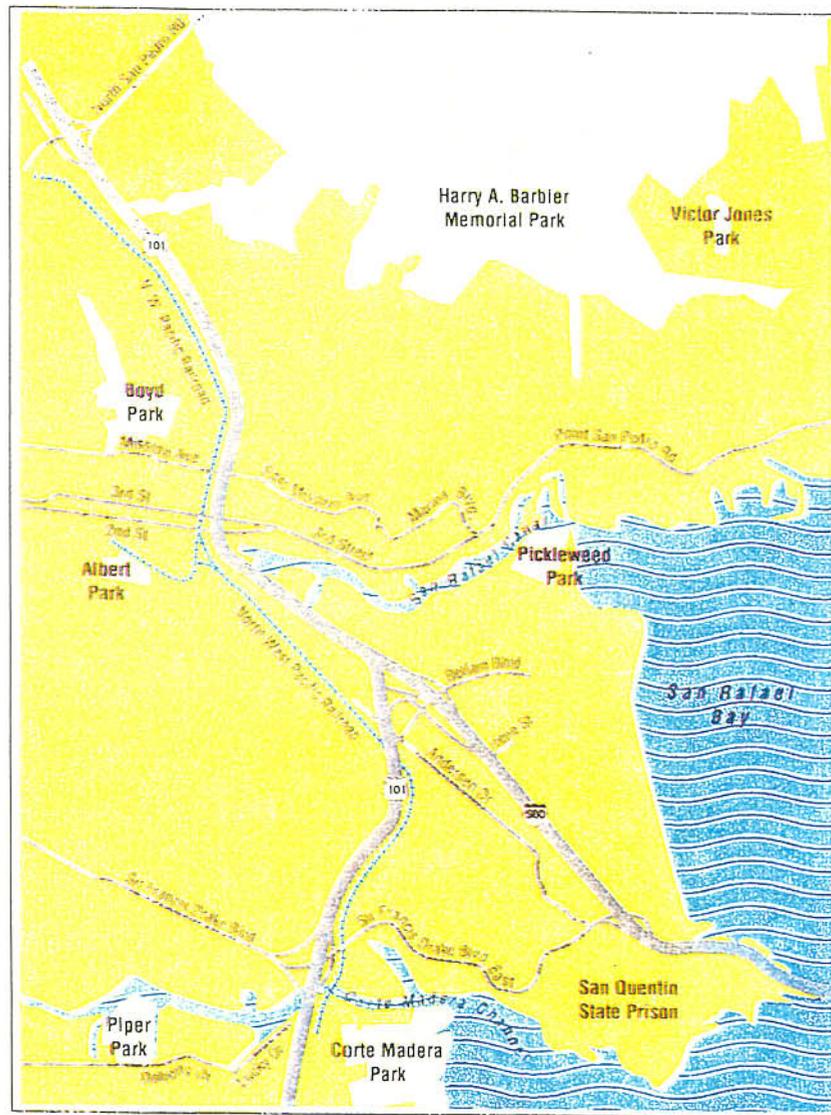




# MARIN 101 HOV LANE GAP CLOSURE PROJECT

## California Department of Transportation



## Final Environmental Impact Statement/Report

### Volume I



Prepared by  
State of California  
Department of Transportation  
District 4



US Department  
of Transportation  
Federal Highway  
Administration

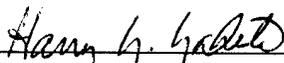


**U.S. 101/INTERSTATE 580  
 KP12.7/20.6(7-9/12.8)/KP7.2/7.7(4.5/4.8)  
 ON U.S. 101 FROM LUCKY DRIVE TO NORTH SAN PEDRO ROAD  
 AND INTERSTATE 580 FROM IRENE STREET TO U.S. 101  
 MARIN COUNTY, CALIFORNIA  
 FINAL ENVIRONMENTAL IMPACT STATEMENT/REPORT (FEIS/R)**

Submitted Pursuant to National Environmental Policy Act - 42 U.S.C. 4332(2)(c)  
 California Environmental Quality Act - Division 13, Public Resources Code

by the  
 U.S. Department of Transportation  
 Federal Highway Administration  
 and the  
 State of California Department of Transportation

12/3/99  
 Date of Approval

  
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Abstract: Caltrans proposes to close the gap in the HOV lane system on U.S. 101 in Marin County between Lucky Drive in Corte Madera and North San Pedro Road in San Rafael. This FEIS/R evaluates the project alternatives including the Southbound/Reversible HOV Lane Gap Closure Alternative. The Southbound/Reversible HOV Lane Gap Closure Alternative is identified as the Preferred Alternative. The Southbound/Reversible HOV Lane Gap Closure Alternative proposes to construct a southbound high occupancy vehicle (HOV) lane and, in a second stage, to convert the southbound HOV lane to a reversible southbound and northbound lane. The Build Alternatives also propose improvements to the U.S. 101/I-580 interchange; relocation of a portion of the Northwestern Pacific Railroad (NWPR) right of way; relocation of Francisco Boulevard West; and noise barriers where required.

