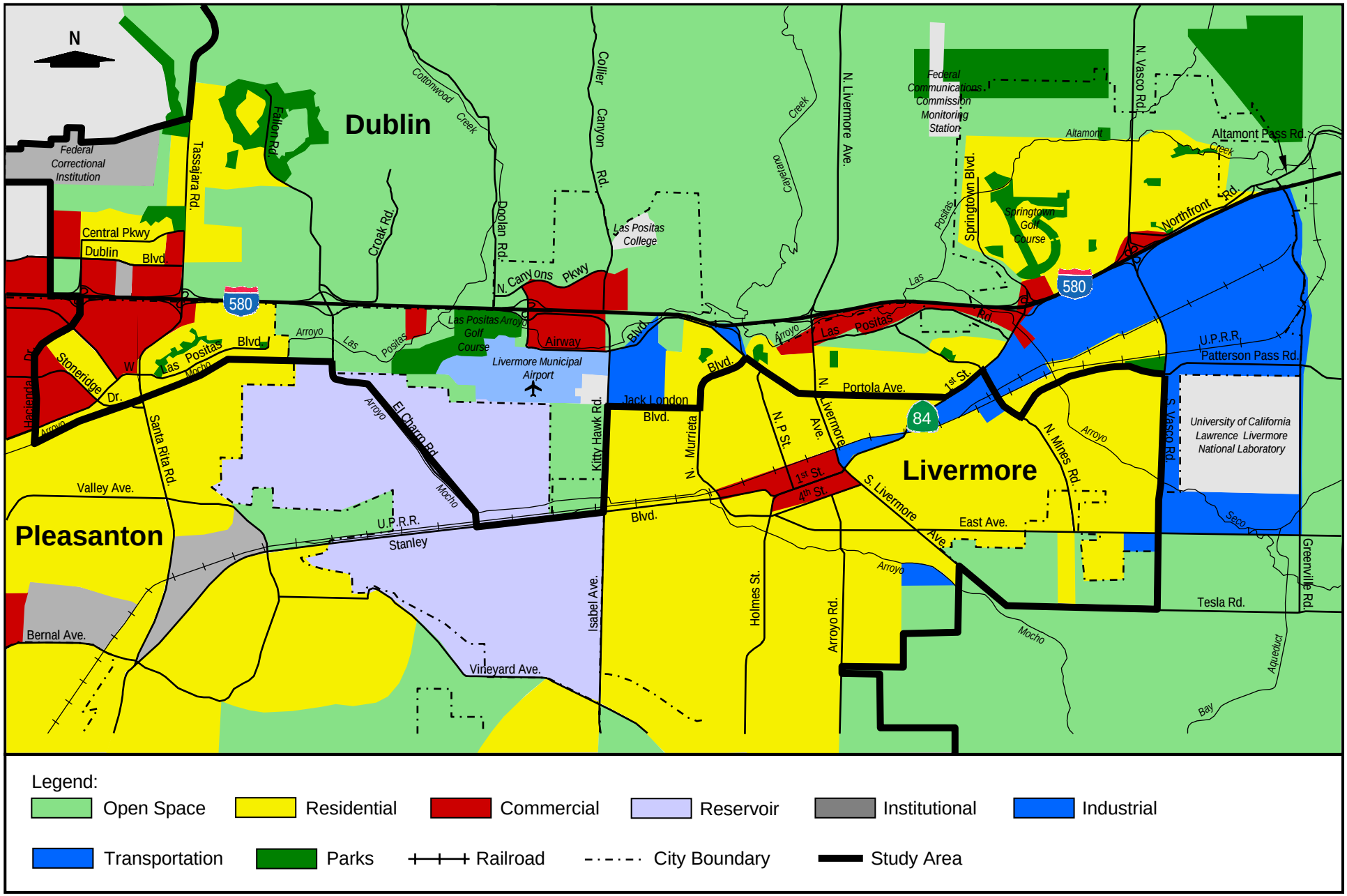
Major Land Uses along Project Alignment. Existing land uses in the vicinity of the I-580 Eastbound HOV Lane Project include single-family residential, undeveloped residential, commercial, industrial, recreational, agricultural, and open space. These land uses are described from west to east below, and they are shown in Figure 2.1.1-1.

From the project limits just west of the Hacienda Drive interchange to the I-580/Tassajara Road interchange, land uses are a mix of residential and commercial on the north side of I-580 and primarily commercial on the south side. Commercial uses are predominant at the I-580/Tassajara Road interchange.

Between Tassajara Road and the I-580/El Charro Road interchange, land uses are mostly residential to the south and undeveloped residential to the north. Open space is the predominant land use at the I-580/El Charro Road interchange.

To the north of I-580, between El Charro Road and Airway Boulevard, land use is primarily open space. To the south in the same segment, land uses include open space, agricultural, and recreational. The Las Positas Golf Course is located on the south side of I-580 with the Livermore Municipal Airport just beyond.

Open space is the predominant land use on the north side of I-580, between Airway Boulevard and North Livermore Avenue. South of I-580, land uses include open space and industrial, with some single-family residential just beyond. Commercial land uses are located on both sides of I-580 at the east side of the I-580/Airway Boulevard interchange.



I-580 Eastbound HOV Lane Project

EXISTING LAND USES
Figure 2.1.1-1

Between North Livermore Avenue and South Vasco Road, land uses include open space, commercial, industrial, and residential. Commercial land uses are centered on the freeway interchanges at North Livermore Avenue and Springtown Boulevard. Residential land uses are located on the north side of I-580, east of the I-580/Springtown Boulevard interchange. Industrial land uses in this segment are located south of I-580 between Springtown Boulevard and South Vasco Road.

From North Vasco Road/South Vasco Road to Greenville Road in the City of Livermore, land uses are primarily open space north of I-580, with some single-family residential just east of North Vasco Road. South of I-580, land uses include residential, open space, industrial, and some commercial. Lawrence Livermore National Laboratory is located south of Patterson Pass Road, between South Vasco Road and Greenville Road.

Developable Land and Development Trends

Alameda County General Plan. The *Alameda County General Plan* includes planning goals, objectives, policies, and programs for the county's 14 cities and six unincorporated subareas. Since the cities retain the authority and primary responsibility for planning matters within their corporate boundaries, the focus of the *General Plan* is on the unincorporated area of the county. Developable land areas and development trends relevant to the proposed project are described in the individual general plans for the cities of Dublin, Pleasanton, and Livermore.

City of Dublin General Plan. Ninety-nine percent of the city's primary planning area, located to the west of Camp Parks, has been developed since the 1960s; therefore, future development in this area will focus on the remaining uncommitted sites and on the potential for more intensive use of the existing sites. Except for downtown intensification, the *General Plan* does not envision highly visible changes in Dublin's primary planning area, but it does provide for a more than 60 percent increase in population.

The Eastern Extended Planning Area, located east of Dublin's "built-up area," is the largest remaining area for future development in Dublin. The approximately 4200-acre area east of Camp Parks permits the eventual expansion of urban development to accommodate the healthy growth of the community. The Eastern Extended Planning Area is projected to reach buildout over the next 30 to 40 years, adding roughly 13,930 new housing units to the city. Buildout is projected to increase the city's population by approximately 32,500 people and add 28,100 new jobs.

The Western Extended Planning Area, which is located along the north side of I-580 to the west of existing development in Dublin, consists of approximately 3,255 developable acres.

Development trends in both the Eastern and Western Extended Planning Areas will encourage responsible and environmentally sensitive development by focusing on the following strategies:

- Increased use of transit, both on a local and regional level;
- Improved balance of employment and housing opportunities to reduce the import or export of labor that results in increased traffic congestion and air pollution;

- Appropriate balance of open space preservation goals and housing and recreational needs; and
- Clustered development for increased land use efficiency.

City of Pleasanton General Plan. The Land Use Element of the *Pleasanton General Plan*, amended in November 1996, projected a maximum of 29,000 housing units within the planning area at full buildout, predicted to occur by 2004 or beyond. If all of the commercial, office, industrial, and other employment-generating land were fully built out, the city would contain approximately 28,176,500 million square feet (sq ft) of building floor area, enough to support approximately 68,254 jobs. The urbanized portion of the Planning Area is surrounded by generally undeveloped land on Pleasanton Ridge and the Southeast Hills, in the sand and gravel quarry areas, and in the vineyards in the South Livermore Valley area.

The *General Plan* designates an Urban Growth Boundary (UGB) line around the edge of land planned for urban development at buildout. The line distinguishes areas generally suitable for urban development from areas generally suitable for the long-term protection of natural resources, large-lot agriculture and grazing, parks and recreation, public health and safety, subregionally significant wildlands, buffers between communities, and scenic ridgeline views. The UGB is intended to be permanent and to define the line beyond which urban development may not occur. The city is currently undergoing an update of this general plan.

City of Livermore General Plan. Within the urban limits of the City of Livermore, residential land uses occupy approximately 5,500 acres; parks, recreation, and open space occupy 1,696 acres; agriculture occupies 1,068 acres; and undeveloped parcels occupy 1,785 acres. Development strategies within the city limits include:

- Clustering new development to create a consolidated pattern of urbanization, maximizing the use of existing public services and facilities;
- Creating neighborhoods that include a mix of uses and a range of housing types;
- Utilizing the transferring of density to preserve environmentally and aesthetically sensitive areas;
- Encouraging commercial development that would support and enhance a vibrant downtown and serve existing neighborhoods; and
- Protecting the city's investments in public property and preserving public lands for the use of the whole community.

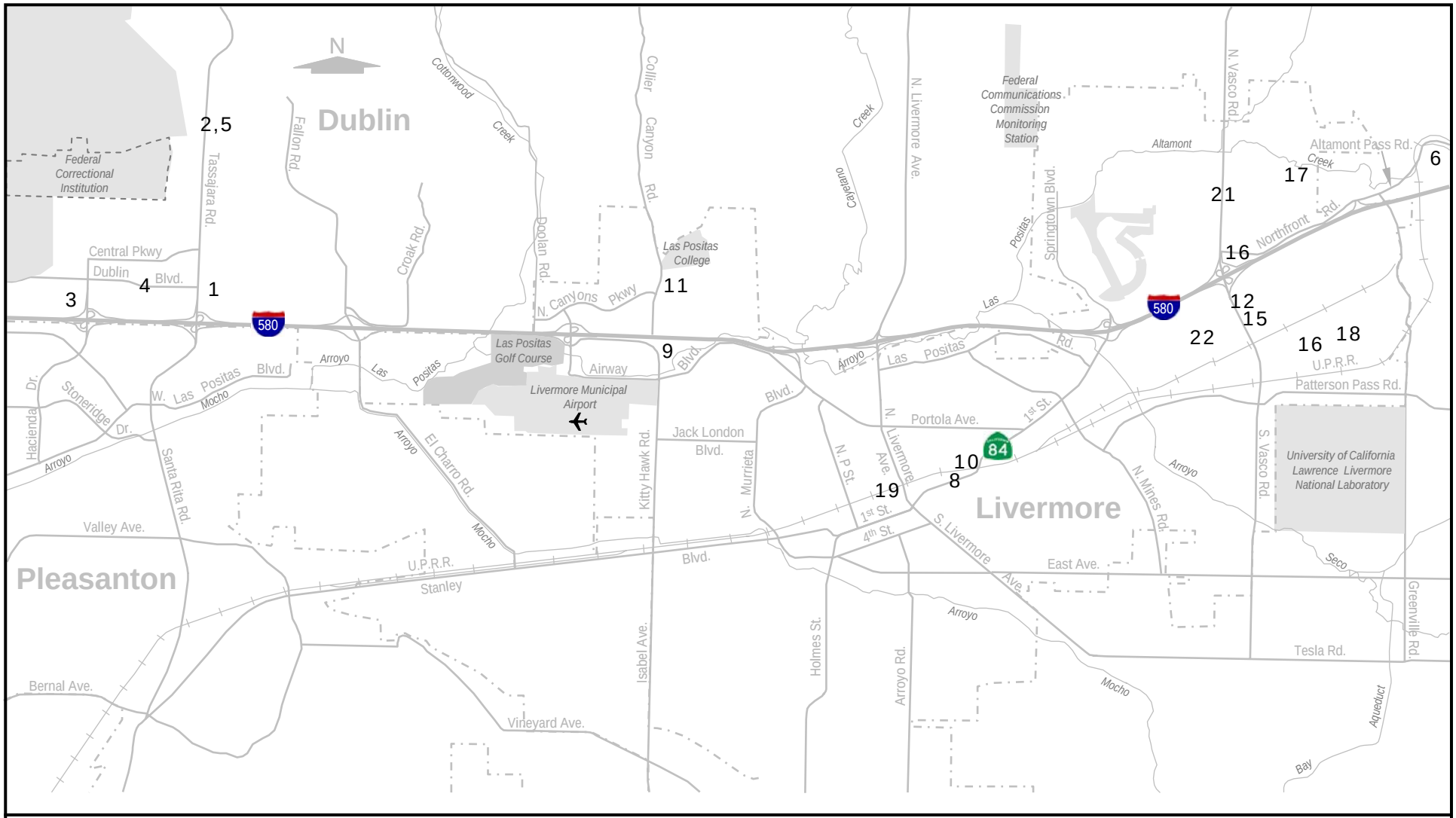
Outside the city limits, development patterns are governed by an UGB that establishes the context for land use designations in outlying areas of the city. The *South Livermore Urban Growth Boundary Initiative*, passed by local voters in March 2000, established the UGB around the southern edge of the city. The *North Livermore Urban Growth Boundary Initiative*, approved by the Livermore city council in December 2002, completed the UGB around the northern edge of the city. The primary purpose of the North and South UGBs is to create a "greenbelt" around the city and preserve Livermore's agriculture and scenic vistas, while providing for suitable and sustainable development.

Major Approved and Active Projects. Major approved and active projects in the study area are listed in Table 2.1.1-1 and shown in Figure 2.1.1-2. Approximately 22 projects, including residential, commercial, industrial, institutional, and office, are under construction, approved, or pending approval. The majority of these projects are located in the City of Livermore.

Table 2.1.1-1: Major Approved and Active Projects in the Study Area

No.	Name	Location	Approved Use	Project Status
CITY OF DUBLIN				
1	Dublin Ranch	North of Dublin Boulevard, East of Tassajara Road	Residential	Waiting for approval
2	Quarry Lane School	6363 Tassajara Road	Institutional	Annexation Approved
3	IKEA	Hacienda Drive and Arnold Road	Commercial	Approved
4	Trumark Commercial Project	4600 Dublin Boulevard	Commercial	Approved
5	Silveria Ranch	6833 Tassajara Road	Residential	Approved
CITY OF LIVERMORE				
6	The Pinnacle Group	Greenville Road at I-580	Commercial	N/A
7	Ponderosa Homes	South of Concannon Boulevard and West of Murdell Lane	Residential	Under Construction
8	PalaSage at Downtown	2911 First Street	Residential	Under Construction
9	Airport Executive Centre	51 Airway Boulevard	Industrial	Permits Issued
10	Eden Housing, Inc.	3330-3376 Gardella Plaza	Residential	Under Construction
11	Orix	751 North Canyons Parkway	Office	Under Construction
12	Wendy's Restaurant	207 S. Vasco Road	Commercial	Under Review
13	J & M, Inc.	National Drive at Brisa Street	Industrial	Permit Ready to be Issued
14	Shea Homes	Collier Canyon Road and Doolan Road	Residential	Incomplete Application
15	BEP Livermore/Ellis Partners	5900 Las Positas Road	Industrial	Under Construction
16	Robert Cush Custom Gear & Machine	6485 Brisa Street	Industrial	N/A
17	Centex Homes	1467 Laughlin Road	Residential	Incomplete Application
18	Dave Gibbons	6820 Brisa Street	Industrial	Incomplete Application
19	Signature Properties	1950 Railroad Avenue	Residential	Permits Issued
20	David Sanchez	6219 Southfront Road	Industrial	Approved
21	Seven Hills Venture	1289 N. Vasco Road	Residential	Under Construction
22	East Bay Habitat for Humanity	732 Hayes Avenue	Residential	Under Construction

Source: Parsons, 2006.



Legend:

City Boundary — Railroad — 5 Projects Listed in Table

I-580 Eastbound HOV Lane Project

MAJOR APPROVED AND ACTIVE DEVELOPMENTS IN THE PROJECT AREA

Figure 2.1.1-2

Impacts

The I-580 Eastbound HOV Lane Project would have no long-term impacts on land use. All construction would occur within the existing right-of-way; therefore, land uses would not change.

Avoidance, Minimization and/or Mitigation Measures

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

2.1.1.2 Consistency with State, Regional, and Local Plans

Affected Environment

Planning goals and policies of the cities and counties affected by the I-580 Eastbound HOV Lane Project are described below.

Alameda County General Plan. The *Alameda County General Plan* includes planning goals, objectives, policies, and programs for the county's 14 cities and six unincorporated subareas. Since the cities retain the authority and primary responsibility for planning matters within their corporate boundaries, the focus of the *General Plan* is on the unincorporated area of the county. Planning goals, objectives, policies, and programs relevant to the I-580 Eastbound HOV Lane Project are described in the individual general plans for the cities of Dublin, Pleasanton, and Livermore.

East County Area Plan. The *East County Area Plan*, adopted in May 1994, identifies seven major planning goals designed to "create and maintain a balanced, multi-modal transportation system that provides for the efficient and safe movement of people, goods, and services." Primary objectives to obtain this goal include:

- Allowing development and expansion of transportation facilities, including streets and highways, in appropriate locations consistent with the policies of the *East County Area Plan*;
- Assigning priority, by the county, in funding decisions to arterial and transit improvements that would improve local circulation, and to improvements that would facilitate movement of commercial goods; and
- Cooperating with cities and regional agencies to design transportation facilities and programs to accommodate East County Area Plan land uses.

Other relative transportation goals set forth by the East County Area Plan include:

- Reducing East County traffic congestion;
- Completing county-planned street and highway improvements that are attractively designed to integrate pedestrian and vehicle use; and
- Preserving and enhancing views within scenic corridors.

City of Dublin General Plan. The Circulation and Scenic Highways Element of the *City of Dublin General Plan* includes diagrams, policies, and programs for existing and proposed thoroughfares,

transportation routes, terminals, and other public utilities and facilities. The *General Plan* requires that these circulation and public service features relate to the population needs planned for in the land use element. Transportation planning goals, objectives, and policies and programs for the primary planning area include:

- Designing nonresidential streets to (1) accommodate forecasted average daily traffic demand on segments between intersections; and (2) minimize congestion conditions during peak hours of operation at intersections and serve a balance of vehicles, bicycles, pedestrians, and transit.
- Improving freeway access.
- Improving I-580 interchanges to serve planned growth.

Area-specific policies for the Eastern Extended Planning Area are concerned primarily with the substantial urban development that is projected for the area. The roadway system has been designed to accommodate traffic at buildout of the area according to the land use distribution and densities projected in the *General Plan*.

The system is structured around the existing north-south roads and freeway interchanges (Hacienda Drive, Tassajara Road, and Fallon Road) and the extension of the existing east-west roadways, such as Dublin Boulevard and Gleason Drive. Guiding land use policies for the Eastern Extended Planning Area include:

- Encouraging the development of a balanced and mixed-use community in the Eastern Extended Planning Area that is well-integrated with both natural and urban systems, and provides a safe, comfortable, and attractive environment for living and working.
- Encouraging the development of a full range of commercial and employment-generating uses in the Eastern Extended Planning Area that would meet the needs of the city and the surrounding Tri-Valley area.

The following transportation policies in the *City of Dublin General Plan* are relevant to the proposed project:

- Provide an integrated multi-modal circulation system that provides efficient vehicular circulation while encouraging pedestrian, bicycle, transit, and other nonautomobile transportation alternatives.
- Cooperate with Caltrans and other affected jurisdictions to pursue the widening of I-580 to ten total lanes (eight through lanes and two auxiliary lanes) between Tassajara Road and Airway Boulevard.
- Support the development of a community that facilitates and encourages the use of local and regional transit systems.

City of Pleasanton General Plan. The overall land use goal for the City of Pleasanton, as put forth by the *City of Pleasanton General Plan*, adopted in August 1996, is to achieve and maintain a complete well-rounded community of desirable neighborhoods, a strong employment base, and a variety of community facilities.

The Circulation Element of the *City of Pleasanton General Plan* includes the following related transportation planning goals:

- To develop a safe, convenient, and uncongested circulation system.
- To develop and manage a street and highway system that accommodates future growth while maintaining acceptable levels of service.
- To provide a multi-modal transportation system that encourages efficient use of existing and future facilities.

City of Livermore General Plan. The *City of Livermore General Plan*, adopted in February 2004, is the city's fundamental land use and development policy document that guides development and conservation in the city through 2025. The main land use goal in the *General Plan* is to protect the unique qualities of Livermore.

Circulation planning goals and policies for the City of Livermore include:

- Supporting state and regional efforts to improve I-580 within the Tri-Valley with HOV lanes, auxiliary lanes, and ramp metering.
- Identifying and developing a circulation system consistent with the Land Use Element.
- Recognizing that increasing capacity on major streets leading to I-580 could increase regional cut-through traffic and should maintain a balance between serving local and regional needs.
- Encouraging vehicle trip reduction by encouraging ridesharing (carpools and vanpools) and coordinating with Caltrans and transit providers to identify and implement park-and-ride sites with convenient access to public transit.
- Maintaining adequate levels of service for all areas of the city.

Impacts

The I-580 Eastbound HOV Lane Project is consistent with local planning goals and policies in local and regional plans and studies. The Build Alternative would be consistent with the stated objectives of these jurisdictions. The No-Build Alternative would not support achievement of these goals.

Avoidance, Minimization, and/or Mitigation Measures

Because the I-580 Eastbound HOV Lane Project is consistent with local planning goals and policies to improve traffic circulation along I-580, no minimization or mitigation measures are needed.

2.1.1.3 Parks and Recreation

Affected Environment

As listed in Table 2.1.1-2 and shown in Figure 2.1.1-3, there are 18 parks and 3 golf courses within the study area. Numbers on the table are keyed to locations shown in the figure.

Table 2.1.1-2: Existing Park and Recreational Facilities within the Study Area

No.	Facility Name	Location	Operator
1	Tassajara Creek Regional Trail	Tassajara Road	EBRPD
2	Emerald Glen Park	Gleason Drive and Tassajara Road	City of Dublin
3	Dublin Ranch Golf Club	5900 Signal Hill Drive	Privately Operated
4	Ted Fairfield Park	S. Dublin Ranch Road and Antone Way	City of Dublin
5	Fairlands Park	4100 Churchill Drive	City of Pleasanton
6	Meadows Park	3201 W. Las Positas	City of Pleasanton
7	Las Positas Golf Course	909 Clubhouse Drive	Privately Operated
8	Maitland Henry Park	1525 Mendocino Road	City of Livermore
9	Livermore Downs Park	2101 Pasco Laguna Seco	City of Livermore
10	Vista Meadows Park	2450 Westminster Way	City of Livermore
11	Lester J. Knott Park	655 N. Mines Road	City of Livermore
12	Ralph T. Wattenburger Park	1515 Honeysuckle Road	City of Livermore
13	Springtown Municipal Golf Course	939 Larkspur Drive	Privately Operated
14	Bill Clark Park	5451 Hillflower Drive	City of Livermore
15	Christensen Park	5611 Bridgeport Circle	City of Livermore
16	Summit Park	6332 Tioga Pass Court	City of Livermore
17	Northfront Park	Northfront Road and Herman Avenue	City of Livermore
18	William J. Payne Sports Park	5800 Patterson Pass Road	City of Livermore
19	Altamont Creek Park	6800 Altamont Creek Drive	City of Livermore
20	Brushy Peak Regional Preserve	N. Vasco Road	EBRPD
21	North Livermore Park	Bluebell Drive and Galloway Street	City of Livermore

EBRPD – East Bay Regional Park District
Source: Parsons, 2005b.

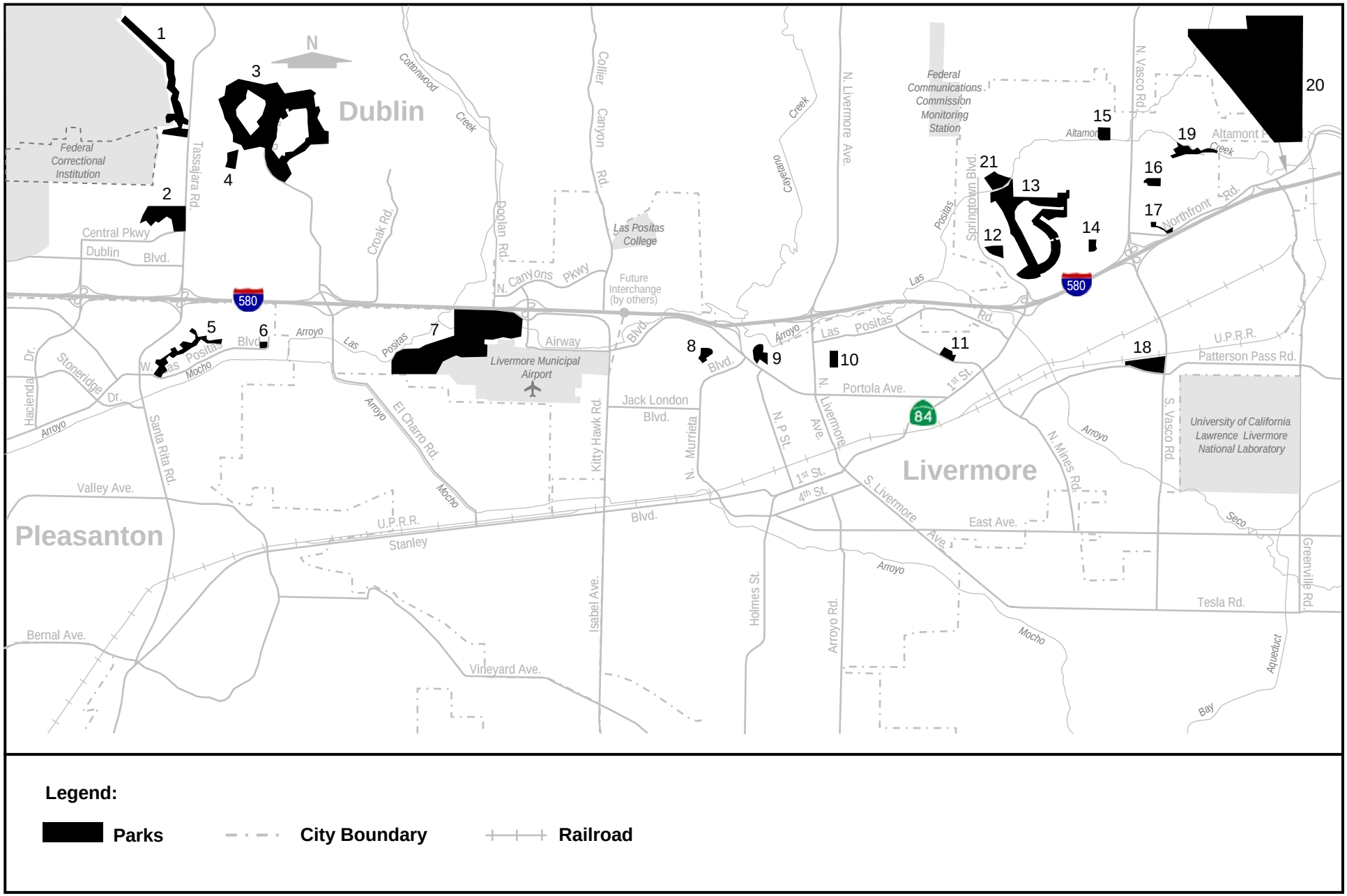
Impacts

The long-term effect of the proposed project would be to reduce congestion and diversion of freeway traffic to local streets, which would enhance accessibility to area park and recreation facilities. No park lands would be displaced by the proposed project.

As shown in Figures 2.1.1-3 and 2.1.4-1, the Las Positas Golf Course, a private recreational facility, is on the eastbound side of I-580. The Build Alternative would not have direct or indirect impacts on this private recreational facility, which is not protected under “Section 4(f)” of the DOT Act because it is not publicly owned.

Avoidance, Minimization, and/or Mitigation Measures

Impacts to park and recreational facilities are not anticipated; therefore, no mitigation is proposed.



Legend:

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

I-580 Eastbound HOV Lane Project

PARK AND RECREATIONAL FACILITIES
Figure 2.1.1-3

2.1.2 Growth

2.1.2.1 Regulatory Setting

The Council on Environmental Quality (CEQ) regulations, which implement NEPA, require evaluation of the potential environmental consequences of all proposed federal activities and programs. This provision includes a requirement to examine indirect consequences that may occur in areas beyond the immediate influence of a proposed action and at some time in the future. The CEQ regulations, 40 *Code of Federal Regulations* (CFR) 1508.8, refer to these consequences as secondary impacts. Secondary impacts may include changes in land use, economic vitality, and population density, which are all elements of growth.

CEQA also requires the analysis of the potential of a project to induce growth. CEQA Guidelines, Section 15126.2(d), require that environmental documents "…discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment…"

The growth inducement assessment examines the relationship of the project to economic and population growth or to the construction of additional housing in the project area. This includes the potential for a project to facilitate or accelerate growth beyond planned developments, or induce growth to shift from elsewhere in the region. The project's influence on area growth is considered within the context of other relevant factors, such as relative cost 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 Analysis for I-580 Eastbound High-Occupancy Vehicle Lane Project* (Parsons, 2006a).

2.1.2.2 Affected Environment

The proposed project is aimed at improving traffic operations on eastbound I-580 by adding an HOV lane on the heavily congested section between Hacienda Drive and Greenville Road. Many residents from the Central Valley (Tracy, Modesto, Stockton, and nearby communities) use I-580 to commute west to their jobs in the Bay Area. Congestion is recurrent both westbound in the morning and eastbound in the evening. Congestion and delay are worse in the evening peak, which is more concentrated than the morning peak.

Without capacity and operational improvements, congested conditions and travel delay would be expected to worsen in the future. Future travel time through the 17.7-km (11.0-mi) stretch of I-580 between Hopyard Road and Greenville Road in 2030 without the proposed project is anticipated to be between 11 and 34 minutes, depending on the direction and peak period, with the eastbound evening peak hour incurring the highest delay. (See Section 1.2.2, Project Need, and Section 2.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities, for more discussion on No-Build and Build travel times.) Adding the HOV lane would reduce delay and commute time between the Bay Area and the communities of Livermore, Tracy, Stockton, Manteca, Ripon, Escalon, Oakdale, and Modesto. Travel time for those using the HOV lanes would be reduced by as much as two-thirds, from 34 to 10 minutes.

A highway improvement project like the proposed project would enhance the accessibility of commuters to Bay Area employment centers, making locations at the east end of I-580 more attractive places to live; thus, it could contribute to unplanned residential growth. Unplanned residential growth, in turn, could attract growth in commercial development. The residential communities included in the growth inducement study are planning for substantial growth, with population increases from 51 percent to 233 percent between 2000 and 2030[4].

Other factors in addition to traffic conditions, such as the General Plans of the residential areas, also influence the climate for growth. For example, the City of Livermore[5] has adopted a residential growth rate of 1.5 to 3.5 percent to monitor the level of residential development activities in the city. The city implements its growth management policies through the competitive Housing Implementation Program (HIP). Projects that do not meet the housing needs of the community or fail to effectively address environmental constraints and/or lack of public services will not rank as high as other projects, and they may not receive residential growth allocations under HIP. Such policies seek to avoid unplanned growth in the region.

In a recent development, builders brought a ballot initiative (Measure D) that would allow the building of over 2,000 more homes in Livermore. Livermore voters rejected Measure D (72 percent to 28 percent) in the November 2005 elections.[6] The results of the election demonstrate that the assumed growth restriction in Livermore, as discussed above, is most likely to remain intact.

The residential areas in the Central Valley are less stringent in their approach to growth management. For example, the City of Stockton[7] is concerned mainly with directing growth to specific areas of the city. The growth in these Central Valley communities is not particularly influenced by commute times, but it is dominated by the search for affordable housing that extends farther and farther from the Bay Area with each passing year.

A growth inducement study was performed to understand how the change in accessibility due to the proposed project would affect growth in these areas.

2.1.2.3 Impacts

Six residential locations, as shown in Figure 2.1.2-1, were selected for testing the growth inducement effects of the project. These residential locations included the communities of Livermore, Tracy, Stockton, Manteca, Ripon, Escalon, Oakdale, and Modesto.

Compared with 2030 No-Build conditions, projected average travel-time savings[8] for trips (based on round-trip commute) between the six residential zones and employment centers in the Bay Area that would be obtained by the proposed project would vary from 6 to approximately 9 minutes. Travel-time savings would vary depending on the location of the residential zones and employment zones. The proposed project would reduce the trip times of commuters from Livermore to Bay Area

[4] ABAG Projections 2005; SJCOG Board Staff Report; Stanislaus County Planners; 2000 Census data.
[5] *Livermore General Plan Update*, City of Livermore, 2003.
[6] *San Francisco Chronicle*, November 10, 2005.
[7] *General Plan Background Report*, City of Stockton, February 2004.
[8] The average travel time for both HOV lane and mixed-flow lane users.

employment centers by 6 to 8 minutes, or 8 to 17 percent. The project would reduce the trip times of the commuters from the other communities analyzed, all in the Central Valley, by 7 to 9 minutes. These commuters from the Central Valley currently have long commute times of 70 minutes to over 2 hours to jobs in the Bay Area. The travel-time savings would translate to approximately 5 to 10 percent savings in total trip time. Based on these travel-time savings, the growth inducement analysis showed a slight increase in growth pressure in Livermore due to the proposed project, but there was no effect on any of the other areas under study. Of the six residential areas under study, Livermore is closer to the project area and to the jobs in the greater Bay Area; hence, it derives the most influence from the project.

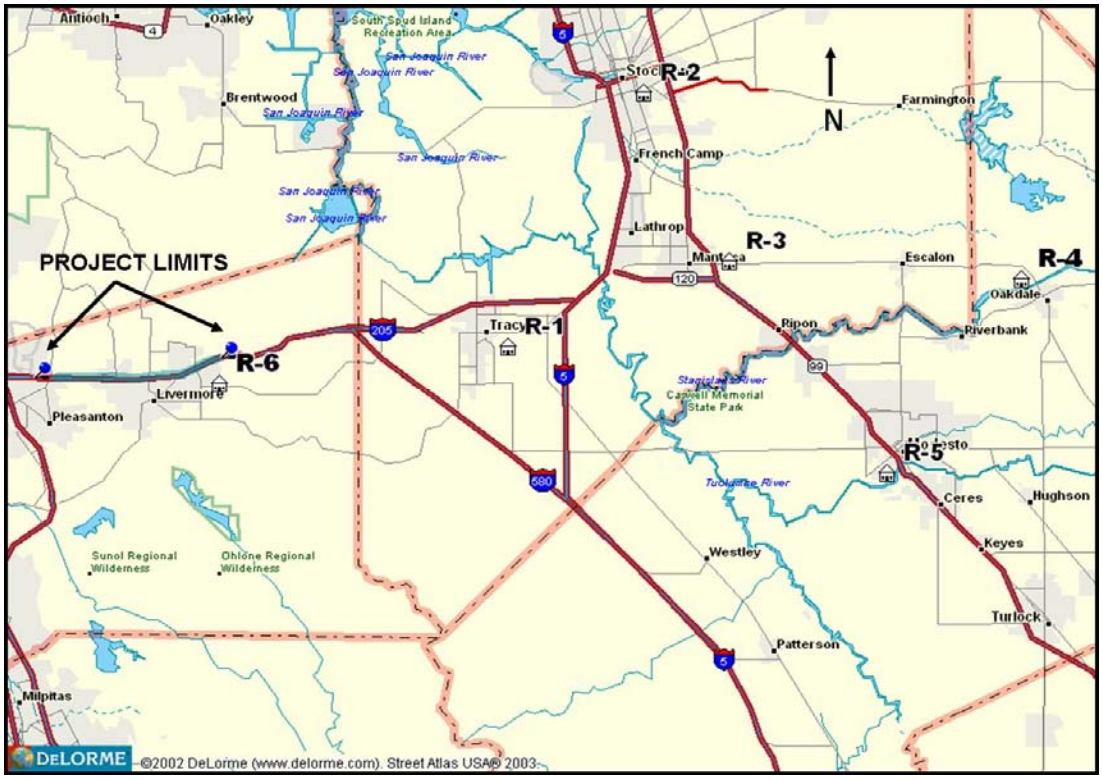


Figure 2.1.2-1: Residential Areas (R-1 to R-6) Studied for Growth Inducement Effects

The proposed project (Build Alternative) would allow HOV lane users to travel at near free-flow speeds through the project area. However, HOV lane users would be only 10 to 15 percent of the total I-580 commuters, and they would still face substantial delays on either end of the project area. Even with the proposed project, mixed-flow lane users would still encounter substantial amounts of congestion and delay and would require over 30 minutes to traverse the project length of less than 15 mi. Additionally, any increase in traffic beyond that which is currently planned would further increase congestion and travel times. While the improved accessibility achieved by the proposed project would be essential to support planned growth, it would neither entirely accommodate planned growth nor induce unplanned growth.

Other factors, in addition to traffic conditions, also influence area climate for growth. Based on the general plan information presented earlier, Livermore has the most stringent growth controls of any of the potentially affected communities, and it would consequently be unlikely to have unplanned growth in response to improved commute times to jobs. The other communities analyzed, which currently have long commutes (as noted above), would be unlikely to have unplanned growth in response to small changes in commute times.

Availability and affordability of housing are other major factors that affect residential growth. The growth inducement analysis shows that the maximum travel-time benefit due to the proposed project would be in the City of Livermore. However, with the increase in jobs within the Tri-Valley over the past few years, and with the relatively ready accessibility of the Tri-Valley to jobs in the rest of the Bay Area, housing prices in Livermore have risen rapidly. In addition, the demand for housing in Livermore is much higher than the available housing supply. Lower housing vacancy rates and higher housing costs tend to act as growth deterrents that would outweigh minor travel-time savings.

As house prices increase within the Bay Area, more buyers extend their search for a new home to more affordable locations in San Joaquin County, Stanislaus County, and beyond. The increased housing demand in turn increases housing prices in these areas. For example, low-end housing prices in Tracy, the closest of the Central Valley communities, have risen above $400,000. While this is still substantially lower than housing in Livermore, the proposed project would reduce the trip times of commuters from these areas to the Bay Area only by an average of approximately 9 minutes or 7 percent.

In summary, growth management policies in Livermore, as well as moderately high housing prices in areas where commuters would realize the greatest potential travel-time savings, would tend to discourage accelerated residential growth, even with the improved travel times. Travel-time savings for commuters living in Central Valley communities would be too small to affect the overall growth potential of those areas. The growth inducement study concluded that the I-580 Eastbound HOV Lane Project would support planned growth, but it would not induce unplanned growth in the area.

2.1.2.4 Avoidance, Minimization, and/or Mitigation Measures

The proposed project would not induce unplanned growth in the area. No avoidance, minimization, or mitigation measures beyond the continued implementation of local area growth policies and regulations are recommended**.**

2.1.3 Farmlands

2.1.3.1 Regulatory Setting

The Farmland Protection Policy Act

The Farmland Protection Policy Act (7 CFR Ch. VI Part 658) requires federal agencies to consider the adverse effects of their projects on the protection of farmland, 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 refers to 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 Secretary to be farmland of statewide or local importance.

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 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.

Alameda County General Plan. The *Alameda County General Plan* includes planning goals, objectives, policies, and programs for the county's 14 cities and 6 unincorporated subareas. Since the cities retain the authority and primary responsibility for planning matters within their corporate boundaries, the focus of the *General Plan* is on the unincorporated area of the county. Agricultural goals, objectives, policies, and programs relevant to the I-580 Eastbound HOV Lane Project are described in the individual general plans for the cities of Dublin, Pleasanton, and Livermore. Measure D, as approved by voters in 2000, amended the *General Plan* to revise the UGB in the East County to reserve less land for urban growth and more land for agriculture and open space.

City of Dublin General Plan. The main agricultural goal for the city of Dublin is to ensure that lands currently in the Williamson Act agricultural preserve can remain as rangeland as long as the landowner(s) wish to pursue agricultural activities. The city does not support the cancellation of Williamson Act contracts unless some compelling public interest would be served.

City of Pleasanton General Plan. As set forth in the Land Use Element of the *City of Pleasanton General Plan*, no significant development is allowed in areas used for the production of agriculture or the grazing of animals. The city supports preservation of open space areas for the protection of public health and safety, the provision of recreation opportunities, use for agriculture and grazing, the production of natural resources, the preservation of wildlands, and the physical separation of Pleasanton from neighboring communities.

City of Livermore General Plan. Land uses in the City of Livermore include agricultural uses, such as vineyards and orchards, including uses that support agriculture, such as tasting rooms and touring facilities. Some of these parcels appear to be completely undeveloped or are utilized for grazing and other low-intensity agriculture. The city's agricultural goals and policies aim to preserve and promote agriculture and viticulture uses in locations suitable for cultivated agriculture, and to protect sensitive or unique environmental and land characteristics, including the rural character of an area.

2.1.3.2 Affected Environment

Existing land uses along the I-580 corridor include agricultural, as described in Section 2.1.1, Land Use. Agricultural resources in the project area are located primarily south of I-580 near the Las Positas Golf Course.

2.1.3.3 Farmlands Impacts

No right-of-way would be required for the transportation improvements in the study area; therefore, no farmland would be affected.

2.1.4 Community Impacts

2.1.4.1 Community Character and Cohesion

Regulatory Setting

NEPA establishes that the federal government use all practicable means to ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings [42 United States Code (U.S.C.) 4331(b)(2)]. FHWA, 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.

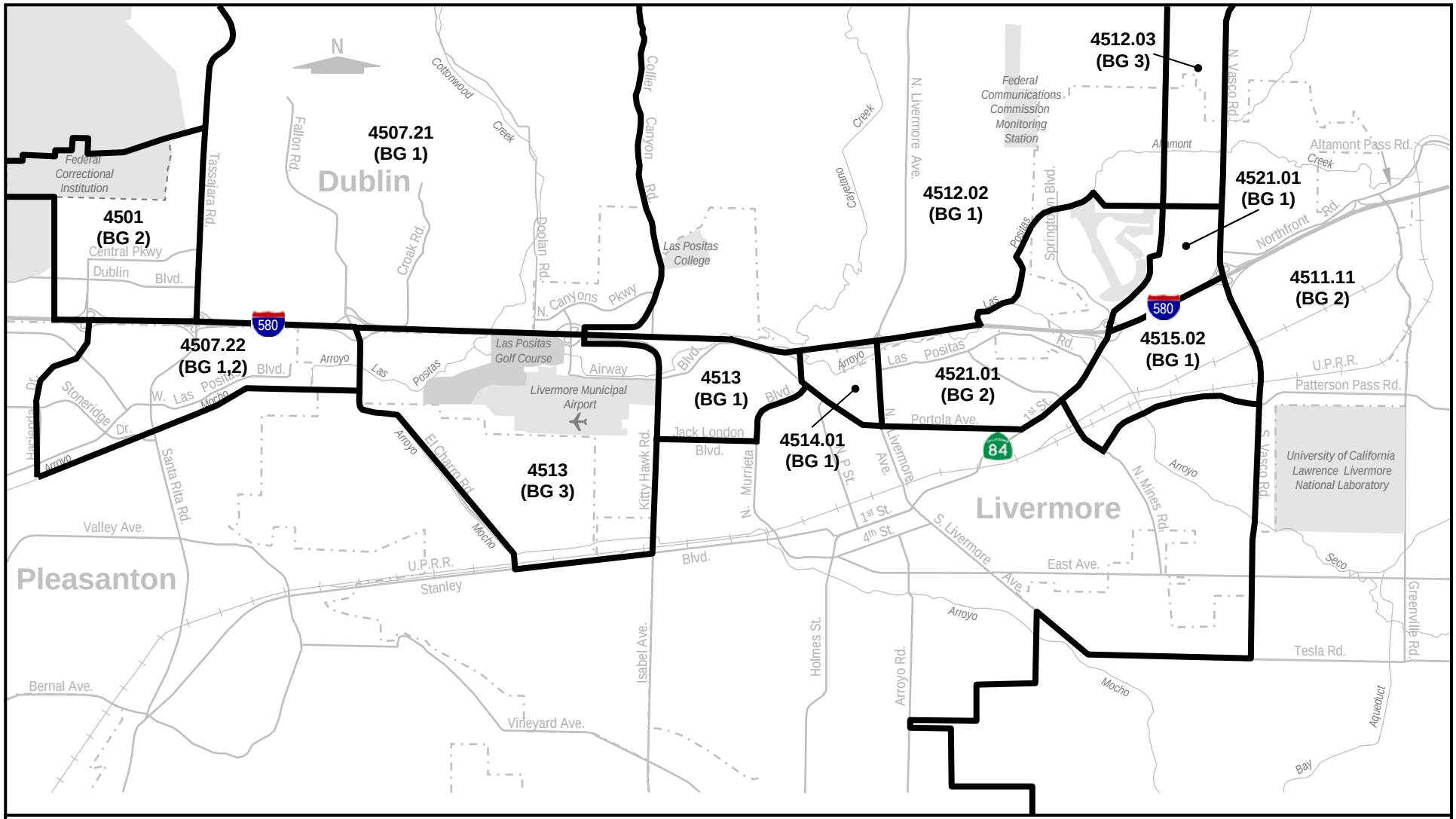
Under CEQA, an economic or social change by itself is not to be considered a significant effect on the environment. However, if a social or economic change is related to a physical change, then social or economic change may be considered in determining whether the physical change is significant. Since 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 effects of the project.

Affected Environment

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* (ABAG, 2005a). Census tracts for the project study area are identified in Figure 2.1.4-1.

Population, Housing, and Employment. Existing and projected population, housing, and employment for Alameda County and the cities of Dublin, Pleasanton, and Livermore are shown in Table 2.1.4-1.

Population. According to the Association of Bay Area Governments (ABAG) 2005 projections, Alameda County is expected to experience a population growth rate of 31 percent between 2000 and 2030. In the same period, the City of Dublin anticipates 161 percent growth, the City of Pleasanton anticipates 40 percent growth, and the City of Livermore anticipates 58 percent growth.



I-580 Eastbound HOV Lane Project

SOCIOECONOMIC CENSUS TRACTS IN THE PROJECT STUDY AREA

Figure 2.1.4-1

Households. Between 2000 and 2030, the growth in study area households is projected to be comparable to that of population, with the number of households rising by 29 percent in Alameda County, 188 percent in the City of Dublin, 38 percent in the City of Pleasanton, and 57 percent in the City of Livermore.

Employment. Between 2000 and 2030, projected growth in study area employment is expected to be similar to that of population and households, with the exception of Alameda County and the City of Livermore, with 45 and 99 percent growth, respectively. The number of jobs is expected to rise by 166 percent in the City of Dublin and by 34 percent in the City of Pleasanton.

Table 2.1.4-1: 2000-2030 Population, Housing and Employment Growth

Area	Population			Households			Employment (Jobs)		
	2000	2030	% Change	2000	2030	% Change	2000	2030	% Change
Alameda County	1,443,741	1,884,600	31	523,366	677,400	29	750,160	1,088,870	45
City of Dublin	30,007	78,200	161	9,335	26,890	188	16,540	43,950	166
City of Pleasanton	65,058	90,900	40	23,831	32,950	38	59,480	79,800	34
City of Livermore	73,841	117,000	58	26,315	41,250	57	48,250	96,170	99

Source: *ABAG Projections, 2005a.*

Household Size and Composition. The U.S. Census Bureau defines a household as a group of people, related or otherwise, living together in a dwelling unit. According to 2000 U.S. Census data, there were 10,711 households in the study area, with an average size of 3.25 persons per household. Sixty-seven percent of these households were family households.

As compared to the study area, Alameda County and the cities of Dublin, Pleasanton, and Livermore all had smaller average household sizes. The percentage of family households in the study area was higher than in Alameda County and the City of Pleasanton, but it was lower than the cities of Dublin and Livermore.

Table 2.1.4-2 compares household characteristics in the study area to those in Alameda County and the cities of Dublin, Pleasanton, and Livermore.

Table 2.1.4-2: Socioeconomic Census Tracts in the Project Study Area

Geographic Area	Number of Households	Average Household Size	Total Number of Families	% of Family Households
Study Area	10,711	3.25	8,002	67
Alameda County	523,366	2.76	339,096	65
City of Dublin	9,325	3.21	6,505	70
City of Pleasanton	19,932	2.74	14,014	57
City of Livermore	26,123	2.81	19,512	79

Source: 2000 U.S. Census Data

Ethnic Composition. The 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, American Indian and Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Hispanic, and Other.

As shown in Table 2.1.4-3, 33 percent of the study area population is part of an ethnic minority group. By comparison, the ethnic population of the City of Dublin is 38 percent. The percentage of ethnic minority residents is higher in Alameda County as a whole, with 59 percent minority residents. The cities of Pleasanton and Livermore each have a lower percentage of minorities with 23 and 26 percent, respectively.

Within the study area, Hispanic groups represent the greatest percentage of ethnic minority residents, with 13 percent of the population. This is lower than the percentages of Hispanic residents in Alameda County as a whole, but comparable to the cities of Dublin, Pleasanton, and Livermore, where Hispanic residents make up between 14 and 15 percent of the population.

Table 2.1.4-3: Ethnic Composition

	Total Persons	White	%	Black or African American	%	American Indian/ Alaskan Native	%
Study Area	34,830	23,449	67	2,839	8	158	>0.5
Alameda County	1,443,741	591,095	41	211,124	15	5,306	>0.5
City of Dublin	29,973	18,669	62	2,995	10	156	0.5
City of Pleasanton	54,548	41,996	77	581	1	173	>0.5
City of Livermore	73,345	54,587	74	1,094	1	315	>0.5

	Asian	%	Native Hawaiian/ Other Pacific Islander	%	Hispanic	%	Other	%
Study Area	2,786	8	61	>0.5	4,513	13	1,024	3
Alameda County	292,673	20	8,458	1	273,910	19	61,175	4
City of Dublin	3,050	10	85	>0.5	4,059	14	959	3
City of Pleasanton	2,089	4	85	>0.5	7,985	15	1,639	3
City of Livermore	4,171	6	189	>0.5	10,541	14	2,448	3

Source: U.S. Census Data, 2000.

Household Income. Table 2.1.4-4 provides information on household income for Alameda County; the cities of Dublin, Pleasanton, and Livermore; and the study area. The 2000 median household income was $85,652 in the study area, higher than in Alameda County and the cities of Dublin, Pleasanton, and Livermore. Median household income for the City of Pleasanton was slightly higher than that of the study area.

Table 2.1.4-4: Household Income		
Study Area	**Median Household Income**	**% of Households below Poverty Level**
Study Area	$83,652	3.11
Alameda County	$55,946	9.82
City of Dublin	$77,283	2.32
City of Pleasanton	$90,859	2.79
City of Livermore	$75,322	4.39
Source: U.S. Census Data, 2000.		

A total of 3.1 percent of households in the study area had incomes below the poverty level; Alameda County as a whole and the City of Livermore had higher percentages of low-income households while the cities of Dublin and Pleasanton had lower percentages of households below poverty level.

Community/Neighborhood Characteristics. I-580 within the proposed project limits, passes through portions of neighborhoods in the planning subareas of Alameda County and the cities of Dublin, Pleasanton, and Livermore. Planning areas and neighborhoods in the project vicinity are described below.

Alameda County Planning Areas. Alameda County is made up of 14 cities (Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City) and 6 unincorporated subareas (Castro Valley, Cherryland/Ashland/Hillcrest Knolls, Fairview, San Lorenzo, Balance Eden, and Livermore-Amador Valley [LAV] Unincorporated). The planning areas that would be most affected by the proposed project are in the cities of Dublin, Pleasanton, and Livermore, discussed below.

City of Dublin Planning Areas. The City of Dublin is divided into three planning areas: the Primary Planning Area, the Eastern Extended Planning Area, and the Western Extended Planning Area. The Eastern Extended Planning Area is approximately 4,200 acres located east of Camp Parks; it is the largest remaining area available for future development. An eastern extension of Dublin Boulevard will link the eastern planning area with the rest of the city.

City of Pleasanton Planning Areas. The City of Pleasanton Planning Area encompasses a 48,000-acre area within which the city designates the future uses of land that bear relation to its planning, even though much of this land is unincorporated and lies within the jurisdictional authority of Alameda County. The city's Sphere of Influence is located within the Planning Area and consists of a 42.2-square-mi (27,200-acre) area that represents the probable ultimate physical boundary and service area of the city. The Sphere of Influence contains unincorporated lands over which Alameda County has zoning control, as well as lands incorporated within the city limits. The incorporated city limits of Pleasanton include a 22.4-square-mi (14,300-acre) area over which Pleasanton exercises zoning control and police powers and provides public services such as water, sewer, and police and fire protection.

City of Livermore Planning Areas. As described in the *City of Livermore General Plan*, the Livermore Planning Area encompasses the 24-square-mile area within the city limits, as well as land in Alameda County extending up to 4 miles beyond the city limits to the north and south. While the Planning Area does not give the city any regulatory power, it signals to the county and to other nearby local and regional authorities that Livermore recognizes that development within this area has an impact on the future of the city. The Livermore Planning Area encompasses several planning subareas, including the Downtown Area, North Livermore, and South Livermore.

Impacts

Community character and 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. Because the I-580 Eastbound HOV Lane Project would be constructed within the existing highway median, the communities and neighborhoods adjacent to I-580 would not experience a disruption in cohesion; therefore, no mitigation measures are required.

2.1.4.2 Economic and Business Environment

Tax Revenue. In the fiscal year 2003-04, collected secured and unsecured property taxes for Alameda County were approximately $1.89 billion. The sales tax revenues for the cities of Dublin, Pleasanton, and Livermore were $13,745,326, $19,738,928, and $17,671,453, respectively.

Employment. Based on ABAG projections, the total number of jobs in Alameda County is expected to increase by 45 percent between 2000 and 2030. Job growth will be higher in the cities of Dublin and Livermore, which will experience growth rates of 166 percent and 99 percent, respectively, and lower in the City of Pleasanton, with an expected 34 percent growth rate.

Labor Force Characteristics. According to U.S. Census Bureau statistics, an estimated 17,058 individuals aged 16 and over were in the study area labor force in 2000. Of these, some 97 percent were employed, comparable to the percentages in Alameda County and the cities of Dublin, Pleasanton, and Livermore as a whole.

The composition of the study area labor force was similar to that of Alameda County and the cities of Dublin, Pleasanton, and Livermore as a whole, with the majority of jobs concentrated in the manufacturing; retail; and professional, scientific, management, administrative, and waste management sectors.

Major Employers. Table 2.1.4-5 lists major study area employers, based on information from the California Employment Development Department.

Table 2.1.4-5: Major Employers in the Study Area		
Employer Name	**Location**	**Industry**
Clorox Technical Center	Pleasanton	Commercial Research
People Soft, Inc.	Pleasanton	Computer Software Manufacturers
Sandia National Laboratories	Livermore	Laboratories
Valley Memorial Hospital	Livermore	Hospitals
Lawrence Livermore National Laboratory	Livermore	Laboratories
Source: America's Labor Market Information System (ALMIS) Employer Database, 2006.		

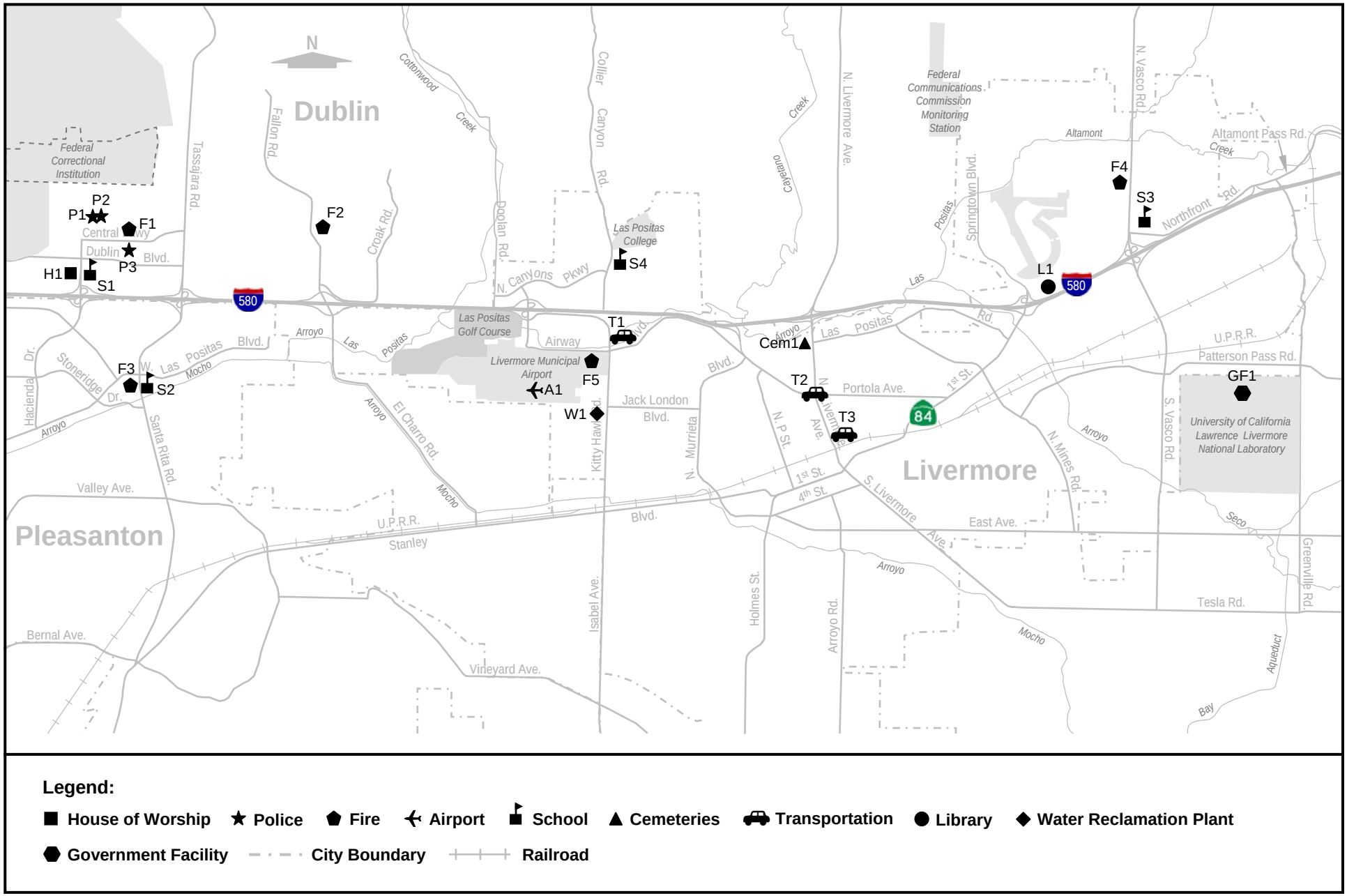
Economic Impacts

No relocations or displacements would be necessary for the proposed project; therefore, no loss of tax revenue would be recognized in Alameda County or the cities of Dublin, Pleasanton, or Livermore. Economic activity generated by the project during the construction phase is anticipated to benefit the region, as described in Section 2.4, Construction Phase Impacts.

2.1.4.3 Public Services and Facilities

Public services and facilities located in the study area, including police and fire; hospital and medical; education; cultural; recreational; religious; and water and sanitation are listed in Table 2.1.4-6 and shown in Figure 2.1.4-2.

Table 2.1.4-6: Public, Cultural, and Religious Facilities in the Study Area				
No.		**Facility**	**Location**	**Facility Type**
Cem 1	Liv	Roselawn Cemetery	1240 N. Livermore Avenue	Cemetery
F1	Dub	Fire Station #17	6200 Madigan Road	Fire Station
F2	Dub	Fire Station #18	4800 Fallon Road	Fire Station
F3	Pl	Fire Station #3	3200 Santa Rita Road	Fire Station
F4	Liv	Fire Station #8	5750 Scenic Avenue	Fire Station
F5	Liv	Fire Station # 10	330 Airway Boulevard	Fire Station
H1	Dub	Word of Faith Fellowship	5050 Hacienda Drive	House of Worship
L1	Liv	Livermore Public Library – Springtown Branch	998 Bluebell Drive	Library
W1	Liv	Livermore Water Reclamation Plant	101 W. Jack London Boulevard	Other Facilities
GF1	Liv	Lawrence Livermore National Laboratory	7000 East Avenue	Other Facilities
P1	Dub	Alameda County Santa Rita Jail	5325 Broder Boulevard	Police Station
P2	Dub	Federal Correctional Institution	5325 Broder Boulevard	Police Station
P3	Dub	California Highway Patrol	4999 Gleason Drive	Police Station
S1	Dub	Dougherty Elementary School	5301 Hibernia Drive	School
S2	Pl	Fairlands Elementary School	4151 Las Positas Boulevard	School
S3	Liv	Altamont Creek Elementary	6500 Garaventa Ranch Drive	School
S4	Liv	Las Positas College	3033 Collier Canyon Road	School
A1	Liv	Livermore Municipal Airport	636 Terminal Drive	Transportation
T1	Liv	BART Park-and-Ride	E. Airway Boulevard	Transportation
T2	Liv	Caltrans Park-and-Ride	Portola Avenue	Transportation
T3	Liv	Altamont Commuter Express Station	2418 Railroad Avenue	Transportation
Source: Parsons, 2006.				



Legend:

■ House of Worship ★ Police ⬟ Fire ✈ Airport School ▲ Cemeteries Transportation ● Library ◆ Water Reclamation Plant

⬢ Government Facility City Boundary Railroad

I-580 Eastbound HOV Lane Project

PUBLIC, CULTURAL, AND RELIGIOUS FACILITIES IN THE STUDY AREA

Figure 2.1.4-2

Affected Environment

Police and Fire. Police protection and traffic enforcement in the study area are provided by the Alameda County Sheriff's Department, CHP, and the police departments of the cities of Pleasanton, Dublin, and Livermore. A precinct station for the CHP is located in the study area at 4999 Gleason Drive in Dublin. The Alameda County Santa Rita Rehabilitation Center and Federal Correctional Institution are located within the study area at 5325 Broder Boulevard in Dublin.

The Alameda County Fire Department and the Livermore-Pleasanton Fire Department provide fire protection services and emergency medical rescue services for the study area. Five fire stations are located in the study area.

Schools. There are four public schools in the study area, including three elementary schools and Las Positas College. Public schools in the study area are within the jurisdiction of the unified school districts of Petaluma and Dublin, the Livermore Valley Joint Unified School District, and the Chabot-Los Positas College District.

Other Facilities. Other facilities in the study area include the Livermore Public Library – Springtown Branch, Livermore Water Reclamation Plant, and Lawrence Livermore National Laboratory.

Public Transportation Facilities. There are four public transportation facilities within Livermore in the study area: the Livermore Municipal Airport, Altamont Commuter Express Station, and two park-and-ride lots. The Dublin/Pleasanton BART Station and the Livermore Transit Center are adjacent to the study area.

Houses of Worship and Cemeteries. One house of worship, the Word of Faith Fellowship, and the Roselawn Cemetery are within the study area.

Public Services and Facilities Impacts

The long-term effect of the proposed project would be to reduce freeway traffic congestion and diversion of freeway traffic to local streets. This would enhance accessibility to the project area and benefit the communities identified in Section 2.1.4.3. None of the facilities discussed in Section 2.1.4.3 would be displaced by the proposed project.

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 runoff.

2.1.4.4 Avoidance, Minimization, and Mitigation Measures

The following measures are proposed to reduce temporary, construction-related impacts to area public services and facilities:

- The contractor would coordinate with local emergency service providers to develop detour plans, and
- Emergency service providers would be provided advance notice of ramp closures and detour routes.

2.1.4.5 Relocations

No residences or businesses would be relocated as a result of this project; therefore, no mitigation is proposed.

2.1.4.6 Environmental Justice

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.

Affected Environment

The project study area comprises a multi-ethnic population and a range of income groups. The ethnic minority and low-income populations in the study area are summarized in Table 2.1.4-7. The 12 U.S. Census block groups located adjacent to I-580 do not qualify as environmental justice communities based on ethnicity and/or income level of the populations within these groups. Low-income populations are defined as having a median household income at or below Department of Health and Human Services poverty guidelines.

Table 2.1.4-7: Minority and Low-Income Populations in the Study Area

	% Minority Population	% Low-Income Population
Study Area	32.68	2.75
Alameda County	59.06	10.86
City of Dublin	37.71	2.40
City of Pleasanton	23.01	5.95
City of Livermore	25.58	5.31

Source: U.S. Census Data, 2000.

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:

- The census tract block group contained 50 percent or more minority or low-income populations; or
- 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 the above criteria, the proposed project has no potential to cause disproportionately high and adverse effects on any minority or low-income populations.

Equity of Impacts and Benefits of the Project on Minority and Low-Income Populations

Transportation benefits of the proposed project would accrue to all area residents. Noise impacts would be distributed evenly through the project area, and they would not be concentrated in any area of minority or low-income residents. Noise abatement measures would be recommended wherever noise abatement criteria (NAC) are met, and they would be expected to prevent disproportionate impacts on any particular area.

2.1.5 Utilities/Emergency Services

2.1.5.1 Affected Environment

Utilities

Utility facilities in the immediate I-580 Eastbound HOV Lane Project vicinity include:

- Overhead electric, television, and telephone;
- Underground electric, gas, sanitary sewer, water, reclaimed water, television, and fiber optic; and
- Water, electric, telephone, and television on existing structures.

Pacific Gas & Electric (PG&E) is the primary provider of gas and electricity service in the project area. Southwestern Bell Company (SBC) and Sprint provide the local telephone service, and Comcast and TCI provide cable service. Both SBC and Comcast offer broadband Internet services over telephone phone and cable lines, respectively.

Water service is provided to cities in the project area as follows: to the City of Dublin by the Dublin San Ramon Services District; to the City of Pleasanton by the City of Pleasanton Water Division; and to the City of Livermore by the City of Livermore Water Resources Division and California Water Service. Stormwater and sanitary sewer systems are maintained locally. The City of Livermore also provides reclaimed water service.

Table 2.1.5-1 summarizes the existing utilities within the highway right-of-way and adjacent to the project corridor.

Emergency Services

Police protection and traffic enforcement in the project area are provided by the City of Dublin Police Department, City of Livermore Police Department, City of Pleasanton Police Department, Alameda County Sheriff's Department, and the CHP. The Dublin office of the CHP is located within the study area at 4999 Gleason Drive.

Fire protection service for the City of Dublin is provided by the Alameda County Fire Department. There are two Alameda County Fire stations near the project area at 6200 Madigan Road and 4800 Fallon Road. The Cities of Livermore and Pleasanton have consolidated their fire protection services. Of the 11 fire stations, including the fire headquarters, three stations are situated near the project area at the following locations: 3200 Santa Rita Road, Pleasanton; 5750 Scenic Avenue, Livermore; 330 Airway Boulevard, Livermore.

Table 2.1.5-2 summarizes the emergency services within the corridor.

Table 2.1.5-1: Existing Utilities

Loc No.	Facility			Existing Location			Risk		Relocate		Comments
	Description	Type	Dir	Route/Road	From	To	High	Low	Yes	No	
1	TV	STR	TR	I-580	H 263+55	H 263+55		X		X	Unknown size.
2	Electric	STR	TR	I-580	H 263+55	H 263+55		X		X	Unknown voltage.
3	Gas	UG	TR	I-580	H 255+75	H 255+90	X			X	300 millimeter (mm), PG&E.
4	Electric	OH	TR	I-580	H 255+60	H 255+80		X		X	21-kilovolt (kV), PG&E.
5	Water	UG	LE	EB On-Ramp, Pimlico Drive and Santa Rita Road	H 249+10	H249+20		X		X	300 mm, City.
6	Water	UG	LE	EB On-Ramp, Pimlico Drive & Santa Rita Road	H 249+10	H 249+45		X		X	675 mm, City.
7	Gas	UG	LE	EB On-Ramp, WB Diagonal Off-Ramp, Pimlico Drive and Santa Rita Road	H 249+10	H 250+25	X			X	400 mm, PG&E.
8	Electric	OH	TR	I-580 and Tassajara Road	H 248+85	H 249+60		X		X	Unknown voltage.
9	TV	OH	TR	I-580 and Tassajara Road	H 248+85	H 249+60		X		X	
10	Sewer	UG	TR	Santa Rita Road and EB On-Ramp	H 249+25	H249+25		X		X	200 mm.
11	Water	STR	TR	I-580	H 249+44	H 249+44		X		X	
12	Telephone	STR	TR	I-580	H 249+50	H 249+50		X		X	
13	TV	STR	TR	I-580 and EB Loop On-Ramp	H 249+50	H 249+50		X		X	
14	Gas	UG	TR	I-580	H 252+45	H 252+45	X			X	400 mm, PG&E.
15	Electric	OH	TR	I-580	H 246+00	H 246+18		X		X	21-kV, PG&E.
16	Electric	UNK	TR	I-580	H 246+00	H 246+17	UNK	UNK		X	21-kV, PG&E.
17	Gas	UG	PA	Pimlico Drive	H 246+10	H 158+00	X			X	400 mm, PG&E.
18	Water	UG	PA	Pimlico Drive	H 243+17	H 158+00		X		X	900 mm ACP, Zone 7.
19	Electric	UG	TR	I-580	H 238+47	H 238+42	UNK	UNK		X	21-kV, 3 – 700 XLP, Concrete 6-inch.
20	Electric	OH	TR	I-580	H 238+46	H 238+41		X		X	Unknown voltage.
21	Electric	OH	TR	I-580	H 215+98	H 215+98		X		X	12-kV, PG&E.
22	Sewer	UG	TR	I-580	H 208+05	H 208+05		X		TBD	18-inch Corrugated Metal Pipe (CMP) Casing; Unknown size.
23	Sewer	UG	TR	I-580	H 206+30	H 206+30		X		TBD	30-inch CMP Casing; Unknown size.

Table 2.1.5-1: Existing Utilities

Loc No.	Facility			Existing Location			Risk		Relocate		Comments
	Description	Type	Dir	Route/Road	From	To	High	Low	Yes	No	
24	Water	UG	LE & TR	I-580 and WB On-Ramp	H 203+60	H 203+60		X		X	Unknown size. Appears to provide service to Caltrans facilities at Airway Boulevard interchange.
25	Water	STR	TR	I-580	H 201+45	H 201+45		X		X	Unknown size.
26	Electric	UG	PA	Kitty Hawk Road	H 192+40	H 200+40	UNK	UNK		X	4-inch, 4W, PE 21-kV, Concrete Encapsulated.
27	Sewer	UG	PA	Kitty Hawk Road	H 192+40	H 200+40		X		X	12-inch ACP.
28	TV	UG	PA	Kitty Hawk Road	H 199+10	H 196+14		X		X	Unknown size.
29	Electric	UG	TR	I-580	H 196+84	H 196+81	UNK	UNK		X	3-600A EPR, Concrete Encapsulated-PE 6-inch 12-kV.
30	Electric	UG	TR	I-580	H 196+81	H 196+78	UNK	UNK		X	3-1100A EPR, Concrete Encapsulated-PE 6-inch 12-kV.
31	TV	UG	TR	I-580	H 196+13	H 196+13		X		X	8-inch Steel Casing with 4 - 2-inch Inside.
32	Gas	UG	TR	I-580	H 196+10	H 196+10	X			X	6 PLC in 24-inch Steel Casing.
33	Telephone	OH	TR	I-580	H 192+95	H 192+95		X		X	Unknown size.
34	Water	UG	TR	I-580	H 191+15	H 191+13		X		X	24-inch ACP, City, Casing; Unknown size.
35	Sewer	UG	TR	I-580	H 191+10	H 191+10		X		X	375 mm VCP.
36	Reclaimed Water	UG	TR	I-580	H 190+55	H 190+55		X		X	600 mm, City, PVC.
37	Water	UG	PA	I-580	H 191+15	H 190+61		X		X	24-inch CMP Casing, Unknown size.
38	Electric	UNK	TR	I-580	H 190+49	H 190+49	UNK	UNK		X	3-110A-EPR, Concrete Encapsulated-PE 6-inch.
39	Electric	OH	LE	I-580	H 181+20	H 184+35		X		X	21-kV, PG&E.
40	Electric	OH	TR	I-580	H 184+00	H 184+00		X		X	Unknown voltage.
41	Fiber Optic	UG	LE	I-580	H 182+30	H 182+90	TBD	TBD		X	Unknown size.
42	TV	UNK	PA	E. Airway Boulevard	H 184+00	H 180+95		X		X	Unknown size.
43	Sewer	UG	PA	E. Airway Boulevard	H 183+04	H 180+95		X		X	Unknown size.
44	Gas	UG	PA	E. Airway Boulevard	H 183+04	H 181+43	UNK	UNK		X	Unknown size or pressure.
45	Electric	UG	PA	E. Airway Boulevard	H 183+04	H 181+43	UNK	UNK		X	6-inch Concrete Encapsulated-PE.
46	TV	UG	PA	E. Airway Boulevard	H 180+95	H 176+89		X		X	Unknown size.
47	Gas	UG	TR	I-580	H 180+80	H 180+65	X			X	610 mm HPG, PG&E main line.
48	Electric	UG	PA	E. Airway Boulevard	H 180+30	H 176+01	UNK	UNK		X	4-inch Concrete Encapsulated-PE.

Table 2.1.5-1: Existing Utilities

Loc No.	Facility			Existing Location			Risk		Relocate		Comments
	Description	Type	Dir	Route/Road	From	To	High	Low	Yes	No	
49	Sewer	UG	LE	I-580	H 175+30	H 176+00		X		X	1,050 mm VCP, City.
50	Sewer	UG	PA	I-580	H 173+80	H 175+30		X		X	1,050 mm VCP.
51	Sewer	UG	LE	I-580	H 172+45	H 173+80		X		X	1,050 mm VCP.
52	Electric	OH	LE	I-580	H 173+40	H 174+95		X		X	21-kV, PG&E.
53	Electric	OH	PA	I-580	H 174+95	H 171+60		X		X	21-kV, PG&E.
54	Electric	OH	LE	I-580	H 171+60	H 172+55		X		X	21-kV, PG&E.
55	Fiber Optic	UG	LE	I-580	H 173+50	H 174+95	TBD	TBD		X	Unknown size.
56	Fiber Optic	UG	PA	I-580	H 172+55	H 173+50	TBD	TBD		X	Unknown size.
57	Fiber Optic	UG	LE	I-580	H 171+70	H 172+55	TBD	TBD		X	Unknown size.
58	TV	UG	PA	E. Airway Boulevard	H 176+95	H 182+60		X		X	Unknown size, Cable TV.
59	Fiber Optic	UG	PA	E. Airway Boulevard	H 176+95	H 182+60		X		X	Unknown size, Comcast.
60	Fiber Optic	UG	PA	E. Airway Boulevard	H 176+95	H 182+60		X		X	Unknown size, AT&T.
61	Electric	UG	PA	E. Airway Boulevard	H 180+40	H 178+88	UNK	UNK		X	4-inch Concrete Encapsulated-PE.
62	Sewer	UG	LE	I-580	H 175+99	H 175+26		X		X	Unknown size.
63	Sewer	UG	PA	I-580	H 175+26	H 173+78		X		X	Unknown size.
64	Sewer	UG	LE	I-580	H 173+78	H 172+46		X		X	Unknown size.
65	Sewer	UG	PA	I-580	H 172+46	H 146+55		X		X	Unknown size.
66	Electric	OH	LE	I-580	H 162+75	H 163+75		X		X	21-kV, PG&E.
67	Electric	OH	TR	I-580	H 162+75	H 162+64		X		X	Unknown voltage; Connects to a 21-kV, PG&E.
68	Sewer	UG	TR	I-580	H 147+41			X		X	Unknown size.
69	Electric	OH	LE	I-580	H 141+38	H 140+75		X		X	21-kV, PG&E; crosses I-580 at a high skew angle.
70	Electric	OH	PA	Southfront Road	H 130+90	H 117+05		X		X	21-kV, PG&E.
71	Gas	UG	PA	Southfront Road	H 130+90	H 117+60	UNK	UNK		X	Concrete Encapsulated PE 6-inch.
72	Sewer	UG	PA	Southfront Road	H 130+90	H 117+60		X		X	Unknown.
73	Gas	UG	TR	I-580	H 129+18	H 129+16	X			X	24-inch Steel Casing; Unknown size.
74	Electric	UG	PA	Southfront Road	H 117+60	H 125+85	UNK	UNK		X	Unknown voltage.
75	Electric	UG	TR	I-580	H 119+68	H 119+63	UNK	UNK		X	2 runs; 3-600A EPR Concrete Encapsulated-PE; 2 – 4-inch Parallel.
76	Gas	UG	TR	I-580	H 119+65	H 119+61	X			X	16-inch Steel Casing; Unknown size.

Table 2.1.5-1: Existing Utilities

Loc No.	Facility			Existing Location			Risk		Relocate		Comments
	Description	Type	Dir	Route/Road	From	To	High	Low	Yes	No	
77	Electric	OH	LE	I-580	H 116+40	H 117+05		X		X	12-kV, PG&E.
78	Water	UG	TR	I-580	H 117+68	H 117+68		X		X	18-inch pipeline with 24-inch Casing.
79	TV	STR	TR	I-580	H 116+46	H 116+46		X		X	Unknown size.
80	Gas	UG	LE	I-580	H 114+96	H 114+31	UNK	UNK		X	Unknown size or pressure; crosses I-580 at a high skew.
81	Sewer	UG	PA	Southfront Road	H 114+80	H 100+69		X		X	Unknown size.
82	Gas	UG	PA	Southfront Road	H 114+80	HE 98+40	UNK	UNK		X	Unknown size or pressure.
83	Electric	OH	PA	Southfront Road	H 114+80	H 100+90		X		X	Unknown size.
84	Electric	OH	TR	I-580	H 109+50	H 109+50		X		X	12-kV PG&E.
85	Electric	UG	TR	I-580	H 109+30	H 109+30		X		X	6-inch Concrete Encapsulated 21-kV.
86	Gas	UG	TR	I-580	H 109+15	H 109+15	X			X	10-inch and 30-inch Steel Casing; Unknown size.

LEGEND:
LE Longitudinal Encroachment – Parallel to and encroaching on the right-of-way
OH Overhead Utility
PA Parallel Direction – Parallel to and outside of the right-of-way
STR Utility on Structure
TBD To be Determined
TR Transverse Direction – Crosses I-580
UG Underground Utility
UNK Unknown

NOTE: List includes only a portion of the utilities outside of the highway right-of-way.

Table 2.1.5-2: Existing Emergency Services in the Project Area					
Loc. No.	**Name**	**Address**	**Loc. No.**	**Name**	**Address**
Police Stations			**Fire Stations**		
PD1	CHP	4999 Gleason Road, Dublin	FD1	Alameda County Fire	4800 Fallon Drive, Dublin
			FD2	Alameda County Fire	6200 Madigan Road
			FD3	Livermore – Pleasanton Fire	3200 Santa Rita Road, Pleasanton
			FD4	Livermore – Pleasanton Fire	5750 Scenic Avenue, Livermore
			FD5	Livermore – Pleasanton Fire	330 Airway Boulevard, Livermore
Source: Parsons, 2006					

2.1.5.2 Impacts

Of the known existing utilities listed in Table 2.1.5-1, no utility relocation work is expected. However, where existing utility crossings occur at locations of proposed mainline widening (to the outside) due to the HOV and auxiliary lane additions, utility casings may have to be extended. Utility conflicts may occur where retaining walls are proposed, depending on the location of the utility line in relation to the retaining wall footings. Table 2.1.5-1 indicates the potential for utility casing extensions for two sewers between El Charro Road and Airway Boulevard (Line Numbers 22 and 23), and for one gas line between Vasco Road and Commerce Way (Line Number 86). Potential impacts to two sewers from the proposed retaining wall are also noted (Line Numbers 22 and 23).

Temporary impacts to emergency services would occur during the construction phase, and they are discussed in Section 2.1.5, Utilities/Emergency Services.

2.1.5.3 Avoidance, Minimization, and Compensation Measures

Design, construction, and inspection of required utility work would be completed in accordance with Caltrans statutes. Where feasible, relocations would be undertaken in advance of project construction. Caltrans and ACCMA would coordinate with the affected service provider in each instance to ensure that all utility work is performed in accordance with appropriate requirements and criteria.

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 include planning for utility re-routes, identification of any other potential conflicts, and formulation of strategies for overcoming problems that may arise to ensure minimum disruption of utility service or operation during the utility work and project construction.

Measures to avoid or minimize disruptions to utilities and emergency services during the construction phase are discussed in Section 2.4.3, Utilities/Emergency Services.

2.1.6 Traffic and Transportation/Pedestrian and Bicycle Facilities

Most of the information in this section is from the *Traffic Operations Technical Memorandom, I-580 Eastbound HOV Lane Project* (Parsons, 2006e).

The project would not affect any existing pedestrian or bicycle facilities, nor would it create any new pedestrian or bicycle facilities since all of the construction would be in the median of I-580.

2.1.6.1 Affected Environment

The study area for this project is the I-580 corridor, from east of the Greenville Road interchange (KP R12.6 [PM 7.8]) to Hacienda Drive (KP 30.7 [PM 19.1]).

Traffic Volumes

The average annual daily traffic volume on I-580 near Greenville Road was approximately 146,000 vehicles in 2004. The average annual daily traffic volume on I-580 near Hacienda Drive was about 200,000. Trucks represented between 10 and 12 percent of the total daily traffic volumes.[9] On weekdays, I-580 is over capacity in the primary commute directions, westbound in the morning peak hour and eastbound in the evening peak hour.

Existing Traffic Conditions

Level of Service

Level of service (LOS) is a qualitative measure used to describe operational conditions within a traffic stream, generally in terms of service measures such as speed and travel time, freedom to maneuver, traffic interruptions and delay, and comfort and convenience. Six levels of service are defined by the 2000 Highway Capacity Manual (HCM) (HCM, 2000). A letter designates each level of service—from LOS A (indicating traffic flows with little or no delay) to LOS F (indicating over-saturated conditions where traffic flow exceeds freeway capacity, generally resulting in long queues and delays). The LOS criteria for freeways are defined by the density of passenger vehicles per lane mile, as presented in Table 2.1.6-1.

Existing conditions were defined by traffic counts and speed measures during 2001 and 2002.

Eastbound AM

No major operational problems exist in the eastbound (non-peak) direction during the AM peak period. Study freeway segments usually operate at an acceptable LOS D or better, although the short weave segment between the Foothill Boulevard on-ramp and I-680 off-ramp typically operates at a slightly reduced travel speed. Travel time over the 17.7 km (11.0 mi) from Hopyard Road to Greenville Road is approximately 10 minutes, with almost no delay and an average travel speed of 103 km/h (64 mph).

[9] http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/index.htm, 2004aadt.xls and 2004truck.xls.

Table 2.1.6-1: LOS Criteria for Freeway Basic Segments	
LOS—Description	**Density Range (pc/mi/ln)**
A—Describes free-flow operations. Free-flow speeds prevail.	0–11
B—Represents reasonably free-flow, and free-flow speeds are maintained.	>11–18
C—Provides for flow with speeds at or near the free-flow speed of the freeway.	>18–26
D—Describes the level at which speeds begin to decline slightly with increasing flows, and density begins to increase somewhat more quickly.	>26–35
E—At this level's highest density value, it describes operation is at capacity of the freeway.	>35–45
F—Describes breakdown in vehicular flow and queues forming behind the breakdown points.	>45
pc/mi/ln passenger car per mile per lane Source: Transportation Research Board, Highway Capacity Manual 2000.	

Eastbound PM

Eastbound is the primary direction of travel in the evening. The eastbound evening peak period begins around 3:00 PM and continues until 7:00 PM. The peak hour used as the basis for existing conditions is from 5:00 PM to 6:00 PM. There is heavy congestion and queuing from Hopyard Road to El Charro Road. The average travel speed in this segment is approximately 16 km/h (10 mph), and traffic currently operates at LOS F. The primary bottleneck occurs at the Santa Rita Road interchange. West of El Charro Road, the majority of the freeway segments in the study area operate at or near capacity (LOS E or better), with the exception of the segment from the First Street on-ramp to the Vasco Road off-ramp, which operates at LOS F. The average speed on this segment is approximately 48 km/h (30 mph). Travel time from Hopyard Road to Greenville Road is approximately 29 minutes, which corresponds to an average vehicle speed of 36 km/h (23 mph) and an average delay per vehicle of approximately 19 minutes.

Subsequent to the initiation of project studies, changes were made to the roadway within the study limits. Ramp metering was implemented and is now operational in the eastbound direction at the Hopyard Road, Hacienda Drive, and Santa Rita Road interchanges. According to the *I-580 Ramp Metering "Before" and "After" Evaluation* (Kimley-Horn and Associates, Inc., 2005), travel times along the I-580 mainline from the I-580/I-680 interchange to North Flynn Road decreased by less than 1 minute in the evening peak period following the implementation of ramp metering.

Westbound AM

During the morning peak hour, traffic is predominately westbound. Two distinct morning peak periods are present. The first peak hour occurs around 5:00 AM, when traffic from the Central Valley passes through the corridor. During this peak hour, the corridor carries in excess of 7,000 westbound vehicles per hour (vph), and there is relatively little traffic entering I-580 from within the Tri-Valley area. A second peak-hour condition occurs around 7:00 AM, when more traffic enters the roadway via local ramps. Due to the ramp activity, the corridor has less vehicular throughput and speeds decline. This second peak hour, from 7:00 AM to 8:00 AM, is the basis for the operational analysis of existing conditions discussed below.

The freeway section between the Vasco Road off-ramp and the Airway Boulevard southbound on-ramp currently operates at LOS E or F. West of the Airway Boulevard westbound on-ramp, I-580 operates at LOS D or better. Travel time is approximately 21 minutes over the 17.9 km (11.1 mi) from Greenville Road to Hopyard Road, with an average delay per vehicle of approximately 11 minutes as a result of the very low travel speed between Vasco Road and Airway Boulevard.

Westbound PM

No major operational deficiencies exist in the westbound direction during the PM peak period. All freeway segments in the study area operate at an acceptable LOS D or better. Travel time from Hopyard Road to Greenville Road is approximately 10 minutes with virtually no delay; average speed per vehicle is 103 km/h (64 mph).

Accident Rates

Accident data for eastbound I-580 from east of the Greenville Road overhead to west of Hacienda Drive, KP R12.6 to 30.7 (PM R7.8 to 19.1), were obtained and reviewed for the 3-year period from July 1, 2002, through June 30, 2005. Table 2.1.6-2 summarizes the reported east and westbound mainline accidents, calculated accident rates, and average rates. The accident rates for the project area are below the reported average rates for similar facilities within the state.

Table 2.1.6-2: Eastbound Mainline Accident Rates – July 1, 2002 through June 30, 2005

Post Mile	Description	Number of Accidents			MVM	Actual Accident Rate (Accidents/MVM)			Average Accident Rate (Accidents/MVM)		
		Total	F	I		F	F+I	Total	F	F+I	Total
R7.9 19.1	East of Greenville Road Overhead West of Hacienda Drive	746	2	230	1072.62	0.002	0.22	0.70	0.005	0.31	0.95

Note: **Bold underlined numbers** reflect higher-than-average accident rates.
Key: F = Fatal; I = Injury; MVM = Million Vehicles Miles

Source: Caltrans, 2006

Most of the accidents are associated with congested conditions. Of the accidents reported, 25.7 percent involved stopped vehicles and 23.9 percent involved slowing or stopping vehicles, and 19.0 percent were associated with changing lanes. Although 83.6 percent of the accident records indicated that there was no apparent associated factor, 11.3 percent identified stop and go traffic, 4.3 percent speeding, and 2.4 percent due to driver inattention as associated factors. The types of accidents involved also are indicative of congested conditions; 61.0 percent involved rear end and 19.4 percent involved sideswipe accidents, and 14.7 percent involved hit objects, a type of accident that occurs under very low volume conditions. Almost 90 percent of the accidents were attributable to speeding (54.3 percent), other violations (20 percent) and improper turns (14.1 percent). Fifty-six percent of the accidents occurred during the afternoon peak period, 3:00 p.m. to 7:00 p.m.

Weather or unusual roadway conditions do not appear to have contributed significantly to the accident rates in this segment. Of the 746 eastbound accidents on I-580 within the three-year period, 2 fatal accidents and 230 injury accidents were reported. Trucks represented 19.7 percent of the vehicles involved in accidents.