The adverse socioeconomic and environmental impacts from the Marin 101 HOV Lane Gap Closure Project Build Alternatives include: the acquisition of residences and businesses on the west side of U.S. 101, change in the viewshed by removal of landscaping and the addition of noise barriers, modification of riparian and wetland habitat, and temporary impacts from construction, among others.

Controversy over certain elements of the project, primarily which side of the existing highway would be widened, the required residential relocation, the possible impacts on the NWPR transit corridor and the potential for reflected noise is considered in this FEIS/R.

The potential benefits of the Marin 101 HOV Lane Gap Closure Project include: creation of a continuous HOV lane system to reduce delay and encourage HOV usage, improved highway operations and safety, and improved access to the commercial Francisco Boulevard West area and to other areas in San Rafael. Highway improvements will include lane and shoulder widening, and on and off-ramps constructed to current standards to improve operational safety.

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Director

Date: 7-27-99

**MARIN 101 HOV LANE GAP CLOSURE PROJECT**

**Lucky Drive to North San Pedro Road**

**Final Environmental Impact Statement/Report**

**Volume I**

**Federal Highway Administration**

**California Department of Transportation**

**District 4 - Oakland**

**January 2000**

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## LIST OF ACRONYMS

AAQS	Ambient Air Quality Standards
ABAG	Association of Bay Area Governments
ACHP	Advisory Council on Historic Preservation
ACOE	U.S. Army Corps of Engineers
ADT	Average Daily Traffic
APE	Area of Potential Effects
ARB	Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BCDC	Bay Conservation and Development Commission
BMP	Best Management Practices
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CMS	Changeable Message Signs
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CTC	California Transportation Commission
CZMA	Coastal Zone Management Act
DEIS/R	Draft Environmental Impact Statement/Report
EIS/R	Environmental Impact Statement/Report
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
FCAAA	Federal Clean Air Act Amendments
FEIS/R	Final Environmental Impact Statement/Report
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTCR	Final Transportation Conformity Rule
GGBHTD	Golden Gate Bridge, Highway and Transportation District
HAR	Highway Advisory Radio
HOV	High Occupancy Vehicle
ISA	Initial Site Assessment
JPA	Joint Powers Authority
Leq	Equivalent Sound Level
LOS	Level of Service
LRT	Light Rail Transit
MIS	Major Investment Study
MTC	Metropolitan Transportation Commission
NAAQS	National Ambient Air Quality Standards
NCRA	North Coast Rail Authority
NEPA	National Environmental Policy Act
NES	Natural Environment Study
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollution Discharge Elimination System
NWPR	Northwestern Pacific Railroad
NWPRA	Northwestern Pacific Rail Authority
PSI	Preliminary Site Investigation
PSR	Project Study Report
RTP	Regional Transportation Plan
RWQCB	San Francisco Bay Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
STIP	State Transportation Improvement Program
SWRCB	State Water Resources Control Board
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
TOC	Traffic Operations Center
TOS	Traffic Operations System
TSM	Transportation Systems Management
USFWS	United States Fish and Wildlife Service

## Chapter 1 PURPOSE AND NEED

### 1.1 Project Purpose

The purpose of the Marin 101 HOV Lane Gap Closure Project is to relieve recurring traffic congestion in the US 101 corridor by providing a continuous high occupancy vehicle (HOV) lane system between Richardson Bay Bridge and Route 37, see **Figure 1-Map of US 101 Corridor in Marin County**. The Marin County Congestion Management Agency and the California Department of Transportation (Caltrans) propose to close the gap in the high occupancy vehicle (HOV) lane system between Lucky Drive and North San Pedro Road on US 101 in Marin County. A continuous HOV lane system would reduce corridor delay, encourage the use of buses, vanpools and carpools, enhance existing inter-modal transportation options, relieve traffic congestion and add capacity in the off-peak period. The project would also improve highway operations and safety by the reconstruction of on and off-ramps, the replacement of freeway-to-freeway connectors and the addition of auxiliary lanes and new on and off-ramps.

### 1.2 Need for the Project

High levels of traffic congestion and long delays occur on US 101 in Marin County during morning and afternoon commute periods. Additional northbound and southbound lanes for high occupancy vehicles (HOV) have been constructed in several sections of this corridor, but not between Lucky Drive and North San Pedro Road. This congestion is caused by a variety of factors including an inadequate transportation infrastructure for existing and projected traffic volumes. Other factors identified in technical studies, see **Appendix E**, for the increases in traffic congestion are travel behavior, job growth, approved and proposed housing and commercial development, and the jobs/housing imbalance. Growth in affordable housing to the north of Marin County has contributed to the jobs/housing imbalance and increased traffic use of US 101. Initiating land use policies that address the jobs/housing imbalance and overall growth is a critical component of the overall solutions, but outside the realm of transportation agency control.

### 1.3 Project Background

Planning for the Marin 101 HOV Lane Gap Closure Project has been a systematic, interdisciplinary approach, including studying the potential project alternatives, evaluating the environmental issues, and timely public outreach. Input from agencies and the public has greatly influenced the process and influenced the selection of alternatives considered.

Planning studies in the late 1960s recommended widening US 101 in Marin County from 6 to 8 lanes between Richardson Bay Bridge and Route 37, see **Figure 1-Map of US 101 Corridor in Marin County**. The proposed additional lane in each direction would be for high occupancy vehicles (HOVs) during peak traffic periods. The first section to be completed, from Richardson Bay Bridge to Lucky Drive, opened in 1974. In 1979, the California Department of Transportation (Caltrans) completed a study of the Marin 101 corridor and recommended completion of the HOV lanes from Lucky Drive to Route 37. Due to funding constraints, the project was broken into three separate stages. The first stage, completed in 1987, was the construction of HOV and auxiliary lanes between North San Pedro Road and Miller Creek Road. The second stage, from Miller Creek Road to Route 37, was completed in 1991. The third stage, from Lucky Drive to North San Pedro Road, is the current proposal, referred to as the Marin 101 HOV Lane Gap Closure Project.

A Project Study Report (PSR) for the Marin 101 HOV Lane Gap Closure Project was requested in the 1985 *State Transportation Improvement Program (STIP) Special Studies* by the California Transportation Commission (CTC) and was completed and approved in 1987. Completion of the HOV lane system through Marin County has been a consistent goal of the *Marin Countywide Plan*, the *US 101 Corridor Strategic Plan*, the *Marin County Congestion Management Plan*, the Metropolitan Transportation Commission (MTC) *2005 HOV Master Plan* and the *MTC Regional Transportation Plan*.

## 1.4 Modal Interrelationships

The Marin 101 HOV Lane Gap Closure Project is focused on increasing HOV usage during peak periods and indirectly increasing the use of efficient commuter transport, including buses and ferries. Providing a continuous HOV lane system for HOVs and buses will improve the operation of the non-HOV mixed-flow lanes. The addition of HOV lanes will provide improved service to the ferry terminal particularly for buses and HOVs during peak traffic periods.

The proposed project is intended to complement the eventual development of the rail transit corridor, which extends from Larkspur in central Marin County to Healdsburg in northern Sonoma County. The complete intercity corridor goes from Larkspur to Eureka. US 101 is a parallel facility to the Northwestern Pacific Railroad (NWPR) rail corridor, see "NWP RR" in **Figure 2-Marin 101 HOV Lane Gap Closure Limits**, and is part of a proposed multimodal network for the 101 corridor in Marin and Sonoma Counties. The existing NWPR track and proposed rail right of way are also shown in **Appendix A-Project Mapping**.

Closing the gap in the existing HOV lanes will directly benefit riders of buses and high occupancy vehicles. A continuous HOV lane will avoid current delays for bus passengers and other HOV riders caused by the gap in the current HOV lane system.

There are secondary benefits for single occupancy vehicle riders commuting within and through the project area. Vehicles using the HOV lanes would receive the greatest benefit, but other vehicles in the mixed-flow lanes will also benefit. The removal of the high occupancy vehicles from the existing mixed-flow lanes will mean shorter delays and less congestion during the peak period for those in the mixed-flow lanes.

There will also be benefits to bicyclists and pedestrians with the Marin 101 HOV Lane Gap Closure Project. Existing bicycle/pedestrian facilities in the US 101 corridor would be protected and/or enhanced with the project. The relocation of the bicycle/pedestrian path on the west side of US 101 at Puerto Suello Hill would be accomplished consistent with the Marin County bicycle plan for this area, see **Figure 9-Map of Existing Bike Lanes**. There would also be improvements to the pedestrian and bicycle lane south of Corte Madera Creek and to the pedestrian and bicycle overpass called the Greenbrae Pedestrian Overcrossing.

## 1.5 Safety

The project would increase safety of the traveling public by widening lanes, widening shoulders, standardizing on and off-ramp merging distances, and other operational improvements, see **Section 2.2-Alternatives Considered**. Within the limits of the Marin 101 HOV Lane Gap Closure Project accident rates are higher than the State average. The combined northbound and southbound US 101 accident rate for the project limits from 1995 through 1998 is 1.16 accidents per million vehicle miles, compared to a statewide accident rate of 1.07 accidents per million vehicle miles. Multiple-vehicle accidents are related to merging traffic and to fast stops required in peak period traffic congestion. HOV lane improvements and standardizing lane widths, shoulders and ramp merges will reduce this type of accident and improve traffic flow. The on

and off-ramps at Andersen Drive/Francisco Boulevard West and the Lucky Drive off-ramp from southbound US 101 are examples of areas that would have improved safety with this project.