Table 4-3 summarizes the ramp accidents in the eastbound direction for ramps that would be re-aligned as part of this project. No fatal accidents were reported on these ramps within the three-year period studied. Only the eastbound on-ramp from southbound Hacienda Drive had rates above the state-wide averages, which had a total of three accidents, all of which are attributed to congested conditions and speeding.

The two reported accidents for the Greenville Road off-ramp occurred on Greenville Road in the vicinity of the ramp terminal intersection and involved vehicles making left turns onto the ramp. One of these accidents was a single vehicle accident resulting in an overturned vehicle with injuries. The other accident involved two vehicles sideswiping each other as they made the turn from separate lanes. Weather or unusual roadway conditions do not appear to have contributed significantly to the accident rates in this segment.

Table 2.1.6-3: Ramp Accident Rates − July 1, 2002 through June 30, 2005

Post Mile	Description	Number of Accidents			MV	Actual Accident Rate (Accidents/MV)			Average Accident Rate (Accidents/MV)		
		Total	F	I		F	F+I	Total	F	F+I	Total
R8.521	EB on-ramp from Greenville Road	0	0	0	3.73	0.000	0.00	0.00	0.002	0.20	0.60
R8.661	EB off-ramp to Greenville Road	2	0	1	3.84	0.000	0.26	0.58	0.005	0.39	1.15
18.851	EB on-ramp from SB Hacienda Drive	3	0	1	3.73	0.000	**0.27**	**0.81**	0.001	0.24	0.70

Note: **Bold underlined numbers** reflect higher-than-average accident rates.
Key: F = Fatal; I = Injury; MV = Million Vehicles

Source: Caltrans, 2006

Transit/Park-and-Ride Facilities

Various transit operators serve the project area. The main transit operator, WHEELS, provides local bus service throughout Dublin, Livermore, and Pleasanton. In conjunction with WHEELS, Direct Access Responsive Transit (DART) service provides more flexible routing and fewer stops for passengers with a specific drop-off area not served by WHEELS. Other local transit agencies providing commute services in the project area are Greyhound, Max Commuter Express, San Joaquin Regional Transit District (SJRTD)/SMART Bus, Tri-Delta Transit, and Amtrak California.

The Pleasanton Altamont Commuter Express (ACE) Station and the Livermore Transit Center (LAVTA) serve as the major transfer points for various transit operators in Dublin, Livermore, and Pleasanton. The Pleasanton ACE Station provides service for the ACE train and shuttles. The ACE shuttles are free, and schedules and routes among the BART, County Connection, and WHEELS are

coordinated with the ACE train schedule. The Livermore Transit Center provides transfer or connections for WHEELS, ACE Train, Amtrak California, and Greyhound.

Two park-and-ride lots are identified within the project area. A BART Park-and-Ride Lot is adjacent to I-580 at Airway Boulevard and Rutan Drive, and a Caltrans Park-and-Ride Lot is further southeast at Portola Avenue and Alviso Place. Park-and-ride lots promote commute alternatives to save time, money, and air quality by encouraging commuters to park their vehicles and use transit. As an incentive to carpool, parking is free for commuters who carpool/vanpool, and the park-and-ride lot serves as a convenient meeting place. Also, park-and-ride lots provide lockers for bike commuters. There is a BART parking lot adjacent to the Hopyard interchange that provides parking for the BART Dublin Station.

Weigh Facilities

There is a weight/inspection facility on both sides of I-580 between the Vasco Road and Greenville Road interchanges. The weigh stations are operated by the CHP.

Pedestrian and Bicycle Facilities

Of the ten major interchanges within the project vicinity, five locations currently have adequate pedestrian facilities at and near the undercrossing or overcrossing per Caltrans standard. Although there are no existing pedestrian facilities at the El Charro interchange, the Fallon Road/El Charro overcrossing structure will be widened in the future (by others) to accommodate pedestrian needs. Current project scope for the Fallon Road/El Charro Road interchange project includes the addition of sidewalks, crosswalks, and wheelchair ramps along the east side of the interchange adjacent to the northbound traveled way. The future Isabel Avenue interchange project (by others) will also provide pedestrian system improvements. It is anticipated that these improvements will be completed prior to the I-580 Eastbound HOV Lane Project.

Within the study area, Vasco Road is the only interchange that has a bikeway facility (Class II) that allows north-south access across I-580. Most bicycle facilities within the project vicinity begin and end south of I-580, where most of the major activity centers are located.

2.1.6.2 Impacts

Traffic Forecasts

Travel demand forecasts were prepared for the Build and No-Build Alternatives for Years 2005 (base year), 2010, and 2030. The analysis used the ACCMA I-580 HOV travel demand model that was updated to ABAG 2003 Projections for Year 2030 conditions. The model selection followed a rigorous review of all available traffic models that cover the Tri-Valley area. The forecasting results include traffic volumes for the I-580 freeway mainline, ramps, and turning movements at key adjacent intersections for 2005, 2010, and 2030. The study intersections generally consist of the ramp junctions plus adjacent signalized (or potentially signalized) intersections near the ramp junctions. The forecasting analysis includes results for both AM and PM peak hours.

The study area is the I-580 corridor, from east of the Foothill Road interchange (PM 21.197, west of the western project limit) to east of the Greenville Road interchange (PM 8.265). Since traffic

volumes on I-580 are influenced by travel east and west of these locations, the study model includes eastbound traffic that is generated from east of Altamont Pass (represented by San Joaquin and other counties) and traffic from all nine Bay Area counties for travel to the west.

For forecast documentation details, please refer to the *Traffic Operations Technical Memorandum, I-580 Corridor Eastbound HOV Lane Project* (Parsons, 2006e). The *Traffic Operations Memorandum* reports travel time on I-580 between Foothill Road and Flynn Road. This environmental document examines I-580 travel times between Hopyard Road and Greenville Road, closer to the project limits; hence, travel times reported in this document are less than the travel times given in the *Traffic Operations Memorandum*.

Analysis of Alternatives

The focus of the operational analysis was to assess the benefits of adding an eastbound HOV lane on I-580. CORSIM (CORridor SIMulation) was used to analyze future traffic conditions. CORSIM is a comprehensive traffic modeling and simulation software package funded by FHWA. CORSIM has capabilities that make it very suitable for elements of this project, such as freeway HOV lanes, freeway ramp metering, origin-destination assignments, the effect of grades, and the location of guide signs. To utilize the software, the highway network was coded and the CORSIM model was calibrated to existing conditions based on field measurements. The calibration goal was to replicate local driving behavior and traffic characteristics to offer a realistic comparison for the observed traffic counts and travel time and speed data.

Since queuing and congestion on I-580 typically occurs during a peak period of 2 hours or more, the simulation was run for 2 hours with the same demand volume input and using the second hour of the output as the final result. A “flat peak” of 2 hours serves as a relatively conservative approach for the evaluation of future operational conditions. Operational analyses were conducted for both 2010 and 2030 forecast years.

No-Build Alternative

The No-Build Alternative includes the following projects (see Section 1.1.3, Related Projects) that are expected to be in place by 2010:

- Fallon Road/El Charro Road interchange: modify existing spread diamond type interchange to a partial cloverleaf-type with loop on-ramps in both directions.
- New Isabel Avenue interchange (Phase I): construct proposed interchange as a partial cloverleaf-type with loop on-ramps in both directions.
- Portola Avenue interchange: remove the interchange at Portola Avenue.
- I-680 interchange to Greenville Road interchange: meter all on-ramps (the metering rate for this study was reviewed by Caltrans).
  - Metering rate for I-680 system interchange on-ramps – 900 vph per lane.
  - Metering rate for all other service interchange on-ramps – 600 vph per ramp plus HOV volumes.

- HOV bypass lanes: add HOV bypass lanes at locations referenced in the Caltrans Ramp Metering PSR.
- Airway Boulevard interchange to Isabel Avenue interchange: add auxiliary lanes in the eastbound direction between the First Street interchange and Vasco Road interchange and in the westbound direction between the El Charro Road interchange and Santa Rita Road interchange.

By 2030, the following additional improvements are assumed to be in place:

- First Street interchange: modify existing configuration to a partial cloverleaf-type with loop on-ramps for both directions.
- Vasco Road interchange: modify existing configuration to a partial cloverleaf-type with loop on-ramps for both directions.
- Greenville Road interchange: modify existing hook-ramp configuration to a modified diamond-type, with eastbound on-ramp as a loop ramp.
- Route 84 Expressway Widening Project.

2010 No-Build Eastbound AM Peak Hour

The eastbound mainline would operate at acceptable LOS D or better (Table 2.1.6-4). The average travel time from the Hopyard Road loop on-ramp to the Greenville Road off-ramp would be 10.9 minutes, with less than 1 minute of delay. The average speed per vehicle would be 98 km/h (61 mph).

2010 No-Build Eastbound PM Peak Hour

Eastbound is the peak direction of travel during the PM peak period. Under No-Build Conditions, the eastbound mainline would operate at LOS F from the Hacienda Drive off-ramp to the Airway Boulevard off-ramp, and the average speed would vary from 21 km/h (13 mph) to 63 km/h (39 mph) (Table 2.1.6-4). This bottleneck would be further impacted by the on-ramp traffic from the El Charro Road interchange. With congested conditions between the Hacienda Drive and Airway Boulevard interchanges, the downstream freeway segments would operate at LOS D or better, except for the segment between the Isabel Avenue diagonal on-ramp and the Livermore Avenue off-ramp, which would operate near capacity at LOS E, primarily due to the heavy on-ramp demand from Isabel Avenue. The average travel time per vehicle through this congested section from the Hopyard Road southbound on-ramp to Greenville Road off-ramp would be 19.6 minutes, with an average 9.2 minutes of delay. The average traffic speed would be 54 km/h (34 mph).

Table 2.1.6-4: I-580 2010 No-Build Eastbound AM and PM Peak Hours

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	6,991	52	D	7,984	58	D
I-680 off-ramp to Hopyard Road off-ramp	4,987	60	C	6,164	53	D
Hopyard Road off-ramp to I-680 SB on-ramp	4,278	60	C	5,135	49	D
I-680 SB on-ramp to I-680 NB on-ramp	5,662	59	C	6,602	42	D
I-680 NB on-ramp to Hopyard Road SB on-ramp	6,740	61	C	7,579	41	D
Hopyard Rd SB on-ramp to Hopyard Road NB on-ramp	7,397	58	C	8,180	39	D
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	7,596	61	B	8,408	32	E
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	6,300	62	C	6,888	19	F
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	6,449	60	B	6,974	14	F
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	6,619	58	C	7,545	13	F
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	5,618	61	C	6,495	14	F
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	5,833	59	C	7,081	16	F
Santa Rita Road NB on-ramp to El Charro Road off-ramp	6,290	61	C	7,842	17	F
El Charro Road off-ramp to El Charro Road SB on-ramp	6,002	60	C	7,701	25	F
El Charro Road SB on-ramp to El Charro Road NB on-ramp	6,328	56	D	8,162	26	F
El Charro Road NB on-ramp to Airway Boulevard off-ramp	6,539	58	D	8,253	39	F
Airway Boulevard off-ramp to Airway Boulevard on-ramp	5,271	61	C	7,190	56	D
Airway Boulevard on-ramp to Isabel Avenue off-ramp	5,470	61	B	7,762	59	D
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	4,409	62	B	6,616	60	D
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	4,428	62	B	6,641	53	D
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	5,376	61	C	8,011	51	E
Livermore Avenue off-ramp to Livermore Avenue on-ramp	4,654	62	C	6,958	57	D
Livermore Avenue on-ramp to First Street off-ramp	4,978	62	C	7,524	59	D
First Street off-ramp to First Street on-ramp	4,194	62	B	6,984	60	D
First Street on-ramp to Vasco Road off-ramp	4,501	61	B	7,753	58	D
Vasco Road off-ramp to Vasco Road on-ramp	2,382	64	A	6,276	61	C
Vasco Road on-ramp to Greenville Road off-ramp	2,541	64	A	6,810	61	C
Greenville Road off-ramp to Greenville Road on-ramp	2,043	64	A	6,301	60	D
Greenville Road on-ramp to North Flynn Road	2,239	61	A	7,035	51	D

2010 No-Build Westbound AM Peak Hour

Westbound is the peak traffic direction during the AM peak period. The westbound mainline segment between the Hacienda Drive off-ramp and I-680 off-ramp would operate at LOS F due to heavy off-ramp diverging effects and inadequate capacity of the loop ramp from I-580 westbound to I-680 southbound (Table 2.1.6-5). There would also be delays on the on-ramps at the First Street, Livermore Avenue, Isabel Avenue, Airway Boulevard, and Tassajara Road interchanges because of demand volumes higher than the ramp metering rates. The average travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 13.8 minutes, with 3.5 minutes of delay; the average speed would be 78 km/h (48 mph).

2010 No-Build Westbound PM Peak Hour

Westbound is the off-peak direction of travel during the PM peak period. In the westbound direction, all of the freeway segments would operate at LOS C or better and would operate near a free-flow speed of 96 to 105 km/h (60 to 65 mph) (Table 2.1.6-5) in 2010. From the Hopyard Road SB on-ramp to westbound I-580 to the I-680 connectors, the free-flow speed would drop due to the influence of the system interchange and the weaving that would occur as traffic maneuvers between the mainline and auxiliary lanes. Travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 10.7 minutes, with less than a minute of delay; the average speed over this stretch would be 100 km/h (62 mph).

Table 2.1.6-5: I-580 2010 No-Build Westbound AM and PM Peak Hours

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
North Flynn Road to Greenville Road off-ramp (begin Network)	7,731	60	D	2,014	64	A
Greenville Road off-ramp to Greenville Road on-ramp	6,361	60	D	1,922	64	A
Greenville Road on-ramp to Vasco Road off-ramp	6,698	58	C	2,296	63	A
Vasco Rd off-ramp to Vasco Rd on-ramp	5,848	60	C	2,146	63	A
Vasco Road on-ramp to First Street off-ramp	6,786	53	D	3,497	59	B
First Street off-ramp to First Street on-ramp	5,870	60	C	2,974	63	B
First Street on-ramp to Livermore Avenue off-ramp	6,552	59	D	3,670	62	B
Livermore Avenue off-ramp to Livermore Avenue on-ramp	6,348	60	D	3,362	63	B
Livermore Avenue on-ramp to Isabel Avenue off-ramp	7,018	55	D	4,016	62	B
Isabel Avenue off-ramp to Isabel Avenue NB on-ramp	5,594	61	C	3,057	63	B
Isabel Avenue NB on-ramp to Isabel Avenue SB on-ramp	6,243	57	D	3,714	60	B
Isabel Avenue SB on-ramp to Airway Boulevard off-ramp	6,396	61	C	3,812	63	B
Airway Boulevard off-ramp to Airway Boulevard NB on-ramp	6,120	60	C	3,438	63	B
Airway Boulevard NB on-ramp to Airway Boulevard SB on-ramp	6,785	54	D	3,975	60	B
Airway Boulevard SB on-ramp to Fallon Road off-ramp	7,446	60	C	4,629	63	B
Fallon Road off-ramp to Fallon Road NB on-ramp	6,658	60	D	4,285	62	B
Fallon Road NB on-ramp to Fallon Road SB on-ramp	6,842	54	D	4,388	62	B
Fallon Road SB on-ramp to Tassajara Road off-ramp	6,961	60	C	4,528	62	B
Tassajara Road off-ramp to Tassajara Road NB on-ramp	6,324	60	D	3,933	63	B
Tassajara Road NB on-ramp to Tassajara Road SB on-ramp	6,941	58	C	4,533	61	B
Tassajara Road SB on-ramp to Hacienda Drive off-ramp	7,557	57	C	4,904	61	B
Hacienda Drive off-ramp to Hacienda Drive NB on-ramp	6,718	35	F	4,508	62	C
Hacienda Drive NB on-ramp to Hacienda Drive SB on-ramp	6,889	27	F	5,216	62	B
Hacienda Drive SB on-ramp to Hopyard Road off-ramp	7,013	17	F	5,839	61	C
Hopyard Road off-ramp to Hopyard Road NB on-ramp	5,936	11	F	5,134	62	C
Hopyard Road NB on-ramp to Hopyard Road SB on-ramp	6,334	11	F	5,780	60	C
Hopyard Road SB on-ramp to I-680 off-ramp	6,948	10	F	6,440	56	C
I-680 off-ramp to I-680 NB on-ramp	4,757	50	D	3,999	61	C
I-680 NB on-ramp to I-680 SB on-ramp	5,540	59	C	5,062	61	C
I-580 WB west of I-680 SB on-ramp	6,733	60	C	6,576	60	C

2030 No-Build Eastbound AM Peak Hour

Eastbound is the off-peak direction during the AM peak -hours. On the I-580 segment just west of the I-680 off-ramp, however, eastbound traffic would operate at LOS F due to heavy off-ramp diverging effects at the system interchange (Table 2.1.6-6). There also would be congestion between the El Charro Road on-ramp and the Airway Boulevard off-ramp because of heavy on-ramp traffic volumes merging from the El Charro Road loop ramp and diagonal ramp and the high off-ramp demand at Airway Boulevard. The average travel time from the Hopyard Road southbound on-ramp to the Greenville Road off-ramp would be approximately 12 minutes, with just under 2 minutes of delay; the average speed would be 88 km/h (55 mph). Figure 1.2-1 shows the expected speed profile.

Table 2.1.6-6: I-580 2030 No-Build Eastbound AM and PM Peak Hours

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	7,730	29	F	6,934	13	F
I-680 off-ramp to Hopyard Road off-ramp	5,767	57	C	5,347	11	F
Hopyard Road off-ramp to I-680 SB on-ramp	4,831	59	C	4,530	11	F
I-680 SB on-ramp to I-680 NB on-ramp	6,437	57	C	5,810	7	F
I-680 NB on-ramp to Hopyard Road SB on-ramp	7,536	60	C	6,209	6	F
Hopyard Road SB on-ramp to Hopyard Road NB on-ramp	8,192	58	C	6,414	5	F
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	8,401	60	C	6,781	5	F
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	7,240	61	C	5,777	10	F
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	7,388	57	C	5,998	10	F
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	7,803	50	C	6,638	10	F
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	6,888	60	D	5,445	9	F
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	7,101	57	D	6,083	10	F
Santa Rita Road NB on-ramp to El Charro Road off-ramp	7,561	60	C	7,041	11	F
El Charro Road off-ramp to El Charro Road SB on-ramp	7,084	50	E	6,612	13	F
El Charro Road SB on-ramp to El Charro Road NB on-ramp	7,730	32	F	6,840	15	F
El Charro Road NB on-ramp to Airway Boulevard off-ramp	7,991	38	F	7,271	32	F
Airway Boulevard off-ramp to Airway Boulevard on-ramp	6,333	57	D	6,598	55	D
Airway Boulevard on-ramp to Isabel Avenue off-ramp	6,537	60	C	7,162	50	D
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	5,335	61	C	6,595	48	E
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	5,437	60	C	6,677	43	E
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	6,581	59	D	8,119	58	D
Livermore Avenue off-ramp to Livermore Avenue on-ramp	5,512	61	C	7,100	43	E
Livermore Avenue on-ramp to First Street off-ramp	5,901	61	C	7,695	41	F
First Street off-ramp to First Street SB on-ramp	4,865	62	C	7,188	42	E
First Street SB on-ramp to First Street NB on-ramp	4,901	61	C	7,208	41	E
First Street on-ramp to Vasco Road off-ramp	5,166	60	B	7,988	39	E
Vasco Road off-ramp to Vasco Road SB on-ramp	2,823	63	B	6,706	29	F
Vasco Road SB on-ramp to Vasco Road NB on-ramp	2,885	63	B	6,816	27	F
Vasco Road NB on-ramp to Greenville Road off-ramp	2,984	63	A	7,221	34	E
Greenville Road off-ramp to Greenville Road on-ramp	2,057	64	A	6,733	18	F
Greenville Road on-ramp to North Flynn Road	2,295	62	A	7,396	34	F

2030 No-Build Eastbound PM Peak Hour

Eastbound is the peak direction of travel during the PM peak period. Under No-Build conditions, LOS would be F for the majority of the roadway segments that were evaluated. Based on the analysis, a bottleneck would develop between the El Charro Road northbound on-ramp and the Airway Boulevard off-ramp (Table 2.1.6-6). Due to this bottleneck, queues would extend from the El Charro Road interchange to beyond the Foothill Road interchange. Another bottleneck would develop east of the Greenville Road interchange, and queues would extend from the Greenville Road interchange to the First Street interchange. Between Hopyard Road and Greenville Road, the average travel time would be over 34 minutes, with approximately 22 minutes of delay; the average speed would be 31 km/h (19 mph). But the average travel time per vehicle through the entire 28.4-km (17.7-mi) corridor from west of the I-580/I-680 interchange to North Flynn Road would be approximately 50 minutes, with 33 minutes of delay. The projected speed profile from the operation model is shown in Figure 1.2-2.

2030 No-Build Westbound AM Peak Hour

Westbound is the peak direction of travel during the AM peak- period. With the implementation of ramp metering (600 vph per ramp), all mainline segments are expected to operate at free-flow speeds of 81 km/h (50 mph) or better, except near Livermore and the I-580/I-680 interchange (Table 2.1.6-7). The other major bottleneck would develop at the I-580/I-680 interchange due to inadequate capacity of the I-580 westbound to I-680 southbound connector, with congestion extending east to the Fallon Road interchange. The mainline would operate at LOS F from the I-680 off-ramp to the Fallon Road off-ramp. Travel time per vehicle from the Greenville Road on-ramp to the Hopyard Road off-ramp would be approximately 17 minutes, with almost 8 minutes of delay; the average speed would be 62 km/h (38 mph).

2030 No-Build Westbound PM Peak Hour

In the westbound evening non-peak direction, all freeway segments would operate at LOS D or better and near a free-flow speed of 88 to 105 km/h (55 to 65 mph) (Table 2.1.6-7). The average travel time per vehicle from the Greenville Road on-ramp to the Hopyard Road off-ramp would be approximately 11 minutes, with less than a minute of delay; the average speed would be 100 km/h (62 mph).

Table 2.1.6-7: I-580 2030 No-Build Westbound AM and PM Peak Hours

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
North Flynn Road to Greenville Road off-ramp (begin Network)	8,264	59	E	2,349	64	A
Greenville Road off-ramp to Greenville Road on-ramp	7,165	60	D	2,190	64	A
Greenville Road on-ramp to Vasco Road off-ramp	7,464	56	D	2,860	63	A
Vasco Road off-ramp to Vasco Road on-ramp	6,599	60	D	2,756	63	A
Vasco Road on-ramp to First Street off-ramp	7,514	59	C	4,406	62	B
First Street off-ramp to First Street NB on-ramp	6,676	60	D	3,953	62	B
First Street NB on-ramp to First Street SB on-ramp	6,798	55	D	4,642	59	C
First Street SB on-ramp to Livermore Avenue off-ramp	7,321	59	D	4,863	62	C
Livermore Avenue off-ramp to Livermore Avenue on-ramp	7,096	43	E	4,424	63	B
Livermore Avenue on-ramp to Isabel Avenue off-ramp	7,745	39	F	5,098	62	C
Isabel Avenue off-ramp to Isabel Avenue NB on-ramp	6,089	60	C	4,024	63	B
Isabel Avenue NB on-ramp to Isabel Avenue SB on-ramp	6,752	54	D	4,683	60	C
Isabel Avenue SB on-ramp to Airway Boulevard off-ramp	6,847	59	C	4,989	62	B
Airway Boulevard off-ramp to Airway Boulevard NB on-ramp	6,442	60	D	4,635	62	C
Airway Boulevard NB on-ramp to Airway Boulevard SB on-ramp	7,098	55	D	5,174	61	C
Airway Boulevard SB on-ramp to Fallon Road off-ramp	7,765	59	D	5,834	62	C
Fallon Road off-ramp to Fallon Road NB on-ramp	7,459	58	D	5,056	62	C
Fallon Road NB on-ramp to Fallon Road SB on-ramp	7,820	53	E	5,487	61	C
Fallon Road SB on-ramp to Tassajara Road off-ramp	7,844	43	E	5,729	62	C
Tassajara Road off-ramp to Tassajara Road NB on-ramp	6,781	27	F	4,997	62	C
Tassajara Road NB on-ramp to Tassajara Road SB on-ramp	7,474	24	F	5,633	61	C
Tassajara Road SB on-ramp to Hacienda Drive off-ramp	8,029	21	F	6,205	61	C
Hacienda Drive off-ramp to Hacienda Drive NB on-ramp	7,186	20	F	5,851	62	C
Hacienda Drive NB on-ramp to Hacienda Drive SB on-ramp	7,371	18	F	6,533	61	C
Hacienda Drive SB on-ramp to Hopyard Road off-ramp	7,792	13	F	7,156	61	C
Hopyard Road off-ramp to Hopyard Road NB on-ramp	6,883	15	F	6,425	61	D
Hopyard Road NB on-ramp to Hopyard Road SB on-ramp	7,356	18	F	7,078	60	C
Hopyard Road SB on-ramp to I-680 off-ramp	7,971	16	F	7,749	57	D
I-680 off-ramp to I-680 NB on-ramp	5,237	53	D	5,165	60	C
I-680 NB on-ramp to I-680 SB on-ramp	6,132	57	D	6,493	60	D
I-580 WB west of I-680 SB on-ramp	7,348	59	C	8,065	60	D

Build Alternative

The proposed project would construct an HOV lane eastbound in the I-580 median from east of Greenville Road (KP R12.6 [PM R7.8]) to the Hacienda Drive interchange at KP 30.7 (PM 19.1). The total distance between the project limits is 17.3 km (10.8 mi). The project would also construct auxiliary lanes eastbound between El Charro Road and Airway Boulevard, and between First Street and Vasco Road. The operations analysis reports the expected conditions with these facilities in place.

2010 Build Eastbound AM Peak Hour

During the AM peak hour, the eastbound HOV lane would attract back to I-580 a minor amount of traffic that is currently diverting to local streets to avoid congestion. West of the HOV lane limit, mainline traffic operations analysis results would be similar to those for the No-Build Alternative (Table 2.1.6-8). From the beginning of the HOV lane limit to the east, the expanded mainline capacity would provide free-flow traffic operations that would operate at LOS D or better throughout the remainder of the corridor. The average travel time from the Hopyard Road southbound on-ramp to the Greenville Road off-ramp would be 9.8 minutes, with less than 1 minute of delay for both mixed-flow and HOV lanes. The average speed per vehicle would be 100 km/h (62 mph) in both the mixed-flow and HOV lanes.

Table 2.1.6-8: I-580 2010 Build Eastbound AM Peak Hour

Freeway Segment	Mixed Flow			HOV		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	6,554	15	F	N/A	N/A	N/A
I-680 off-ramp to Hopyard Road off-ramp	4,851	56	C	N/A	N/A	N/A
Hopyard Road off-ramp to I-680 SB on-ramp	4,143	60	C	N/A	N/A	N/A
I-680 SB on-ramp to I-680 NB on-ramp	5,593	59	C	N/A	N/A	N/A
I-680 NB on-ramp to Hopyard Road SB on-ramp	6,668	61	C	N/A	N/A	N/A
Hopyard Road SB on-ramp to Hopyard Road NB on-ramp	7,319	58	C	N/A	N/A	N/A
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	7,531	60	B	N/A	N/A	N/A
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	6,075	58	C	241	N/A	N/A
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	6,027	48	C	436	64	A
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	6,389	57	C	462	63	A
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	5,179	61	C	465	63	A
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	5,397	60	C	462	62	A
Santa Rita Road NB on-ramp to El Charro Road off-ramp	5,829	61	C	491	62	A
El Charro Road off-ramp to El Charro Road SB on-ramp	5,558	61	C	489	61	A
El Charro Road SB on-ramp to El Charro Road NB on-ramp	5,882	59	C	490	61	A
El Charro Road NB on-ramp to Airway Boulevard off-ramp	6,119	61	C	464	61	A
Airway Boulevard off-ramp to Airway Boulevard on-ramp	4,829	62	C	383	61	A
Airway Boulevard on-ramp to Isabel Avenue off-ramp	5,080	61	B	332	62	A
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	3,936	62	B	332	61	A
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	3,966	62	B	329	61	A
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	4,851	61	C	386	61	A
Livermore Avenue off-ramp to Livermore Avenue on-ramp	4,126	62	B	352	61	A
Livermore Avenue on-ramp to First Street off-ramp	4,431	62	B	356	61	A
First Street Off ramp to First Street on-ramp	3,658	63	B	309	61	A
First Street on-ramp to Vasco Road off-ramp	3,977	61	B	294	62	A
Vasco Road off-ramp to Vasco Road on-ramp	1,897	64	A	274	63	A
Vasco Road on-ramp to Greenville Road off-ramp	2,080	64	A	252	63	A
Greenville Road off-ramp to Greenville Road on-ramp	1,600	64	A	232	62	A
Greenville Road on-ramp to North Flynn Road	1,962	61	A	76	N/A	N/A

2010 Build Eastbound PM Peak Hour

During the PM peak hour, which produces more total traffic than the AM peak hour, the eastbound HOV lane would attract back to I-580, a moderate amount of traffic that is currently diverting to local streets to avoid congestion. Thus the demand volumes for the facility are slightly higher under the Build Alternative than the No-Build Alternative. The HOV lane would also increase carpooling on I-580. The amount of traffic on major parallel arterial streets, such as Stanley Boulevard, would be substantially reduced. The capacity added to I-580 may reduce diversion or "cut-through" traffic in the cities of Pleasanton, Dublin, and Livermore as drivers return to the freeway system.

During the PM peak period, there would be free-flow operating conditions in the HOV lane throughout the corridor; however, the mixed-flow lanes would experience bottlenecking and queuing problems (Table 2.1.6-9). The primary bottleneck would occur at the Isabel Avenue interchange, where metered on-ramp and mainline demand volumes would exceed downstream capacity. The queue is projected to extend beyond the Airway Boulevard interchange. A second bottleneck would develop east of the Greenville Road interchange, where the HOV lane returns to a mixed-flow lane. To connect the freeway alignment to the existing 4-lane section downstream, the outer right lane (number 5) would be dropped at 1,500 feet east of the Greenville Road on-ramp. This lane drop would create a bottleneck as a consequence of merging HOV lane traffic with mixed traffic traveling upgrade toward North Flynn Road. Due to this bottleneck, the queues would extend to the First Street interchange.

The bottleneck on I-580 near the Santa Rita Road Interchange under the No-Build alternative meters traffic east of the bottleneck. Under the Build Alternative, the bottleneck is shifted further east. Without metering of traffic at Santa Rita Road Interchange, the bottlenecks formed east of Santa Rita Road increase congestion and delay in the project area, compared to the No-Build Alternative.

By 2030, due to Isabel Interchange (Route 84) and other improvements, congestion and delay within the project limits under the 2030 Build Alternative would be less than under the 2010 Build Alternative.

The average travel time per vehicle between the Hopyard Road southbound on-ramp and the Greenville Road off-ramp is projected to be 21.9 minutes in the mixed-flow lanes, with 12.4 minutes of delay, and 10.3 minutes in the HOV lane, with approximately 1 minute of delay. The average speed over this freeway segment is projected to be 44 km/h (28 mph) for the mixed-flow traffic and 95 km/h (59 mph) in the HOV lane. Adding the HOV lane would save over 11 minutes, or 53 percent, of the mixed-flow travel time.

Table 2.1.6-9: I-580 2010 Build Eastbound PM Peak Hour

Freeway Segment	Mixed Flow			HOV		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	8,163	54	D	N/A	N/A	N/A
I-680 off-ramp to Hopyard Road off-ramp	6,302	56	D	N/A	N/A	N/A
Hopyard Road off-ramp to I-680 SB on-ramp	5,333	55	D	N/A	N/A	N/A
I-680 SB on-ramp to I-680 NB on-ramp	6,928	56	C	N/A	N/A	N/A
I-680 NB on-ramp to Hopyard Road SB on-ramp	8,130	59	C	N/A	N/A	N/A
Hopyard Road SB on-ramp to Hopyard Road NB on-ramp	8,816	56	C	N/A	N/A	N/A
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	9,144	40	E	N/A	N/A	N/A
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	7,151	48	D	549	N/A	N/A
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	6,831	33	E	1,132	62	C
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	8,048	52	D	1,235	61	C
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	6,684	59	D	1,294	60	C
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	7,320	52	D	1,295	60	C
Santa Rita Road NB on-ramp to El Charro Road off-ramp	7,959	58	D	1,331	59	C
El Charro Road off-ramp to El Charro Road SB on-ramp	7,823	58	D	1,327	59	C
El Charro Road SB on-ramp to El Charro Road NB on-ramp	8,315	52	E	1,324	60	C
El Charro Road NB on-ramp to Airway Boulevard off-ramp	8,426	50	D	1,291	57	C
Airway Boulevard off-ramp to Airway Boulevard on-ramp	7,436	36	F	1,189	59	C
Airway Boulevard on-ramp to Isabel Avenue off-ramp	7,978	27	F	1,133	57	C
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	6,669	18	F	1,132	58	C
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	6,643	17	F	1,142	59	C
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	7,940	40	F	1,134	59	C
Livermore Avenue off-ramp to Livermore Avenue on-ramp	6,995	56	D	1,003	59	B
Livermore Avenue on-ramp to First Street off-ramp	7,548	56	D	1,028	59	B
First Street Off ramp to First Street on-ramp	6,678	37	F	952	59	B
First Street on-ramp to Vasco Road off-ramp	7,209	22	F	894	57	B
Vasco Road off-ramp to Vasco Road on-ramp	5,427	12	F	838	59	B
Vasco Road on-ramp to Greenville Road off-ramp	5,837	8	F	840	57	B
Greenville Road off-ramp to Greenville Road on-ramp	5,252	9	F	857	60	B
Greenville Road on-ramp to North Flynn Road	6,499	43	F	287	N/A	N/A

2010 Build Westbound AM Peak Hour

Operations westbound in the morning under the Build Alternative would be similar to those described above for the No-Build Alternative (Table 2.1.6-10). The average travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 15 minutes, with 4.7 minutes of delay; the average speed would be 71 km/h (44 mph).

Table 2.1.6-10: I-580 2010 Build Westbound AM and PM Peak Hours (No HOV Lane)

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
North Flynn Road to Greenville Road off-ramp (begin Network)	7,719	60	D	2,016	64	A
Greenville Road off-ramp to Greenville Road on-ramp	6,479	59	D	1,912	64	A
Greenville Road on-ramp to Vasco Road off-ramp	6,872	57	C	2,302	62	A
Vasco Road off-ramp to Vasco Road on-ramp	6,019	61	C	2,160	64	A
Vasco Road on-ramp to First Street off-ramp	6,940	60	C	3,543	62	B
First Street off-ramp to First Street on-ramp	6,072	60	C	3,008	63	B
First Street on-ramp to Livermore Avenue off-ramp	6,748	59	D	3,706	62	B
Livermore Avenue off-ramp to Livermore Avenue on-ramp	6,519	59	D	3,388	63	B
Livermore Avenue on-ramp to Isabel Avenue off-ramp	7,200	52	D	4,056	62	B
Isabel Avenue off-ramp to Isabel Avenue NB on-ramp	5,658	60	C	3,136	63	B
Isabel Avenue NB on-ramp to Isabel Avenue southbound on-ramp	6,326	58	D	3,783	59	B
Isabel Avenue SB on-ramp to Airway Boulevard off-ramp	6,391	59	C	3,880	63	B
Airway Boulevard off-ramp to Airway Boulevard NB on-ramp	6,112	61	C	3,524	63	B
Airway Boulevard NB on-ramp to Airway Boulevard SB on-ramp	6,778	56	D	4,064	60	B
Airway Boulevard SB on-ramp to Fallon Road off-ramp	7,446	60	C	4,719	63	B
Fallon Road off-ramp to Fallon Road NB on-ramp	6,657	60	D	4,368	62	B
Fallon Road NB on-ramp to Fallon Road SB on-ramp	6,853	59	D	4,453	62	B
Fallon Road SB on-ramp to Tassajara Road off-ramp	6,943	53	D	4,588	62	B
Tassajara Road off-ramp to Tassajara Road NB on-ramp	6,208	42	E	4,011	63	B
Tassajara Road NB on-ramp to Tassajara Road SB on-ramp	6,888	38	E	4,762	60	B
Tassajara Road SB on-ramp to Hacienda Drive off-ramp	7,487	31	F	5,140	61	B
Hacienda Drive off-ramp to Hacienda Drive NB on-ramp	6,629	24	F	4,763	62	C
Hacienda Drive NB on-ramp to Hacienda Drive SB on-ramp	6,809	22	F	5,487	61	B
Hacienda Drive SB on-ramp to Hopyard Road off-ramp	6,996	15	F	6,113	61	C
Hopyard Road off-ramp to Hopyard Road NB on-ramp	6,052	13	F	5,447	62	C
Hopyard Road NB on-ramp to Hopyard Road SB on-ramp	6,443	15	F	6,102	60	C
Hopyard Road SB on-ramp to I-680 off-ramp	7,033	13	F	6,772	56	C
I-680 off-ramp to I-680 NB on-ramp	4,683	55	C	4,230	61	B
I-680 NB on-ramp to I-680 SB on-ramp	5,337	60	C	5,325	60	C
I-580 WB west of I-680 SB on-ramp	6,580	60	C	6,867	60	C

2010 Build Westbound PM Peak Hour

Westbound evening operations under the Build Alternative would be the same as under the No-Build Alternative; all westbound freeway segments would operate at LOS C or better and at near free-flow speeds of 96 to 105 km/h (60 to 65 mph) (Table 2.1.6-10). Travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 10.7 minutes, with less than a minute of delay; the average speed over this stretch would be 100 km/h (62 mph).

2030 Build Eastbound AM Peak Hour

During the AM peak, adding capacity with the eastbound HOV lane would attract a minor amount of traffic that is currently diverting to local streets to avoid congestion back to I-580. West of the HOV lane limit, mainline traffic operations would be similar to those for the No-Build Alternative

(Table 2.1.6-11). From the beginning of the HOV lane limit to the east, the expanded mainline capacity would provide free-flow traffic operations and would operate at LOS D or better throughout the remainder of the corridor. The average travel time from the Hopyard Road southbound on-ramp to the Greenville Road off-ramp would be approximately 10 minutes, with less than one minute of delay for both the mixed-flow and HOV lanes. There would be only a slight time savings in the HOV lane. The average speed per vehicle would be 96 km/h (60 mph) in the mixed-flow lanes and 98 km/h (61 mph) in the HOV lane. Figure 1.2-4 shows the expected speed profile generated from the operational analysis.

Table 2.1.6-11: I-580 2030 Build Eastbound AM Peak Hour

Freeway Segment	Mixed Flow			HOV		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	7,744	29	F	N/A	N/A	N/A
I-680 off-ramp to Hopyard Road off-ramp	5,775	57	C	N/A	N/A	N/A
Hopyard Road off-ramp to I-680 SB on-ramp	4,823	59	C	N/A	N/A	N/A
I-680 SB on-ramp to I-680 NB on-ramp	6,463	58	C	N/A	N/A	N/A
I-680 NB on-ramp to Hopyard Road SB on-ramp	7,534	60	C	N/A	N/A	N/A
Hopyard Road SB on-ramp to Hopyard Road NB on-ramp	8,186	57	C	N/A	N/A	N/A
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	8,372	60	C	N/A	N/A	N/A
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	6,753	61	C	488	63	A
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	6,630	57	C	788	64	B
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	7,468	51	C	806	62	B
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	6,215	60	C	788	62	B
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	6,426	58	D	792	61	B
Santa Rita Road NB on-ramp to El Charro Road off-ramp	6,971	60	C	796	61	B
El Charro Road off-ramp to El Charro Road SB on-ramp	6,498	57	D	780	60	B
El Charro Road SB on-ramp to El Charro Road NB on-ramp	7,146	53	D	808	60	B
El Charro Road NB on-ramp to Airway Boulevard off-ramp	7,528	58	C	775	59	B
Airway Boulevard off-ramp to Airway Boulevard on-ramp	5,960	61	C	650	60	A
Airway Boulevard on-ramp to Isabel Avenue off-ramp	6,244	60	C	566	61	A
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	5,045	62	C	563	60	A
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	5,154	60	C	561	60	A
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	6,270	59	C	584	60	A
Livermore Avenue off-ramp to Livermore Avenue on-ramp	5,213	61	C	509	60	A
Livermore Avenue on-ramp to First Street off-ramp	5,544	61	C	537	60	A
First Street off-ramp to First Street SB on-ramp	4,543	62	C	465	60	A
First Street SB on-ramp to First Street NB on-ramp	4,571	61	B	471	60	A
First Street NB on-ramp to Vasco Road off-ramp	4,896	60	B	416	62	A
Vasco Road off-ramp to Vasco Road SB on-ramp	2,563	63	A	370	62	A
Vasco Road SB on-ramp to Vasco Road NB on-ramp	2,626	63	A	369	62	A
Vasco Road NB on-ramp to Greenville Road off-ramp	2,789	63	A	303	62	A
Greenville Road off-ramp to Greenville Road on-ramp	1,685	64	A	252	62	A
Greenville Road on-ramp to North Flynn Road	2,098	61	A	82	N/A	N/A

2030 Build Eastbound PM Peak Hour

As projected for 2010 conditions, adding the eastbound HOV lane would attract a moderate amount of traffic that is currently diverting to local streets to avoid congestion back to I-580. The HOV lane would increase carpooling on I-580. The amount of traffic on major parallel arterial streets, such as Stanley Boulevard, would be substantially reduced. The capacity added to I-580 may reduce diversion or "cut-through" traffic in the cities of Pleasanton, Dublin, and Livermore as drivers return to the freeway system.

Based on the analysis, a bottleneck would develop between the Isabel Avenue northbound on-ramp and the Livermore Avenue off-ramp (Table 2.1.6-12). Due to this bottleneck, queues would extend from the Isabel Avenue interchange to the Santa Rita Road interchange.

Table 2.1.6-12: I-580 2030 Build Eastbound PM Peak Hour

Freeway Segment	Mixed Flow			HOV		
	Through-put Volume (vph	Speed (mph)	LOS	Through-put Volume (vph	Speed (mph)	LOS
I-580 EB west of I-680 off-ramp (begin Network)	8,382	54	D	N/A	N/A	N/A
I-680 off-ramp to Hopyard Road off-ramp	6,541	54	D	N/A	N/A	N/A
Hopyard Road off-ramp to I-680 SB on-ramp	5,636	52	D	N/A	N/A	N/A
I-680 SB on-ramp to I-680 NB on-ramp	7,335	54	D	N/A	N/A	N/A
I-680 NB on-ramp to Hopyard Road SB on-ramp	8,331	59	C	N/A	N/A	N/A
Hopyard Road SB on-ramp to Hopyard Road NB on-ramp	9,031	57	C	N/A	N/A	N/A
Hopyard Road NB on-ramp to Hacienda Drive off-ramp	9,477	58	C	N/A	N/A	N/A
Hacienda Drive off-ramp to Hacienda Drive SB on-ramp	7,329	53	D	694	58	**B**
Hacienda Drive SB on-ramp to Hacienda Drive NB on-ramp	6,983	31	E	1,172	59	**C**
Hacienda Drive NB on-ramp to Santa Rita Road off-ramp	8,286	26	F	1,298	57	**D**
Santa Rita Road off-ramp to Santa Rita Road SB on-ramp	6,289	24	F	1,406	58	**C**
Santa Rita Road SB on-ramp to Santa Rita Road NB on-ramp	6,793	22	F	1,428	59	**C**
Santa Rita Road NB on-ramp to El Charro Road off-ramp	7,848	18	F	1,477	58	**C**
El Charro Road off-ramp to El Charro Road SB on-ramp	7,230	20	F	1,458	58	**C**
El Charro Road SB on-ramp to El Charro Road NB on-ramp	7,392	21	F	1,460	59	**C**
El Charro Road NB on-ramp to Airway Boulevard off-ramp	7,640	16	F	1,446	58	**C**
Airway Boulevard off-ramp to Airway Boulevard on-ramp	6,923	17	F	1,399	59	**C**
Airway Boulevard on-ramp to Isabel Avenue off-ramp	7,484	15	F	1,397	55	**C**
Isabel Avenue off-ramp to Isabel Avenue SB on-ramp	6,627	15	F	1,334	56	**C**
Isabel Avenue SB on-ramp to Isabel Avenue NB on-ramp	6,706	16	F	1,341	59	**C**
Isabel Avenue NB on-ramp to Livermore Avenue off-ramp	7,967	43	F	1,307	59	**C**
Livermore Avenue off-ramp to Livermore Avenue on-ramp	6,978	58	D	1,148	59	**C**
Livermore Avenue on-ramp to First Street off-ramp	7,512	59	D	1,205	59	**C**
First Street off-ramp to First Street SB on-ramp	7,025	60	D	1,140	58	**C**
First Street SB on-ramp to First Street NB on-ramp	7,057	59	D	1,136	58	**C**
First Street NB on-ramp to Vasco Road off-ramp	7,797	52	D	1,071	59	**C**
Vasco Road off-ramp to Vasco Road SB on-ramp	6,314	31	F	1,020	59	**B**
Vasco Road SB on-ramp to Vasco Road NB on-ramp	6,332	26	F	1,021	59	**B**
Vasco Road NB on-ramp to Greenville Road off-ramp	6,506	15	F	1,066	57	**C**
Greenville Road off-ramp to Greenville Road on-ramp	5,696	11	F	1,059	59	**B**
Greenville Road on-ramp to North Flynn Road	7,056	25	F	353	N/A	N/A

Another bottleneck would develop east of the Greenville Road interchange where the HOV lane ends and becomes a mixed-flow lane. Queues would extend from the Greenville Road interchange to west of the Vasco Road interchange. The average travel time per vehicle between the Hopyard Road southbound on-ramp and the Greenville Road off-ramp is projected to be 26.2 minutes in the mixed-flow lanes, with 16.8 minutes of delay, and 10.4 minutes in the HOV lane, with just over one minute of delay. The average speed over this freeway section is projected to be 37 km/h (23 mph) for the mixed-flow traffic and 93 km/h (58 mph) in the HOV lane. The HOV land would save approximately 16 minutes, or 60 percent, of the mixed-flow travel time. The speed profile projected by the operation model is shown in Figure 1.2-3.