## 1.6 Economic Development/Planned Growth

The Marin 101 HOV Lane Gap Closure Project has been planned in conjunction with local area plans. Completion of this project will accommodate planned growth and economic development in San Rafael in several ways, including the following:

- The replacement of the northbound elevated viaduct structure in San Rafael would decrease the area required for support structures and allow expansion and reconfiguration of the streets under the US 101 elevated structure in downtown San Rafael.
- Improvements and replacements of on and off-ramps and changes in connector streets would improve the capacity and access to and from the freeway as well as enhance local circulation in several areas. See **Section 2.2-Alternatives Considered** for a listing of specific proposed improvements and see **Appendix A-Project Mapping** for plan views. Specifically:
  - The relocation of Francisco Boulevard West and traffic circulation improvements, including improved access to and from this area, conforms to local redevelopment plans.
  - The relocation of the Bellam Boulevard on and off-ramps to a proposed new Irene Street interchange improves freeway access to and from local streets and business in this area.
  - Connecting the new Irene Street interchange to Andersen Drive and to Kerner Boulevard removes a traffic bottleneck and facilitates traffic circulation in this area.

All three build alternatives would relocate Francisco Boulevard West, allowing the transformation of this commercial area in accordance with the San Rafael Redevelopment Plan. This would improve traffic circulation to and from the downtown business district. The Redevelopment authority has closely coordinated this project with plans for future business growth in the US 101 and I-580 corridors.

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## Chapter 2 PROJECT ALTERNATIVES

### 2.1 Introduction

The proposed Marin 101 HOV Lane Gap Closure Project proposes to relieve recurring traffic congestion in the US 101 corridor by providing a continuous high occupancy vehicle (HOV) lane system on US 101 between Richardson Bay Bridge and Route 37. The objectives of the project are to provide a continuous HOV lane system and to improve the operations and safety in the US 101 corridor.

Caltrans has performed preliminary engineering and environmental feasibility studies on a range of possible project alternatives. This chapter describes one No-Build Alternative and three build alternatives that best meet the objectives of the Marin 101 HOV Lane Gap Closure Project. These four alternatives are described in **Section 2.2-Alternatives Considered**. Other alternatives initially considered and subsequently withdrawn from consideration are briefly described in **Section 2.3-Alternatives Considered and Withdrawn** along with the reasons for their withdrawal. **Section 2.4-Funding** discusses project-funding sources. **Section 2.5-Related Projects** discusses other transportation-related projects in the area. **Section 2.6-Alternatives Comparison** summarizes and compares the relevant environmental, physical, economic, and social issues for each of the alternatives and the potential of each alternative to meet the project objectives. This section also identifies the Preferred Alternative designated by the Federal Highway Administration.

Pursuant to the National Environmental Policy Act (NEPA), the alternatives under consideration described in this chapter were analyzed at an equal level of detail. Since the No-Build Alternative does not satisfy the project purpose, it is presented and evaluated primarily as a baseline to compare with the other alternatives.

Based on the purpose of the Marin 101 HOV Lane Gap Closure Project, see **Section 1.1-Project Purpose**, environmental analysis of the alternatives, see **Table 1-Comparison of Alternatives**, and public and agency comments, the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) have identified the Southbound/Reversible HOV Lane Gap Closure Alternative as the Preferred Alternative. This decision was based on all of the engineering and environmental studies reported in this document and in consideration of public and agency comments received on the Draft Environmental Impact Statement/Report.

#### 2.1.1 Project Limits, Location and Existing Facility

The project limits extend from Lucky Drive in Corte Madera to North San Pedro Road in San Rafael on Route 101 in Marin County, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**. The existing facility is a six-lane freeway with narrow shoulders and a narrow median throughout much of the project limits. Existing auxiliary lanes, lanes connecting on-ramps with the next consecutive off-ramp, on US 101 within the project limits are located between:

- the westbound I-580 connector to northbound US 101 and the northbound US 101 Central San Rafael off-ramp,
- the southbound US 101 Second Street on-ramp and the southbound US 101 connector to eastbound I-580, and
- the northbound US 101 Sir Francis Drake Boulevard on-ramp and the northbound US 101 Bellam Boulevard off-ramp.

There is also a seventh lane on US 101, a northbound mixed-flow lane, from the northbound Mission Avenue on-ramp to the northbound Manuel T. Freitas off-ramp.

The total project length on US 101 is 7.2 kilometers (4.5 miles) and on I-580 it is 1.6 kilometers (1.0 mile). To the north and south of the project limits, see **Figure 1-Map of US 101 Corridor in Marin County**, US 101 is an eight-lane facility with three mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction between Richardson Bay and Route 37, see **Section 1.3-Project Background**. The Northwestern Pacific Railroad (NWPR) right of way generally parallels US 101 within the project limits, see **Section 3.12.4-Rail Transit**. I-580 is a four-lane freeway with a wide median that connects US 101 with eastern Marin County and Contra Costa County via the Richmond-San Rafael Bridge, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**.