2030 Build Westbound AM Peak Hour

Westbound morning operations under the Build Alternative in 2030 would be similar to those described for the No-Build Alternative (Table 2.1.6-13). The average travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 16.4 minutes, with over 6 minutes of delay; the average speed would be 65 km/h (41 mph).

2030 Build Westbound PM Peak Hour

Westbound evening operations under the Build Alternative would also be similar to those described for the No-Build Alternative (Table 2.1.6-13). In the westbound direction, all freeway segments would operate at LOS D or better and near free-flow speeds of 88 to 105 km/h (55 to 65 mph). The average travel time from the Greenville Road on-ramp to the Hopyard Road off-ramp would be 10.9 minutes, with less than 1 minute of delay; the average speed would be 98 km/h (61 mph).

Table 2.1.6-13: I-580 2030 Build Westbound AM and PM Peak Hours (No HOV Lane)

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
North Flynn Road to Greenville Road off-ramp (begin Network)	8,211	59	D	2,351	64	A
Greenville Road off-ramp to Greenville Road on-ramp	7,138	60	D	2,188	64	A
Greenville Road on-ramp to Vasco Road off-ramp	7,397	56	D	2,854	63	A
Vasco Road off-ramp to Vasco Road on-ramp	6,574	59	D	2,745	63	A
Vasco Road on-ramp to First Street off-ramp	7,501	59	C	4,429	61	B
First Street off-ramp to First Street NB on-ramp	6,683	60	D	3,983	61	B
First Street NB on-ramp to First Street SB on-ramp	6,805	55	D	4,677	57	C
First Street SB on-ramp to Livermore Avenue off-ramp	7,256	39	F	4,898	62	C
Livermore Avenue off-ramp to Livermore Avenue on-ramp	6,914	35	F	4,480	62	B
Livermore Avenue on-ramp to Isabel Avenue off-ramp	7,587	45	E	5,150	61	C
Isabel Avenue off-ramp to Isabel Avenue NB on-ramp	6,088	60	C	4,097	62	B
Isabel Avenue NB on-ramp to Isabel Avenue SB on-ramp	6,738	54	D	4,681	59	C
Isabel Avenue SB on-ramp to Airway Boulevard off-ramp	6,826	59	C	5,030	62	B
Airway Boulevard off-ramp to Airway Boulevard NB on-ramp	6,304	60	D	4,677	62	C
Airway Boulevard NB on-ramp to Airway Boulevard SB on-ramp	6,965	56	D	5,218	59	C
Airway Boulevard SB on-ramp to Fallon Road off-ramp	7,637	60	C	5,878	62	C
Fallon Road off-ramp to Fallon Road NB on-ramp	7,292	57	D	5,130	61	C
Fallon Road NB on-ramp to Fallon Road SB on-ramp	7,784	46	E	5,629	58	C

Table 2.1.6-13: I-580 2030 Build Westbound AM and PM Peak Hours (No HOV Lane)

Freeway Segment	AM Peak (7:00-8:00 AM)			PM Peak (4:00-5:00 PM)		
	Through-put Volume (vph)	Speed (mph)	LOS	Through-put Volume (vph)	Speed (mph)	LOS
Fallon Road SB on-ramp to Tassajara Road off-ramp	7,876	57	D	5,795	62	C
Tassajara Road off-ramp to Tassajara Road NB on-ramp	6,883	52	D	5,095	62	C
Tassajara Road NB on-ramp to Tassajara Road SB on-ramp	7,462	46	D	5,698	60	C
Tassajara Road SB on-ramp to Hacienda Drive off-ramp	8,076	37	E	6,263	60	C
Hacienda Drive off-ramp to Hacienda Drive NB on-ramp	7,218	29	F	5,912	61	C
Hacienda Drive NB on-ramp to Hacienda Drive SB on-ramp	7,406	26	F	6,586	61	C
Hacienda Drive SB on-ramp to Hopyard Road off-ramp	7,686	16	F	7,209	61	C
Hopyard Road off-ramp to Hopyard Road NB on-ramp	6,742	14	F	6,467	60	D
Hopyard Road NB on-ramp to Hopyard Road SB on-ramp	7,198	15	F	7,125	59	C
Hopyard Road SB on-ramp to I-680 off-ramp	7,766	13	F	7,794	53	D
I-680 off-ramp to I-680 NB on-ramp	5,103	52	C	5,212	58	C
I-680 NB on-ramp to I-680 SB on-ramp	5,950	58	C	6,463	59	D
I-580 WB west of I-680 SB on-ramp	7,167	59	C	7,972	60	D

Comparison of Build and No-Build Alternatives

Traffic simulations suggest that the proposed project would improve peak-hour operating conditions in the mixed-flow lanes, as well as for HOV lane users in the eastbound direction. The analysis does not show material differences between the Build and No-Build Alternatives in the westbound direction, but this is reasonable, given that no westbound improvements are included. Nonetheless, the Eastbound I-580 HOV lane project would not have adverse impacts on westbound traffic operations.

During the morning peak hour, when eastbound is the off-peak direction, the majority of the mainline freeway segments would operate at free-flow conditions. Without the proposed project, minor congestion would occur between the Airway Boulevard off-ramp and the El Charro Road off-ramp. The HOV lane also would improve these conditions.

During the evening peak hour, the addition of an HOV lane would generate substantial benefits to both HOV lane users and to those in mixed-flow lanes. The average travel-time savings from east of the Foothill Road interchange to east of the Greenville Road interchange would be approximately 19 minutes. Travel time in the mixed-flow lanes within the project limits would be reduced from 50 minutes under No-Build conditions to 34 minutes with the proposed project in place. Adding an eastbound HOV lane would save 16 minutes for travelers in the mixed-flow lanes. Although ramp metering rates are consistent for both No-Build and Build conditions, adding the eastbound HOV lane would improve mainline traffic operations and shorten freeway queuing at bottlenecks.

Since on-ramp demand is constrained by ramp metering, anticipated bottleneck locations and queuing conditions would change under Build conditions compared to No-Build conditions. With the Build Alternative, the anticipated bottleneck at the El Charro Road interchange would move to the Isabel Avenue interchange, and the queue length would be substantially reduced. It should also be noted that

under the No-Build Alternative, the freeway queue would extend beyond the study limit. Thus, there are potentially more benefits from the addition of the eastbound HOV lane than are calculated in the operational analysis.

Accident Rates

The proposed eastbound HOV lane would be anticipated to help reduce congested-related accidents by increasing freeway capacity and reducing congestion. The proposed auxiliary lanes between El Charro Road and Airway Boulevard, and between First Street and Vasco Road would help facilitate and separate traffic entering and exiting the freeway from the mainline, thus reducing the potential vehicular conflicts.

Intersection Analysis

A number of ramp intersections and adjacent city intersections were analyzed in addition to studying the freeway performance of the proposed project. The intersection analysis was conducted for Year 2030 with *Synchro Trafficware*. The software is capable of analyzing both unsignalized and signalized intersections and allows optimization of traffic signal timing.

The Year 2000 edition of the HCM defines six LOSs for intersections. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions. For the purposes of determining LOS at a signalized intersection, average control delay is considered. LOS for an unsignalized intersection is based on the control delay experienced and is not defined for the intersection as a whole. Table 2.1.6-14 summarizes the average range of control delay experienced by motorists traversing both signalized and unsignalized intersection for each of the service levels.

Table 2.1.6-14: Intersection LOS Criteria

LOS	Control Delay by Type of Intersection (seconds/vehicle)	
	Signalized	Unsignalized
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: *Highway Capacity Manual, 2000*, Transportation Research Board, Washington, D.C.

The *Synchro* analysis results are summarized in Table 2.1.6-15. Based on the future demand forecasts, and as indicated in the table, a number of intersections within the study area will operate at marginal LOS. The Build Alternative would not result in substantial negative impacts to any of the study intersections since travel demand volumes would generally not change as a result of the project. At certain locations, the Build Alternative produces improved operations and reduced delays, such as

at the I-580 westbound off-ramp at Santa Rita Road. At this particular location, evening northbound traffic volumes under the No-Build Alternative are marginally higher, which is potentially due to vehicles that divert off I-580 to travel eastward using Dublin Boulevard.

Table 2.1.6-15 also shows the difference for intersection delays between the Build Alternative and the No-Build Alternative: a positive value indicates that delays would be higher under the Build Alternative; a negative value shows the converse. There are no major differences in computed delay. Overall, the Build Alternative would have a better LOS and reduced delays. These intersection analysis results confirm that the proposed eastbound HOV lane would improve freeway operations, as well as at ramp termini and adjacent intersection operations.

Transit/Park-and-Ride Facilities

During construction, all transit routes along I-580, and at those locations with interchange ramp improvements, would require temporary detours. Advance warning to the public using signs, fliers, and the public media should notify riders to expect delays due to the temporary detours.

There would be no permanent impacts to the transit routes or center. The project would benefit transit operators who would use the new HOV lanes.

The Caltrans park-and-ride lot would not be affected by this project. The BART park-and-ride lot may have to close the two access points along the frontage road adjacent to I-580 during construction. Access to the site would be provided by the existing driveways along Airway Boulevard and Rutan Drive.

Weigh Facilities

Weigh stations within the project limits may be closed for limited periods while constructing paving conforms. No long-term closure would be anticipated.

Pedestrian and Bicycle Facilities

There would be no long-term impacts to pedestrian facilities. Minor impacts may include temporary detours or closure of pedestrian routes due to construction of auxiliary lanes. Currently, pedestrian traffic is low within the project area. It is expected that overall safety and accessibility for pedestrians would remain unchanged as a result of the proposed project.

Although there would be no temporary or permanent impacts to the existing bike system due to the proposed freeway improvements, indirect benefits of the proposed project would include enhancing on-street safety for cyclists and encouraging general bike-lane usage. With the proposed project, freeway traffic congestion would generally be reduced. As freeway conditions improve, the amount of cut-through traffic on city streets and roads would be reduced. This would enhance the overall safety of cyclists on the existing street network, which would eventually encourage more cyclists to use the system.

Table 2.1.6-15: Year 2030 Ramp Termini and Adjacent Intersection Analysis Summary
(Delays measured in seconds/vehicle)

Reference Number	Intersection Location	No-Build Alternative				Build Alternative				Difference	
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak	PM Peak
		Delays	LOS	Delays	LOS	Delays	LOS	Delays	LOS	Delays	Delays
1	Hopyard Road/Dougherty Road at Dublin Boulevard	125.7	F	248.1	F	126.5	F	240.2	F	1	-8
2	Hopyard Road at I-580 WB off-ramp	58.8	E	22.1	C	60.7	E	17.3	B	2	-5
3	Hopyard Road at I-580 EB off-ramp	21.7	C	41.6	D	20.4	C	46.2	D	-1	5
4	Hopyard Road at Owens Drive	63.4	E	131.4	F	65.7	E	133.4	F	2	2
5	Hacienda Drive at Dublin Boulevard	31.2	C	49.7	D	30.5	C	43.0	D	-1	-7
6	Hacienda Drive at I-580 WB off-ramp	18.1	B	10.5	B	16.9	B	9.6	A	-1	-1
7	Hacienda Drive at I-580 EB off-ramp	16.4	B	16.6	B	14.9	B	15.1	B	-2	-2
8	Hacienda Drive at Owens Drive	30.0	C	42.2	D	31.1	C	47.6	D	1	5
9	Santa Rita Road/Tassajara Road at Dublin Boulevard	35.1	D	110.1	F	33.2	C	109.0	F	-2	-1
10	Santa Rita Road at I-580 WB off-ramp	17.6	B	79.9	E	18.8	B	30.4	C	1	-50
11	Santa Rita Road at I-580 EB off-ramp	41.6	D	158.3	F	44.5	D	142.5	F	3	-16
12	Santa Rita Road at Rosewood Drive	6.9	A	18.5	B	6.0	A	17.4	B	-1	-1
13	El Charro Road at I-580 WB off-ramp (SC - WB)	5.1	A	12.2	B	6.4	A	11.9	B	1	0
14	El Charro Road at I-580 EB off-ramp (SC - EB)	8.6	A	15.4	B	9.3	A	12.2	B	1	-3
15	Airway Boulevard at North Canyons Parkway	151.1	F	230.6	F	170.3	F	204.3	F	19	-26
16	Airway Boulevard at I-580 WB off-ramp	20.9	C	26.2	C	35.0	D	21.5	C	14	-5
17	Airway Boulevard at I-580 EB off-ramp (Kittyhawk Road)	88.0	F	35.9	D	94.5	F	32.6	C	7	-3
18	Isabel Avenue at I-580 WB off-ramp	23.0	C	22.3	C	23.3	C	21.7	C	0	-1
19	Isabel Avenue at I-580 EB off-ramp	18.6	B	12.3	B	19.3	B	15.3	B	1	3
20	Livermore Avenue at I-580 WB off-ramp	39.8	D	87.7	F	38.4	D	108.6	F	-1	21
21	Livermore Avenue at I-580 EB off-ramp	26.6	C	182.5	F	29.2	C	213.4	F	3	31
22	Livermore Avenue at Las Positas Road	27.5	C	78.1	E	27.4	C	45.8	D	0	-32
23	1st Street at Bluebell Drive	28.4	C	69.3	E	24.9	C	55.6	E	-4	-14
24	1st Street at I-580 WB off-ramp	20.7	C	16.1	B	19.0	B	16.4	B	-2	0
25	1st Street at I-580 EB off-ramp	33.9	C	11.6	B	40.1	D	10.8	B	6	-1
26	1st Street at Southfront Road	75.9	E	59.4	E	69.9	E	57.3	E	-6	-2
27	Vasco Road at Northfront Road	33.7	C	83.2	F	33.4	C	97.1	F	0	14
28	Vasco Road at I-580 WB off-ramp	11.5	B	6.0	A	11.5	B	6.1	A	0	0
29	Vasco Road at I-580 EB off-ramp	34.9	C	11.2	B	37.6	D	12.5	B	3	1
30	Vasco Road at Preston Avenue (SC - EB/WB)	19.3	B	41.1	D	19.7	B	38.4	D	0	-3
31	Greenville Road at Northfront Road (SC - AW)	36.2	D	22.2	C	33.9	C	12.1	B	-2	-10
32	Greenvillle Road at I-580 WB off-ramp	41.0	D	12.6	B	29.5	C	16.2	B	-12	4
33	Greenvillle Road at I-580 EB off-ramp	37.0	D	16.7	B	48.3	D	29.7	C	11	13
34	Greenville Road at Southfront Road	11.4	B	43.4	D	11.3	B	28.7	C	0	-15
									Total	**41**	**-107**

2.1.6.3 Avoidance, Minimization, and/or Mitigation Measures

Construction of the Build Alternative would provide positive impacts (i.e., reduce congestion and traffic delay) along I-580 within the project limits. In addition, the Build Alternative would not result in any substantially adverse impacts to local intersections. As no adverse traffic impacts would be anticipated, no minimization or mitigation measures are recommended.

A Transportation Management Plan (TMP) would be prepared to address traffic delays during construction. Preparation of the TMP would be coordinated with local partners to develop the necessary strategies to raise awareness and reduce traffic impacts.

2.1.7 Visual/Aesthetics

2.1.7.1 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]), 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)].

2.1.7.2 Affected Environment

Existing Visual Character and Viewer Groups

Motorists traveling on I-580 in the project corridor have a variety of visual experiences, as shown in Figure 2.1.7-1. Much of the terrain on the north side of I-580 is rural and varies from flat to rolling hills. Various land uses are located along the south side of I-580, including residential, commercial, light industrial, recreational, agricultural, and open space. Single-family residential developments occur in several locations along the roadway; commercial and light industrial uses are clustered around interchange areas. Development of this type has increased in recent years; consequently, the visual character of the project area is evolving as population and growth increases. Freeway planting in the median is intermittent, but dense, for the length of the project (approximately 9.8 km [6.1 mi] of median planting). Along the side of the roadway, shrubs and trees occur intermittently for approximately 5.6 km (3.5 mi).

Figure 2.1.7-1: Existing View of I-580 (Looking East)

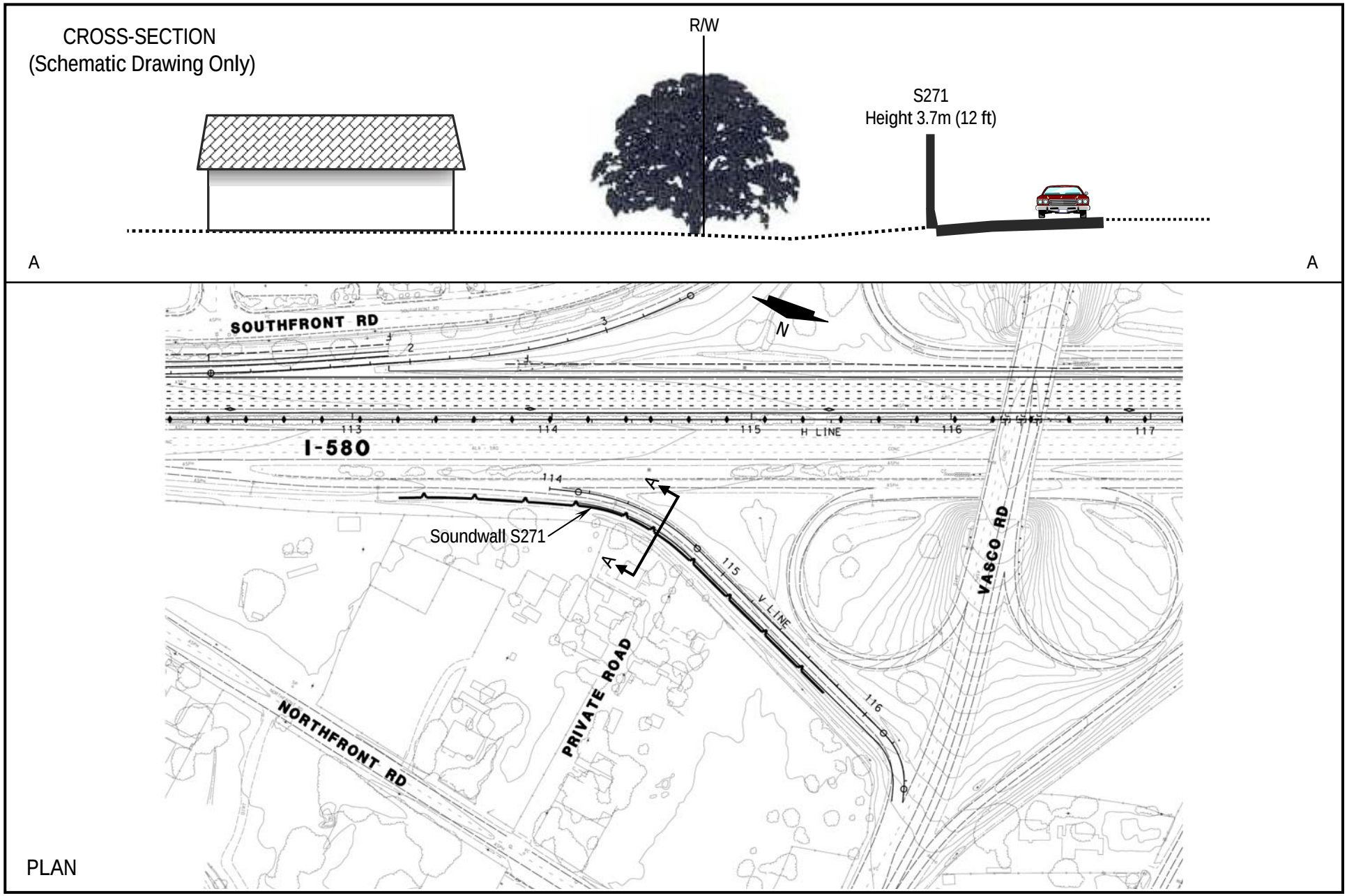
Viewer groups are generally categorized by their views, either as highway users (from the road) or as highway neighbors (of the road). Two viewer groups were identified within the project area: motorists (commuters, local residents, and recreational users/tourists) and community viewer types (residents and employee/patrons of commercial and light industrial uses). Some residents and employees of commercial and light industrial uses have views of I-580 where gaps in soundwalls or vegetative screens exist.

Motorists traveling from west to east enter the project area from a relatively developed stretch of I-580 within the cities of Dublin and Pleasanton, with commercial and residential uses visible from the freeway. Existing soundwalls partially screen residential areas from motorists' views and the roadway from residents' views. As motorists travel eastward into the City of Livermore, views on the north range from agricultural lands to gently rolling grasslands. On the south, views include agricultural fields, the Las Positas Golf Course, and limited views of the Livermore Municipal Airport and aircraft activity. Traveling farther east, residential and commercial uses return to view on the south side of I-580, with some scenic views of the Arroyo Las Positas. On the north side are views of adjacent hillsides. At the eastern limits of the project corridor, views consist primarily of single-family residences to the north and light industrial uses to the south. Views of the residential area to the north from the road and from the residences to the road are partially screened by an existing soundwall.

2.1.7.3 Environmental Consequences

Visual Changes and Effect on Viewer Groups

The I-580 Eastbound HOV Lane Project would be constructed entirely within the existing roadway right-of-way. Soundwalls would be constructed at several locations on both sides of the highway to reduce noise levels at adjacent residences. The soundwalls would be 3.7 m (12 ft) to 4.3 m (14 ft) in height. A typical soundwall cross-section is shown in Figure 2.1.7-2. Architectural and landscaping treatments would be implemented on the soundwalls. Construction of soundwalls would screen views of I-580 from residential uses along the corridor, a potentially beneficial effect.



I-580 Eastbound HOV Lane Project

TYPICAL SOUNDWALL CROSS-SECTION
Figure 2.1.7-2

These residences do not currently have scenic views that would be obstructed by soundwall construction. The soundwalls would also screen motorists' views of the residential areas, but they would not obstruct views of the open space areas adjacent to I-580. Soundwalls could introduce visual glare for both motorists and residents. Retaining walls would be constructed along the outside shoulders where necessary due to existing topography and to avoid right-of-way acquisitions. The retaining walls would be 1.7 m (5.6 ft) to 3.0 m (9.8 ft) in height. The existing metal thrie-beam median barrier would be removed and replaced with two types of median barriers along the existing freeway centerline: a double thrie-beam barrier and a concrete barrier. Removal of landscaping from the roadway median and shoulder would be the primary visual effect of the project, as described below.

Landscaping is provided along state highways for aesthetic, safety, environmental mitigation, or erosion control purposes. Occasionally, highway planting is used to reduce headlight glare. Past landscaping practice along state highways sometimes included the center median strip, as was the case along segments of I-580, but Caltrans now generally does not permit landscaping within narrow median strips on state roads that carry large volumes of traffic at highway speeds. This is due to the extreme risk of injury faced by maintenance crews while maintaining landscaping in the median.

The median landscaping that would be removed for construction of the proposed project consists of an intermittent dense row of oleanders (*Nerium oleander*), as shown in Figure 2.1.7-3. Oleander is a large, evergreen shrub with red, white, or pink flowers. Oleanders were originally planted in the median to beautify the highway corridor and to screen on-coming traffic from view. Various oleander rows have been removed over time as a result of highway improvement projects throughout the region, and future highway projects would likely require additional removals. Removal of the oleanders would give the freeway a starker appearance and would visually expose the opposing lanes of traffic. These effects would occur within the 9.8 km (approximately 6.1 mi) of the intermittent project segments where the shrubs would be removed. Approximately 8,050 oleanders would be removed within the median. The proposed project would also remove approximately 1.4 ha (3.4 ac) of landscaping along the roadway shoulder.

Figure 2.1.7-3: Median Landscaping in the I-580 Corridor (Looking East)

To offset the effects of landscaping removal within the median and along the roadway shoulder, replacement planting would be provided in suitable and feasible roadside areas within the I-580 corridor. If shoulders do not provide adequate space, replacement planting may be done within interchange loops. Replacement plantings would improve the appearance of the highway corridor at these locations. It would not address increased visual exposure of the highway and oncoming traffic.

2.1.7.4 Consistency with Scenic/Visual Resource Plans and Policies

The I-580 project corridor is listed as eligible to be designated a "scenic highway" by the State of California and is designated a "scenic corridor" by the City of Livermore. The I-580 Scenic Corridor is defined by the *City of Livermore General Plan* as the area within 3,500 feet of the freeway centerline that is visible from the roadway.

Portions of the I-580 project corridor are designated as "Landscaped Freeway" by the State of California. According to the California Code of Regulations, a landscaped freeway is defined as the following: 1,000 feet of continuous planting measured on one side of the highway, or a combination of plantings on both sides; ornamental vegetation is present and healthy; plantings primarily improve the aesthetic appearance of the freeway; spacing in plantings must be less than 200 feet; plantings should receive reasonable maintenance; and the segment must be certified by a licensed landscape architect. The landscaped freeway designation applies to the following roadway segments: PM 10.22/0.83, PM 13.17/13.41, PM 14.97/15.63, PM 17.55/18.31, and PM 18.54/18.82.

The General Plans for the cities of Pleasanton and Livermore 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 *City of Dublin General Plan* does not set forth any relevant scenic/visual resource goals and policies. The proposed project would be generally consistent with relevant scenic/visual resources policies, or mitigation would be applied to make it consistent, as shown in Table 2.1.7-1.

Table 2.1.7-1: Consistency with Scenic/Visual Resource Plans and Policies

Pleasanton General Plan	
Goal: To enhance the appearance of major city entry streets.	**Consistent.** The proposed project would not detract from the appearance of I-580 entries to the city. Caltrans and ACCMA will coordinate with the City of Pleasanton to identify appropriate and feasible roadside locations to enhance major city entry streets and compensate for loss of oleanders in the I-580 median near the Tassajara Road/Santa Rita Road interchange.
Policy: Improve the visual quality of entries to Pleasanton.	**Consistent.** The proposed project would not detract from the appearance of I-580 entries to the city. Caltrans and ACCMA will coordinate with the City of Pleasanton to identify appropriate and feasible roadside locations to improve the visual quality of entries to the City and to compensate for loss of oleanders in the I-580 median near the Tassajara Road/Santa Rita Road interchange.

Table 2.1.7-1: Consistency with Scenic/Visual Resource Plans and Policies	
Pleasanton General Plan	
Policy: Soften the visual appearance of existing soundwalls, where feasible, and require the treatment of future soundwalls with landscaping and design features.	**Consistent:** Architectural and landscaping treatments would be implemented on the soundwalls proposed with the project. Where feasible, vines would be planted and allowed to grow on the walls to help reduce glare and the incidence of graffiti.
Livermore General Plan	
Goal CC-4: Protect and enhance public views within and from established scenic routes, including views from arroyos.	**Consistent.** The proposed project would not obscure, detract from, or negatively affect the quality of scenic views from I-580 of Livermore's surrounding hillsides and ridgelines.
Objective CC-4.1: Protect public views from scenic routes and corridors.	**Consistent.** The proposed project would not obscure, detract from, or negatively affect the quality of scenic views from I-580 of Livermore's surrounding hillsides and ridgelines.
Objective CC-4.6: Use landscaping to increase the scenic qualities of scenic routes.	**Potentially Inconsistent.** The removal of oleanders in the median of the freeway would result in an adverse visual impact unless mitigation is incorporated. Caltrans and ACCMA will coordinate with the City of Livermore to identify appropriate and feasible roadside locations for replacement planting.
Objective CC-4.14: Control removal of vegetation in scenic routes.	**Potentially Inconsistent.** The removal of oleanders in the median of the freeway would result in an adverse visual impact unless mitigation is incorporated. Caltrans and ACCMA will coordinate with the City of Livermore to identify appropriate and feasible roadside locations for replacement planting.

2.1.7.5 Avoidance, Minimization, and/or Mitigation Measures

It is Caltrans' policy to replace highway planting, including oleander median planting, that is damaged or removed by state highway construction. Using the current formula that values oleander median planting at $127,300 per linear mi (2005/06 Fiscal Year [FY]), the cost of replacement planting along 9.8 km (6.1 mi) within the project area would be approximately $776,530. The cost of replacement planting for the removal of 1.4 ha (3.4 ac) of shoulder landscaping would be approximately $145,856, at $42,400 per acre (2005/06 FY). Caltrans and ACCMA would coordinate with the cities of Dublin, Pleasanton, and Livermore to identify suitable and feasible roadside areas for replacement planting. Such replacement locations must meet safety requirements for sight distance and recovery zone setbacks, in addition to providing favorable conditions for tree establishment and survival. The following mitigation measures are proposed to reduce visual effects of the Build Alternative:

- The landscape replacement plan would include landscaping and design elements, such as architectural treatments on soundwalls, that would restore the corridor's existing visual quality to the extent possible. Where feasible, vines would be planted and allowed to grow on the walls to help reduce glare and the incidence of graffiti. New retaining walls would also be given aesthetic treatment.
- All replacement planting shall be implemented within two years of the completion of all roadwork in order to retain the I-580 roadway segments designated as "Landscaped Freeway." Replacement planting shall be funded by the proposed roadway project and would be completed

under a separate contract. Vines on soundwalls would be planted during the road construction period to facilitate their early establishment.

- Planting and irrigation systems shall be designed to achieve a balance between aesthetics, safety, maintainability, cost effectiveness and resource conservation. Tree, shrub and groundcover species will be selected for their drought tolerance and disease resistance characteristics. An automated irrigation system, compatible with existing electric automatic irrigation systems currently utilized along the I-580 corridor, will be provided. The use of reclaimed water for irrigation will be considered if available within close proximity to proposed irrigation service points.
- Where feasible, replacement planting for the loss of oleanders would be planted along the same linear stretch of freeway where planting is removed due to construction. Interchange areas within the project limits would provide additional planting areas.
- Caltrans does not currently plant oleanders in large quantities due to their susceptibility to disease; therefore, replacement planting would include a mixture of other shrub and tree species, with the possibility of some oleander.
- Tree planting along I-580, including interchange areas, would occur where a desired minimum of 12 meters of clearance would exist between large trees and the edge of traveled way. A minimum clearance of 9 meters could be established depending upon the selected tree species.
- A 3-year plant establishment period would be implemented.

2.1.8 Cultural Resources

"Cultural resources," as used in this document, refers to all historical and archaeological resources, regardless of significance. The information in this section is taken from the technical reports, *Historical Resources Evaluation Report* (JRP Historical Consulting Services, 2006), *Archaeological Survey Report* (Far Western Anthropological Research Group, 2006), and *Historic Properties Survey Report* (Parsons, 2006b)

2.1.8.1 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 and to allow the Advisory Council on Historic Preservation (ACHP) to comment on those undertakings, following regulations issued by the ACHP (36 CFR 800). On January 1, 2004, a Section 106 Programmatic Agreement (PA) among the ACHP, FHWA, State Historic Preservation Officer (SHPO), and Caltrans went into effect for all Caltrans projects, both state and local, with FHWA involvement. The PA takes the place of the ACHP's regulations, streamlining the Section 106 process and delegating certain responsibilities to Caltrans.

Historic properties may also be covered under Section 4(f) of the U.S. Department of Transportation Act, which regulates the "use" of land from historic properties. See Appendix B for specific information regarding Section 4(f).

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

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 NHPA 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.

California Environmental Quality Act of 1970 [PRC §21000 *et seq.*]:

Under California Law, cultural resources are protected by 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) and city-designated historic resources are protected under CEQA.

Public Resources Code (PRC §5024.1):

PRC 5024.1 established the CRHR, a listing of historic properties within the state. Section 5024.5 requires state agencies to provide notice to and to confer with the SHPO before altering, transferring, relocating, or demolishing state-owned historical resources.

2.1.8.2 Affected Environment

Archaeological Resources

An Archaeological Survey Report (ASR) was prepared in accordance with Section 106 of the NHPA and its implementing regulations. To develop a historic context and assess the sensitivity for intact buried historic and prehistoric archaeological resources, cultural resource site records, maps, and survey reports pertaining to the prehistory and history of the project area were reviewed.

The Native American Heritage Commission (NAHC) in Sacramento was contacted by letter on August 22, 2002, for a search of sacred lands files and for a list of local Native American organizations and individuals. On September 4, 2002, the NAHC indicated that no sacred lands sites were on file for the project area and provided a list of interested parties. On September 11, 2002, 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.

In accordance with both Section 106 of the NHPA and CEQA, Caltrans delineated an archaeological Area of Potential Effects (APE), comprising all of the area that would be subject to ground disturbance to construct the proposed project. Because all project facilities would be constructed within the existing I-580 right-of-way, the archaeological APE boundary basically follows the highway right-of-way boundary. The archaeological APE also includes any proposed grading and

equipment staging areas. At potential soundwall locations, the archaeological APE extends 2 m (6.5 ft) beyond the right-of-way to accommodate temporary construction easements.

Some construction events are anticipated within high sensitivity areas along I-580. In these high sensitivity areas, the vertical impacts would not extend into undisturbed sediments. The vertical APE for a retaining wall within a highly sensitive area would extend only 0.2 meters into undisturbed sediments. It is unlikely that intact buried archaeological material will be encountered at such a shallow depth.

Prehistoric Archaeological Resources. A surface survey of the archaeological APE was conducted beginning on December 13, 2002, to determine if previously unrecorded archaeological resources are present within the project area. No archaeological resources were identified in the APE. One cultural resource that had been previously observed and that might possibly extend into the APE was revisited, but no cultural material was noted. No other previously recorded cultural resources exist within the archaeological APE.

It is highly unlikely that the proposed project would disturb intact resources within the existing highway right-of-way, since this area has previously been disturbed to construct I-580. To evaluate the potential for buried cultural deposits at depths below highway and related facilities, background research was conducted on the archaeology and geomorphology of the study area. Based on this review, a buried sites sensitivity model was developed, indicating that just seven percent of the APE has potential for buried archaeological resources, particularly in the western half of the Livermore-Amador valley where Holocene floodplain deposits dominate.

Because all areas within the APE are highly developed (under pavement or concrete), contain a high density of buried utilities (i.e., fiber-optic lines, high-voltage lines, or gas pipelines), or contain steep slopes, subsurface testing for buried resources prior to project construction is infeasible. See Section 2.1.8.4, Avoidance, Minimization, and Mitigation Measures for recommendations.

Historic Archaeological Resources: Reviews of project information, late 19th century and 20th 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 archaeological APE.

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, a Historic Property Survey Report (HPSR) and Historic Resource Evaluation Report (HRER) were completed for the project.

Consistent with Caltrans' policies and general cultural resource practices, the architectural APE includes the area that would be directly affected by construction, as well as one parcel deep immediately adjacent to the construction area. Where the highway right-of-way is extensive and proposed work is minimal, or where substantial roadway infrastructure (e.g., frontage roads or interchange ramps) exists and would remain between the construction area and roadside development,

the architectural APE conformed to the existing right-of-way. Only those resources located within the architectural APE line were included in the survey.

A field survey was conducted in November 2002 to account for historic-era resources within the APE. Results were rechecked in the field in September 2005, February 2006, and March 2006. This field reconnaissance helped to determine which buildings, structures, and objects were contributed in or prior to 1956 and would need more detailed study for this project.

The architectural APE contains 47 buildings, groups of buildings, or structures located within the cities of Dublin, Pleasanton, and Livermore, as well as the unincorporated county lands in between. Three of these resources contained historic-era buildings, groups of buildings, structures, or features constructed in or before 1960 and were subject to further evaluation.

The remaining 44 buildings, groups of buildings, or structures fall under one of the six property types that are exempt from evaluation in accordance with the PA among Caltrans, FHWA, ACHP, and SHPO, which became effective January 1, 2004.

The properties within the architectural APE containing historic-era structures 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 have also been 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 Resource Code. Three historic-era properties constitute the survey population for this study. It is concluded that none of the survey population resources appear to be eligible for 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.

The 24-acre Gandolfo Ranch, located at 487 East Airway Boulevard in Livermore, is adjacent to, but outside of, the project APE. SHPO determined this property to be eligible for inclusion in the National Register of Historic Places as a historic district in 2001.[10] Although this property borders the architectural APE, the main complex, which comprises 16 modern and historic buildings, is located within the southwestern portion of the property boundary and is more than 500 feet from the architectural APE as currently drawn. East Airway Boulevard, a modern road constructed between 1968 and 1973, also intersects the ranch property, and provides a buffer between I-580 and the ranch complex. The buildings are also screened behind eucalyptus, pepper, and fruit trees. While a soundwall is proposed near the northeast corner of the property, the buffer provided by modern East Airway Boulevard and the ranch complex's landscaping shields it from any potential indirect effects

[10] Dr. Knox Mellon, California State Historic Preservation Officer, letter to Michael G. Ritchie, Division Administrator, Federal Highway Administration, California Division, November 15, 2001, regarding determinations of eligibility and effect for the proposed construction of an interchange on Interstate 580 at Isabel Avenue in Livermore, CA, Reference No. FHWA011017A; The Gandolfo Ranch is eligible at the local level of significance under Criterion A, for its important association with agricultural development of Livermore during its period of significance (1885-1950), and Criterion C, as a 19th century ranch (period of significance between 1885 and 1930). In addition, the ca. 1870s residence is also individually eligible at the local level under Criterion C, as a representative example of a Gothic Revival/Folk Victorian farmhouse.

of the proposed project; therefore this property was excluded from the architectural APE. Only those resources located within the architectural APE boundary were included in the survey.

Consultation

On May 10, 2006, the HPSR, HRER, and ASR were transmitted to the SHPO with a request for concurrence in the findings of no eligibility for properties within the archaeological or architectural APE. The SHPO returned this concurrence on August 9, 2006; a copy of the SHPO's letter is included in Appendix E, Agency Correspondence.

2.1.8.3 Impacts

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. Recommendations are presented in Section 2.8.1.4, Avoidance, Minimization, and/or Mitigation Measures, to avoid adverse impacts in the event that deeply buried archaeological resources exist within the APE. Measures are also identified in Section 2.4.5, (Construction Phase Impacts, Cultural Resources) Avoidance, Minimization, and/or Mitigation Measures, to address late discovery of unanticipated buried cultural deposits.

As no historic resources within the APE appear to meet the criteria for eligibility, there is no potential for impact. Avoidance, minimization, and/or mitigation measures are not necessary.

2.1.8.4 Avoidance, Minimization, and/or Mitigation Measures

Since the project will not affect or have the potential to affect cultural resources, no further archaeological studies are recommended. In the unlikely event that previously unidentified buried cultural materials are unearthed during construction of the proposed project, Caltrans and FHWA would comply with 36 CFR 800.13 regarding late discoveries.

2.2 Physical Environment

2.2.1 Hydrology and Floodplain

Documents reviewed for the hydrology and floodplain studies include United States Geological Survey (USGS) topographic maps and FEMA Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) for the Cities of Dublin, Pleasanton, and Livermore, and for unincorporated Alameda County. Also consulted was the Zone 7 System Map prepared for the Alameda County Flood Control and Water Conservation District (1997). Supplemental data were obtained during site investigations and from as-built drawings and construction plans for Tassajara Creek, Collier Canyon Creek, and Line G-3 (Arroyo Mocho tributary).

2.2.1.1 Regulatory Setting

The following federal, state, and local laws, ordinances, and guidelines apply:

National Flood Insurance Program (23 CFR §640, Subpart A, Section 650 *et seq.*)

NEPA, 42 USC Section 4231, requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure that environmental considerations are given due weight in project decision-making. 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 that the project would have on these areas and on the resources within those areas. Federal implementing regulations are at 23 CFR §771 (FHWA) and 40 CFR §1500-1508 (CEQ).

Executive Order 11988

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless there is no other practicable alternative. The FHWA requirements are outlined in 23 CFR 650, Subpart A.

2.2.1.2 Affected Environment

Regional Hydrology

The San Francisco Bay Area has a Mediterranean-type climate, characterized by warm, dry summers and mild, wet winters. Because the project location is in an inland valley away from the moderating influences of the ocean and bay, it experiences greater temperature extremes than its Bay plain neighbors. Temperatures in the Amador Valley dip below 32.0 degrees Fahrenheit (°F) in winter and often rise above 100.0°F in summer. The annual maximum mean temperature is 72.9°F and the annual minimum mean temperature is 45.3°F. The terrain in the project vicinity is generally level, and drainage through the geologically recent alluvial soils is poor due to the existence of a relatively impermeable clay “cap” soil layer covering most of the valley. Flood-producing rainfall occurs during the winter months.

The project is located in the Arroyo Mocho watershed, which has a drainage area of 454.3 square kilometers ($km^{2)}$ (175.4 square miles [sq mi]). The following streams cross I-580 within the project limits:[11]

- Tassajara Creek (Line K): Tassajara Creek crosses I-580 approximately 0.64 km (0.40 mi) west of the Tassajara Road/Santa Rita Road interchange. The Tassajara Creek Bridge is composed of shotcrete and measures approximately 27.4 m (90 ft) in length and 61.5 m (202 ft) in width. The bottom width of the channel at the crossing is approximately 27.4 m (32 ft).
- Arroyo Mocho Tributary (Line G-3): This unnamed tributary crosses I-580 approximately 0.45 km (0.28 mi) east of the Tassajara Road/Santa Rita Road interchange. Line G-3 is conveyed through triple box culverts with dimensions of 4.3 m by 2.7 m (14 ft by 9 ft).
- Arroyo Las Positas (Line H): Arroyo Las Positas crosses I-580 at four locations within the project limits. The first is approximately 1.85 km (1.15 mi) east of the Airway Boulevard interchange;

[11] All line designations per Zone 7, Alameda County Flood Control and Water Conservation District.

the second is at the Cayetano Creek confluence (Line N) described below; the third is approximately 1.27 km (0.7-mi) east of the North Livermore Avenue interchange; and the fourth is approximately 0.6 km (0.3 mi) east of the Vasco Road interchange at Northfront Road. At the first location, Arroyo Las Positas is conveyed through a continuous concrete tee-beam bridge that is 53.0 m long by 48.8 m wide (174 ft long by 160 ft wide). At the third location, Arroyo Las Positas is conveyed through a continuous concrete tee-beam bridge that is 39.9 m long by 46.9 m wide (131 ft long by 154 ft wide). The inlet at Arroyo Las Positas near Northfront Road is a double reinforced box concrete culvert with dimensions of 3.7 m by 2.4 m (12 ft by 8 ft), headwalls and wingwalls, and a 1.2-m (4-ft) cutoff wall at the downstream end.