## 2.2 Alternatives Considered

### 2.2.1 Introduction

Numerous alternatives were evaluated in the Marin 101 HOV Lane Gap Closure Project Draft Environmental Impact Statement/Report (DEIS/R). The No-Build, the Ultimate HOV Lane Gap Closure Alternative and the Southbound Only HOV Lane Gap Closure Alternative were evaluated in detail in the DEIS/R. The DEIS/R also described the Southbound/Reversible HOV Lane Gap Closure Alternative as "considered but withdrawn." However, the Southbound/Reversible HOV Lane Gap Closure Alternative is now being retained as an alternative under consideration. This is the result of:

- considerable public interest in northbound and southbound HOV lanes for peak traffic periods,
- other programmed funding options,
- environmental impacts from the Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Alternative are nearly identical, and
- the stated goals of closing the HOV gap in both the northbound and the southbound directions are met.

See **Section 2.2.5-The Southbound/Reversible HOV Lane Gap Closure Alternative** for further discussion and **Appendix A-Project Mapping** for plans of all of the build alternatives.

### 2.2.2 No-Build Alternative

The No-Build Alternative assumes no major widening projects within the project limits. The existing facility is described above in **Section 2.1.1-Project Limits, Location and Existing Facility**. The existing US 101 freeway, within the project limits, is at or approaching capacity during both the AM and PM peak hours. For the year 2000, maximum mixed-flow delay will be 45 minutes during the AM peak period and users of the existing HOV lane system will experience delays of 33 minutes. During the PM peak period, the maximum mixed-flow delay will be 39 minutes and the delay for HOV lane users will be 29 minutes. Traffic volumes are expected to increase resulting in increased delay.

The No-Build Alternative does not fulfill the project purpose and need because it does not reduce congestion, does not reduce peak traffic delays, does not improve operations or safety, and does not encourage the use of buses, vanpools and carpools. It is evaluated primarily as a basis for comparison with the build alternatives.

### 2.2.3 The Ultimate HOV Lane Gap Closure Alternative

The Ultimate HOV Lane Gap Closure Alternative proposes to close the gap in the existing HOV lane system by adding a northbound HOV lane and a southbound HOV lane to US 101 between Lucky Drive and North San Pedro Road in Marin County. See **Appendix A-Project Mapping**

for a plan view of the Ultimate HOV Lane Gap Closure Alternative. The proposed improvements would widen the existing six-lane freeway to accommodate two additional lanes, one in each direction, operating as HOV lanes during peak traffic periods.

In addition to the northbound and southbound HOV lanes, the proposed Ultimate HOV Lane Gap Closure Alternative includes construction of northbound and southbound auxiliary lanes and improvements to the US 101/I-580 Interchange. Improvements to the US 101/I-580 Interchange would include a northbound US 101 to eastbound I-580 direct connector. This addition would allow the redirection of East Bay bound traffic from Sir Francis Drake Boulevard onto northbound US 101 and to eastbound I-580. This would reduce traffic congestion on Sir Francis Drake Boulevard, a local arterial, where East Bay bound traffic competes with traffic to and from the Larkspur Ferry Terminal and the adjacent commercial center. The replacement of the existing northbound San Rafael Viaduct structure is also a component of this project.

The Ultimate HOV Lane Gap Closure Alternative would have a 1.8 meter (6 foot) median on US 101 throughout the project limits, 3.6 meter (12 foot) lane widths, 3.0 meter (10 foot) outside shoulders, and 0.6 meter (2 foot) inside shoulders. There are no nonstandard features proposed for the Ultimate HOV Lane Gap Closure Alternative.

The Ultimate HOV Lane Gap Closure Alternative was addressed in the Draft Environmental Impact Statement/Report (DEIS/R) even though there was insufficient funding to construct it. This evaluation of the environmental impacts of the Ultimate HOV Lane Gap Closure Alternative is needed because the Ultimate HOV Lane Gap Closure Alternative will be constructed if funding becomes available. These impacts need to be evaluated so that incremental improvements, including the southbound only HOV lane, the southbound/reversible HOV lane, and eventually the Ultimate HOV Lane Gap Closure Alternative could be constructed without major additional right of way, major environmental impacts, or major redesign.

The Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative are fully compatible with the Ultimate HOV Lane Gap Closure Alternative and will be wholly utilized if and when the Ultimate HOV Lane Gap Closure Alternative is built. This long-range planning is important so that future local and regional road and transit improvements and land use planning decisions can include the Ultimate HOV Lane Gap Closure Alternative's geometrics in their plans. It is also important to evaluate the Ultimate HOV Lane Gap Closure Alternative's stages and impacts because of the complex methods of acquiring funds for transportation improvements. Determining the impacts and costs now will facilitate the programming of future funds.