- Cottonwood Creek (Line L): Cottonwood Creek crosses I-580 approximately 1.07 km (0.66 mi) west of the Collier Canyon interchange. Cottonwood Creek is conveyed through double reinforced concrete box culverts with dimensions of 3.1 m by 2.2 m (10 ft by 7 ft).
- Collier Canyon Creek (Line M): Collier Canyon Creek crosses I-580 approximately 0.83 km (0.50 mi) east of the Collier Canyon interchange, and it is conveyed through double box culverts with dimensions of 3.0 m by 2.2 m (10 ft by 7 ft) with wingwalls and 1.2-m (4-ft) flared inlets.
- Cayetano Creek (Line N): The confluence of Cayetano Creek and Arroyo Las Positas at the north side of I-580 is approximately 0.97 km (0.60 mi) west of the North Livermore Avenue interchange. Arroyo Las Positas is conveyed through a continuous concrete tee-beam bridge that is 53.6 m long by 46.9 m wide (176 ft long by 154 ft wide).
- Arroyo Seco (Line P): Arroyo Seco crosses I-580 approximately 0.59-km (0.37-mi) west of the Livermore Boulevard interchange. Arroyo Seco is conveyed through triple reinforced concrete box culverts with approximate dimensions of 4.3 m by 2.7 m (14 ft by 9 ft).

Most of the contributing creeks drain from north to south, including Tassajara Creek, Line G-3, Cottonwood Creek, Collier Canyon Creek, and Cayetano Creek. Arroyo Las Positas flows from east to west and drains into Arroyo Mocho. Arroyo Mocho flows in a generally northwesterly direction from its headwaters at Mount Mocho (1,117 m [3,664 ft]), located 3.2 km (2 mi) south of the Alameda County/Santa Clara County border. Arroyo Mocho changes course at Stanley Boulevard, where it veers west, and again at the confluence of Arroyo Las Positas. Arroyo Mocho drains into Arroyo de la Laguna, which flows into Alameda Creek. San Francisco Bay and the Pacific Ocean are the ultimate receiving water bodies.

Flood Sources

Relatively frequent and substantial flooding has occurred in the Amador and Livermore Valleys in the past. Winter rains fluctuate greatly in size and severity, occasionally bringing heavy rainfall in short periods of time. During periods of intense precipitation, runoff can be rapid and heavy, causing flows in excess of stream course capacities and inundating large areas of the valley floor. A Flood of Record occurred in January 1952, when floodwaters from a constricted Arroyo Seco backed up at the (then) Western Pacific Railroad trestle and spread out over the flat valley, causing severe flooding and damaging railroads, bridges, roads, utilities, and buildings.

Flooding also can occur in the wake of low-intensity precipitation spread over several days, as was the case during the storms of 1955 and 1958. The combination of rapid runoff rates, inadequate channel capacities, constricting structures, and development of floodplain areas make the cities of Dublin, Pleasanton, and Livermore susceptible to damage when large rainstorms occur.

FEMA Flood Zone Designations

FEMA FIRMs and FISs for the City of Dublin, the City of Pleasanton, the City of Livermore, and unincorporated Alameda County were reviewed to identify areas subject to a 100-year flood (defined as a flooding event that has a one percent or greater annual chance of occurring in any given year, or once every 100 years).

- **Tassajara Creek Crossing:** FIRM maps indicate flooding at the north side of I-580 at the Tassajara Creek crossing, designated Zone AE (area subject to 100-year flood); flooding does not extend south of I-580. Based 1984 and 1997 FISs for the City of Pleasanton, capacity at this crossing is sufficient to convey flow from Tassajara Creek.
- **Arroyo Mocho Crossing:** Flooding is indicated in the developed areas north and south of I-580, east of the Tassajara Road interchange near Line G-3. Flooding is also indicated in the El Charro Road area, due to the insufficient capacity of Arroyo Las Positas. The relocation of the Arroyo Las Positas channel to Arroyo Mocho at El Charro Road has reduced flooding risks in these locations, and project-related construction should not impact the floodplain.
- **Arroyo Las Positas—First Street Crossing:** Flooding occurs at the Arroyo Las Positas crossing approximately 1.7 km (1.0 mi) west of the First Street interchange. The area immediately north of I-580 and west of the First Street interchange is designated Zone A8 (area subject to 100-year flood); the area farther upstream is designated Zone A5 (area subject to 100-year flood). FEMA indicates that although the 500-year flood would overtop I-580, the 100-year flood would be contained in the channel.
- **Arroyo Las Positas—North Livermore Crossing:** South of I-580 and west of the North Livermore interchange is designated as Zone A7 (area subject to 100-year flood); the area farther upstream is designated Zone A8 (area subject to 100-year flood).
- **Arroyo Las Positas—Airway Boulevard Crossing:** Flooding downstream of the Arroyo Las Positas crossing east of the Airway Boulevard interchange would not encroach on I-580. This area is designated as Zone AO (area subject to 100-year shallow flooding with an average depth of 0.3- to 0.9-m [1.0 to 3.0 ft]). FIRM maps indicate that the 100-year flood would be contained in the channel upstream of the crossing.
- **Arroyo Seco Crossing:** The Arroyo Seco crossing upstream and at I-580 is contained in the channel. Immediately downstream of I-580, however, the Arroyo Seco floodplain is designated as Zone AE (area subject to 100-year flood). A drop structure at the confluence of Arroyo Seco and Arroyo Las Positas causes a backwater effect up to the downstream end of the I-580 crossing.

Base Flood Backwater Potential

- Upstream of the Tassajara Creek crossing of I-580, northwest of the Tassajara Road interchange, the base flood has the potential to inundate approximately 33.8 hectares (ha) (83.5 acres [ac]);
- Downstream of the Arroyo Las Positas crossing of I-580, east of Kitty Hawk Road, the base flood has the potential to inundate an area of approximately 7.8 ha (19.3 ac);
- Upstream of the Arroyo Las Positas crossing of I-580, the base flood would be contained in the channel. The base flood has the potential to inundate a small area in the southwest quadrant of the I-580/North Livermore Avenue interchange; however, Zone 7 owns this channel and flooding would not impact the floodplain.
- Upstream of the Arroyo Las Positas crossing of I-580, east of the I-580/North Livermore Avenue interchange, the base flood has the potential to inundate an area of approximately 8.8 ha (21.8 ac).
- Downstream of the Arroyo Seco crossing of I- 580, the base flood has the potential to inundate an area of approximately 2.0 ha (4.8 ac).

2.2.1.3 Floodplain Impacts

The I-580 Eastbound HOV Lane Project would extend the concrete box culvert at Cottonwood Creek for a distance of 0.87-m (2.9 ft). No other changes would be made to bridges or culverts. The proposed project would insignificantly increase water surface elevations as currently defined on the FEMA FIRMs.

Regulations governing the National Flood Insurance Program (23 CFR 650, Subpart A, Section 650) were used, in part, as guidance for the evaluation of floodway impacts. Section 650.111 of the regulations calls for location hydraulic studies to be performed with detailed engineering design drawings, and it lists five location considerations to be examined for floodplain encroachments (which coincide with the policies of FHWA):

1. Risks associated with implementation of the action.
2. Impacts on the natural and beneficial floodplain values.
3. Avoid support of incompatible floodplain development.
4. Measures to minimize impacts associated with the action.
5. Measures to restore and preserve the natural and beneficial floodplain values affected by the action.

Risks Associated with Implementation of the Action

As defined by FHWA, a significant encroachment is a highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction or flood-related impacts: 1) a significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or that provides a community's only evacuation route; 2) a significant risk; or 3) a significant adverse impact on the natural and beneficial floodplain values.

Based on available information, the I-580 Eastbound HOV Lane Project would not have a significant impact on any of the waterways that cross the roadway within the project limits. Any widening of the highway embankments to the south would impact a ditch on the south side of I-580. The impact would be minor because of the shallow depth, low velocity, and minor encroachment to the existing wide floodplain. Project drainage facilities would be designed to mitigate the small increase in runoff from the increase in paved areas. There would be no adverse effects to emergency vehicle access, or to natural or beneficial floodplain values. There would be no significant floodplain risk.

Impacts on Natural and Beneficial Floodplain Values

Natural and beneficial floodplain values include, but are not limited to, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agricultural, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge. There are wetland areas within Tassajara Creek, Line G-3 (Arroyo Mocho Tributary), Cottonwood Creek, Collier Canyon Creek, Cayetano Creek, Arroyo Seco, and Arroyo Las Positas. Natural communities, habitat for special-status species, and impacts to wetlands and other waters of the U.S. are described in Section 2.3, Biological Environment.

Support of Incompatible Floodplain Development

Although portions of the project would be located on the fringe of a floodplain, the project would not support incompatible floodplain development. The project would alter an existing major roadway facility, and with the single exception of the extension of the Cottonwood Creek concrete culvert, the project would avoid construction within creeks and channels. The proposed highway improvements would maintain local and regional access to existing land uses and would not create new access to developed or undeveloped lands.

Measures to Minimize Floodplain Impacts Associated with the Action

In the existing condition, 100-year flood flows are contained within the creek channels for the entire study reach, passing through reinforced concrete box culverts and the soffits of the bridges. The extension of the Cottonwood Creek concrete box culvert would not allow 100-year water surface elevations to overtop I-580.

Measures to Restore and Preserve the Natural and Beneficial Floodplain Values Impacted by the Action

There are no identified significant impacts to natural and beneficial floodplain values. No nonroutine measures would be required. Except for a minor encroachment on riparian area for the Cottonwood Creek concrete box culvert extension, any environmental impacts would be the result of construction activities and would be mitigated with standard measures, such as revegetation, Best Management Practices (BMPs), and project permit requirements.

The ACCMA would obtain all necessary permits and approvals from USACE; Alameda County Flood Control and Water Conservation District, Zone 7; CDFG; USFWS; and the RWQCB.

2.2.1.4 Drainage Impacts

The principal feature of the project that would potentially affect existing drainage facilities would be replacing the existing metal thrie-beam median barrier and unpaved median with a continuous concrete barrier and complete paving of the median. Within the median, most of the existing inlets would be removed or abandoned. To avoid floodplain impacts, a thrie-beam median barrier would be used in lieu of concrete barrier at locations that FEMA has designated as within the 100-year floodplain. Only those median inlets along reaches of super elevation would be modified and incorporated into the modified median drainage facilities. An auxiliary lane would be added at two locations, and some existing longitudinal ditches along the south toe of slope would need to be relocated with the widened fill slopes. With regard to the design of onsite drainage facilities, the existing onsite drainage pattern would be maintained, with new drainage facilities constructed to replace the existing drains and matching the new roadway improvements.

2.2.1.5 Avoidance, Minimization, and Mitigation Measures

The proposed project would not significantly increase water surface elevations as currently defined on FEMA FIRMs. Project drainage facilities would be designed to mitigate the small increase in runoff from the increase in paved areas. The proposed project would have no significant impacts to natural or beneficial floodplain values. Therefore, no mitigation measures are proposed.

With the completion of the project drainage facilities, no major direct or indirect impacts are anticipated to offsite or cross drainage facilities. Therefore, no mitigation measures are proposed.

2.2.2 Water Quality and Stormwater Runoff

2.2.2.1 Regulatory Setting

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

Clean Water Act

The federal Clean Water Act (CWA) is the primary water resources protection statute. 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 U.S. and wetlands) apply to the proposed project. Sections 401 and 404 (see Section 2.3, 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 (Certification of Compliance with State Water Quality Standards)

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). USACE would not issue a Section 404 permit without satisfaction of RWQCB Section 401 requirements.

Clean Water Act, Section 402 (NPDES Permits, California State Water Resources Control Board, NPDES, Construction General Permit for Stormwater Discharges)

The California State Water Resources Control Board (SWRCB) implements the NPDES program, which was established by the United States Environmental Protection Agency (EPA) to regulate discharges into receiving waters. 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 that arise from construction activities. An NPDES application requires the filing of a Notice of Intent (NOI) to comply with the Statewide General Permit (see next paragraph). Prior to the start of construction, an 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.

Caltrans (NPDES Permit for Stormwater Discharges)

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. Stormwater runoff from Caltrans construction activities is regulated under Caltrans' NPDES permit.

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 RWQCB within the state formulate and adopt water quality control plans or basin plans for all areas in the region.

2.2.2.2 Affected Environment

The proposed project is within the jurisdiction of the San Francisco Bay RWQCB, which has the authority to implement water quality protection standards through the issuance of permits for discharge to waters at locations within its jurisdiction. Water quality objectives for the San Francisco Basin Plan are specified in compliance with the federal CWA and the state Porter-Cologne Water Quality Control Act. The Basin Plan establishes water quality objectives and implementation programs to meet state objectives and to protect the beneficial uses of water in the basin. Because the project site is located within the San Francisco Bay RWQCB jurisdiction, all discharges to surface water or groundwater are subject to appropriate Basin Plan requirements. In addition, USACE; FEMA; California Department of Water Resources; and Zone 7, Alameda County Flood Control and Water Conservation District all have jurisdiction over flood control and water quality activities.

Surface Water Beneficial Uses

As described in the San Francisco Basin Plan (1995), the beneficial uses of surface waters in the project vicinity include groundwater recharge; migration of aquatic organisms; water contact recreation; noncontact water recreation; spawning, reproduction, and/or early development of wildlife; and wildlife habitat. Arroyo Mocho, Arroyo Las Positas, Tassajara Creek, and Arroyo Seco were not designated as supporting beneficial uses in the Basin Plan.

Groundwater Beneficial Uses

Beneficial uses of the Livermore Valley Groundwater Basin include agricultural supply, industrial service supply, municipal and domestic supply, and industrial process supply. According to Zone 7, the part of the Livermore-Amador Valley Groundwater Basin that lies beneath most of the City of Pleasanton and the westernmost portion of the City of Livermore, often referred to as the Main Basin, contains water of good quality, as measured by Total Dissolved Solids (TDS). The TDS is 500 milligrams per liter (mg/L) for many of the municipal wells in the valley. However, as set forth in the *City of Livermore General Plan*, the preservation and enhancement of existing groundwater quality hinges on the success of the "Salt Management Plan" that has been prepared by Zone 7 for the Main Basin to offset excessive salt loading, which could result in a degraded water supply.

Existing Drainage

Existing drainage systems are currently using few Design Pollution Prevention BMPs. BMPs that are currently used include ditches, dikes, overside drains, and vegetated surfaces. These BMPs would be upgraded as part of the proposed project.

Pollutants

Diazinon impairment is known to exist in Arroyo Mocho and Arroyo Las Positas. The San Francisco Bay RWQCB and USEPA have listed the Arroyo Mocho and Arroyo Las Positas watersheds under CWA Section 303(d) as sediment-impaired water bodies. At this time, RWQCB staff is in the process of establishing a draft Basin Plan Amendment for diazinon in the Arroyo Mocho and Arroyo Las Positas watersheds. The *Final Project Report for Diazinon and Pesticide-Related Toxicity in Bay Area Urban Creeks, Water Quality Attainment Strategy and Total Maximum Daily Load (TMDL)* was completed on March 2004. The goal of the TMDL program is to restore and maintain the sediment-impaired beneficial uses of water for Arroyo Mocho, Arroyo Las Positas, and their tributaries. Tassajara Creek, Line G-e (Arroyo Mocho Tributary), Cottonwood Creek, Collier Canyon Creek, Cayetano Creek, and Arroyo Seco are not listed on the state RWQCB CWA 303(d) list of impaired water bodies.

Pollutants found on streets and freeways that could be constituents of stormwater runoff include heavy metals, organic compounds (including petroleum hydrocarbons), sediments, trash, debris, oil, and grease. Potential sources of pollutants from the right-of-way include total suspended solids, nutrients, pesticides, particulate metals, dissolved metals, pathogens, litter, biochemical oxygen demand, and TDS. Additional sources of pollutants from offsite sources within the watershed include silviculture, road construction, removal of riparian vegetation, stream bank modification, natural sources, urban runoff/storm sewers, land development, sediment resuspension, and nonpoint sources.

2.2.2.3 Impacts

Surface Water Impacts

The I-580 Eastbound HOV Lane Project would have a minor impact on surface water quality or beneficial uses. The primary potential for water quality impact is soil erosion or suspended solids being introduced into the waterways in stormwater runoff. Mitigation measures for long-term impacts to water quality would focus on control of sediments and suspended solids from entering the waterways.

Groundwater Impacts

The project would have no impact on groundwater supplies, nor would it interfere substantially with groundwater recharge. The project would not result in a net deficit in aquifer volume or a lowering of the local groundwater table level. In addition, because the project is designed to address congestion by consolidating traffic into fewer vehicles, no substantial increase in traffic-related pollutants is anticipated.

Drainage Impacts

The project would have no impact on the existing drainage pattern of the project area that would result in substantial erosion or siltation on- or offsite. The only change to existing waterway conveyances is the 0.87-m (2-ft) extension of the reinforced concrete box culvert of Cottonwood Creek. Between First Street and Vasco Road on the south side of I-580, slope widening for the auxiliary lanes would have a minor impact on the roadside ditch near where the First Street eastbound on-ramp enters I-580. Existing median drainage facilities would be removed in constructing the new paved median section. Water would be directed to sheet flow across the roadway pavement to the extent practicable, and additional drainage systems would be provided to direct flows to the south side of the highway where sheet flow is not practicable.

Stormwater Impacts

The project would not substantially increase impervious surface and runoff. As described in the preceding paragraph, replacement drainage facilities would generally convey runoff across the pavement insofar as practicable, and additional drainage facilities would be provided to capture and convey the storm runoff in super elevation areas. Drainage would be conveyed to the same receiving waters as currently. There would be no substantial adverse impact from the small increase in runoff or the small increase in runoff to the south side of the roadway.

Impacts to Stormwater Runoff Quality

FHWA has found that street and highway stormwater runoff can adversely affect receiving water quality. The nature of the impacts depends on the uses and flow rate or volume of the receiving waters, rainfall characteristics, and street or highway characteristics. In general, heavy metals associated with vehicle tire and brake wear, oil and grease, and air emissions are the primary toxic pollutants associated with transportation corridors. The project is designed to address congestion by consolidating traffic into fewer vehicles and would not increase pollutants compared with existing conditions.

The project would add 9.3 ha (23.0 ac) of impervious surface within the project limits; therefore, it would slightly increase the volume of stormwater runoff. The sediment-loading potential may increase because of flow coming from paved surfaces and then contacting bare and/or vegetated surfaces. The volume of downstream flow would not be substantially increased. The potential increase to sediment loads would be minimized by erosion control measures, planting of vegetation, and installation of treatment BMPs

2.2.2.4 Avoidance, Minimization, and/or Mitigation Measures

Permanent water quality control measures to reduce pollutants in stormwater runoff would be incorporated into the final engineering and/or landscape design of the project, taking into account expected runoff volumes from the roadway. These control measures would include the following design pollution prevention and treatment BMPs:

- **Consideration of downstream effects related to potentially increased flow.** The project would discharge to unlined channels; therefore, necessary erosion control would be applied to ditches. The potential for increased sediment loads to be transported to downstream waterways would be addressed by temporary and permanent erosion control measures.
- **Slope/surface protection systems.** The project would create or modify existing slopes, requiring the application of one or more of the following control measures:
    - Vegetated surfaces
    - Hard surfaces
- **Preservation of existing vegetation.** At all locations, desirable vegetation that provides erosion- and sediment-control benefits would be preserved.

Treatment BMPs

At appropriate locations, biofiltration swales and strips would be designed to mitigate for negative impacts associated with urban runoff. Biofiltration strips and swales are vegetated surfaces that remove pollutants by filtration through grass, sedimentation, sorption to the soil or grass, and infiltration through the soil. Strips and swales are mainly effective at removing debris and solid particles, although some constituents are removed by sorption to the soil. Biofiltration swales are vegetated channels that receive directed flow and convey stormwater. Biofiltration strips, also known as vegetated buffer strips, are vegetated sections of land over which stormwater flows as overland sheet flow. A detention basin may be feasible in the southeast quadrant of the Vasco Road interchange. A detention basin is a permanent treatment BMP designed to reduce the sediment and particulate loading in runoff. An infiltration basin may be feasible at the southwest quadrant of the Portola Avenue overpass. Infiltration basins remove pollutants by capturing water and infiltrating it directly to the soil rather than discharging it to surface waters.

The proposed project has no critical source areas, such as vehicle service facilities, parking areas, paved storage areas, and fueling stations. Therefore, a multichamber treatment train (MCTT) would not be an appropriate mitigation, as MCTTs are designed to treat runoff at critical source areas. Media filters perform best if the tributary area has a relatively high percentage of impervious area and

low sediment loading. Since the project site has a relatively small percentage of impervious area, media filters are not recommended. A wet basin would not be feasible as it would require a large area and supplemental water to maintain the water level through the dry season. Other treatment BMPs, such as dry weather diversion, gross solids removal devices, and traction sand traps, were deemed to be infeasible and/or unnecessary and were not recommended.

Erosion Control Measures

The goal of an effective erosion control strategy is to maintain natural, preconstruction erosion rates to the maximum extent possible. Existing vegetation would be preserved to the maximum extent. Unpaved areas that are disturbed would be restabilized according to Caltrans Landscape Architecture and Maintenance recommendations. The erosion potential of cuts, fills, and drainage patterns would be minimized. Concentrated flows would be collected into drains and channels. Permanent erosion control measures include measures for sediment control, such as biofiltration swales and strips, and measures for soil stabilization. All measures would be addressed as part of the design process in a manner consistent with Caltrans' permanent erosion control measures.

2.2.3 Geology/Soils/Seismic/Topography

Information in this section derives from published and unpublished geologic, soil, and groundwater data; as-built plans; and a geological reconnaissance of the project area. No new soil borings were performed for the geology study.

2.2.3.1 Affected Environment

The project site is located in eastern Alameda County within the Tri-Valley area, which encompasses the Cities of Dublin, Pleasanton, and Livermore. The terrain is generally flat from the westernmost project boundary to the I-580/El Charro Road interchange, which has an approximate elevation of 99 m (325 ft). East of El Charro Road, the terrain gradually slopes upward towards the easternmost project boundary, which has an approximate elevation of 183 m (600 ft).

Site Geology

The regional structure of the area is typical of the Northern California Coast Ranges, consisting of a complex series of northwest-trending synclines and anticlines and a number of northwest-trenching faults. The area is made up of marine and nonmarine sedimentary strata whose age ranges from Tertiary Oligocene-Miocene (Contra Costa Group and San Pablo Group) to Holocene (alluvium). The area has been cut by a complex series of high-angle thrust and strike-slip faults. The process of folding and faulting has produced the northwest-trending ridge and valley systems. These valleys are filled with Pleistocene to Holocene alluvium, derived from the surrounding ridges.

Subsurface Conditions

The Livermore Valley is underlain by water-bearing unconsolidated alluvial, stream channel, and basin sediments, which were deposited beginning in the late Pleistocene era. Early in the period of alluvial deposition, large streams draining the Livermore Valley from east to west converged in the northwest corner of the valley and flowed northward through the San Ramon Valley to current Suisun

Bay area. When the northwest outlet of the valley was open and the stream gradient steep, sheets of clean gravel gradually accumulated over much of the valley floor. After the northwest outlet of the valley was blocked, swamps and lakes formed in the area, particularly in the west, and continuous sheets of silt and clay were deposited on top of the previously deposited gravel layers. At least four thick clay layers separated by extensive gravel beds are known to be present in the western portion of the valley.

Project area subsoils mainly consist of Holocene floodplain deposits (Qhfp), Holocene basin deposits (Qhb), Holocene Alluvial Fan and fluvial deposits (Qhaf), Pleistocene alluvial fan deposits (Qpaf), Pleistocene alluvial terrace deposits (Qpaf1), and Pleistocene and/or Pliocene Livermore gravels (QT1).

Geologic Hazards

The project is located in a seismically active part of northern California. The potential for the site to experience strong ground shaking is moderate to high.

The eastern project boundary at the Greenville Road interchange lies within the Alquist Priolo Earthquake Fault Zone (EFZ, formerly Special Studies Zone), which is part of the Greenville Fault Zone. According to the California Seismic Hazard Map (Mualchin, 1996), the controlling fault is either the Calaveras-Pacines-San Benito Fault (Moment Magnitude [Mmax] 7.5) or the Greenville Fault (Mmax 7.25), depending on the specific location and the peak bedrock acceleration within the project area. The potential for fault rupture within the area is considered to be high.

Maximum credible earthquake magnitudes for some of the major faults in the area are summarized in Table 2.2.3-1. These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on a given fault based on the current understanding of the regional tectonic structure.

Table 2.2.3-1: Major Faults in the Project Area

Fault Name	Estimated Closest Distance from the Middle of the Project Area* (km/mi) (Mualchin, 1996)	Maximum Credible Earthquake	Peak Bedrock Acceleration
Greenville (strike-slip)	6.8 km/4.2 mi	7.25	0.49
Calaveras-Pacines-San Benito (strike-slip)	12.5 km/7.8 mi	7.5	0.38
Verona-Williams (unknown type)	9.4 km/5.8 mi	6.0	0.29
Hayward (strike-slip)	23.0 km/14.3 mi	7.5	0.24
Coast Ranges-Sierran Block (reverse including thrust)	12.5 km/7.8 mi	7.0	0.38

* Most of the proposed structures (e.g., retaining walls and overhead sign) are approximately at the middle of the project.
Source: Parikh Consultants, Inc., 2006.

Liquefaction-Induced Settlement

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils that are susceptible to liquefaction; clays generally are not susceptible to liquefaction.

Based on the available data, the majority of submerged cohesionless subsoils in the project area are medium dense to dense. Consequently, the liquefaction potential of the site is low. However, near the Vasco Road interchange there is some potential for encountering loose sands.

2.2.3.2 Impacts

Fault Rupture and Ground Shaking

There is moderate to high potential for the project area to experience strong ground shaking. The potential for fault rupture is high in the Greenville Fault Zone. The impact of the ground rupture within this zone is considered to be insignificant with respect to the roadway widening project. Project design to the latest seismic design standards would minimize damage to roadway facilities and the traveling public.

Liquefaction-Induced Settlement

Subsoil conditions generally consist of stiff to hard lean clay/sandy lean clay, interbedded with medium dense clayey/silty sand. Generally, liquefaction potential is low due to the cohesive nature of the subsoils. Liquefaction would not substantially affect pavement; however, near the Vasco Road interchange where loose sands could be encountered, localized and random settlement could occur that has potential to affect structures.

Groundwater Seepage

Groundwater was encountered at a depth of 8 m to 10 m (25 ft to 30 ft) at the El Charro Road and future Isabel Avenue interchanges. At the Vasco Road interchange, groundwater was encountered at a depth ranging from 2 m to 6 m (7 ft to 20 ft). The groundwater level in the project area is anticipated to vary according to seasonal and groundwater fluctuations, creek flows, surface and subsurface flows, ground surface runoff, and other environmental factors, which may not have been present at the time of the investigation. If locally shallow groundwater or seepage were encountered, it would be mitigated using Caltrans design and construction techniques.

2.2.3.3 Avoidance, Minimization, and/or Mitigation Measures

Geotechnical considerations within the project area would generally be addressed by using Caltrans' standard design and construction techniques.

- Embankment construction would be required for the roadway widening and/or ramp modifications. Generally, short-term and long-term settlement would not be a concern along the site. Caltrans' embankment construction standards would be followed. Placing embankment in accordance with Highway Design Manual guidelines would reduce the potential for earthquake-induced settlement or slippage. Caltrans' standard embankment settlement waiting period does

not appear to be required because ground surface soils are generally stiff and a relatively thin layer of sliver fill is proposed for roadway construction.

- Caltrans standard erosion control and drainage measures would be used to develop a design with low erosion potential to maintain the overall stability of the proposed sliver fill slopes.
- At locations where loose sands may be encountered, random settlement would be minimized using design techniques such as providing additional joints, using alternative flexible design for linear project elements such as walls, and accounting for the settlement in the foundation design loads.
- Retaining wall construction would likely use spread footing foundations given the relatively stiff ground conditions. Site specific studies would be made to evaluate requirements during the design phase. Caltrans standard retaining wall (Types 1 and 5) may be appropriate applications for this project with proper backfill compaction and drainage. Subsurface soil corrosivity should be determined during the final design phase and considered during the selection of wall type.
- Soundwalls, like retaining walls, would likely be constructed using spread footings and standard design practices.
- Foundations for overhead sign structures would be constructed using standard Caltrans design practices.

2.2.4 Paleontology

The project crosses geologic materials that primarily consist of Alluvial Terrace Deposits (Qpafl-Pleistocene), Livermore gravels (Qpaf-Pleistocene), and Basin deposits (Qhb-Holocene). No published data indicate findings of fossils within the project corridor. Considering that the soils within the roadway prism have been repeatedly disturbed to construct and maintain I-580 over the past 40 years, there is little potential for the eastbound HOV lane to encounter any fossils within the area. Proposed construction for the HOV lane is expected to disturb only the upper approximately 0.9m (3 ft) of existing soil, which may all have been placed or disturbed during the construction of the original highway. Based on these conditions, there is very little likelihood of encountering any paleontological resources during construction of the HOV lane. It does not appear that a paleontological monitor would be required.

2.2.5 Hazardous Waste/Materials

Information in this section is based upon the *Initial Site Assessment (ISA) for the I-580 HOV Lane PSR*, (Caltrans, 2000) and the *Initial Site Assessment Update*, (Parikh Consultants, Inc., 2006a). Other data sources investigated include:

- Standard federal, state, and regional environmental “record sources” (e.g., the Federal Superfund List) pinpointing incidents of spills; soil and groundwater contamination; and hazardous materials transfer, storage, or disposal facilities within a 1.5-km-wide (0.9-mi-wide) band along the project corridor.
- Historical aerial photographs identifying previous land uses in the area.
- Field reconnaissance of the project vicinity identifying the potential for proximate hazardous wastes sites and or associated land uses that might adversely affect the corridor.

2.2.5.1 Affected Environment

Historically, land uses in the project vicinity were largely limited to agriculture. The agricultural lands surrounding the I-580 corridor were gradually converted to residential and commercial land uses from the mid-1980s to the present.

Identified Hazardous Waste/Materials Sites

A search of environmental regulatory databases was conducted for the project vicinity by Environmental Data Resources, Inc. (EDR) to determine whether documentation exists related to hazardous waste/materials sites or incidences. The sites identified in the EDR search were evaluated with respect to their potential to adversely affect the project. Sites were considered to warrant further consideration if they were: (1) located in close proximity to I-580 (i.e., less than 200 m [656 ft] from the edge of the proposed right-of-way); (2) hydraulically upgradient with respect to groundwater flow; and/or (3) hydraulically upgradient with respect to surface water flow/stormwater runoff.

One National Priority List (NPL) site was identified within 1.6 km (1.0 mi) of the project. The NPL site was located more than 200 m (656 ft) away and cross-gradient; therefore, hazardous waste from the NPL site is unlikely to migrate to the project site. No environmental impacts are anticipated.

One Comprehensive Environmental Response, Compensation, and Liability Information System – No Further Remedial Action Planned (CERCLIS—NFRAP) site was identified within 1.6 km (1.0 mi) of the project. This site is down-gradient from the project. No adverse environmental impacts are anticipated.

Twenty-five leaking underground storage tank (LUST) sites were identified within 1.6 km (1.0 mi) of the project corridor. Most of these sites were closed, too far up-gradient (more than 200 m [656 ft]), or too far down-gradient from the proposed project right-of-way to pose an environmental concern. Ten hazardous waste sites with proximity to the I-580 project are presented in Table 2.2.5-1.

Table 2.2.5-1: Hazardous Waste Sites with Potential to Affect Subsurface Conditions along the I-580 Eastbound HOV Lane Project Corridor

Identified Property	Property Address	Hazardous Waste	Risk Assessment
MTM General Store and Gas (Texaco)	115 Vasco Road South, Livermore	This site was cited for release of petroleum hydrocarbons; however, the case was closed in 1998. The site is also listed as having three 10,000-gallon gasoline underground storage tanks (USTs) and one 10,000-gallon diesel UST. Tanks are listed as fiberglass tanks with active monitoring systems.	Evidence of groundwater monitoring wells was not observed on the property. The eastern portion of the site falls within the proposed right-of-way. Soils from this property within the right-of-way should be tested prior to removal.
Texaco	930 Springtown Boulevard, Livermore	This site was cited for release of methyl tertiary butyl ether (MTBE) in groundwater discovered during UST closure activities.	This site is currently undergoing remediation and should not pose an adverse environmental impact.

Table 2.2.5-1: Hazardous Waste Sites with Potential to Affect Subsurface Conditions along the I-580 Eastbound HOV Lane Project Corridor

Identified Property	Property Address	Hazardous Waste	Risk Assessment
ARCO	909 Bluebell Drive, Livermore	This site was listed for release of waste oil to soil discovered during tank closure activities. This site is now closed.	This site was closed in September 2000 and should not pose an adverse environmental impact.
Bay-Cal Equipment	5605 Southfront Road, Livermore	This site was listed for having 2 USTs: a 6,000-gallon waste UST and a 5,000-gallon unleaded gasoline UST. Both USTs were removed in 1988. No other indication of leaks or releases was found.	This site borders on the right-of-way. Therefore, it is recommended that soils from this site within the right-of-way be tested to ensure that the soil and groundwater have not been impacted by the previously removed USTs.
Genos Deli (Shell Gas Station)	1000 Vasco Road, Livermore	Listed as LUST and UST site; however, based on a review of the EDR report, the LUST case has been closed. The site is also listed as having 3 unleaded and one diesel UST, each made of fiberglass with active monitoring systems and a capacity of 10,000 gallons.	This site is down-gradient of the proposed project and should not pose an environmental concern.
Livermore Dublin Disposal	6175 Southfront Road, Livermore	LUST site due to release of gasoline to soil. The case was closed in 1998.	During the site visit, a diesel aboveground storage tank (AST) was observed. Evidence of groundwater monitoring wells and groundwater remediation systems were not observed. The site is closed and should not pose an environmental concern; however, it is recommended that surface soil samples be collected in the event that stained soils are encountered during construction activities at this site.
Capitol Metals	261 Vasco Road	LUST site due to release of gasoline to soil. The case was closed in 1997.	This site is closed and should not pose an environmental concern.
Caltrans Maintenance Yard	6153 Southfront Road, Livermore	Due to the presence of trucks and hazardous waste/materials at this site, there is a potential for surface soils to have been impacted by petroleum hydrocarbons.	Should the right-of-way be extended to this property, it is recommended that surface soil samples be collected and analyzed for total petroleum hydrocarbons (TPH) as gasoline and benzene, toluene, ethyl benzene, and xylenes (BTEX), volatile and semi-volatile organic compounds.

Table 2.2.5-1: Hazardous Waste Sites with Potential to Affect Subsurface Conditions along the I-580 Eastbound HOV Lane Project Corridor

Identified Property	Property Address	Hazardous Waste	Risk Assessment
Union 76 Gas Station	115 South Vasco Road, Livermore	Cited for release of petroleum hydrocarbons; however, the case was closed in 1998. The site is also listed as having three 10,000-gallon USTs and one 10,000-gallon diesel UST.	During the site visit, evidence of groundwater monitoring wells was not observed on the property. The eastern portion of this site falls within the proposed right-of-way. Soils from this property within the right-of-way should be tested prior to removal.
	6219 Southfront Road, Livermore	Although not listed on any database, during the site visit, an AST containing hazardous materials was observed on this property.	Recommended that should Caltrans decide to purchase this property, it should contact the property owners, identify the type of hazardous materials stored at this property, and perform testing of the surface soils to determine if any materials have been released to the soil and groundwater at the site.

Source: Parikh Consultants, Inc., 2005.

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 or proximate soils have the potential to contain lead-based paint (LBP). Lead is a suspect carcinogen, a known teratogen (i.e., it has the potential to cause birth defects), and a reproductive toxin.

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 airborne heavy metal debris in excess of the threshold established by Title 22 California Code of Regulations.

Aerially Deposited Lead

Various studies have been performed in the Bay Area that have identified 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 0.15-m (6 inches) of soil in unpaved shoulder and median areas of many freeway corridors. The lead levels in surface soils along highways can reach concentrations in excess of the hazardous waste threshold, requiring disposal at either a Class I landfill or onsite stabilization.

2.2.5.2 Impacts

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

Hazardous Waste

Review of the EDR report and agency databases identified four sites in the City of Livermore with the potential to adversely affect the project: Livermore Dublin Disposal, 6175 Southfront Road; Caltrans Maintenance Yard, 6153 Southfront Road; Union 76 gas station, 115 South Vasco Road; and the property at 6219 Southfront Road. It is not currently anticipated that any new right-of-way would be required to construct the eastbound HOV lane. Should the ACCMA decide at some time in the future to purchase any of the above properties, it is recommended that surface soil samples be collected and analyzed for hazardous wastes so that remediation needs can be determined prior to purchase.

Another site that might affect the project is Bay-Cal Equipment, located at 5605 Southfront Road. This site was listed for having a gasoline and waste oil UST removed in 1989. A review of records at the County Public Health Department and the RWQCB did not provide additional information on this site. If any portion of this site were to fall within the proposed right-of-way based on final design plans, it is recommended that additional soil and groundwater investigations be carried out to ensure that the right-of-way would not be affected by any release from the USTs.

Lead-Based Paint

As stated, LBP could remain on the surface of existing roadway bridges or in adjacent soils. Abatement measures are recommended to avoid releases of contaminants into air or waterways.

Aerially Deposited Lead

Historical aerial photographs show that I-580 has carried traffic since 1952. It is highly likely that the surface soils along the project corridor contain ADL. The lead levels in surface soils along highways can reach concentrations in excess of the hazardous waste/materials threshold, requiring disposal at either a Class I landfill or onsite stabilization. It is recommended that surface samples of median soils and soils at the roadway edge be collected and analyzed for total lead to determine whether they could be reused onsite or must be removed. Results would also be used to develop appropriate soil handling measures in the Worker Health and Safety Plan (see Section 2.4.8, Hazardous Waste/Materials.).

2.2.5.3 Avoidance, Minimization, and/or Mitigation Measures

Hazardous Waste/Materials

Additional review of the data analyzed for this environmental document would be performed during the final design phase of the project to ensure that the identified hazardous waste/materials sites would not have an adverse impact on the proposed project.

The selection of foundation systems should take into consideration the depth to groundwater. If excavations were to be designed below groundwater levels, this issue would be addressed in a Phase II work plan during the design phase of the project and carried out in a testing program.

Lead-Based Paint

Testing for LBP would be conducted prior to any work in the immediate vicinity of existing bridge structures or painted pavement within the right-of-way. It is anticipated that this testing would be carried out in conjunction with soil tests for ADL.

Aerially-Deposited Lead

It is recommended that surface samples of soil be collected and analyzed for total lead. Any sample exceeding 1,000 milligrams/kilogram (mg/kg) should be tested for Toxicity Characteristic Leaching Procedure (TCLP). Any soil containing 5 mg/L or more of lead is considered a Resource Conservation and Recovery Act (RCRA) hazardous waste for disposal purposes. If the ACCMA were to use the affected soils onsite, special provisions subject to the ADL variance provided to Caltrans by DTSC should be used. This variance includes testing of soils exceeding the hazardous waste thresholds via a WET-DI procedure, a waste extraction procedure using deionized water as a leaching agent. The ACCMA would consult with DTSC and the San Francisco RWQCB regarding the applicability of the variance and management of lead-impacted 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.

2.2.6 Air Quality

This section reports the results of the *Air Quality Impact Technical Report* (Terry A. Hayes Associates, 2006) prepared for the project.

2.2.6.1 Regulatory Setting

Air quality in the U.S. 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 (EPA). 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).

EPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS), which are required under the 1977 CAA and subsequent amendments. EPA 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 (Cal EPA) 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 14,504-km^2 (5,600-sq-mi) 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.

Pollutants and Effects

Air quality studies generally focus on six pollutants that are most commonly measured and regulated: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$).

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 CO 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, a colorless toxic gas, is the chief component of urban smog. O_3 enters the bloodstream 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 BAAB. Under the CAA and the CCAA, the Alameda County portion of the BAAB is designated as a nonattainment area for O_3.

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 it is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NO_X and are major contributors to O_3 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 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, and 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 Alameda County portion of the BAAB is a nonattainment 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. The phase-out of leaded gasoline between 1978 and 1987 has 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 ADL to be in soils along I-580 is discussed in Section 2.2.5, Hazardous Waste/Materials.

National and State Ambient Air Quality Standards

State and federal standards for major air pollutants are summarized in Table 2.2.6-1. Since the CAAQS are more stringent than the NAAQS, the CAAQS are used as the standard in the air quality analysis for the I-580 Eastbound HOV Lane Project.

Table 2.2.6-1: 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)	Nonattainment	0.12 ppm (235 µg/m^3)	Nonattainment
	8-hour	0.70 ppm (137 µg/m^3)[1]	Nonattainment	0.08 ppm (157 µg/m^3)	Nonattainment
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	Nonattainment	150 µg/m^3	Attainment
	Annual Arithmetic Mean	20 µg/m^3	Nonattainment	50 µg/m^3	Attainment
Fine Particulate Matter ($PM_{2.5}$)[2]	24-hour	--	--	65 µg/m^3	Attainment
	Annual Arithmetic Mean	12 µg/m^3	Nonattainment	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)	Attainment
	1-hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Attainment
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	--	--
Lead (Pb)	30-day Average	1.5 µg/m^3	Attainment	--	Attainment
	Calendar Quarter	--	Attainment	1.5 µg/m^3	Attainment

[1] The 8-hour O_3 concentration standard was approved by CARB on April 28, 2005 and is expected to become effective in early 2006.

[2] 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. Therefore, because no EPA guidance on performing qualitative or quantitative $PM_{2.5}$ hot-spot analysis exists, this air quality analysis does not analyze $PM_{2.5}$.

mg/m^3 – milligrams per cubic meter

µg/m^3 – micrograms per cubic meter

ppm – parts per million

Source: Terry A. Hayes Associates, 2006.

Attainment Status

Under CAA and CCAA requirements, areas are designated as either attainment or nonattainment for each criterion pollutant based on whether the NAAQS or CAAQS have been achieved. Areas are designated as nonattainment 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 3 calendar years. Exceedences that are caused by highly irregular or infrequent events are not considered violations of a state standard, and

they are not used as a basis for designating areas as nonattainment. Under the CCAA, the Alameda County portion of the BAAB is designated as a nonattainment area for O_3, PM_{10}, and $PM_{2.5}$. Under the CAA, the Alameda County portion of the BAAB is designated as a nonattainment area for O_3.

Air Quality Plans

The BAAQMD, in coordination with MTC and 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 nonattainment 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 Nonattainment Area for O_3. The most current SIP is called the Bay Area 2001 Ozone Attainment Plan, which was adopted by 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 O_3. 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.

Air Quality Conformity

Under the 1990 CAA Amendments, the DOT cannot fund, authorize, or approve federal actions to support programs or projects that do not conform to CAA requirements. Transportation conformity ensures that federal funding is approved for 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 FHWA or the Federal Transit Administration (FTA) in nonattainment 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 nonattainment and maintenance areas to ensure that federal actions conform to the "purpose" of SIPs. In late 1993, EPA 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.

2.2.6.2 Affected Environment

Air Monitoring Data

The BAAQMD monitors air quality conditions at various locations throughout the BAAB. The Livermore-Rincon Monitoring Station is the closest air monitoring station to the project area. This monitoring station is approximately 0.8 km (0.5 mi) south of the project area. Another monitoring station, the Oakland-Fruitvale Monitoring Station, is located approximately 4.8 km (3 mi) northeast of the project area. Historical data from these two monitoring stations were used to characterize

existing conditions within the vicinity of the proposed project area and to establish a baseline for estimating future conditions without and with the proposed project.

Criteria pollutants monitored at the Livermore-Rincon Monitoring Station include O_3, CO, NO_2, $PM_{2.5}$, and PM_{10}. Since SO_2 is not monitored at the Livermore-Rincon Monitoring Station, SO_2 data from the Oakland-Fruitvale Monitoring Station are presented in Table 2.2.6-2. A summary of the data recorded at these monitoring stations during the period 2002-2004 is shown in Table 2.2.6-2. CAAQS and NAAQS for the criteria pollutants are also shown in the table. As Table 2.2.6-2 indicates, criteria pollutants CO, NO_2, and $PM_{2.5}$ did not exceed the CAAQS or NAAQS between the years 2002 and 2004. O_3 exceeded the federal 1-hour standard 3 times and the state 1-hour standard 25 times during the period. In addition, O_3 exceeded the federal 8-hour standard 9 times. During the same period, PM_{10} exceeded the state 24-hour standard twice.

Table 2.2.6-2: 2002-2004 Criteria Pollutant Violations: Livermore-Rincon and Oakland-Fruitvale Monitoring Stations

Pollutant	Standard Exceedance	2002	2003	2004
O_3 (1-hour)	Maximum 1-hour concentration (ppm)	0.160	0.128	0.113
	Days > 0.12 ppm (Federal 1-hour standard	2	1	0
	Days > 0.09 ppm (State 1-hour standard)	10	10	5
O_3 (8-hour)	Maximum 8-hour concentration (ppm)	0.106	0.094	0.080
	Days > 0.08 ppm (Federal 8-hour standard)	6	3	0
CO	Maximum 8-hour concentration (ppm)	2.50	1.94	1.81
	Days > 9 ppm (Federal 8-hour standard)	0	0	0
	Days > 9.0 ppm (State 8-hour standard)	0	0	0
NO_2	Maximum 1-hour concentration (ppm)	0.079	0.065	0.063
	Days > 0.25 ppm (State 1-hour standard)	0	0	0
$PM_{2.5}$	Maximum 24-hour concentration (µg/m^3)	61.6	42.0	40
	Days > 65 µg/m^3 (Federal 24-hour standard)	0	0	0
PM_{10}	Maximum 24-hour concentration (µg/m^3)	63.5	31.5	46.7
	Estimated days > 150 µg/m^3 (Federal 24-hour standard)	0	0	0
	Estimated days > 50 µg/m^3 (State 24-hour standard)	2	0	0

Source: Terry A. Hayes Associates, 2006.

Background Carbon Monoxide Conditions

Operational air quality impacts associated with this project are based on estimated changes in CO concentrations, because CO levels are directly related to vehicular traffic volumes, the main source of air pollutants, and localized CO concentrations and characteristics can be modeled using EPA methods. The ambient, or background, CO concentration is typically established as the highest of the second-maximum 8-hour readings over the past 3 years. A review of data from the Livermore-Rincon Monitoring Station for the period 2002-2004 indicates that the average 8-hour background concentration is approximately 2.0 ppm. Assuming a typical persistence factor of 0.6, the estimated

1-hour background concentration is approximately 3.4 ppm.[12] The existing 8-hour background concentration does not exceed the state and federal 8-hour CO standard of 9.0 ppm. Additionally, the existing 1-hour background concentration does not exceed the state and federal 1-hour CO standards of 20.0 ppm and 35.0 ppm, respectively.

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.

Fourteen representative sensitive receptors were identified within 0.4-km (0.25-mi) of the I-580 Eastbound HOV Lane Project limits. These locations primarily include residential uses, recreational uses, and a school. These sensitive receptors do not constitute all sensitive uses within the vicinity of the project limits. Rather, they are intended to represent a sampling of the different types of sensitive uses in the area. For purposes of providing a worst-case analysis, CO concentrations were modeled at 7.6 m (25 ft) from 9 roadway segments that are projected to be the most congested. Since CO is a localized gas that disperses quickly, concentrations are highest within close proximity to the congested roadway segments. Concentrations at specific sensitive receptors would be substantially lower than concentrations immediately adjacent to the roadway segments.

2.2.6.3 Environmental Consequences

Methodology

The following calculation methods and estimation models were used to determine air quality impacts: South Coast Air Quality Management District's (SCAQMD) construction emissions calculation formulas, CARB's EMFAC2002 emissions factor model, and Caltrans' CALINE4 dispersion model. EMFAC2002 is the latest emission inventory model that calculates emission inventories and emission rates for motor vehicles operating on roads in California. This model reflects the CARB's current understanding of how vehicles travel and how much they pollute.

The EMFAC2002 model can be used to show how California motor vehicle emissions have changed over time and are projected to change in the future. CALINE4 is a model developed by Caltrans to predict CO and other pollutant concentrations from motor vehicles near roadways.

A quantitative analysis was conducted for this project because the traffic report identified that roadway segments within the project area would have LOS E or F under the Build Alternative (see Section 2.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities, for definitions of LOS.) These roadway segments were analyzed to determine whether the proposed project would result in any CO violations.

[12] Persistence factor is the ratio between the 8- and 1-hour CO concentrations measured at a continuous air monitoring station. A persistence factor of 0.6 is typically used in suburban areas.

The proposed project does not contain lead emissions sources. ADL in materials next to freeways constructed prior to the ban on such fuels may be encountered during construction. Therefore, the potential impacts associated with this issue are qualitatively addressed below (and in Section 2.2.5, Hazardous Waste/Materials).

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 2.2.6-3.
- Operational emissions were to exceed federal emissions thresholds for ROG or NO_X, as shown in Table 2.2.6-4.
- Project-related traffic were to cause CO concentrations at roadway segments to violate the CAAQS or NAAQS for either the 1- or 8-hour period, as shown in Table 2.2.6-1.

Table 2.2.6-3: BAAQMD Daily Operational Emissions Thresholds

Criteria Pollutant	Pounds Per Day
CO	550
ROG	80
NO_X	80
PM_{10}	80

Source: Terry A. Hayes Associates, 2006.

Table 2.2.6-4: 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.

2.2.6.4 Impact Analysis

No-Build Alternative

The No-Build Alternative would include all currently planned and programmed projects in the I-580 corridor through the year 2030, with the exception of the proposed project. The No-Build Alternative is not anticipated to generate any new vehicle trips; thus, it would not increase the region's vehicle miles of travel (VMT) or vehicle emissions. No substantial increase in CO concentrations is expected at sensitive receptor locations. PM_{10} concentrations would not increase. No impact is anticipated.

Build Alternative

The proposed project also would not generate any new vehicle trips; thus, it would not increase vehicle emissions. Therefore, no substantial impacts associated with operational emissions are anticipated for the Build Alternative.

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. 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. One-hour CO concentrations at worst-case sidewalk receptors range from 3.2 ppm to 5.2 ppm and from 1.0 ppm to 1.5 ppm, respectively, and years 2010 and 2030 8-hour CO concentrations range from 1.9 ppm to 3.1 ppm and from 0.6 ppm to 0.9 ppm, respectively. Generally, CO concentrations under the Build Alternative are the same or slightly lower than those under the No-Build Alternative due to the nature of the proposed project. The proposed project would not cause CO concentrations to exceed the state or federal standards; therefore, no substantial impact related to CO concentrations would occur under the Build Alternative.

Road dust is the primary source of operational 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 congestion at nearby roadways. PM_{10} concentrations are not anticipated to increase, and no impact is anticipated.

2.2.6.5 Avoidance, Minimization, and/or Mitigation Measures

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

2.2.6.6 Transportation Conformity Analysis

FHWA cannot approve funding for project activities beyond preliminary engineering unless the project is in conformity with EPA transportation conformity regulations (40 CFR Part 93). The criteria that the Build 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 (MPOs) responsible for determining areawide population and employment forecasts, modeling regional travel demand, and formulating the RTP and the 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 EPA.

§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 transportation plan 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 on February 23, 2005. The 2005 TIP was adopted by MTC on July 28, 2004. FHWA and FTA made a conformity determination on the Transportation 2030 Plan on March 17, 2005, and on the 2005 TIP on October 4, 2004. The proposed project is included in the Transportation 2030 Plan, and it will be amended to the 2005 TIP in 2006.

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

The proposed project is included in the Transportation 2030 Plan and will be amended to the 2005 TIP in 2006.

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

CO concentrations under the Build Alternative are the same or slightly lower than those under the No-Build Alternative. One-hour CO concentrations under the 2030 Build Alternative would range from approximately 1.0 ppm to 1.5 ppm at worst-case sidewalk receptors. The Build Alternative 8-hour CO concentrations are anticipated to range from approximately 0.6 ppm to 0.9 ppm. None of the analyzed roadway segments are anticipated to exceed the state and federal 1- and 8-hour CO standards. Qualitatively, the proposed project would not have adverse effects on PM_{10} levels, as the proposed project would not increase the frequency or severity of existing PM_{10} violations.

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

PM_{10} control measures are not available for the San Francisco Bay Area since the BAAQMD does not have an implementation plan for PM_{10}. The No-Build and Build Alternatives would not change VMT in the region. However, the proposed project would improve roadway conditions, which would result

in lower PM_{10} concentrations. If a federal PM_{10} attainment plan were required in the future, Caltrans would identify appropriate control measures for PM_{10} emissions.

Based on the above, the proposed project satisfies EPA's project-level conformity requirements (40 CFR Part 93).

2.2.7 Noise

This section reports anticipated noise effects of the proposed project and recommended noise abatement measures. Noise impacts and abatement measures would be subject to reassessment during final design based upon further technical studies and public input. The type, location, and size of soundwalls, if any, would be established with the participation of the affected residents and business owners.

FHWA and Caltrans guidelines establish methods and criteria for evaluating and mitigating highway traffic noise effects in compliance with NEPA. These noise analysis methods and abatement criteria are also in compliance with the requirements stemming from CEQA.

2.2.7.1 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 FHWA in *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR Part 772, 2006) and criteria adopted by Caltrans in *Traffic Noise Analysis Protocol for New Highway Construction and Highway Reconstruction Projects* (Protocol) (Caltrans, 1998). For residential land uses, parks, schools, and hospitals, the FHWA outdoor noise criterion is 67 A-weighted decibels (dBA), and the interior noise criterion is 52 dBA. Table 2.2.7-1 shows noise criteria for these and other land use categories.

Table 2.2.7-1: Activity Categories and Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA $L_{eq}(h)$	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
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.

$L_{eq}(h)$ – equivalent sound level averaged over a 1-hour period of time
Source: 23 CFR Part 772, 2006.

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; and/or 2) predicted noise levels approach or exceed the NAC. A noise increase is considered by Caltrans to be substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, L_{eq}(h). A traffic noise impact will also occur when the predicted noise levels of the project approach within 1 dBA or exceed the NAC shown in Table 2.2.7-1. Noise abatement measures are considered for this project when predicted future peak-hour traffic noise levels are equal to or exceed 66 dBA.

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 (e.g., for driveways, ramps), 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[13]
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

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. 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, 1998a).

The Protocol identifies four scenarios under which noise impacts or abatement considerations for a project may need to be reanalyzed. 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

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

b) A significant period of time has passed since the most recent environmental analysis, generally considered to be 3 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 Fundamentals

Noise is 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 it 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 of "loudness" are called decibels (dB), and they are described logarithmically. 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. 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 2.2.7-1 shows 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 (L_{eq}) represents an average of the sound energy occurring over a specified period. L_{eq} 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 NAC used by Caltrans and FHWA use an L_{eq} that averages dBA over a 1-hour period of time. This L_{eq} is referred to as L_{eq} (h).

Maximum Sound Level (L_{max}) 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.

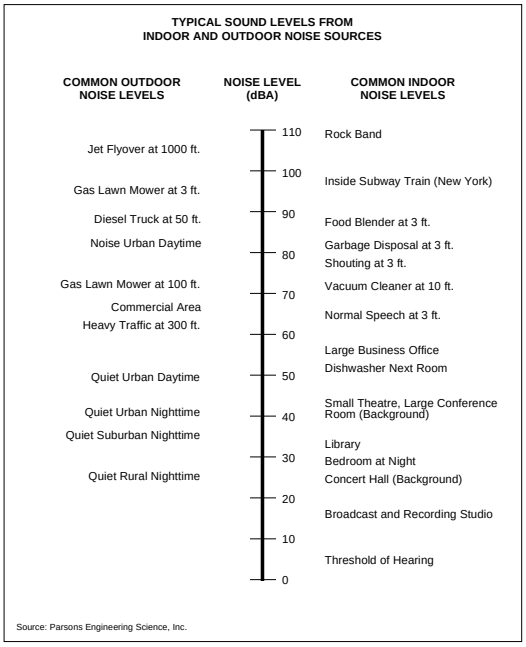


Figure 2.2.7-1: Typical A-Weighted Noise Levels

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 3dB 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 1.5dB 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.

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. Therefore, 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.

2.2.7.2 Affected Environment

Traffic Noise Measurement – Existing I-580 Noise Levels

Existing noise levels in the vicinity of the project were determined through field measurements conducted in May 2005 in accordance with FHWA guidelines. Twenty-one locations along the freeway were monitored, 14 locations for 20-minute durations and 7 for 24-hour durations. Short-term measurements were adjusted to reflect peak-hour traffic-noise levels by comparison with long-term measurement results at nearby sites. At most monitoring locations along the project corridor, the measured hourly or adjusted hourly exterior dBA, L_{eq}(h), already equals or exceeds the NAC. The adjusted short-term peak-hour traffic noise levels range from 60 to 80 dBA, while the measured long-term noise levels range from 62 to 75 dBA.

The location of each noise monitoring site is shown on Figures A (Sheets 1 through 24) in Appendix A. Tables 2.2.7-2 and 2.2.7-3 list the noise monitoring sites and measured hourly L_{eq}, dBA.

2.2.7.3 Impacts

Noise impacts are assessed by comparing the future (year 2030) Build 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 LOS C by traffic engineers. To approximate the worst-case LOS C scenario for the Year 2030 Build 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). Actual year 2030 volumes were used for ramps, but they were capped at 1,000 vehicles per lane per hour to maintain the greatest noise generation potential. The speeds used for ramp traffic were 72 km/h (45 mph).

The FHWA traffic noise model, TNM 2.5, was used for the noise computations (FHWA, 2004). TNM 2.5 input is based on a three-dimensional grid created for the study area to be modeled. All roadway, barrier, and receiver points are defined by their x, y, and z coordinates. Roadways and barriers are coded into TNM 2.5 as line segments defined by their end points. Receivers, defined as single points, are typically located at sensitive receptors such as residences, schools, and recreational areas. Receivers are modeled at a height of 1.50 m (5 ft) above ground elevation.

Table 2.2.7-2: Short-Term Noise Measurement Results

Site No.	Street Address, City	Land Use[1]	Meter Location	Measurement Dates	Start Time	Measured L_{eq}, dBA[2]	Adjusted Peak-Hour L_{eq}, dBA[3]	Adjusted to Long-Term Site
ST01	Dublin Sports Grounds, 100 Civic Plaza, Dublin	REC	Park	5/10	12:34	70.0	71.0	LT01
ST02	Ramada Inn, 5375 Owens Court, Pleasanton	HM	Pool Area	5/10	11:49	66.7	68.0	LT01
ST03	3938 Brockton Way, Pleasanton	MFR	Front Yard	5/10	13:24	70.1	71.0	LT01
ST04	Pro Valley Golf Course, Livermore	GC	Park	5/10	15:31	71.6	74.0	LT01
ST05	Vacant Lot (Future School), Livermore	SCH	Open Field	5/10	17:20	72.9	75.0	LT03
ST06	Las Positas Golf Course, 917 Club House Drive, Livermore	GC	14th Hole	5/10	16:11	76.1	80.0	LT04
ST07	Comfort Inn, 2625 Constitution Drive, Livermore	HM	Pool Area	5/10	16:50	70.7	73.0	LT03
ST08	Saddleback Park, Livermore	REC	Sidewalk	5/11	9:49	73.4	77.0	LT04
ST09	Los Positas Creek Apartments, Livermore	MFR	Front Yard	5/11	9:15	61.1	65.0	LT04
ST10	North Livermore Avenue, Livermore	SFR	Side Yard	5/10	19:34	59.1	62.0	LT04
ST11	Motel 6, 4673 Lassen Road, Livermore	HM	Parking Lot	5/11	11:57	58.1	60.0	LT05
ST12	5281 Southfront Road, Livermore	SFR	Front Yard	5/11	12:23	76.4	78.0	LT05
ST13	729 Pleasant Avenue, Livermore	SFR	Front Yard	5/11	14:38	64.7	66.0	LT06
ST14	6647 Southfront Road, Livermore	MH	Front Yard	5/11	15:20	73.6	75.0	LT07

Notes:
1- Land Use: SFR – single family residence; MFR - multi-family residence; REC - recreation facility; MH - mobile home; SCH – school; HM - hotel/motel; GC- Golf Course.
2- All short-term measured noise levels were measured for a 20-minute period.
3- Measurements conducted during off-peak hours were adjusted to the peak-hour Leq(h) based on a comparison with long-term noise levels measured at a nearby measurement site listed in the last column.

Table 2.2.7-3: Long-Term Noise Measurement Results

Site No.	Street Address, City	Land Use[1]	Noise Abatement Category (Criterion)	Meter Location	Measurement Dates	Start Time	Duration, No. of Hours	Measured Peak Hour L_{eq}, dBA[2]	Peak-Hour Time
LT01	3684 Kirkcaldy Court, Pleasanton	SFR	B (67)	Rear Yard	5/9 – 5/10	12 PM	26	70	7PM & 7AM – 8AM
LT02*	835 Portola Avenue (Sun Valley Mobile Home Estate), Pleasanton	MH	B (67)	Pool Area	5/9 – 5/10	5 PM	26	–	–
LT03	3680 Los Colinas Road, Livermore	SFR	B (67)	Side Yard	5/9 – 5/10	4 PM	26	67	3PM – 4PM
LT04	4221 Las Positas Road, Livermore	SFR	B (67)	Side Yard	5/10 – 5/11	2 PM	23	67	5AM – 6AM
LT05	5151 Sundial Circle, Livermore	MH	B (67)	Rear Yard	5/10 – 5/11	7 PM	25	75	4AM – 5AM
LT06	5674 Sunflower Court, Livermore	SFR	B (67)	Rear Yard	5/11 – 5/12	10 AM	25	64	5PM – 6PM & 4AM – 5AM
LT07	6421 Almadea Way, Livermore	SFR	B (67)	Rear Yard	5/11 – 5/12	1 PM	24	61	6PM – 7PM

Notes:
1- Land Use: SFR – single family residence; MFR - multi-family residence; MH - mobile home.
2- The highest measured hourly noise level recorded during the long-term measurement period.
*- The data collected from this long-term measurement is contaminated.

To determine the noise levels generated by traffic, the TNM 2.5 computer program requires inputs of traffic volumes, speeds, and vehicle types. Three vehicle types were input into the model, namely cars, medium trucks, and heavy trucks. The propagation path between source and receiver is modeled in TNM 2.5 by specifying rows of houses or building structures, special terrain features, and even barriers. Propagation of noise can be further specified by selecting ground types, such as hard soil, loose soil, pavement, and lawn field grass. All other natural obstructions, such as cuts and fills that could affect the future predicted noise levels, were also included in the input file.

Table 2.2.7-4, Future Noise Prediction and Barrier Analysis, summarizes the results of the predicted levels at the representative receptor locations. As shown in the table, the predicted Build Alternative peak hour L_{eq}(h) at the representative receptors range from 57 to 81 dBA, exceeding the NAC at most locations. Noise abatement measures were considered, as described in Section 2.2.7.4, Avoidance, Minimization, and Compensation Measures.

2.2.7.4 Avoidance, Minimization, and Compensation Measures

Table 2.2.7-4, 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 24) 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 criterion for calculated Reasonable Allowance per Residence. The plan drawings in Figure A in Appendix A show only soundwalls that are considered both feasible and reasonable. A final decision concerning noise barriers would be made upon completion of the project design and public involvement processes. Table 2.2.7-5 provides a summary of the reasonable allowance, preliminary cost estimate, and determination if the preliminary estimated costs fall within the reasonable allowance for each soundwall determined feasible.

Locations where Soundwalls would Meet Feasible and Reasonable Criteria

The following soundwalls would achieve a 5-dBA reduction in traffic noise and would be feasible to construct. In addition, these soundwalls would meet the Reasonable Allowance for construction cost, which is the preliminary criterion for a reasonableness determination. The final reasonableness determination would be made upon completion of the project design and public involvement process.

Soundwall S148: Soundwall S148 would be located along the eastbound side of I-580, just east of Tassajara Road. This soundwall would abate highway traffic noise at two single-family residences represented by Receptor R8. There are two options for abating noise at this location. The first option, Soundwall S148A, would locate a soundwall across a utility easement. It is not anticipated that a soundwall would be permitted on the easement. The second option, is discussed in this section under "Locations Where Soundwalls Would Exceed Reasonable Allowance."

Soundwall S210: Soundwall S210 would be located along the eastbound Portola Avenue off-ramp along the right-of-way and shoulder. The proposed soundwall would abate highway traffic noise at 6 single-family residences, 32 mobile homes, a park, and a pool area represented by Receptors R26B, R27, and R29 through R34 and R34A. This soundwall would be built as a part of the Isabel Avenue/I-580 Interchange Project. Given that these two proposed projects would be constructed within the same time frame, related construction activities would be coordinated such that the wall is constructed as soon as possible. The wall would be 739 m (2,425 ft) long and 3.7 m (12 ft) high. Should the Isabel Avenue Interchange project be delayed, the wall would be constructed as part of this project.

Soundwall S259: Soundwall S259 would be located along the westbound I-580 shoulder and along the westbound First Street Interchange off-ramp shoulder. The proposed wall would abate highway traffic noise at the pool area for the Doubletree Club Hotel, at 12 multi-family residences, and 38 mobile homes represented by Receptors R44 through R50. A portion of this soundwall, adjacent to the mobile home park and the multi-family residences, has been approved under a separate project and would be constructed either prior to or during the construction of the present project. Hotel owners would be consulted regarding construction of this soundwall. The soundwall would be 663 m (2,175 ft) long and 4.3 m (14 ft) high.

Soundwall S276: Soundwall S276 would be along the eastbound I-580 shoulder between Vasco Road and the truck weigh station. The proposed wall would abate highway traffic noise at 14 mobile homes represented by Receptors R62, R62A, and R63; The soundwall would be 274 m (899_ft) long and 3.7 m (12 ft) high.

Table 2.2.7-4: Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] $L_{eq(h)}$, dBA	FUTURE PEAK HOUR NOISE LEVELS, $L_{eq(h)}$, dBA[1, 6]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	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.	
Tassarajara Road to El Charro Road - Eastbound																	
R1 [Z]	MFR	71 [E]	71	71	B (67)	A/E	--	--	--	--	--	--	69	2	68	3	
R2 [Z]	MFR	72 [E]	72	72	B (67)	A/E	--	--	--	--	--	--	71	1	68	4	
R2A [Z]	MFR	71 [M, ST03/CAL]	71	72	B (67)	A/E	--	--	--	--	--	--	69	3	68	4	
R3 [Z]	MFR	72 [E]	72	72	B (67)	A/E	--	--	--	--	--	--	70	2	68	4	
R4 [Z]	SFR	72 [E]	72	72	B (67)	A/E	--	--	--	--	--	--	69	3	68	4	-
R5 [Z]	SFR	73 [E]	73	73	B (67)	A/E	--	--	--	--	--	--	70	3	69	4	
R6 [Z]	SFR	70 [E]	70	70	B (67)	A/E	--	--	--	--	--	--	69	1	68	2	
R6A [Z]	SFR	70 [M, LT01]	70	71	B (67)	A/E	--	--	--	--	--	--	69	2	68	3	
R7 [Z]	SFR	71 [E]	71	71	B (67)	A/E	--	--	--	--	--	--	69	2	68	3	
R8 [C]	SFR	78 [E]	78	79	B (67)	A/E	76	3	74	5	72 [T]	7	**70 [R]**	**9**	69	10	S148A/Private Property[8]
R8 [C]	SFR	78 [E]	78	79	B (67)	A/E	76	3	74	5	72 [T]	7	**70 [R]**	**9**	69	10	S148B/R/W[8]
R9 [Y]	SFR	67 [E]	67	68	B (67)	A/E	--	--	--	--	66	2	65	3	64	4	
R9A [Y]	SFR	68 [E]	68	68	B (67)	A/E	--	--	--	--	67	1	66	2	65	3	-
R10 [Y]	SFR	67 [E]	67	67	B (67)	A/E	--	--	--	--	66	1	65	2	65	2	
R10A [Y]	SFR	64 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
El Charro Road to Airport Boulevard - Eastbound																	
R11	GC	78 [E]	79	79	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R12	GC	81 [M, ST04, #]	82	82	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R12A	GC	78 [E]	79	79	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R14	GC	75 [E]	76	76	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R15	GC	75 [E]	76	76	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	-
R16	GC	80 [E,7]	74	74	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R17	GC	79 [E,7]	73	73	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R19	GC	80 [M, ST06/CAL,7]	74	74	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R20	GC	69 [E]	70	71	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R21	GC	64 [E]	65	65	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
El Charro Road to Airport Boulevard - Westbound																	
R13 [C]	SFR	75 [E]	77	77	B (67)	A/E	72	5	69	8	**69 [R,T]**	**8**	67	10	66	11	S173/R/W
R18 [C]	SCH	75 [M, ST05/CAL]	77	77	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	-

Notes:

1 - $L_{eq(h)}$ are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational area; MH - Mobile Home; HM - Motel; GC - Golf Course.
3 - M - Measured noise level; STxx or LTxx - measurement site number; E - Calculated using future "No-Build" and measured data; CAL - modeled calibration point.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Traffic noise from the freeway only; other local noise sources are not included.
7 - A retaining wall will be placed in this area for the future "build" and "no build", which will reduce the future noise levels compared to the existing noise level.
8 - Two soundwall options were considered for this area due to preexisting soundwalls.
C - Critical design receiver.
R - Recommended height to meet feasibility requirements of Caltrans' Noise Abatement Protocol.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
W - Includes the benefits of an existing soundwall/property wall.
Z - Receivers R1 through R7 are behind an existing 3.7 m (12 ft) high soundwall; therefore, a soundwall of lesser height has not been considered for these receivers.
Y - Receivers R9 through R10A are behind an existing 3.0 m (10 ft) high property wall; therefore, a soundwall of lesser height has not been considered for these receivers.
- Noise measurement contaminated and was not used for existing noise level.

Table 2.2.7-4: Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1, 6]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	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.	
Airport Boulevard to Isabel Avenue																	
R22	HM	61 [E]	62	63	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	-
R23 [C]	HM	73 [M, ST07/CAL]	74	74	B (67)	A/E	69	5	68	6	67 [R,T]	7	66	8	66	8	S189/R/W
R24 [C]	REC	75 [E]	76	77	B (67)	A/E	72	5	70	7	69 [R,T]	8	67	10	66	11	S192/R/W
R25	REC	74 [E]	75	75	B (67)	A/E	72	3	71	4	70 [R,T]	5	68	7	67	8	
Isabel Avenue to Portola Avenue On/Off Ramp - Eastbound																	
R26A	HST	63 [E]	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	S210/R/W and Shoulder
R26B	HST	64 [E]	65	66	B (67)	A/E	64	2	63	3	63 [T]	3	62	4	60 [R]	6	
R26	SFR	66 [E]	67	67	B (67)	A/E	66	1	65	2	64	3	64	3	64	3	
R27A	REC	77 [M, ST08/CAL]	78	78	C(72)	NONE	--	--	--	--	--	--	--	--	--	--	
R27	REC	65 [E]	66	66	B (67)	A/E	64	2	63	3	61 [T]	5	61 [R,5]	5	60	6	
R28A	SFR	63 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R28	SFR	63 [E]	64	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R29	SFR	67 [E]	68	69	B (67)	A/E	67	2	66	3	64 [R,T]	5	63	6	62	7	
R30	SFR	73 [E]	74	74	B (67)	A/E	69	5	67	7	65 [R,T]	9	64	10	63	11	
R31 [C]	MH	75 [E]	76	76	B (67)	A/E	71	5	68	8	66 [R,T]	10	65	11	64	12	
R32	MH	73 [E]	74	75	B (67)	A/E	69	6	67	8	66 [R,T]	9	65	10	64	11	
R33	MH	71 [E]	72	72	B (67)	A/E	68	4	66	6	64 [R,T]	8	63	9	62	10	
R34	MH	70 [E]	71	71	B (67)	A/E	67	4	65	6	63 [R,T]	8	62	9	61	10	
R34A	REC	67 [M, LT02, #]	68	68	B (67)	A/E	65	3	63	5	61 [R,T]	7	60	8	59	9	
Portola Avenue On/Off Ramp to Livermore Avenue- Eastbound																	
R35A	REC	66 [E]	66	66	B (67)	A/E	64	2	64	2	63	3	62	4	62	4	-
R35	MFR	65 [M, ST9/CAL]	65	65	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R36	SFR	65 [E]	65	66	B (67)	A/E	64	2	64	2	64	2	63	3	62	4	
Portola Avenue On/Off Ramp to Livermore Avenue- Westbound																	
R36A	SFR	60 [E,7]	59	59	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	-
R37	SFR	63 [E,7]	62	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R37A	SFR	62 [M, ST10,7]	61	61	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	
R38	SFR	65 [E,7]	64	64	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	-

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational area; MH - Mobile Home; HM - Motel; HST - Historical Site.
3 - M - Measured noise level; STxx or LTxx - measurement site number; E - Calculated using future "No-Build" and measured data; CAL - modeled calibration point.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Traffic noise from the freeway only; other local noise sources are not included.
7 - The short term measurement includes noise traffic from Livermore Avenue, which will reduce the future noise levels compared to the existing noise level.
C - Critical design receiver.
R - Recommended height to meet feasibility requirements of Caltrans' Noise Abatement Protocol.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
W - Includes the benefits of an existing soundwall/property wall.
- Noise measurement contaminated and was not used for existing noise level.

Table 2.2.7-4: Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,5]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.) 2.4 m (8 ft)		3.0 m (10 ft)		3.6 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.	
Livermore Avenue to First Street																	
R39A	FM	67 [M, LT03]	67	67	C (72)	NONE	--	–	--	–	--	--	--	–	--	--	S241/R/W
R39 [C]	SFR	71 [E]	71	71	B (67)	A/E	69 [T]	2	68	3	68	3	67	4	66 [R]	5	
R40	SFR	76 [E,6]	75	75	B (67)	A/E	73	2	72	3	71 [T]	4	70	5	69 [R,5]	6	S246/R/W
R41 [C]	SFR	75 [E,6]	74	75	B (67)	A/E	72	3	72	3	71 [T]	4	70	5	68 [R]	7	
R41A	SFR	67 [M, LT04,7]	66	67	B (67)	A/E	66	1	66	1	66	1	65	2	66	1	
R42 [C]	SCH	63 [E]	67	68	B (67)	A/E	63	5	62	6	61 [R,T]	7	59	9	59	9	S253/R/W
R42A	HM	60 [M, ST11/CAL]	64	64	B (67)	NONE	--	–	--	–	--	--	--	–	--	--	
R43	HM	55 [E]	59	59	B (67)	NONE	--	–	--	–	--	--	--	–	--	--	
First Street to Vasco Road On/Off Ramp																	
R47 [C]	SFR	78 [M, ST12/CAL]	79	80	B (67)	A/E	71	9	71 [R,T]	9	68	12	67	13	66	14	S258/R/W
R44A	HM	63 [E]	63	63	B (67)	NONE	--	–	--	–	--	--	--	–	--	--	
R44	HM	72 [E]	72	72	B (67)	A/E	70	2	68	4	66	6	66 [R,T]	6	65	7	S259/Shoulder
R45	MFR	77 [E]	78	78	B (67)	A/E	72	6	70	8	68 [T]	10	67 [R,5]	11	66	12	
R46	MH	79 [E]	80	80	B (67)	A/E	74	6	73	7	70 [T]	10	68 [R,5]	12	67	13	
R46A	MH	75 [E]	75	75	B (67)	A/E	71	4	70	5	67	8	66 [R,T]	9	64	11	
R48 [C]	MH	80 [M, LT05, #]	81	81	B (67)	A/E	75	6	71	10	69 [T]	12	68 [R,5]	13	67	14	
R49	MH	80 [E]	81	81	B (67)	A/E	75	6	72	9	70 [T]	11	69 [R,5]	12	68	13	
R49A	MH	74 [E]	75	75	B (67)	A/E	71	4	70	5	67	8	65 [R,T]	10	65	10	
R50A	MH	74 [E]	74	74	B (67)	A/E	70	4	69	5	67	7	65 [R,T]	9	64	10	
R50	MH	77 [E]	77	77	B (67)	A/E	72	5	71	6	68	9	67 [R,T]	10	65	12	
R51 [W]	SFR	68 [E]	67	67	B (67)	A/E	66	1	66	1	66	1	64	3	63	4	-
R52 [Z]	SFR	67 [E]	68	68	B (67)	A/E	--	–	--	–	--	--	67	1	66	2	-
R53 [Z]	SFR	67 [E]	68	68	B (67)	A/E	--	–	--	–	--	--	67	1	66	2	
R54 [Z]	SFR	67 [E]	68	68	B (67)	A/E	--	–	--	–	--	--	67	1	66	2	
R54A [Z]	SFR	68 [M, LT06, #]	69	69	B (67)	A/E	--	–	--	–	--	--	68	1	66	3	
R55 [W]	SFR	68 [E]	69	69	B (67)	A/E	68	1	68	1	68	1	66	3	65	4	
R56 [C]	SFR	66 [E]	67	67	B (67)	A/E	63	4	63	4	62 [R,T]	5	60	7	59	8	S269/Shoulder

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational area; MH - Mobile Home; HM - Motel; HST - Historical Site; FM - commercial farm.
3 - M - Measured noise level; STxx or LTxx - measurement site number; E - Calculated using future "No-Build" and measured data; CAL - modeled calibration point.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Traffic noise from the freeway only; other local noise sources are not included.
7 - The short term measurement includes noise traffic from Las Positas Road, which will reduce the future noise levels compared to the existing noise level.
C - Critical design receiver.
R - Recommended height to meet feasibility requirements of Caltrans' Noise Abatement Protocol.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
W - Includes the benefits of an existing soundwall/property wall.
Z - Receivers R52 through R54 are behind an existing 3.7 m (12 ft) high soundwall; therefore, a soundwall of lesser height has not been considered for these receivers.
- Noise measurement was taken behind a wooden fence and was not used for existing noise level.

Table 2.2.7-4: Predicted Future Noise and Barrier Analysis

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1, 3] Leq(h), dBA	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1, 6]														BARRIER NO./LOCATION
			FUTURE "NO-BUILD"	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (S, A/E or NONE)[4]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
							2.4 m (8 ft)		3.0 m (10 ft)		3.6 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.	
Vasco Road On/Off Ramp to Greenville Road																	
R57	SFR	64 [E]	71	71	B (67)	A/E	67	4	67	4	66 [R,T]	5	63	8	62	9	S271/Shoulder
R57A	SFR	66 [M, ST13/CAL]	73	73	B (67)	A/E	69	4	68	5	67 [R,T]	6	65	8	64	9	
R58 [C]	SFR	70 [E]	77	77	B (67)	A/E	73	4	71	6	70 [R,T]	7	67	10	66	11	
R59 [Z]	SFR	61 [M, LT07]	60	61	B (67)	NONE	--	–	--	--	--	--	--	–	--	--	S275/Shoulder
R60 [C]	REC	78 [E]	77	77	B (67)	A/E	72	5	71	6	70 [R,T]	7	67	10	66	11	
R61 [Z]	SFR	63 [E]	62	62	B (67)	NONE	--	–	--	--	--	--	--	–	--	--	
R62 [C]	MH	74 [E]	76	77	B (67)	A/E	70	7	68	9	68 [R,T]	9	65	12	65	12	S276/Shoulder
R62A	MH	75 [M, ST14/CAL]	77	77	B (67)	A/E	70	7	68	9	68 [R,T]	9	66	11	65	12	
R63	MH	70 [E]	72	72	B (67)	A/E	68	4	67	5	67 [R,T]	5	64	8	63	9	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; SCH - school; REC - recreational area; MH - Mobile Home; HM - Motel; HST - Historical Site; FM - commercial farm.
3 - M - Measured noise level; STxx or LTxx - measurement site number; E - Calculated using future "No-Build" and measured data; CAL - modeled calibration point.
4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Traffic noise from the freeway only; other local noise sources are not included.
C - Critical design receiver.
R - Recommended height to meet feasibility requirements of Caltrans' Noise Abatement Protocol.
T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.
W - Includes the benefits of an existing soundwall/property wall.
Z - Receivers R59 and R61 are behind an existing soundwall.
- Noise measurement was taken behind a wooden fence and was not used for existing noise level.

Locations Where Soundwalls Would Exceed Reasonable Allowance

Soundwalls at the following receptor locations would achieve a 5-dBA reduction in traffic noise and be feasible to construct, but they would not be cost effective, as determined by Caltrans' Calculated Reasonable Allowance per Residence. These soundwalls are not depicted in Appendix A, Build Alternative Plan Drawings, because they are not within the Reasonable Allowance. (Reasonable and feasible determinations are discussed in Section 2.2.7.1, State and Federal Guidelines for Noise Impact Evaluation.) Appendix A, Build Alternative Plan Drawings, does show the receptor locations for these soundwalls, as described in the following paragraphs. Table 2.2.7-5 shows the preliminary reasonableness determination for all soundwalls.

Soundwall S148B: A soundwall along the eastbound side of I-580, just east of Tassajara Road and north of Annis Circle (approximately 800 m (2,625 ft) west of the El Charro Road Overcrossing) would abate highway traffic noise at two single-family residences represented by Receptor R8. Another option for abatement of highway traffic noise at this location is Soundwall S148A, which is described in this section under "Locations where Soundwalls would Meet Feasible and Reasonable Criteria."

Soundwall S173: A soundwall along the westbound side of I-580 on the right-of-way just west of Cottonwood Creek would abate highway traffic noise for a single-family residence represented by Receptor R13.

Soundwall S189: A soundwall along the westbound side of I-580 on the right-of-way and along Airway Boulevard Interchange off-ramp on the right-of-way would abate highway traffic noise at the pool area for Comfort Inn, represented by Receptor R23.

Soundwall S192: A soundwall along the eastbound side of I-580 on the right-of-way east of the Airway Boulevard Interchange and just west of Collier Canyon Creek, would abate highway traffic noise at the recreational area for Boomers' Mini Golf and Go Cart Recreation Center, represented by Receptors R24 and R25.

Soundwall S241: A soundwall along the westbound side of I-580 on the right-of-way just east of the Las Colinas Road overcrossing would abate highway traffic noise at a single-family residence represented by Receptor R39.

Soundwall S246: A soundwall along the eastbound side of I-580 on the right-of-way from east of the Las Colinas Road overcrossing to near Arroyo Seco Creek, would abate highway traffic noise at two single-family residences represented by Receptors R40 and R41.

Soundwall S243: A soundwall on the right of way along the westbound First Street diagonal on-ramp, would abate highway traffic noise at a school represented by receptor R42.

Soundwall S258: A soundwall along the eastbound side of I-580 on the right-of-way adjacent to Southfront Road just east of the First Street Interchange, would abate highway traffic noise at two single-family residences represented by Receptor R47.

Soundwall S269: A soundwall on the right of way along the westbound Vasco Road diagonal on-ramp, would abate highway traffic noise at a single-family residence represented by receptor R56.

Soundwall S271: A soundwall along the westbound Vasco Road diagonal off-ramp shoulder would abate highway traffic noise at five single-family residences represented by Receptors R57, R57A, and R58; the wall would be 253 m (830 ft) long and 3.7 m (12 ft) high.

Soundwall S275: A soundwall along the westbound side of I-580 on the right-of-way adjacent to Northfront Road at Arroyo Las Positas Creek and just east of the Vasco Road Interchange, would abate highway traffic noise at a park area represented by Receptor R60.

Table 2.2.7-5: Preliminary Reasonableness Determination for Soundwalls

Receptor	Reasonable Allowance*	Preliminary Cost Estimate†	Is Soundwall within Reasonable Allowance?		Soundwall	Comment
			Yes	No		
R8	$108,000	$20,468	✓		S148A	This soundwall is one of two options for abating noise at Receptor R8. It is unlikely that this option would be constructed, as the soundwall would be over an existing utility easement.
R8	$108,000	$110,768		✓	S148B	
R13	$50,000	$170,940		✓	S173	
R23	$48,000	$250,712		✓	S189	
R24 & R25	$200,000	$307,692		✓	S192	
R26B, R27, R29 - R34 & R34A	$2,184,000	$1,618,344	✓		S210	A soundwall at this location is proposed for construction under the Isabel Avenue Interchange Project. Wall S210 would be constructed by this project only if the planned and programmed Isabel Avenue Interchange did not occur. The estimate for wall S210 is not included in the cost estimate for this project.
R39	$44,000	$138,572		✓	S241	
R40 & R41	$100,000	$488,432		✓	S246	
R42	$48,000	$95,312		✓	S253	
R47	$108,000	$150,220		✓	S258	
R44 - R50	$2,856,000	$798,252	✓		S259	The portion of this wall adjacent to residential units already has environmental approval and could be constructed as a separate project.
R56	$44,000	$152,292		✓	S269	
R57, R57A, & R58	$260,000	$262,108		✓	S271	
R60	$150,000	$288,008		✓	S275	
R62, R62A, & R63	$756,000	$283,864	✓		S276	

* Reasonable allowance for abatement is based upon guidelines from the Caltrans Traffic Noise Analysis Protocol.

† Preliminary cost estimate is based upon 2005 costs and does not include contingencies.

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 2.2.7.1, state and federal guidelines for Noise Impact Evaluation.) The following paragraphs describe these locations and, where applicable, explain why abatement is not warranted or feasible. Receptor locations are shown in Appendix A, Build Alternative Plan Drawings.

Receptors R1 to R7: These receptors represent single- and multi-family residences on the eastbound side of I-580, east of Tassajara Road. The existing 3.7-m (12-ft) soundwall already abates highway traffic noise. Soundwalls that were modeled in place of the existing soundwall did not meet the 5-dBA reduction requirement to be considered feasible.

Receptors R9, R9A, R10, and R10A: These receptors represent single-family residences on the eastbound side of I-580, east of Tassajara Road. The existing 3.0-m (10-ft) property wall already provides abatement from highway traffic noise. However, 3.7-m (12-ft), 4.3-m (14-ft), and 4.9-m (16-ft) soundwalls were modeled in place of the existing property wall, and they did not meet the 5-dBA reduction required to be considered feasible.

Receptors R11, R12, and R12A: Receptors R11, R12, and R12A are approximately half-way between the El Charro and Airway Boulevard interchanges at the Pro Valley Golf Course. A soundwall was not considered at this location due to the transitory use by the golf course patrons at this location. Sheet 19 in Appendix A shows the location of these receptors.

Receptors R14-R17 and R19-R21: Receptors R14-R17 and R19-R21 are located in the Las Positas Golf Course in the southwest quadrant of the Airway Boulevard Interchange. A soundwall was not considered at this location due to the transitory use by the golf course patrons at this location.

Receptor R18: Receptor R18 is located along the westbound side of I-580 on the right-of-way near the intersection of Collier Canyon Road and Doolan Road at a property owned by the school district. A soundwall was not considered at this location because there are no plans for a school facility at this site.

Receptor R26: This receptor represents a single-family residence, and it is located on the eastbound side of I-580, east of the future Isabel Avenue interchange. It is not feasible to abate highway traffic noise in this area because the receptor is partially blocked by a natural berm in this area. A soundwall on the right-of-way or shoulder would be extremely high and expensive to effectively abate noise for this receptor, and it would not meet reasonable allowance standards.

Receptors R35A, R35, and R36: These receptors represent multi-family residences, on the eastbound side of I-580, just east of the Portola Avenue interchange. It is not feasible to abate highway traffic noise in this area because the receptor is more than 200 m (650 ft) from the highway, and a soundwall on the right-of-way or shoulder would not provide a 5-dBA noise reduction to these receptors.

Receptor R41A: This receptor represents a single-family residence and is located on the eastbound side of I-580, east of Livermore Avenue. It is not feasible to abate highway traffic noise in this area because the receptor is located more than 200 m (650 ft) from the highway and a soundwall on the right-of-way or shoulder would not provide a 5-dBA noise reduction to these receptors; therefore, it would not be feasible.

Receptor R51: This receptor represents a single-family residence located on the westbound side of I-580, west of Vasco Road. It is not possible to abate highway traffic noise at this receptor because an existing 3.7-m (12-ft) soundwall partially blocks the area.

Receptors R52 to R55: These receptors represent single- and multi-family residences on the westbound side of I-580 just west of Vasco Road. The existing 3.7-m (12-ft) soundwall already abates highway traffic noise. Soundwalls that were modeled in place of the existing soundwall did not meet the 5-dBA reduction requirement to be considered feasible.

2.2.8 Energy

2.2.8.1 Regulatory Setting

Because project impacts in the context of the countywide travel model would be too small to demonstrate differences in energy consumption, in accordance with Caltrans' Standard Environmental Reference Guidelines (Caltrans, 2005), a qualitative energy analysis was conducted. The information presented in this section is taken from *Technical Memorandum on Energy Impacts for the Interstate 580 Eastbound HOV Lane Project*, (Parsons, 2006d).

2.2.8.2 Affected Environment

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 I-580 operations with and without the proposed project.