The proposed geometrics for the section of US 101 from Lucky Drive to Andersen Drive, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**, for the Ultimate HOV Lane Gap Closure Alternative will include:

- adding an HOV lane on US 101 in each direction,
- adding a northbound US 101 to eastbound I-580 connector,
- adding a southbound auxiliary lane on US 101 between the southbound Andersen Drive on-ramp and the southbound Sir Francis Drake Boulevard off-ramp,
- retaining the recently constructed northbound US 101 auxiliary lane between the northbound Sir Francis Drake Boulevard on-ramp and the northbound Bellam Boulevard off-ramp, and
- realigning the existing ramps at the US 101/Sir Francis Drake Boulevard Interchange to allow widening of the freeway.

In this section of US 101, south of Andersen Drive, the majority of the widening of US 101 occurs on the east side of the freeway, see **Appendix A-Project Mapping**.

Between Andersen Drive and Mission Avenue, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**, the proposed geometrics for the Ultimate HOV Lane Gap Closure Alternative will include:

- adding an HOV lane on US 101 in each direction,
- adding a two-lane connector structure from southbound US 101 to eastbound I-580,
- retaining a southbound auxiliary lane from the southbound Second Street on-ramp to the US 101/I-580 Interchange,
- replacing the existing northbound San Rafael Viaduct structure on US 101,
- relocating the southbound US 101 on/off-ramps at Andersen Drive/Francisco Boulevard West to standardize the ramp merging distances at this interchange and improve traffic operations,
- widening the existing southbound Second Street on-ramp to southbound US 101 from one lane to two lanes,
- relocating Francisco Boulevard West to the west of the existing alignment as a two-lane frontage road,
- reconstructing the intersections of Rice Drive and Irwin Street with relocated Francisco Boulevard West,
- adding a two-lane connector from westbound I-580 to northbound US 101, and
- adding two northbound auxiliary lanes on US 101 between the new two-lane connector from westbound I-580 to northbound US 101 and the northbound Central San Rafael off-ramp.

All the widening on US 101 between Andersen Drive and Mission Avenue will be done on the west side of the freeway, see **Appendix A-Project Mapping**.

From Mission Avenue to North San Pedro Road, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**, the Ultimate HOV Lane Gap Closure Alternative will include:

- adding an HOV lane on US 101 in each direction,
- relocating the Northwestern Pacific Railroad (NWPR) right of way to the west to clear sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative. The rail corridor relocation occurs from approximately 244 meters (800 feet) south of Linden Lane to approximately 152 meters (500 feet) north of Myrtle Avenue,
- widening the Lincoln Avenue Undercrossing to accommodate additional freeway lanes,
- reconstructing the Linden Lane Undercrossing to provide standard sight distance,
- adding a southbound auxiliary lane on US 101 from the southbound Lincoln Avenue on-ramp to the southbound Mission Avenue off-ramp,
- adding a southbound auxiliary lane on US 101 from the southbound Merrydale Road on-ramp to the southbound Lincoln Avenue off-ramp,
- reconstructing the US 101/Lincoln Avenue Interchange to allow for additional storage at the on/off-ramps improving its traffic operations,
- retaining the existing northbound auxiliary lane on US 101 between the northbound Lincoln Avenue on-ramp and the northbound North San Pedro Road off-ramp, and
- widening the existing northbound US 101 Mission Avenue on-ramp from one lane to two lanes.

The majority of the widening on US 101 between Mission Avenue and North San Pedro Road will occur on the west side of the freeway, see **Appendix A-Project Mapping**. There would also be minor widening of the freeway, within the existing State right of way, on the east side of US 101 at Puerto Suello Hill.

The Ultimate HOV Lane Gap Closure Alternative's proposed improvements to I-580 include:

- adding a new interchange on I-580 just east of Irene Street,
- relocating the I-580 westbound on/off-ramps and the I-580 eastbound on-ramp at Bellam Boulevard to the new Irene Street interchange,
- retaining the existing off-ramp to Bellam Boulevard from northbound US 101 and eastbound I-580,

- connecting the new Irene Street interchange to Andersen Drive on the south side of I-580 and to Kerner Boulevard on the north side of I-580,
- adding an eastbound I-580 auxiliary lane from the northbound US 101 connector to eastbound I-580 and the eastbound I-580 Irene Street off-ramp connecting to Kerner Boulevard, and
- widening the Bellam Boulevard Undercrossing on the east to provide space for the new auxiliary lane, see **Appendix A-Project Mapping**.

Under the Ultimate HOV Lane Gap Closure Alternative, ramp metering and ramp meter enforcement areas are proposed on the on-ramps wherever the interchanges are modified. Traffic operations system (TOS) hardware would be provided along the mainline and existing TOS hardware would be retained. TOS elements include Traffic Monitoring Stations, Highway Advisory Radios, Extinguishable Message Signs (a fixed message sign that can be turned on or off) and Closed Circuit Television Cameras.

The current estimated costs of the Ultimate HOV Gap Closure Alternative are as follows:

Construction	\$121,300,000
Right of Way	<u>31,700,000</u>
Total	\$153,000,000

The current programmed funds are inadequate to build the Ultimate Gap Closure Alternative.

#### 2.2.4 The Southbound Only HOV Lane Gap Closure Alternative

The Southbound Only HOV Lane Gap Closure Alternative would add one lane on southbound US 101 between North San Pedro Road and Lucky Drive for a total of four southbound lanes. In the morning peak traffic periods, there would be three mixed-flow lanes and one HOV lane. During the non-peak periods, all lanes would operate as mixed use. The typical traffic lane width would be 3.6 meters (12 feet). The inside and outside shoulder widths would be 0.6 meter (2 feet) and 3.0 meters (10 feet), respectively. The total project length on US 101 is approximately 7.2 kilometers (4.5 miles).

With the completion of the southbound HOV lane there would be a continuous HOV lane system on southbound US 101 in Marin County from Route 37 in Novato to Route 1 at Richardson Bay in Mill Valley. The operating time for the HOV lane would be the morning peak traffic period, and the rest of the time the lane would be used as a mixed-flow lane.

The Southbound Only HOV Lane Gap Closure Alternative will include:

- retaining the northbound US 101 auxiliary lane from the northbound Sir Francis Drake Boulevard on-ramp to the northbound Bellam Boulevard off-ramp,
- widening the southbound Sir Francis Drake Boulevard on-ramp bridge over Corte Madera Creek,
- widening the west side of the mainline US 101 bridge over Corte Madera Creek,
- widening into the median area between the northbound and southbound structures of the Cal Park Railroad Overhead,
- reconstructing the outside railing on the Cal Park Overhead to current standards,
- constructing retaining walls at Cal Park Hill to minimize excavation,
- replacing the existing double metal beam barrier in the median on US 101 between Corte Madera Creek Bridge and the Cal Park Overhead with safety-shaped concrete median barrier,
- relocating Francisco Boulevard West towards the west, compatible with the Ultimate HOV Lane Gap Closure Alternative,
- retaining the existing southbound US 101 auxiliary lane from the southbound Second Street on-ramp to the southbound US 101 connector to eastbound I-580,

- replacing the existing southbound US 101 to eastbound I-580 single lane connector structure with a two lane freeway-to-freeway connector,
- relocating the southbound US 101 on/off-ramps at Andersen Drive/Francisco Boulevard West to standardize the ramp merging distances at this interchange and improve traffic operations,
- relocating the Northwestern Pacific Railroad (NWPR) right of way to the west to clear sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative. The rail corridor relocation occurs from approximately 244 meters (800 feet) south of Linden Lane to approximately 152 meters (500 feet) north of Myrtle Avenue,
- relocating the existing noise barriers along the west side of US 101, from approximately 244 meters (800 feet) south of Linden Lane to approximately 152 meters (500 feet) north of Myrtle Avenue, further west to clear sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative,
- retaining the existing noise barriers along the east side of US 101 from Mission Avenue to North San Pedro Road,
- adding a new southbound US 101 auxiliary lane between the southbound Merrydale Road on-ramp and the southbound Lincoln Avenue off-ramp, and
- widening the Linden Lane Undercrossing and the Lincoln Avenue Undercrossing to the west to accommodate the additional lane.

There are no improvements to I-580 proposed in the Southbound Only HOV Lane Gap Closure Alternative. The Southbound Only HOV Lane Gap Closure Alternative would acquire sufficient right of way at Francisco Boulevard West and between the Coleman School Pedestrian Overcrossing and North San Pedro Road for construction of the Southbound/Reversible HOV Lane Gap Closure Alternative and for the future construction of the Ultimate HOV Lane Gap Closure Alternative. The right of way will be incorporated in the Southbound Only HOV Lane Gap Closure Alternative as an interim clear recovery zone.

As funds become available, the completion of the Ultimate HOV Lane Gap Closure Alternative still remains a goal of transportation planning organizations. The Southbound Only HOV Lane Gap Closure Alternative is completely compatible and would be utilized by the Ultimate HOV Lane Gap Closure Alternative.

The Southbound Only HOV Lane Gap Closure Alternative proposes ramp metering and ramp meter enforcement areas on on-ramps wherever interchanges are modified. Traffic operations system (TOS) hardware would be provided along the mainline and existing TOS hardware would be retained. TOS elements include Traffic Monitoring Stations, Highway Advisory Radios, Extinguishable Message Signs and Closed Circuit Television Cameras.

The current estimated cost of the Southbound Only HOV Lane Gap Closure Alternative is as follows:

Construction	\$40,967,000
Right of Way	22,134,000
Total	\$63,101,000

### 2.2.5 The Southbound/Reversible HOV Lane Alternative

The Southbound/Reversible HOV Lane Alternative was included in the DEIS/R discussion as an alternative "considered and withdrawn" due to lack of funding. The Southbound/Reversible HOV Lane Alternative has been reconsidered for the Marin 101 HOV Lane Gap Closure Project for the following reasons:

- There was considerable interest expressed during the review of the DEIS/R in an alternative achieving a continuous HOV lane system in each direction during the peak traffic periods.