Recurrent congestion in the I-580 corridor is attributable to heavy commuter traffic during weekday morning and evening commute hours, as well as a high concentration of trucks. Congestion occurs both westbound in the morning and eastbound in the evening, but it is worse in the evening peak hour, which is more concentrated than the morning peak hour. By 2030, without capacity improvements to I-580, traffic conditions in the study area would deteriorate; the freeway would be unable to serve the projected demand. Due to insufficient mainline capacity for the forecast volumes, extremely congested conditions would develop at certain locations along the mainline. Low travel speeds and long delays would be prevalent during the evening peak hour in the eastbound direction. Such congested traffic conditions contribute to inefficient energy consumption as vehicles use extra fuel while idling in stop-and-go traffic or moving at slow speeds on a congested roadway. (See

Section 2.1.6 for a detailed discussion on travel time and delay under the No-Build and Build Alternatives.)

2.2.8.3 Impacts

The proposed project (Build Alternative) would improve average travel speeds and thereby reduce average travel times during the evening peak hour in the eastbound direction. Improved travel speeds would translate to an approximately 50 percent reduction in travel time for HOV lane users. The added lane of capacity would also improve traffic conditions for mainline traffic as a result of the diversion of HOVs from the mixed-flow lanes to the HOV lane. The reduction of congestion, delay, and travel time in the project area under the Build Alternative would result in more efficient energy consumption. By reducing congestion and delay and improving travel times in the study area, 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 the extremely congested conditions on the mainline.

The proposed eastbound HOV lane would offer dedicated peak-hour capacity and a high level of traffic service to transit and carpool vehicles on eastbound I-580 during the evening peak hour. This would substantially improve travel time for intercity buses and carpooling commuters as they would operate at speeds of approximately 93 km/h (58 mph) in the new HOV lanes. This compares to speeds as low as 14 km/h (9 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 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. A shift by more commuters into HOVs would lead to further energy savings.

Improved traffic operations under the Build 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 anticipated to have a beneficial effect on direct energy use compared to the No-Build Alternative.

2.2.8.4 Avoidance, Minimization, and/or Mitigation Measures

The proposed project is anticipated to have a beneficial effect on direct energy use compared to the No-Build Alternative; therefore, no energy mitigation measures would be necessary.

2.3 Biological Environment

A *Draft Natural Environment Study* (NES) (ECORP Consulting, Inc., 2006), *Preliminary Wetland Delineation Report* (ECORP Consulting, Inc., 2006a) and *California Red-Legged Frog Habitat Assessment* (ECORP Consulting, Inc., 2005) were prepared for the project. Species-specific surveys for California red-legged frog (federally and state listed as threatened) were conducted in accordance with the *Revised Guidance on Site Assessments and Field Surveys for California Red-legged Frog* (U.S. Fish and Wildlife Service, 2005). A bat roost habitat assessment was conducted to identify highway structures with potential roost features and make observations regarding obvious signs of bat use. This section presents the findings of these reports and studies concerning natural communities, wetlands, and other waters of the U.S., vegetation and wildlife communities, threatened and endangered species, and invasive vegetative species within the project study area.

2.3.1 Natural Communities

2.3.1.1 Affected Environment

Land uses in the I-580 Eastbound HOV Lane Project area include single-family residential, undeveloped residential, commercial, industrial, recreational, agricultural, and open space, as described in Section 2.1.1.1, Existing and Future Land Use. Several creeks traverse the corridor, some in concrete-lined channels or culverts and others in their natural watercourses.

Four natural communities exist within the project area: ornamental landscape, ruderal/disturbed, annual grassland, and riparian scrub. The remaining areas along I-580 consist of hardscape, having been previously developed. Existing bridge structures and box culverts are discussed in the context of providing biotic habitat for wildlife. A description of each community and its associated wildlife assemblage is provided below.

Ornamental Landscape

Within the project area, this community is composed primarily of Oleander trees (*Nerium* sp.) that have been planted within the I-580 median separating the eastbound and westbound traffic and along the eastbound limits of the right-of-way. Ornamental landscaped areas may provide resources for species that are tolerant of noise and human activities. Examples of native birds that are known to forage and/or nest in landscaped areas include western scrub-jay (*Aphelocoma californica*), American robin (*Turdus migratorius*), northern mockingbird (*Mimus polyglottos*), and house finch (*Carpodacus mexicanus*). Non-native birds, such as European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*), are also commonly associated with ornamental landscapes. The fact that this community is within the highway median may reduce its suitability for wildlife.

Ruderal/Disturbed

The ruderal community encompasses urban development and highly disturbed vegetation communities. This community occurs at various localities throughout the length of the project area, both within and adjacent to freeway facilities. These areas typically had a high incidence of exotic plant invasion. Exotic plant species commonly identified in this community included fennel (*Foeniculum vulgare*), black mustard (*Brassica nigra*), and a variety of thistles. Native and

introduced animal species that are tolerant of human activities often thrive in urban environments. Species typically encountered in ruderal communities include western fence lizard (*Sceloporus occidentalis*), European starling, house sparrow, house finch, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis virginianus*).

Annual Grassland

Non-native, naturalized Mediterranean grasses are the predominant species within the annual grassland community. Annual grasslands are found in the valleys and foothills throughout much of the state. Plant species commonly associated with this community include wild oat (*Avena* ssp.), brome (*Bromus* ssp.), ryegrass (*Lolium multiflorum*), California poppy (*Eschscholzia californica*), lupine (*Lupinus* ssp.), and yellow star-thistle (*Centaurea solstitialis*). Grasslands within the project study area exist in a disturbed state and generally have a high incidence of exotic plant species. Grasslands provide foraging and nesting habitat for a wide variety of wildlife species, including raptors, seed-eating birds, small mammals, and reptiles. Wildlife species typically associated with grasslands include gopher snake (*Pituophis catenifer*), western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and California ground squirrel (*Spermophilus beecheyi*).

Riparian Scrub

Willow species (e.g., *Salix lasiolepsis* and *S. laevigata*) dominate this community, forming scrubby streamside thickets, ranging from open to extremely dense. Herbaceous plant species found in this community include creeping wild-rye (*Leymus triticoides*), soft rush (*Juncus effusus*), hard-stem bulrush (*Scirpus acutus*), and mugwort (*Artemisia douglasiana*). Riparian scrub communities may provide a wide range of resources to wildlife, including movement and migration corridors, cover (e.g., nesting, resting, thermal), water, and a variety of foraging opportunities. Examples of wildlife that may occur in this community include Pacific tree frog (*Hyla regilla*), common garter snake (*Thamnophis sirtalis*), bushtit (*Psaltriparus minimus*), Wilson's warbler (*Wilsonia canadensis*), black phoebe (*Sayornis nigricans*), spotted towhee (*Pipilo maculatus*), song sparrow (*Melospiza melodia*), raccoon, striped skunk, and Virginia opossum.

Riparian vegetation was historically found along most perennial and intermittent streams in the Livermore area; however, riparian communities have become rare, due to disturbance by agriculture, development, and past filling or channelization of streams. Within the project study area, riparian scrub was limited to various locations along Arroyo Las Positas. Arroyo Las Positas has been substantially modified for flood control purposes and impacted by grazing and, as a result, riparian vegetation is relatively sparse.

Approximately 0.65 hectares (ha) (1.60 ac) of riparian scrub were mapped within the project study area. No riparian scrub occurs within the project site, including construction and access areas. The riparian scrub community occurs in association with Arroyo Las Positas, a perennial creek. An impassable downstream obstruction at Niles prevents anadromous fish from occurring within this section of Arroyo Las Positas. However, a variety of introduced warm-water fish, such as mosquito

fish (*Gambusia affinis*), green sunfish (*Lempomis cyanellus*), and largemouth bass (*Micropterus salmoides*), are likely to occur here.

Existing Bridge Structures and Box Culverts

Bridges and box culverts in the project corridor provide suitable habitat or potential habitat for a number of bird and bat species. These features may provide suitable nesting habitat for bird species, such as cliff swallow (*Petrochelidon pyrrhonota*) and black phoebe, and potential roosting habitat for bat species, such as pallid bat (*Antrozous pallidus*) and Yuma myotis (*Myotis yumanensis*). Cliff swallow nests were observed during the September 2005 field visit at the railroad overpass east of Greenville Road, in a cement box culvert at Tassajara Creek, and at three creek overpasses associated with Arroyo Las Positas. Obvious signs of bat roosting were observed at eight locations within the project study area during visual inspections conducted in February 2006.

2.3.1.2 Environmental Consequences

Ornamental Landscape. The proposed project would require removal of the existing median landscaping and other shrubs and trees along the roadway shoulder. Approximately 8,050 oleander shrubs in the median and 1.4 ha (3.4 ac) of landscaping along the shoulder would be removed..

Riparian Scrub. No permanent or temporary construction-related impacts to the riparian scrub community along Arroyo Las Positas are anticipated.

Existing Bridge Structures and Box Culverts

The proposed project would not result in the widening or modification of bridge or culvert structures, with the exception of the Cottonwood Creek culvert, within the project study area. Therefore, permanent loss of potential habitat for bird or bat species is not anticipated to occur as a result of this project.

2.3.1.3 Avoidance, Minimization, and/or Mitigation Measures

Ornamental Landscape. A landscape replacement plan would be implemented to mitigate for the removal of landscaping within the median and along the roadway shoulder, as described in Section 2.1.7, Visual/Aesthetics.

Riparian Scrub. As described in Section 2.4.11, Construction Phase Impacts, Biological Resources – Avoidance, Minimization, and Mitigation Measures, Environmentally Sensitive Areas (ESAs) would be established adjacent to construction areas to ensure that the riparian scrub outside the project site would be avoided during construction and no impacts would occur.

Existing Bridge Structures and Box Culverts. Measures to avoid impacts during construction are described in Section 2.4.11, Construction Phase Impacts, Biological Resources – Avoidance, Minimization, and Mitigation Measures.

2.3.2 Wetlands and Other Waters of the United States

For regulatory purposes, wetlands are defined as: "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3, 40 CFR 230.3). Wetlands can be perennial or intermittent, and isolated or adjacent to other waters.

Other waters of the U.S. refer to predominately unvegetated waterways and water bodies with an apparent ordinary high water mark (OHWM) or bed and bank, such as playas, alkali flats, lakes, creeks, and rivers. Other waters of the U.S. are non-tidal, perennial, and intermittent watercourses and tributaries to such watercourses. They typically lack one or more of the mandatory technical criteria needed to qualify as jurisdictional wetlands.

2.3.2.1 Regulatory Setting

Federal Clean Water Act (33 U.S.C. 1344)

At the federal level, the Clean Water Act (CWA) is the primary law regulating wetlands and other waters of the U.S. Waters of the U.S. include navigable waters, interstate waters, territorial seas, and other waters that may be used in interstate or foreign commerce. To classify wetlands for the purposes of the Clean Water Act (CWA), a three-parameter approach is used that includes the presence of hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (soils subject to saturation/inundation). All three parameters must be present, under normal circumstances, for an area to be designated as a jurisdictional wetland under the CWA.

Section 404 of the CWA establishes a regulatory program that provides that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. The Section 404 permit program is run by the U.S. Army Corps of Engineers (USACE) with oversight by the Environmental Protection Agency (EPA).

Executive Order for the Protection of Wetlands (EO 11990)

The Executive Order for the Protection of Wetlands (EO 11990) also regulates the activities of federal agencies with regard to wetlands. Essentially, this executive order states that a federal agency, such as FHWA, cannot undertake or provide assistance for new construction located in wetlands unless the head of the agency finds: 1) that there is no practicable alternative to the construction, and 2) the proposed project includes all practicable measures to minimize harm.

California Department of Fish and Game Code (Sections 1600 *et seq.*)

At the state level, wetlands and waters are regulated primarily by CDFG. Sections 1600-1607 of the Fish and Game Code require any agency that proposes a project that would substantially divert or obstruct the natural flow of or substantially change the bed or bank of a river, stream, or lake to notify CDFG before beginning construction. If CDFG determines that the project may substantially and adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement would be required. CDFG jurisdictional limits are usually defined by the tops of the stream or lake banks, or the

outer edge of riparian vegetation, whichever is wider. Wetlands under jurisdiction of USACE may or may not be included in the area covered by a Streambed Alteration Agreement obtained from CDFG.

Porter-Cologne Water Quality Control Act

The Regional Water Quality Control Boards (RWQCBs) were established under the Porter-Cologne Water Quality Control Act to oversee water quality. The RWQCBs also issue water quality certifications in compliance with Section 401 of the CWA. Please see Section 2.2.2, Water Quality and Stormwater Runoff, for additional details.

2.3.2.2 Affected Environment

A wetlands delineation was conducted in accordance with the *U.S Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Waters of the U.S. boundaries were delineated through aerial photograph and topographic interpretation, and standard field methodologies (i.e., paired data set analyses).

Field surveys initially were conducted on July 23 and 24, 2003, and August 26, 2004. At this time, the project extended from the San Ramon Road/Foothill Road interchange to just east of the Greenville Road interchange, included both eastbound and westbound lanes, and had a broader footprint. Biologists walked the entire corridor along both sides of I-580 to determine the location of potentially jurisdictional boundaries within the project area. An additional field visit was conducted on September 15, 2005, to review the previously delineated areas in the context of the revised project boundary and current conditions.

A total of 0.67 ha (1.65 ac) of potentially jurisdictional waters of the U.S. consisting of other waters were mapped within the project area. These features include a variety of creeks and drainage ditches. USACE has final authority over the identification of wetlands and other waters of the U.S., including their jurisdiction, determination of area affected by the proposed improvements, and type of permits and conditions required; therefore, the delineation of wetlands and other waters of the U.S. is not final until USACE returns its jurisdictional determination.

Waters of the United States

Waters of the U.S. identified within the project area that may be regulated by USACE pursuant to Section 404 of the CWA are shown in Table 2.3.2-1 and described below.

Table 2.3.2-1: Total Waters of the United States in Project Area

Type	Area (ha/ac)
Other Waters	
Creek	0.05 / 0.12
Ditch	0.62 / 1.53
Total	**0.67 / 1.65**

Several low-gradient creeks and their tributaries meander through or cross the project area. These include Tassajara Creek, Cottonwood Creek, Collier Canyon Creek, and Arroyo Las Positas. With the exception of Arroyo Las Positas, the portions of these creeks within the project study area have been channelized and have concrete beds and banks. Portions of Arroyo Las Positas have also been realigned and channelized to accommodate construction of I-580 and development in the surrounding area. The drainage ditches generally run parallel to I-580 and along the edge of the right-of-way, and they appear to have been designed to convey stormwater runoff from I-580 into adjacent drainages.

2.3.2.3 Impacts

There would be no impacts to wetlands and other waters of the U.S. from the No-Build Alternative. The Build Alternative would permanently affect 0.10 ha (0.24 acres) of other waters. Table 2.3.2-2 summarizes the acres of wetlands and other waters of the U.S. that would be permanently filled by the project. Permanent impacts to waters of the U.S. are limited to Cottonwood Creek and portions of the drainage features located to the west of Greenville Road. There would be no other impacts to any of the other potential jurisdictional waters of the U.S. identified in the project study area.

Table 2.3.2-2: Approximate Area of Permanent Impacts to Waters of the U.S.

Feature	Location	Action	Permanent Impact[1]
Cottonwood Creek	Near west end of the Arroyo Las Positas Golf Course	Extend the double reinforced box culvert 0.87 m (2.85 ft)	0.0004 ha 0.001 ac
Drainage Ditch	Adjacent to Southfront Road, west of the weigh station	Modifications to the road alignment	0.0600 ha 0.148 ac
Drainage Ditch	Off-ramp located between Laurence Road and Greenville Road	Realignment of the off-ramp configuration	0.036 ha 0.088 ac
Total			**0.0960 ha** **0.237 ac**

[1] Impact acreages are based on preliminary plan sets and should be viewed as approximate values. Also, acreage calculations are based on a draft wetland delineation that has not yet been verified by USACE.

2.3.2.4 Avoidance, Minimization, and/or Mitigation Measures

Mitigation requirements for impacts to other waters of the U.S. would be determined through consultation with USACE, and they would include restoration of waters of the U.S. at a minimum ratio of 1:1. Mitigation measures would be identified for both permanent and temporary (construction phase) impacts of the project to ensure no net loss of other waters. USACE's review would be completed and the final mitigation measures identified before the Mitigated Negative Declaration/ Finding of No Significant Impact is approved.

2.3.3 Threatened and Endangered Species

2.3.3.1 Regulatory Setting

The following federal, state, and local laws, ordinances, and guidelines seek to avoid, minimize, and/or mitigate for impacts to threatened and endangered plant and animal species.

Federal Endangered Species Act (16 U.S.C. 1531, *et seq.*)

The primary federal law protecting threatened and endangered species is the Federal Endangered Species Act (FESA): U.S.C., Section 1531, *et seq*. (see also 50 CFR Part 402). This act and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this act, federal agencies, such as FHWA, are required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 is a Biological Opinion and/or incidental take permit. Section 3 of FESA defines take as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or any attempt at such conduct.”

California Endangered Species Act, California Fish and Game Code (Section 2050 *et seq.*)

The California Endangered Species Act (CESA) emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. CDFG is the agency responsible for implementing CESA. Section 2081 of the Fish and Game Code prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects; for these actions an incidental take permit is issued by CDFG. For projects requiring a Biological Opinion under Section 7 of the FESA, CDFG may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the Fish and Game Code.

CESA protects wildlife and plants listed as endangered or threatened under the act by the California Fish and Game Commission (CFGC). CESA prohibits all persons from taking species that are state-listed as endangered or threatened under the California Fish and Game Code Section 2080 or as fully protected (as defined in California Fish and Game Code Sections 3511, 4700, and 5050), except under certain circumstances. The CESA definition of “take” is any action or attempt to “hunt, pursue, catch, capture, or kill” a listed species.

Section 2081 of CESA provides a means by which agencies or individuals may obtain authorization for incidental “take” of state-listed species, except for certain species designated as “fully protected” under the California Fish and Game Code (see “California Fish and Game Code” below). Take must be incident to, not the purpose of, an otherwise lawful activity. Requirements for a Section 2081 permit are similar to those used in FESA Section 7 process, including identification of impacts on

listed species, development of mitigation measures that minimize and fully mitigate impacts, development of a monitoring plan, and assurance of funding to implement mitigation and monitoring.

California Fish and Game Code, Native Plant Protection Act (CFGC, Sections 1900-1913)

The California Native Plant Protection Act (CNPPA), enacted in 1977, prohibits the import of rare and endangered plants into California, the take of rare and endangered plants, and the sale of rare and endangered plants (the "threatened" category replaced "rare" when CESA was enacted in 1984). CESA defers to the CNPPA, which ensures that state-listed plant species are protected when state agencies are involved in projects subject to CEQA. The removal of plants for performance of a public service by a public agency or publicly or privately owned public utility is exempt from the CNPPA.

California Fish and Game Code, Lake or Streambed Alteration Agreements (Section 1600 *et seq.*)

The California Fish and Game Code regulates activities that interfere with the natural flow of or substantially alter the channel, bed, or bank of a lake, river, or stream. Lake and streambed alteration activities are covered under Section 1601 for public agencies and Section 1603 for private parties. Requirements to protect the integrity of biological resources and water quality are often conditions of streambed alteration agreements administered under Section 1600 *et seq*.

Migratory Bird Treaty Act

Nesting activities of numerous birds are protected under the Migratory Bird Treaty Act (MBTA). Tree removal activities that could alter nesting behavior, jeopardize eggs or young in nests, or reduce parental care would result in a violation.

2.3.3.2 Affected Environment

USFWS was contacted for a listing of threatened, endangered, and candidate species that may occur in the project vicinity. A copy of the letter and listing received from USFWS is included in Appendix E. Studies and field surveys were performed as required for all special-status species with the potential to be present within the proposed I-580 project vicinity. All survey results for plants, wildlife, and jurisdictional features are addressed in the NES. The discussion below focuses on the results of the studies conducted for species for which there is potentially suitable habitat in the project area.

Special-Status Plant Species

Fourteen special-status plant species were identified as having the potential to occur in the project area: large-flowered fiddleneck (*Amsinckia grandiflora*), bent-flowered fiddleneck (*Amsinckia lunaris*), San Joaquin spearscale (*Atriplex joaquiniana*), big-scale balsamroot (*Balsamorhiza macrolepis var. macrolepis*), big tarplant (*Blepharizonia plumosa* ssp. *plumosa*), Congdon's tarplant (*Centramadia parryi* ssp. *congdonii*), hispid bird's beak (*Cordylanthus mollis* ssp. *hispidus*), palmate-bracted birds beak (*Cordylanthus palmatus*), recurved larkspur (*Delphinium recurvatum*), round-leaved filaree (*Erodium marcrophyllum*), diamond-petaled California poppy (*Eschscholzia rhombipetala*), stinkbells (*Fritillaria agrestis*), fragrant fritillary (*Fritillaria liliacea*), and Diablo

helianthella (*Helianthella castanea*). Each of these species is known to inhabit valley and foothill grasslands, and many are associated with alkaline soils. Of these species, stinkbells and Congdon's tarplant are considered to have the greatest potential to occur in proximity to the project study area.

Stinkbells are not formally listed or proposed for listing in accordance with either FESA or CESA. The species is on the California Native Plant Society (CNPS) List 4: plants of limited distribution, a watch list. This species is uncommon but widespread, occurring on clay soils, sometimes serpentinite, in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grasslands in Alameda, Contra Costa, Fresno, Kern, Mendocino, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, Santa Cruz (extirpated), San Luis Obispo, San Mateo (extirpated), Stanislaus, Tuolumne, and Ventura counties. This perennial herb typically occurs at elevations ranging from 10 to 1,555 m (30 to 5,100 ft) above mean sea level and blooms from March through June. Floristic surveys conducted in support of the proposed I-580/Isabel Avenue Interchange Project identified a population of stinkbells consisting of approximately 185 individuals. No other special-status plants were identified within the I-580/Isabel Avenue Interchange Project study area.

Congdon's tarplant is not formally listed or proposed for listing in accordance with either FESA or CESA. The species is listed as a species of concern by USFWS and a List 1B species by CNPS. This species typically occurs in valley and foothill grasslands on alkaline soils at elevations ranging from 1.0 to 230 m (3 to 750 ft). It is known to occur in Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz (extirpated), San Luis Obispo, and Solano (extirpated) counties. Congdon's tarplant is an annual herb that blooms from June through November. This species has been observed in disturbed grasslands containing ryegrass, yellow star-thistle, and bristly oxtongue (*Picris echioides*).

The California Natural Diversity Database (CNDDB) contains records for the following species within 1.6 km (1.0 mi) of the project study area: Congdon's tarplant, Livermore tarplant (*Deinandra bacigalupi*), San Joaquin spearscale, alkali milk-vetch (*Astragalus tener* var. *tener*), brittlescale (*Atriplex depressa*), caper-fruited tropidocarpum (*Tropidocarpum capparideum*), hairless popcorn flower (*Plagiobothrys glaber*), and heartscale (*Atriplex cordulata*). Livermore tarplant, alkali milk-vetch, brittlescale, and hairless popcorn flower are associated with wetland features, such as vernal pools and seeps, which do not occur within the project study area. Therefore, these species are not anticipated to occur within the project study area.

The I-580 Eastbound HOV Lane Project is primarily limited to the existing highway median and two areas of widening within the existing right-of-way, both of which appear to offer unsuitable habitat for rare plants. The existing right-of-way in these areas is highly disturbed, consisting of compacted soils, gravel, trash, and a variety of noxious weeds. Neither Congdon’s tarplant nor stinkbells were identified during site visits for the proposed project. No special-status plant surveys have been conducted as it was determined that the project area was not suitable for either plant.

Special-Status Wildlife Species

California Red-legged Frog. The California red-legged frog (*Rana aurora draytonii*) is federally listed as threatened and considered to be a species of special concern by CDFG. The historic range of the California red-legged frog extended along the coast from Marin County, California, and inland

from Shasta County, California, southward to northwestern Baja California, Mexico. This area includes the Coast Ranges and the west slope of the Sierra Nevada Mountains at elevations below 1,525 m (5,000 ft). The current range is greatly reduced, with most remaining populations occurring along the coast from Marin County to Ventura County and in isolated locations in the foothill region of the west slopes of the Sierra Nevada Mountains. The subspecies has experienced a 70 percent reduction in its range in California due to habitat alteration, excessive harvest, and introduction of non-native predators, especially bullfrogs and introduced fish species. Current information suggests that California red-legged frog has been extirpated from most of its Sierra Nevada range.

Adult California red-legged frogs prefer dense, shrubby, or emergent riparian vegetation near deep [greater than or equal to 0.7 m (2.3 ft)], still or slow-moving water, especially where dense stands of overhanging willow and an intermixed fringe of cattail occur. This subspecies breeds from November through April. California red-legged frogs breed in a variety of aquatic habitats, including streams, deep pools, backwater areas within streams and creeks, ponds, marshes, sag ponds, dune ponds, stock ponds, and lagoons. Upland areas provide important sheltering habitat during winter when California red-legged frogs are known to aestivate in burrows and leaf litter.

Parsons biologists conducted focused California red-legged frog surveys at 11 sites along the I-580 corridor in 2003 and 2004. California red-legged frog tadpoles were positively identified on October 14, 2004, within a portion of Arroyo Las Positas located just east of the proposed I-580/Isabel Avenue interchange. In September 2004, a California red-legged frog was observed in Arroyo Las Positas between the Kitty Hawk and I-580 Bridges by herpetologist Sean Barry (in the general vicinity of the occurrence documented by Parsons).

The CNDDB contains 10 recent (within the last 8 years) sightings of California red-legged frog within 1.6 km (1.0 mi) of the project area. These occurrences are listed below in Table 2.3.3-1.

A California red-legged frog habitat assessment was prepared under separate cover (ECORP Consulting, Inc., 2006) for the project area in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS, 2005). On September 15, 2005, ECORP Consulting, Inc., conducted habitat assessments for the California red-legged frog within all appropriate aquatic habitats and associated upland areas within and adjacent to the project study area. Habitat areas evaluated as part of this assessment included Tassajara Creek and Arroyo Las Positas (perennial streams), several ephemeral drainages including Cottonwood Creek, an unnamed drainage to Arroyo Las Positas, and three unnamed drainage channels adjacent to I-580.

Table 2.3.3-1: California Red-legged Frog CNDDB Occurrences within 1.0-Mile of the Project Study Area

Occurrence #	Location	Observed By	Year of Observation
227	Arroyo Las Positas, south of I-580, between Las Positas Golf Course and the west end of Livermore Airport	B. Pittman	1997
229	Cayetano Creek, from Arroyo Las Positas upstream to 0.6-mi south of Hartman Road, north of Livermore	M. Jennings	1997
279	West side of Fallon Road, 0.4-mi north of I-580, between Livermore and Pleasanton	M. Jennings	1998
281	Collier Creek, at the entrance to Las Positas College, north side of Livermore	M. Jennings	1998
422	North side of I-580, 0.3-mi east of Vasco Road, Livermore	T. Tatarian	2000
432	0.6-mi northwest of the junction of Fallon Road and I-580, east of Dublin	J. Wilkinson	2000
445	Arroyo Las Positas, 0.6-mi north of I-580 and 0.9-mi east of North Livermore Avenue, Livermore	S. Lynch and J. G. Monk	1997
558	0.8-mi north-northeast of the intersection of I-580 and Tassajara Road, East of Dublin	M. Jennings	1999
646	Arroyo Las Positas and flood control channel line P-1, Livermore	B. Pittman	2000
778	South of Central Parkway and north of I-580, Dublin	California Academy of Sciences	2003

The project does not occur within the critical habitat designations for California red-legged frog (USFWS 2006). No avoidance and minimization measures are required with respect to critical habitat. However, potentially suitable habitat for California red-legged frogs does occur within and adjacent to the project study area.

During the California red-legged frog habitat assessment, potentially suitable breeding habitat was identified in the project study area, but outside the project site, at two locations along Arroyo Las Positas. In addition, potentially suitable summer refugia and dispersal habitats were identified at several locations. In general, due to the number of documented sightings of California red-legged frogs in the vicinity of the project, there is a high likelihood that this species could be present within the project study area.

Of the sites identified during the California red-legged frog habitat assessment, only Cottonwood Creek would be directly affected by construction-related activities. In the vicinity of I-580, Cottonwood Creek does not provide suitable breeding or summer refugia habitat for California red-legged frog, but could potentially serve as a dispersal corridor for juvenile and adult frogs. As currently proposed, the project will result in approximately 0.0004 ha (0.001 ac) of permanent and 0.0021 ha (0.005 ac) of temporary (construction-related) impacts to Cottonwood Creek.

Western Pond Turtle. Both the northwestern and southwestern subspecies of the western pond turtle (*Clemmys marmorata marmorata* and *C. m. pallida*, respectively) have the potential to occur within the project study area. Both subspecies are considered to be federal species of concern and California species of special concern. Based on their similar status, the potential for both subspecies

to occur within the project study area and their generally similar habitat requirements, the two subspecies are treated together as the western pond turtle for purposes of this document.

Western pond turtles typically occur in perennial streams, creeks, ponds, marshes, and irrigation ditches with aquatic vegetation. The availability of basking sites and suitable upland environments for egg laying (e.g., sandy banks or grassy open fields) are important components of suitable habitat for this species. Mating typically occurs during late April and early May, and eggs are deposited between late April and early August. Most hatchling turtles are thought to winter-over in nests. Adults may or may not winter-over depending on specific location (i.e., latitude). While nesting and wintering over can take place close to watercourses, individuals have been known to move considerable distances (350 m [1,150 ft]) in search of nesting/winter-over sites.

No focused western pond turtle surveys have been conducted in support of this project; however, western pond turtles are known to occur throughout Arroyo Las Positas and the lower reaches of Cayetano Creek.

Special-Status Birds (including Common Raptors and Other Migratory Birds). Several species of special-status birds may forage in grasslands, riparian scrub, or other communities within and immediately adjacent to the project area, but they are unlikely to breed there. These include ferruginous hawk (*Buteo regalis*), tricolored blackbird (*Agelaius tricolor*), rufous hummingbird (*Selasphorus rufus*), and little willow flycatcher (*Empidonax traillii brewsteri*). White-tailed kite (*Elanus leucurus*), Cooper's hawk (*Accipiter cooperii*), western burrowing owl (*Athene cunicularia hypugaea*), Allen's hummingbird (*Selasphorus sasin*), California thrasher (*Toxostoma redivivum*), loggerhead shrike (*Lanius ludovicianus*), and California horned lark (*Eremophila alpestris actia*) may breed in appropriate communities within or adjacent to the project area. Western burrowing owl and swallows are discussed below under separate headings due to their unique nesting habitats, relative to the other bird species.

The species that have the potential to breed within or immediately adjacent to the project study area are not protected by either FESA or CESA. However, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by Fish and Game Code §3503. In addition, all raptors or birds of prey (i.e., owls, hawks, falcons), including common species, and their nests, are protected from take pursuant to the Fish and Game Code of California §3503.5. In accordance with this code, it is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes or to take, possess, or destroy the nest or eggs of any such birds.

The CNDDB contains records for the following special-status birds in the vicinity (8-km [5-mi] radius) of the project study area: northern harrier, California horned lark, and tricolored blackbird. All of these occurrences are located greater than 1.6 km (1.0 mi) from the project study area. No focused special-status bird surveys have been conducted in support of this project.

Western Burrowing Owl. The western burrowing owl is a federal species of concern and a California species of special concern. Burrowing owls and their nests are protected pursuant to California Fish and Game Code §3503.5. In addition, the federal MBTA, also makes the take, possession, purchase, or bartering of any burrowing owl, their nests, or eggs unlawful. The western

burrowing owl inhabits dry open rolling hills, grassland, desert floor, and open bare ground with gullies and arroyos. Burrowing owls typically use burrows created by fossorial mammals, most notably the California ground squirrel, but they also may use man-made structures such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement. The breeding season extends from February 1 through August 31. Burrowing owls are opportunistic feeders, taking a variety of invertebrates, small mammals, birds, amphibians, and reptiles.

Most of the project area appears to be unsuitable for burrowing owls. A limited number of ground squirrel burrows were observed within the project study area during field surveys conducted coincident with the wetland delineation and vegetation community mapping. These burrows were either unoccupied (determined by the presence of spider webs and debris) or being used by ground squirrels. Although no burrowing owls are currently known to occur within the project area, potentially suitable habitat is present within the corridor. The CNDDB contains numerous burrowing owl records in the vicinity of the project area. Four occurrences are located within 1.6 km (1.0 mi), and an additional 13 occurrences have been documented within 8 km (5 mi) of the project study area.

Swallows. Swallows most likely to occur within the project study area are cliff swallows and barn swallows (*Hirundo rustica*). Both of these species can form colonial nesting aggregations where they build mud nests that adhere to the underside of bridges, in culverts, and on the sides of buildings. These swallows are protected under the provisions of the MBTA, and take of these species, including disturbance to or destruction of active nesting sites, are prohibited. These two species are not listed pursuant to either FESA or CESA, nor are they considered to be species of concern by USFWS or species of special concern by CDFG.

Cliff swallow nests were observed within the project study area at five locations in September 2005. Nests were observed at the concrete box culvert associated with Tassajara Creek, under three bridges that span the Arroyo Las Positas, and the railway overpass located east of Greenville Road.

Special-Status Bats. Highway structures within the project study area may represent potentially suitable roosting habitat for a variety of regionally occurring bat species. Special-status bat species that have the potential to occur within the project study area include pallid bat, small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), and Yuma myotis. Pallid bat, Yuma myotis, and Mexican free-tailed bat (*Tadarida brasiliensis*) are commonly found on bridges. Other regionally occurring special-status bats were determined to be unlikely to occur within the project study area based on an apparent lack of suitable roosting habitat. None of the potentially occurring special-status bats are listed pursuant to either FESA or CESA. These species are listed as species of concern by USFWS and/or species of special concern by CDFG.

The CNDDB contains only one bat occurrence record in the vicinity of the project. Townsend's big-eared bats (*Corynorhinus townsendii*) were observed roosting in an abandoned wine cave located 5.6 km (3.5 mi) south of Livermore (greater than 8 km [5 mi] south of the project corridor).

A bat roost habitat assessment was conducted in February 2006. Several highway structures present within the project site represent potential bat roosting habitat and the visual inspection conducted in February 2006 resulted in observations of several active bat roosts. No special-status bats were

observed, however, preconstruction surveys would be conducted to fully evaluate bat use of potential roost features within the project site

2.3.3.3 Environmental Consequences

Special-Status Plant Species

The project is not anticipated to affect special-status plant species, due to the lack of suitable habitat within the proposed work areas. Construction activities would be limited to the median and two areas along the existing right-of-way. These represent highly disturbed settings that are not suitable habitat for special-status plants.

Special-Status Wildlife Species

California Red-legged Frog. In-stream construction activities associated with the project could have the potential for direct impacts to California red-legged frogs in Cottonwood Creek. Although Cottonwood Creek does not provide suitable habitat for the California red-legged frog in the vicinity of the project study area, it could potentially serve as a dispersal corridor for juvenile and adult frogs.

Construction activities in the immediate vicinity of potentially suitable aquatic habitat could permanently reduce the availability of upland refugia for this species. In addition, the removal of riparian vegetation could result in adverse effects to this sensitive plant community, as well as California red-legged frogs. Water quality impacts (e.g., sedimentation, release of pollutants) due to construction in or near Arroyo Las Positas and other waterways could also adversely affect California red-legged frogs. The avoidance and minimization measures described in Section 2.4.11, (Construction Phase Impacts, Biological Resources) Avoidance, Minimization, and Mitigation Measures, would prevent a take on the species and therefore compensatory mitigation measures are not proposed.

Western Pond Turtle. Direct impacts to western pond turtles as a result of project construction are not anticipated. Construction activities in aquatic habitats within the project study area are limited to Cottonwood Creek. The channel of Cottonwood Creek is moderately incised, averaging 3.0 to 4.6 m (10 to 15 ft) wide, and it is generally vegetated with introduced grasses with scattered willows (*Salix* species) and valley oak (*Quercus lobata*). There is no evidence of pooling in the channel within or adjacent to the project area. Based on the heavily vegetated channel and the lack of a water line, this channel is likely only wet during and following rain events. During the September 2005 field visit, the creek was observed to have been dry for an extended period of time. Cottonwood Creek does not provide suitable habitat for the western pond turtle.

Construction activities in the immediate vicinity of potentially suitable aquatic habitat, such as Arroyo Las Positas, could temporarily or permanently reduce the availability of upland retreat sites and nesting areas. In addition, the removal of riparian vegetation could result in adverse effects to this sensitive plant community and the species that inhabit it, including western pond turtles. Water quality impacts (e.g., siltation and construction and roadway runoff) due to construction activities in the vicinity of waterways could also adversely affect this species.

Special-Status Birds (including Common Raptors and Other Migratory Birds). Tree removal or nearby construction activities could adversely affect nesting birds. The removal of a tree containing an active nest may result in direct impacts (loss) to the nest and any associated eggs and/or nestlings. Construction-related disturbance in proximity to an active nest may lead to increased stress, decreased foraging opportunities, nest abandonment, and/or forced fledging.

Western Burrowing Owl. In accordance with the CDFG Staff Report on Burrowing Owl Mitigation (CDFG, 1995), the following should be considered impacts to the species:

- Disturbance within 50 m (160 ft) of an occupied burrow, which may result in harassment of the owls;
- Destruction of occupied natural and artificial burrows (e.g., culverts, concrete slabs, and debris piles); and
- Destruction and/or degradation of foraging habitat adjacent (within 100 m [330 ft]) to an occupied burrow(s).

Swallows. The proposed project would not result in the widening or modification of bridge or culvert structures, with the exception of the Cottonwood Creek culvert, within the project study area. Therefore, permanent loss of potential nesting habitat is not anticipated to occur as a result of this project.

Special-Status Bats. Implementation of the project may have a direct permanent impact on special-status bats if construction activities result in the disturbance, alteration, or loss of roosting habitat. The project would not result in structural modifications to existing bridge and culvert structures, with the exception of the Cottonwood Creek culvert, which would be extended approximately 0.89-m (2.9 ft). Work would be limited to the existing paved surface of these structures. Direct loss or alteration of potential roosting habitat is not anticipated to occur as a result of the project. Construction activities may result in increased vibratory, noise, and light impacts. Increased disturbance levels may lead to roost abandonment, the loss or reduction of reproductive effort, or increased bat exposure to the elements and predators. Through the successful implementation of avoidance and minimization efforts, the project is not likely to adversely affect the species.

2.3.3.4 Avoidance, Minimization, and/or Mitigation Measures

The following avoidance, minimization, and/or mitigation measures are proposed to address the species impacts identified in the foregoing sections. The final measures would be subject to concurrence by USFWS and CDFG.

Special-Status Plant Species

Special-status plants are considered unlikely to occur within the project construction areas. Given these conditions, preconstruction surveys would be appropriate to cover the highly unlikely possibility that one of these plants would be present.

Special-Status Wildlife Species

California Red-legged Frog and Western Pond Turtle. Preconstruction avoidance/minimization measures and BMPs would be implemented, as described in Section 2.4.11, (Construction Phase Impacts, Biological Resources) Avoidance, Minimization, and Mitigation Measures, to ensure no take of individuals of the species.

Western Burrowing Owl. Adverse impacts to burrowing owls could be avoided by conducting preconstruction surveys and implementing appropriate avoidance/minimization measures in the event an active burrow is located, as described in Section 2.4.11, (Construction Phase Impacts, Biological Resources) Avoidance, Minimization, and Mitigation Measures. Compensatory mitigation would be required only if adverse impacts to occupied burrows (removal or construction within the buffer zone) are unavoidable. Compensatory mitigation, if any is required, would be developed through consultation with CDFG.

Swallows. The project would not result in the permanent loss or degradation of potentially suitable habitat for swallows. Implementation of avoidance and minimization measures, as described in Section 2.4.11, (Construction Phase Impacts, Biological Resources) Avoidance, Minimization, and Mitigation Measures, would prevent direct impacts to swallows; therefore, no mitigation measures are recommended.

Special-Status Bats. Direct loss or alteration of potential roosting habitat is not anticipated to occur as a result of the project. Implementation of avoidance and minimization measures, as described in Section 2.4.11, (Construction Phase Impacts, Biological Resources) Avoidance, Minimization, and Mitigation Measures, would prevent direct impacts to special-status bats; therefore, no mitigation measures are recommended.

2.3.4 Invasive Species

2.3.4.1 Regulatory Setting

On February 3, 1999, President Clinton signed EO 13112 requiring federal agencies to combat the introduction or spread of invasive species in the U.S. The order defines invasive species as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health." FHWA issued guidance on August 10, 1999, that directs the use of the state’s noxious weed list to define the invasive plants that must be considered as part of the NEPA analysis for a proposed project.

2.3.4.2 Affected Environment

Biotic communities identified within and immediately adjacent to the project study area include ornamental landscape, ruderal, annual grassland, and riparian scrub. Ruderal represents the dominant community within the study area. Each of these communities, with the exception of riparian scrub, contains a high incidence of non-native (exotic) plant species. Exotic plant species commonly identified in the ruderal community included fennel (*Foeniculum vulgare*), black mustard (*Brassica*

nigra), and a variety of thistles. Oleander trees (*Nerium* sp.) are the primary constituents of the ornamental landscape, having been planted within the I-580 median separating the eastbound and westbound traffic and along the eastbound limits of the right-of-way. Non-native, naturalized Mediterranean grasses, such as wild oat (*Avena* ssp.), brome (*Bromus* ssp.), ryegrass (*Lolium multiflorum*), represent the predominant species within the annual grassland community. Yellow star-thistle (*Centaurea solstitialis*) was also commonly observed in the grassland communities.

The California Exotic Pest Plant Council (CalEPPC) maintains a database and ranking system for noxious weeds based on the species' ability to displace native plant species and/or disrupt natural habitats. The ranking system is as follows:

- List A: Most Invasive Wildland Pest Plants; documented as aggressive invaders that displace natives and disrupt natural habitats. Includes two sublists – List A-1: Widespread pests that are invasive in more than three Jepson regions, and List A-2: Regional pests invasive in three or fewer Jepson Regions.
- List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.
- Red Alert: Pest plants with potential to spread explosively; infestations currently small or localized.

Table 2.3.4-1 provides List A and B species identified within the project study area.

Table 2.3.4-1: Invasive Species

Scientific Name	Common Name	Family
List A-1: Most Invasive Wildland Pest Plants; Widespread		
Centaurea solstitialis	Yellow star-thistle	Asteraceae
Eucalyptus globules	Blue gum	Myrtaceae
Foeniculum vulgare	Sweet fennel	Apiaceae
Lepidium latifolium	Broad-leaf pepper grass	Brassicaceae
List A-2: Most Invasive Wildland Pest Plants; Regional		
Bromus madritensis ssp. *Rubens*	Red brome	Poaceae
List B: Wildland Pest Plants of Lesser Invasiveness		
Brassica nigra	Black mustard	Brassicaceae
Carduus pycnocephalus	Italian thistle	Asteraceae
Cirsium vulgare	Bull thistle	Asteraceae
Conium maculatum	Poison-hemlock	Apiaceae
Phalaris aquatica	Harding grass	Poaceae

Note: The list is organized by CalEPPC's ranking system (1999). Within these groups, species are ordered alphabetically by scientific name.

2.3.4.3 Environmental Consequences

The I-580 corridor provides opportunities for the movement of invasive species through the landscape. Invasive plant and animal species could be transported on vehicles and in the loads they carry. Weed seed could be introduced inadvertently 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.

2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures

In compliance with EO 13112 and subsequent FHWA guidance, the landscaping and erosion control included in the project would not use species listed as noxious weeds. In areas of particular sensitivity, extra precautions would be taken if invasive species are found in or adjacent to the construction areas. These include the inspection and cleaning of construction equipment and eradication strategies to be implemented should an invasion occur.

To prevent or minimize any introduction or spread of invasive species in the project area, the following methods would be incorporated into the construction specifications:

- Use high-pressure water blasting or steam cleaning methods to 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 the 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 revegetate 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.

2.4 Construction Phase Impacts

2.4.1 Construction Schedule and Work Hours

It is anticipated that the I-580 Eastbound HOV Lane Project would be constructed with minimum disruption to the traveling public or surrounding communities. The following sections describe a reasonable and feasible construction approach so that anticipated construction phase impacts could be reported with appropriate mitigation measures.

2.4.1.1 Construction Stages

To minimize disruption to the traveling public, it is anticipated that the I-580 Eastbound HOV Lane Project would be constructed in stages. Specific construction staging requirements would be defined during the final design process.

Construction for the mainline widening would require two primary stages. Stage 1 would shift eastbound traffic to the south and westbound traffic to the north to reconstruct the median area to provide an eastbound HOV lane, paved median shoulders, new median barrier, and replacement drainage facilities. Once the median area construction is complete, Stage 2 would shift westbound traffic back to its location prior to the median reconstruction work, and shift eastbound traffic to the north and onto the newly constructed roadway in the median. Construction of the eastbound outside widening and auxiliary lanes would then be performed. Once the outside widening work is complete, the new eastbound HOV lane would be opened to traffic.

Retaining walls and the culvert extension at Cottonwood Creek would be constructed with the associated widening work in each stage. Soundwalls would be constructed as early in each stage as practicable to help mitigate construction noise.

2.4.1.2 Construction Schedule

It is anticipated that project construction would take approximately 2 years. The construction contract would be followed by a replacement planting contract that would require approximately 6 months to construct, and it would be followed by a 3-year plant establishment period.

2.4.1.3 Construction Hours

Most of the work would be done during daylight hours, but there would be some work in night-time hours to permit temporary closures for tasks that could interfere with mainline traffic or create safety hazards. Any required lane closures would be limited to non-peak travel periods. Examples of tasks requiring lane closures include placing and removing temporary construction barriers, connecting or conforming to ramps to the mainline or local streets, or shifting traffic due to widening adjacent to the existing median and eastbound outside shoulder.

Temporary night-time lane closures would be required for activities such as placing and removing temporary concrete barriers to separate construction work areas and traffic. Some short-term closures (from a few hours to a few days) of existing interchange ramps may be necessary during construction of 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 I-580 and local streets, construction activities requiring traffic lane or ramp closures would not be permitted to occur simultaneously at adjacent interchanges.

2.4.1.4 Staging Locations

At this time it appears that no staging areas outside of the existing roadway right-of-way would be required.

2.4.1.5 Construction Phase Impacts and Avoidance, Minimization, and Mitigation Measures

Given that construction of the eastbound I-580 HOV lane is not complicated and would be carried out within the existing roadway right-of-way, the potential for construction phase impacts is greatly reduced. Most impacts would be avoided or minimized through implementation of construction BMPs.

2.4.2 Traffic and Transportation/Pedestrian and Bicycle Facilities

2.4.2.1 Impacts

Potential impacts to vehicular and non-motor transportation include short-term temporary traffic, access interruptions, or traffic detours. Traffic service would be maintained by keeping all lanes open to traffic during peak periods, restricting temporary lane closures to off-peak or night-time periods, providing adequate detours, and avoiding simultaneous construction at adjacent interchanges.

2.4.2.2 Avoidance, Minimization, and Mitigation Measures

A TMP for the project would be implemented for the construction phase and would include a public information program to provide motorists and transportation and emergency service providers with advance notice of construction activities and durations, temporary closures and detours, and other information affecting access. The TMP would identify services to facilitate safety during construction, such as increased CHP during critical construction operations, and increased Freeway Service Patrol during peak travel periods. The TMP would also identify measures to address detours and other transportation issues.

In addition, the following measures would be implemented to reduce traffic impacts during construction:

- Each construction stage would maintain four lanes of traffic on I-580 in each direction.
- Lane and ramp 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.
- Contractors would be required to coordinate activities with commute schedules to minimize impacts to corridor traffic.
- Construction activities would be coordinated with the local jurisdictions during the development of the TMP and during the construction period.
- Construction crews would be required to follow established safety practices, including using flaggers, to protect work crews while working in the construction zone.
- Provisions would be incorporated into the construction contracts to designate areas for construction worker parking to avoid parking impacts to residential or business areas.
- Construction haul routes would be required to utilize I-580 during non-peak hours to the greatest extent practicable to avoid traffic impacts to residential or business areas.

2.4.3 Utilities/Emergency Services

2.4.3.1 Impacts

ACCMA would coordinate with all utility providers during the design phase of the project to incorporate effective design treatments and construction procedures 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.

2.4.3.2 Avoidance, Minimization, and Mitigation Measures

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 would be provided to users.

Caltrans and ACTIA 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.

2.4.4 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 worksite 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; therefore, no mitigation is necessary beyond BMPs. Dust control during construction is discussed in Section 2.4.9, Air Quality.

2.4.5 Cultural Resources

2.4.5.1 Impacts

There is no potential for construction activities to affect historic structures. It is also unlikely that construction would encounter intact buried cultural resources. There is potential for unidentified resources to exist below the level of planned excavations in two locations, which are identified in the *Archaeological Survey Report* (Far Western Anthropological Research Group, 2006).

2.4.5.2 Avoidance, Minimization, and Mitigation Measures

In the unlikely event that previously unidentified cultural materials are encountered, ACCMA, Caltrans, and FHWA would comply with 36 CFR 800.13 regarding late discoveries.

2.4.6 Hydrology and Floodplains

2.4.6.1 Impacts

The I-580 Eastbound HOV Lane Project crosses numerous streams and channels, including Tassajara Creek, Line G-3 (an unnamed Arroyo Mocho tributary), Cottonwood Creek, Collier Canyon Creek, Cayetano Creek, Arroyo Seco, Arroyo Las Positas, and Arroyo Mocho. The project is limited to median and shoulder widening located outside of the main river channels and would avoid bridge widening and construction activity within creeks and channels. The box culvert at Cottonwood Creek would be extended. There is no other construction potentially affecting waterways.

2.4.6.2 Avoidance, Minimization, and Mitigation Measures

This project would disturb more than 0.4-ha (1.0-acre) of land, requiring an SWPPP to be prepared by the contractor and implemented in accordance with Section 402 of the federal CWA, 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, temporary BMPs would be identified to be used during construction to minimize the effect of construction activities on waterways. These include BMPs designed to control streambank erosion and in-stream sedimentation, guidelines for stream crossings, and seasonal construction scheduling.

The SWPPP would identify construction-period BMPs to reduce impacts to surface waterways. Recommended construction-phase BMPs include the following:

- Schedule construction during the non-rainy season.
- Monitor the forecast for rainfall; adjust the construction schedule to allow implementation of soil stabilization and sediment treatment controls before the onset of rain.
- For stream crossings, minimize disturbance by selecting the narrowest crossing, avoid steep and unstable banks or highly erodible soils, select equipment that reduces the amount of pressure exerted on the ground (e.g., use wide or high flotation tires, dual tires, tracked machines), and use overhead or aerial access for transporting equipment across streams whenever possible.
- Limit temporary stream crossings to culverts or bridges if the stream crossing remains during the rainy season.
- For pumped diversion of in-stream flows, continuously monitor pumps and incorporate a standby pump. Employ velocity dissipation at the outlet as necessary to control erosion.
- Size diversion channels and/or culverts to accommodate a minimum 10-year storm event if placed within the channel during the rainy season.
- Isolate work areas within the waterway from the flow using sheet piling, k-rails, rip rap berms, or other methods of isolation.
- Keep equipment used in a waterway leak-free.
- Stabilize waterway embankments where necessary using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, etc.
- Protect all drainage systems (e.g., culvert entrances, inlets) from debris and sediment-laden waters.

- If in-channel disturbance of fines (i.e., sand and silt sized particles) occurs, wash the fines, using water from a water truck or hydrant, back into the interstitial spaces of the existing gravel and cobbles.

2.4.7 Water Quality and Stormwater Runoff

2.4.7.1 Impacts

Construction activities could have adverse effects on the surrounding watershed and streams if stormwater and non-stormwater pollution controls are not in place. Construction over or in waterways (for the Cottonwood Creek culvert extension only) could cause streambank erosion and water turbidity, as well as increased siltation and sedimentation from temporary changes in water flow.

2.4.7.2 Avoidance, Minimization, and Mitigation Measures

The project would require an SWPPP to be prepared by the contractor and implemented to reduce the amount of construction-related pollutants that would be transported from construction activities or by stormwater runoff to surface waters. As part of the requirements for the SWPPP, temporary stormwater pollution prevention practices would be identified to be used during construction. The SWPPP would detail the placement, staging, and monitoring of BMPs required to be implemented during project construction. These include BMPs designed to control discharges of pollutants, including pollutants from stormwater and non-stormwater discharges.

The SWPPP would emphasize:

1) temporary erosion control measures to reduce sedimentation and turbidity of surface runoff 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 RWQCB. Construction over and adjacent to waterways would include special construction BMPs to minimize debris deposition into those waterways. Suggested BMPs for such activities are:

- Demolish and construct over and adjacent to waterways without methods that would scatter debris.
- Place platforms under/adjacent to bridges over waterways to collect debris.
- Provide watertight curbs or toe-boards on bridges over waterways to contain spills and prevent materials, tools, and debris from falling from the bridge.
- Secure materials adjacent to waterways to prevent discharges via wind.

- Use attachments on equipment, such as backhoes, to catch debris from small demolition operations.
- Stockpile accumulated debris and waste away from the waterway.
- For the Cottonwood Creek culvert extension, isolate the work areas within the waterway from the flow using sheet piling, k-rails, rip rap berms, or other methods of isolation.
- Use drip pans during equipment operation, maintenance, cleaning, fueling, and storage for spill prevention. Place drip pans under all vehicles and equipment placed on a bridge when expected to be idle for more than 1 hour.
- Keep equipment used in a waterway leak-free.
- Protect all drainage systems (e.g., culvert entrances, inlets) from debris and sediment-laden waters.
- Keep logs of all storm events and spill events.
- In the event groundwater is encountered during construction, conduct dewatering locally. Test dewatering effluent for contaminants as specified by the RWQCBs. Dispose of contaminated effluent in accordance with applicable federal, state, and local regulations.

It is anticipated that the project would require a Water Quality Certification from the RWQCB in accordance with Section 401 of the CWA. This permit may stipulate additional waste discharge requirements and management practices to be implemented during construction.

2.4.8 Hazardous Waste/Materials

2.4.8.1 Impacts

The potential exists for the release of hazardous materials that are used for construction operations and for encountering ADL in median soils or at the edge of roadway paving.

2.4.8.2 Avoidance, Minimization, and Mitigation Measures

An approved Worker Health and Safety Plan (WH&SP) would address 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 of contaminated soil or water. The WH&SP also would address storage and disposal of any hazardous waste/materials used in construction operations. 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.

For ADL, mitigation would be conducted as described in Section 2.2.5.3, Hazardous Waste/Materials, Avoidance, Minimization, and Mitigation Measures.

In the event that groundwater is encountered during construction, mitigation would be conducted as described in Section 2.4.3.6, Water Quality and Stormwater Runoff, to prevent contamination from hazardous wastes. In the event that contaminated groundwater is encountered, it would be handled as described in Section 2.2.5.3, Hazardous Waste/Materials, Avoidance, Minimization, and Mitigation Measures.

2.4.9 Air Quality

2.4.9.1 Impacts

Construction of the Build Alternative would take approximately 2 years—from 2008 to 2010—and involve 6 phases:

1. Clearing and grubbing;
2. Earthwork;
3. Construction of structures;
4. Construction of retaining walls and soundwalls;
5. Paving; and
6. Miscellaneous construction activities.

Construction of the proposed project would generate pollutant emissions 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 onsite construction equipment.

Table 2.4.9-1 shows the estimated emissions associated with each phase of construction.

Table 2.4.9-1: Construction Emissions

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
1. Clearing and Grubbing	97	27	253	49	237
2. Median Barrier	101	28	264	50	244
3. Earthwork	100	27	260	50	240
4. Drainage Structure and Retaining Walls	116	34	174	31	477
5. Paving	103	28	270	52	244
6. Miscellaneous	48	12	56	11	53

Note: As previously discussed, no methodologies for determining impacts relating to $PM_{2.5}$ have been developed or adopted by federal, state, or regional agencies. No $PM_{2.5}$ analysis is provided above, because no EPA guidance on performing qualitative or quantitative $PM_{2.5}$ hot-spot analysis exists.

Source: Terry A. Hayes Associates, 2005.

2.4.9.2 Avoidance, Minimization, and Compensation Measures

BAAQMD's approach to analysis and mitigation of construction impacts focuses on effective and comprehensive control measures. The BAAQMD CEQA Guidelines provide feasible control measures for construction emissions. If the appropriate construction controls are implemented, there would be no substantial air pollutant emissions from construction activities. Control measures that would be implemented during construction of the proposed project are as follows:

- All active construction areas would be watered at least twice daily.
- All trucks hauling soil, sand, and other loose materials would be covered and would maintain at least 2 feet of freeboard.
- All unpaved access roads, parking areas, and staging areas at the construction site would be watered at least three times daily or would be applied with nontoxic soil stabilizers. All paved access roads, parking areas, and staging areas at the construction site would be swept daily with water sweepers.
- Streets would be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Nontoxic soil stabilizers would be applied to inactive construction areas (previously graded areas that are inactive for 10 days or more).
- Exposed stockpiles of dirt, sand, or debris would be enclosed, covered, watered at least twice daily, or applied with nontoxic soil binders.
- Traffic speeds on unpaved roads would be limited to 24 km/h (15 mph).
- Sandbags or other erosion control measures would be installed to prevent silt runoff to public roadways.
- Operations on any unpaved surfaces would be suspended during designated BAAQMD "Spare the Air" days.
- Vegetation in disturbed areas would be replanted as quickly as possible.
- Tires or tracks of all trucks and equipment leaving the site would be washed.
- Excavation and grading activities would be suspended when winds exceed 40 km/h (25 mph).
- Construction equipment would use cool exhaust gas recirculation.
- If I-580 was constructed prior to the phase-out of leaded gasoline, site investigations would be conducted in the unpaved shoulder areas in the highway right-of-way along the project to determine existing lead concentrations. Materials found to contain lead at concentrations that are considered potentially hazardous to either human health or the environment would be handled in accordance with all local, state, and federal regulations.
- If the lead levels in the soil exceed the threshold authorized by the DTSC, then soils contaminated by ADL would be hauled to a permitted landfill. If the daily air monitoring results indicate that

the lead levels in the air exceeded 1.5 µg/m^3 of air per day, then the contractor would stop work and modify the operations to prevent any further release of lead that exceeds the required limit. Air monitoring would be conducted under the direction of a Certified Industrial Hygienist.

Table 2.4.9-2 displays construction emissions for the proposed project with implementation of the control measures. CO, ROG, NO_X, and PM_{10} emissions would be substantially reduced. SO_X emissions would remain unchanged. The control measures would ensure that there are no substantial emissions of air pollutants from construction activities for the proposed project.

Table 2.4.9-2: Construction Emissions with Controls

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
1. Clearing and Grubbing	61	17	101	49	44
2. Median Barrier	64	17	105	50	46
3. Earthwork	64	17	104	50	44
4. Drainage Structure and Retaining Walls	51	14	70	31	83
5. Paving	67	17	108	52	47
6. Miscellaneous	18	4	22	11	19

Note: As previously discussed, no methodologies for determining impacts relating to $PM_{2.5}$ have been developed or adopted by federal, state, or regional agencies. No $PM_{2.5}$ analysis is provided above, because no EPA guidance on performing qualitative or quantitative $PM_{2.5}$ hot-spot analysis exists.

Source: Terry A. Hayes Associates, 2005.

2.4.10 Noise

Noise at the construction sites would be intermittent, and the intensity of it would vary. The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities.

2.4.10.1 Regulatory Setting

During the construction period, the contractors would be required to comply with local noise ordinances:

City of Pleasanton – Notwithstanding any other provision of Chapter 9 of the city code, between the hours of 8:00 A.M. and 8:00 P.M. daily, except Sundays and holidays, when the exemption would apply between 10:00 A.M. and 6:00 P.M., construction, alteration, or repair activities that are authorized by a valid city permit would be allowed if they meet at least one of the following noise limitations:

A. No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 ft. If the device is housed within a structure on the property, the measurement would be made outside the structure at a distance as close to 25 ft from the equipment as possible; or

B. The noise level at any point outside of the property plane of the project shall not exceed 86 dBA (City of Pleasanton, 2005).

City of Livermore – The operation between the hours of 6:00 p.m. Saturday to 7:00 a.m. Monday; 8:00 p.m. to 7:00 a.m. on Monday, Tuesday, Wednesday, and Thursdays; 8:00 p.m. Friday to 9:00 a.m. on Saturday; or at all on city-observed holidays of any pile driver, pneumatic tools, derrick, electric hoist, sandblaster, or other equipment used in construction, demolition, or other repair work, the use of which is attended by loud or unusual noise, is prohibited (City of Livermore, 2005).

In addition, Caltrans Standard Specifications include the following two noise control requirements that restrict construction noise (Caltrans, 2002a):

- The contractor shall comply with all local sound control and noise level rules, regulations, and ordinances that apply to any work performed pursuant to the contract.
- Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine would operate without a muffler.

2.4.10.2 Impacts

No-Build Alternative − No highway construction or improvements beyond routine maintenance would be provided for this alternative; therefore, there would be no project-related construction noise.

Build Alternative − Long-term noise exposure descriptors are difficult to quantify due to the intermittent nature of construction noise. Highway construction is accomplished in several different phases. Table 2.4.10-1 lists the calculated noise levels for typical construction activity that could be expected in the project area.

During the construction period, some receptors that are close to the highway may be exposed to high noise levels. Effective noise control during the construction of a project means minimizing noise disturbances to the surrounding community. A combination of mitigation techniques with equipment noise control and administrative measures would be selected to provide the most effective means to minimize effects of the construction activity noise.

Table 2.4.10-1: Typical Construction Noise Level

No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA [1]	Hourly 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
Ramp 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	Concrete 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]	Hourly Equivalent Noise Levels at 30 m, dBA [1]
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	Soil Compactor	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
4	Medium Duty Dump Trucks	73	70	64
3	Ready Mix Trucks	81	78	72
		Overall L_{eq}(h)	87	81
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

2.4.10.3 Avoidance, Minimization, and Compensation Measures

The following control measures would be implemented to minimize noise disturbances at sensitive receptors during periods of 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) (Caltrans, 1999).
- Turn off idling equipment.

Administrative Measures

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times least sensitive to receptors.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to the unavoidable construction impacts. Provide frequent activity updates of all construction activities.

Application of the mitigation measures would reduce construction noise at the sensitive receptors; however, a temporary increase in noise would likely occur.

2.4.11 Biological Resources

2.4.11.1 Impacts

Riparian Scrub. No riparian scrub occurs within the project site, including temporary construction easements and construction staging areas. Temporary impacts to riparian scrub in areas adjacent to the project site would be avoided through the establishment of ESAs, as described in Section 2.4.11.2, Avoidance, Minimization, and/or Mitigation Measures.

Special-Status Plant Species. The I-580 Eastbound HOV Lane Project is primarily limited to the existing highway median and two areas of widening within the existing right-of-way, both of which appear to offer unsuitable habitat for rare plants.

Wetlands and Other Waters of the United States

The Build Alternative would temporarily affect up 0.06 ha (0.16 ac) of other waters, as shown in Table 2.4.11-1. Temporary construction-related impacts to waters of the U.S. would be limited to Cottonwood Creek and portions of the drainage features located to the west of Greenville Road. There would be no other impacts to any of the other potential jurisdictional waters of the U.S. identified in the project study area. Avoidance and minimization measures, including BMPs, would

be implemented to protect jurisdictional waters during construction, as described in Section 2.4.11.2, Avoidance, Minimization, and/or Mitigation Measures.

Table 2.4.11-1: Temporary (Construction-Phase) Impacts to Waters of the U.S.

Feature	Location	Action	Temporary Impact[1]
Cottonwood Creek	Near west end of the Arroyo Las Positas Golf Course	Extend the double reinforced box culvert 0.87-m (2.85 ft)	0.0021 ha 0.005 ac
Drainage Ditch	Adjacent to Southfront Road, west of the weigh station	Modifications to the road alignment	0.0108 ha 0.027 ac
Drainage Ditch	Off-ramp located between Laurence Road and Greenville Road	Realignment of the off-ramp configuration	0.0516 ha 0.128 ac
		Total	**0.0645 ha 0.160 ac**

[1] Impact acreages are based on preliminary plan sets and should be viewed as approximate values. Temporary impacts include all areas located within 3.7 m (12 ft) of the construction area. Also, acreage calculations are based on a draft wetland delineation that has not yet been verified by USACE.

California Red-legged Frog. In-stream construction activities associated with the project could have the potential for direct impacts to California red-legged frogs in Cottonwood Creek. Although Cottonwood Creek does not provide suitable habitat for California red-legged frogs in the vicinity of the project study area, it could potentially serve as a dispersal corridor for juvenile and adult frogs.

Construction activities in the immediate vicinity of potentially suitable aquatic habitat could temporarily reduce the availability of upland refugia for this species. In addition, the removal of riparian vegetation could result in adverse effects to this sensitive plant community, as well as California red-legged frogs. Water quality impacts (e.g., sedimentation, release of pollutants) due to construction in or near Arroyo Las Positas and other waterways could also adversely affect California red-legged frogs. Avoidance and minimization measures are proposed to ensure that there would be no construction-related impacts to California red-legged frogs, as described in Section 2.4.11.2, below.

Western Pond Turtle. Western pond turtles are not anticipated to occur within Cottonwood Creek; however, avoidance and minimization measures, including a preconstruction survey, are proposed to ensure that there would be no construction-related impacts to western pond turtle.

Special-Status Birds (including Common Raptors and Other Migratory Birds). Tree removal or nearby construction activities could adversely affect nesting birds. The removal of a tree containing an active nest may result in direct impacts (loss) to the nest and any associated eggs and/or nestlings. Construction-related disturbance in proximity to an active nest may lead to increased stress, decreased foraging opportunities, nest abandonment, and/or forced fledging. Avoidance and minimization measures, including preconstruction surveys, are proposed to ensure that there would be no construction-related impacts to special-status birds, as described in Section 2.4.11.2, below.

Western Burrowing Owl. Most of the project area appears to be unsuitable for burrowing owls; however, avoidance and minimization measures are proposed, including preconstruction surveys, to ensure that there would be no construction-related impacts to western burrowing owl.

Swallows. The project would likely result in temporary impacts to nesting habitat, including increased vibratory, noise, and light disturbance. Impacts to swallows would be avoided by timing construction to coincide with the non-nesting season.

Special-Status Bats. Construction activities may result in increased vibratory, noise, and light impacts. Increased disturbance levels may lead to roost abandonment, the loss or reduction of reproductive effort, or increase the bat's exposure to the elements and predators. Avoidance and minimization measures are proposed, as described in Section 2.4.11.2, below.

2.4.11.2 Avoidance, Minimization, and/or Mitigation Measures

Riparian Scrub. Impacts to riparian scrub communities outside the project site would be avoided through the establishment of ESAs to limit work zones adjacent to riparian scrub. The boundaries of the ESAs would be shown on plans and specifications, and the fencing would be installed prior to construction. The contractor would not disturb riparian areas, marked or otherwise, unless indicated on the drawings. Protective measures would remain onsite and in good repair until all construction activities in that zone are complete. Protective measures would be removed by the construction contractor in consultation with the environmental compliance monitors.

Special-Status Plant Species. •Special-status plants are considered unlikely to occur within the project construction areas. Given these conditions, preconstruction surveys would be appropriate to cover the highly unlikely possibility that one of these plants would be present.

Wetlands and Other Waters of the United States. The following measures are identified to avoid and minimize impacts to waters of the U.S. These measures, and all other permit requirements, would be included in contract specifications and would be implemented by the contractor:

- Erosion control measures would be implemented during construction.
- Cover vegetation would be removed as close to the time of construction as practicable.
- Construction within drainages would be avoided during the rainy season to prevent excessive siltation and sedimentation.
- Construction equipment and associated activities would be confined to the construction corridor.
- Streambank contours would be re-established following construction, and permanent erosion control would be installed, as needed.
- No refueling of construction-related equipment would take place within 30.5 m (100 ft) of the aquatic environment.
- Hazardous materials spill kits would be maintained in proximity to aquatic crossings.
- State and federal permits would be in compliance.
- State of California Standard Specifications for avoidance of water pollution (Section 7-1.01G) would be adhered to by compliance with NPDES permit requirements and implementation of BMPs.

- Proper sediment control would be performed.
- The spill prevention and response plan would be implemented.
- Construction activities near specified drainage and riparian areas would be monitored.
- All construction spoils, remaining construction materials, and miscellaneous litter would be removed for proper offsite disposal.
- Postconstruction monitoring and supplemental revegetation would be implemented where needed.

California Red-legged Frog. A qualified biologist would conduct a Worker Environmental Awareness Training Program for construction personnel prior to initiation of construction activities. At a minimum, the training would include a description of the natural history of the California red-legged frog and its habitat, general measures that are being implemented to conserve the species as they relate to the project, penalties for noncompliance, and the boundaries within which the project may be accomplished. The training program would be repeated as needed for new employees. Sign-up sheets identifying attendees and the contractor or company they represent would be retained by the biologist.

A qualified biologist would also conduct pre-construction surveys of all potentially suitable California red-legged frog habitat present within project-affected areas 14 days prior to instream construction or disturbance of riparian vegetation. In the event a California red-legged frog is observed in an area where disturbance would be proposed, work would be halted and the USFWS would be contacted to determine appropriate actions, unless already stipulated by the USFWS. If the USFWS approves moving the frogs, a permitted biologist would be allowed sufficient time to move the individual(s) from the work site before work activities resume. Only USFWS-approved biologists with a 10(a)(1)(A) permit would participate in the capturing, handling, and moving of California red-legged frogs. Any "take," including handling of the California red-legged frog without the appropriate permits, would be a violation of the federal Endangered Species Act. Results of pre-construction surveys would be reported to the USFWS.

Based on the results of the pre-construction surveys, a qualified biologist would flag all potential California red-legged frog habitat that could be avoided by construction activities prior to grading or other construction activities. All California red-legged frog habitat would be temporarily fenced off and designated as ESAs to prevent accidental intrusion by workers or equipment. An appropriate buffer size between the habitat and exclusionary fencing would be determined through coordination with the USFWS. Protective measures would remain on site and in good repair until all construction activities in that zone have been completed. Protective measures would be removed by the construction contractor in consultation with the environmental compliance monitors.

Additionally, a qualified biologist would also be present during instream construction activities to ensure that construction activities are contained within the limits of the work space and to respond in the event a California red-legged frog is encountered during construction. The qualified biologist would have the authority to halt any action that might result in "take" of California red-legged frog.

A qualified biologist would conduct preconstruction surveys of all potentially suitable California red-legged frog habitat present within project-affected areas 14 days prior to instream construction or disturbance of riparian vegetation. A qualified biologist would also flag all potential California red-legged frog habitat that could be avoided by construction activities prior to grading or other construction activities. All California red-legged frog habitat would be temporarily fenced off and designated as ESAs to prevent accidental intrusion by workers or equipment. An appropriate buffer size between the habitat and exclusionary fencing would be determined through coordination with USFWS. Protective measures would remain onsite and in good repair until all construction activities in that zone are complete. Protective measures would be removed by the construction contractor in consultation with the environmental compliance monitors. A qualified biological monitor would be present during instream construction activities to ensure that construction activities are contained within the limits of the work space and to respond in the event that a California red-legged frog is encountered during construction.

Water quality impacts associated with construction-related activities would be minimized through adherence to State of California Standard Specifications (Standard Specifications) for avoidance of water pollution (Section 7-1.01G), by compliance with NPDES permit requirements and implementation of BMPs.

Western Pond Turtle. Western pond turtles are not anticipated to occur within Cottonwood Creek. However, a qualified biologist would conduct a preconstruction survey of all project-affected aquatic habitats no more than 14 days prior to instream construction or disturbance of riparian vegetation in conjunction with the California red-legged frog preconstruction surveys. If western pond turtles are found to be present within the immediate construction area, onsite monitoring and possibly relocation would be implemented to ensure that no western pond turtles are injured during the construction phase. Plans for onsite monitoring and/or relocation would be submitted to the appropriate agencies (e.g., CDFG, USFWS) for approval prior to implementation.

Water quality and site restoration measures would be implemented in accordance with the measures described in the waters of the U.S. and California red-legged frog avoidance and minimization measures.

Special-Status Birds (including Common Raptors and Other Migratory Birds). Adverse impacts to nesting birds could be avoided by timing construction activities to avoid the nesting season or by conducting preconstruction surveys and implementing appropriate avoidance measures in the event that an active nest is located. If construction or tree removal would occur between February 1 and August 31, a qualified biologist would conduct preconstruction nesting bird surveys of all potential nest sites within a 150-m (500-ft) radius of the project area. Surveys would be conducted no more than 14 days prior to the initiation of construction activities.

If an active nest is found, an ESA would be established around the nest to provide a no-disturbance zone. The size of the buffer would be determined through consultation with the appropriate resource agencies (e.g., CDFG). The no-disturbance buffer would be maintained until it is determined that the young have fledged. If a nest tree must be removed, the removal would occur outside of the nesting

season (February through August) or after a qualified biologist verifies that the nest is unoccupied and the young have fledged.

Western Burrowing Owl. Adverse impacts to western burrowing owls could be avoided by conducting preconstruction surveys and implementing appropriate avoidance/mitigation measures in the event that an active burrow is located. A qualified biologist would conduct preconstruction surveys for western burrowing owl no more than 14 days prior to the initiation of construction activities, regardless of the time of year in which construction activities occur. Surveys would be conducted by walking suitable habitat throughout the project area and, to the extent possible, in all areas within 150 m (500 ft) of construction.

If active burrows are located on or immediately adjacent to the construction area, a no-disturbance buffer would be established around each burrow. The size of the buffer would be determined through coordination with CDFG. Typically, the radius of the buffer zone is 50 m (160 ft) during the non-breeding season (September 1 through January 31) and 75 m (250 ft) during the breeding season (February 1 through August 31). Avoidance also requires that a minimum of 2.6 ha (6.5 ac) of foraging habitat be permanently preserved contiguous to occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by CDFG.

If adverse affects to occupied burrows (direct removal or construction within the buffer zone) are unavoidable, the owls would be passively relocated using techniques approved by CDFG (install one-way doors on burrows) to avoid the loss of any individual owls. However, no occupied burrows would be disturbed during the nesting season unless a qualified biologist approved by CDFG verifies through noninvasive methods that either the birds have not begun egg-laying and incubation or that juveniles from the occupied burrows are foraging independently and are capable of independent survival. The loss of foraging and burrow habitat would be mitigated in accordance with the guidelines set forth in the CDFG Staff Report on Burrowing Owl Mitigation.

Swallows. Impacts to swallows could be avoided through timing construction activities to coincide with the non-nesting season (generally September through February). If avoiding the nesting season is unfeasible, the following minimization measures would be implemented.

To prevent disturbance to active nests, swallows must be prevented from nesting at bridge and culvert structures within the project study area during project construction. Their nesting season can begin as early as March 1 and continue through August 31. Prior to the onset of the nesting season, all swallow nests would be removed from bridge and culvert structures within the project study area. Exclusion techniques would be implemented to prevent swallows from establishing nests in these areas. Appropriate exclusion measures would be determined through coordination with appropriate resource agencies. These structures would be monitored on a regular basis to ensure that the exclusion devices remain in working order and to ensure that swallows are not able to construct any nests.

Bats. A qualified biologist would conduct preconstruction surveys during the summer, which should include the following:

- Revisit those features identified during the habitat assessment that were of appropriate size and configuration for bat roosting, but showed no evidence of use.
- Revisit the active day roost that was identified during the habitat assessment to determine colony size in the summer, further assess whether species other than Mexican free-tail bats are present, and evaluate it's importance as a maternity roost.
- Revisit the other anticipated day roost observed in the Union Pacific Railroad overhead to fully evaluate its importance to roosting bats during the summer.
- Further evaluate the six night roosts located during the habitat assessment to determine species composition and amount of use. Survey techniques would include visual inspection at the appropriate time of night (approx. 1:00-2:00 AM) and passive acoustic survey.

Appropriate avoidance and minimization measures would be developed in cooperation with the appropriate resource agencies, based on factors such as roost type, species present, colony size, and extent of estimated project-related impacts. The following minimization measures for night and day roosts are in accordance with the *Bats and Bridges Technical Bulletin* (Erickson et al. 2003).

Project-related impacts to night roosts shall be minimized via the following measures:

- Work activities would not occur under the structure between 10:00 PM and sunrise;
- Airspace access would not be severely restricted;
- Bird exclusion netting would not be used;
- Clearing and grubbing near the bridge would be minimized;
- Lights would not be used under the structure;
- Combustion equipment, such as generators, pumps, and vehicles, would not be parked or operated under the structure; and
- Personnel would not be present under the bridge during the evening or at night.

Project-related impacts to day roosts shall be minimized via the following measures:

- Work would occur outside the maternity season, April through August;
- Work would not occur directly under or adjacent to the roost;
- The area under the roost within visual sight of the bats would be avoided;
- Airspace access to and from the bridge would not be severely restricted;
- Clearing and grubbing would be minimized wherever possible;
- Combustion equipment, such as generators, pumps, and vehicles, would not be parked nor operated under or adjacent to the structure; and
- Personnel would not be present directly under the colony, especially during the evening exodus.

2.4.12 Creation of Jobs and Economic Activity

Table 2.4.12-1 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the No-Build and Build Alternatives. Estimates are based in part on an input/output study of construction activity in Texas by FHWA (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being respent 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 $1 million investment in transportation construction would directly generate 10 onsite, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.5 PYE positions to reflect inflation through 2005. When offsite, construction-related, and service-industry-related jobs and related increases in consumer demand (i.e., direct, indirect, and induced effects) are considered, the total number of full-time PYE positions created rises to approximately 11.01, adjusting for inflation, for each $1 million of highway investment.

Compared with the No-Build Alternative, capital costs for construction of the Build Alternative would be $75 million, exclusive of right-of-way. Construction expenditures would generate approximately 400 onsite full-time construction positions (PYE) and 800 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.

Table 2.4.12-1: Impacts from Construction Investment in the I-580 Eastbound HOV Lane Project (millions of 2005 dollars)

Alternative	Construction Value *	Regional Economic Output	Total Earnings	Job Creation (PYE)	
				Onsite	Total
Build Alternative	$75	$130.34	$34.53	400	800
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, 2006.

2.5 Cumulative Impacts

NEPA defines cumulative impact as “the impact...which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.” CEQA defines cumulative impacts as "two or more individual effects which, when considered together are considerable," and suggests that “cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355). NEPA includes cumulative impacts within the scope of impacts to be considered in an environmental document.

CEQA documents are required to include a discussion of cumulative effects when those effects are significant, and the State CEQA Guidelines suggest two possible methods for assessing potential cumulative effects (State CEQA Guidelines Section 15130). The first method is a list-based approach, which considers a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts. The second method is projections based, and it uses a summary of projections contained in an adopted general plan or related planning document that is designed to evaluate regional or areawide conditions.

While the use of regional projections is one possible method of analyzing cumulative effects under CEQA, it is the required method under NEPA. FHWA guidelines require that regional growth projections from the MPO (ABAG and MTC in this case) be used as inputs for the assumed future year conditions.

The I-580 version of the ACCMA Countywide Model was used to develop the travel forecasts for development and growth in the region through the year 2030. The I-580 model estimates future traffic and transit travel demand for 869 traffic analysis zones within Alameda County, 150 zones representing the other Bay Area counties, and 7 zones representing external counties. The model was previously enhanced with an additional 150 zones in the Tri-Valley Area to provide sufficient zonal and network detail for regional studies in Tri-Valley. Sociodemographic data for the Tri-Valley area were developed with information from local jurisdictions, including city general plans and specific plans. The data were then controlled to ABAG totals and extended to the long-range horizon year of 2030 with information from the latest *ABAG Projections 2003* series.

2.5.1 Regional Context

Because this document is based on accepted, regional land use forecasts for 2030, and assumes transportation improvements programmed within the same time frame, effects evaluated with the project include the cumulative effects of development within the region. Thus, additional analysis of cumulative effects related to specific development and transportation improvement projects within the region is not necessary for impacts such as land use, transportation (including traffic and transit), air quality, and noise.

2.5.2 Local Context

Cumulative effects are not always regional in scope, and the current project was analyzed to determine whether less than significant environmental effects that would be experienced locally could

become significant when considered in combination with other reasonably foreseeable future projects in the project area. Reasonably foreseeable future projects are here defined as the projects assumed in the 2030 No-Build Alternative described in Chapter 1 and the other related projects described in Section 1.1.3, Related Projects.

Large-scale transportation projects and other actions requiring federal approval are generally subject to laws and permit processes requiring consideration of and mitigation for impacts to special-status species and their habitats; to wetlands/waters of the U.S.; to water quality; and to cultural and parkland resources. These laws and requirements assure that the impacts of such undertakings would be fully mitigated. Minimization and mitigation measures required for these projects ensure that they have no contribution to cumulative impacts.

Primary threats to biological and wetlands resources are from urban and agricultural development, however, and these types of local projects are not consistently subject to the same types of laws and permit requirements as federal actions. Therefore, the search for cumulative impacts for this environmental document was extended to the types of local development projects for which no or only limited regulatory protections exist, or for which such regulation might be applied inconsistently. These projects might contribute to cumulative loss of resources in the general project corridor. The additional local development projects identified and included in the cumulative impact analysis are identified in Table 2.5-1 below.

Table 2.5-1: Non-Transportation Projects Considered for Cumulative Impacts

Project and Development Type	Location	Shared Impact Areas
Dublin Ranch, Residential Development.	North of Dublin Boulevard and east of Tassajara Road, City of Dublin	Water quality.
IKEA, General Commercial	West of Hacienda Drive, just north of I-580	Visual/Aesthetics. Added impervious pavement. Traffic.

Cumulative impacts considered for these local projects, the projects included in the No-Build Alternative, and the related projects identified in Section 1.1.3 focus on biological resources, water quality, and visual quality. Also, traffic impacts during construction of the I-580 Eastbound HOV Lane Project were considered for cumulative effects with other projects that would be under construction concurrently. These are discussed by category in the following subsections.

2.5.2.1 Biological Resources

A total of 0.66-ha (1.67 acres) of potentially jurisdictional waters of the U.S, consisting of other waters, were mapped within the project area. The proposed project would permanently affect 0.036-ha (0.089-ac) of these waters. These impacts are limited to Cottonwood Creek and portions of the drainage features to the west of Greenville Road. Habitat in these areas is not suitable for California red-legged frog or any other special-status species. These waters represent a very small percentage of the combined corridorwide wetlands/waters and would not render these impacts cumulatively considerable.

Table 2.5-2 summarizes the cumulative permanent losses from the following projects for which wetlands impacts have been defined:

Table 2.5-2: Cumulative Impacts to Wetlands and Other Waters of the U.S. (permanent impacts in hectares/acres)

Project	Total Area of Impact	Cumulative Impact (After Mitigation Provided)
I-580 Eastbound HOV Lane Project: Hacienda Drive to East of Greenville Road	0.10 ha (0.24 acre)	0.00 ha (0.00 ac)
I-580/Isabel Avenue Interchange Project	0.09 ha (0.23 ac)	0.00 ha (0.00 ac)
Dublin IKEA	0.00 ha (0.00 ac)	0.00 ha (0.00 ac)
Total (of projects with determined potential impacts to wetlands and/or other waters of the U.S.)	0.13 ha (0.32 ac)	0.00 ha (0.00 ac)

Because the total impacts are relatively minor and would be mitigated to ensure no net loss of wetlands and other waters, the proposed project does not contribute substantially to a cumulative impact with these other projects, nor do the projects taken together result in significant cumulative impacts.

2.5.2.2 Visual Quality

The I-580 Eastbound HOV Lane Project would remove an intermittent row of oleanders (*Nerium oleander*) in the median. Various oleander rows have been removed over time as a result of highway improvement projects throughout the region, and future highway projects would likely require additional removals. Also, placing such vegetation in the highway median is no longer consistent with Caltrans' safety policy. To offset the effects of the oleander removal, replacement planting would be provided in suitable and feasible roadside areas within the I-580 corridor. This replacement planting would improve the appearance of the highway corridor, but it would not address the visual exposure of the highway and oncoming traffic.

The I-580/Isabel Avenue Interchange Project would also contribute to the visual degradation of the corridor by contributing to the loss of riparian areas and screening vegetation and by blocking views of the Coast and Altamont Mountain Ranges. The Isabel Avenue Interchange Project would install new trees and shrubs as part of a landscape plan that would mitigate for some of the visual effects of the project. Give the urban setting of these projects, with these mitigation measures, these two projects would not contribute to a substantial adverse cumulative effect on visual resources.

2.5.2.3 Hydrology and Water Quality

The project would increase the total impervious surface (e.g., paving median and widening portions of the outside lanes) within the project limits; therefore, it would increase the volume of stormwater runoff. The existing drainage systems in the highway median would be reconstructed. The very slight increase to runoff volume would flow to existing drainage facilities, which have the capacity to convey the increased flow. In areas where the project does not include curbs or dikes along the

tangent segments of the project pavement, runoff would flow across the vegetated slopes and flow in the vegetated swales along the highway. Since the project is not intended to provide capacity for increased traffic, but it would help to consolidate additional traffic demand into fewer vehicles, no increase in traffic-related pollutants is anticipated. Though there would be a slight increase in impervious surface with a related increase in the pollutants washed off the pavement, roadside treatments incorporated into the project would remove sediments and the associated non-point source pollutants from runoff within the project right-of-way. These treatments would have minimal effect on runoff originating outside the project footprint.

Other projects that would increase impervious surfaces in the project area include the I-580/Isabel Avenue Interchange Project, Route 84 Expressway Widening Project, Auxiliary Lanes between Tassajara Road/Santa Rita Road and Airway Boulevard, and IKEA west of Hacienda Drive. Table 2.5-3 summarizes the estimates, made by various projects and Parsons, of the increase in impervious surface. The combined total of approximately 43 ha (107 ac) would be a very small percentage of the total existing impervious surface in surrounding Livermore, Dublin, and Pleasanton, and it would not constitute an increase above that reasonably planned for by the three cities in their general plans. That is, the developed area of the three cities is on the order of approximately 52 km^2 (20 sq mi); if approximately one third of the developed area is impervious surface, these projects would make up less than three percent of the existing impervious area. Thus, these projects would not contribute substantially to an adverse cumulative impact.

Table 2.5-3: Cumulative Totals of Impervious Surface

Project	Hectares	Acres	%
I-580 EB HOV lane from Hacienda to east of Greenville Road	9.3	23.0	21%
− Auxiliary lane El Charro Road to Airway Boulevard			
− Auxiliary lane First Street to Vasco Road			
New Isabel Avenue interchange	16.6	41.0	38%
− Remove Portola Avenue interchange			
HOV bypass lanes	0.7	1.8	2%
Auxiliary lane EB First Street to Vasco Road	0.4	0.9	1%
Auxiliary lane WB El Charro Road to Santa Rita Road	0.4	1.0	1%
Route 84 Expressway Widening Project	5.9	14.5	14%
Dublin IKEA	10.0	24.8	23%
Total	**43.3**	**107.0**	**100%**

2.5.2.4 Construction Phase Traffic Impacts

Long-term cumulative effects of the I-580 projects would be beneficial, relieving present congestion. If, however, two or more projects in the same transportation corridor are under construction at the same time, excessive traffic delays and detours could occur during construction. As described in Section 2.4.1, Construction Schedule and Work Hours, construction of the proposed project would occur in two stages over approximately 2 years. Stage 1 would shift eastbound traffic to the south and westbound traffic to the north while the median area is reconstructed. Stage 2 would shift westbound

traffic back to its previous location (preconstruction) and shift eastbound traffic onto the newly constructed roadway in the median while outside widening work is completed.

The I-580 Eastbound HOV Lane Project is the first of a larger program of I-580 improvements. The project is expected to begin construction in autumn 2007. Of the related projects listed in Section 1.1.3 of this Environmental Assessment (EA)/Initial Study (IS), only the Isabel Avenue/I-580 Interchange Improvements Project, scheduled for construction from summer 2007 to late 2009, would overlap with construction of the proposed project. Planned construction traffic management provisions in the TMP for each of the projects would minimize the mainline delays and avoid a substantial cumulative effect.

As described in Section 2.4.1.5, Avoidance, Minimization, and Mitigation Measures, construction of the I-580 Eastbound HOV Lane Project would be managed to minimize traffic impacts. Detours and delays would be coordinated with local authorities. The proposed project would therefore not contribute to adverse cumulative effects. Permanent cumulative effects of the I-580 Eastbound HOV Lane Project would be beneficial, as future travel demand and projected peak-hour traffic volumes would be better accommodated by the HOV lane.