- There was less interest in the use of an additional lane as a mixed-flow lane in non-peak periods.
- The Ultimate HOV Lane Gap Closure Alternative, including the construction of two additional lanes to provide a continuous HOV lane in each direction, is not funded in current regional plans.
- Funding is currently programmed for construction of the southbound HOV lane as a first phase of the Southbound/Reversible HOV Lane Gap Closure Alternative.
- The Marin Congestion Management Agency and Caltrans did additional investigation of a reversible HOV lane with a moveable barrier.
- The southbound HOV lane, as described in **Section 2.2.4-The Southbound Only HOV Lane Gap Closure Alternative**, will be constructed and put into operation as a functioning HOV lane in Phase I.
- The southbound HOV lane, see above, would be utilized in a second phase for conversion to a reversible lane with a moveable barrier to provide an HOV lane in either the northbound or southbound direction along US 101.
- The additional funding for the Southbound/Reversible HOV Lane Gap Closure Alternative, beyond the currently secured funds for the Southbound Only HOV Lane Gap Closure Alternative, was small compared to the additional cost of the Ultimate HOV Lane Gap Closure Alternative.
- The Southbound/Reversible HOV Lane Gap Closure Alternative will provide an HOV lane for the predominant peak flow of traffic in each direction, without the need for additional right of way beyond what is acquired to construct the Southbound Only HOV Lane Gap Closure Alternative.

As discussed above, the Southbound/Reversible HOV Lane Gap Closure Alternative will meet the project's purpose and need of providing a continuous HOV lane in both northbound and southbound directions during peak traffic periods. The Southbound/Reversible HOV Lane Gap Closure Alternative's initial physical attributes match those of the Southbound Only HOV Lane Gap Closure Alternative, as described in **Section 2.2.4-The Southbound Only HOV Lane Gap Closure Alternative**. The cost is only slightly higher than a southbound only HOV lane, see **Section 2.2.4-The Southbound Only HOV Lane Gap Closure Alternative**, and considerably less than the ultimate addition of two lanes, see **Section 2.2.3-The Ultimate HOV Lane Gap Closure Alternative**.

The right of way and environmental impacts are also very similar to the Southbound Only HOV Lane Gap Closure Alternative requirements. As with the Southbound Only HOV Lane Gap Closure Alternative, the Southbound/Reversible HOV Lane Gap Closure Alternative would acquire sufficient right of way at Francisco Boulevard West and between the Coleman School Pedestrian Overcrossing and North San Pedro Road for construction of the Southbound/Reversible HOV Lane Gap Closure Alternative and for the future construction of the Ultimate HOV Lane Gap Closure Alternative. The right of way will be incorporated in the Southbound/Reversible HOV Lane Gap Closure Alternative as an interim clear recovery zone.

A southbound HOV lane will be constructed and put into operation. In a second stage, the southbound lane will be converted into the reversible lane. As funds become available, the completion of the Ultimate HOV Lane Gap Closure Alternative still remains a goal of transportation planning organizations. Both the Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative are completely compatible and would be utilized by the Ultimate HOV Lane Gap Closure Alternative.

The Southbound/Reversible HOV Lane Gap Closure Alternative includes a number of operational features in the design and operation of a reversible traffic lane with a moveable barrier. Some of these include:

- The lane is proposed to operate as a mixed-flow lane during off-peak periods, including midday, nights and weekends. The specifics of off-peak period, mixed-flow use will be a future operational decision.
- The reversible lane remains on the southbound side of the freeway.
- At all times, a moveable barrier separates the reversible HOV lane traffic from traffic flowing in the opposite direction.
- The reversible lane would be converted from southbound to northbound using a transport vehicle that moves the moveable barrier laterally from one side of the lane to the other.
- The vehicle that moves the barrier will be stored in the median and protected by concrete barriers at both ends of the project.
- Southbound vehicles in the reversible lane will always be able to enter and exit the HOV lane restricted only by other vehicles in adjacent mixed-flow lanes.
- Northbound vehicles will only be able to move between the HOV lane and the three mixed-flow lanes south of Andersen Drive and north of Mission Avenue. Between Andersen Drive and Mission Avenue there will be a fixed barrier between the northbound reversible lane and the three northbound mixed-flow lanes. Northbound vehicles using the reversible lane between Andersen Drive and Mission Avenue will not be able to exit the reversible lane nor exit the freeway until they are north of Mission Avenue, see **Figure 3-Northbound and Southbound Reversible Lane Configurations**.
- The reasons for constraints on northbound traffic in the reversible lane between Andersen Drive and Mission Avenue are limited right of way, varying profiles of bridges and varying clearances between bridges and existing structures.
- This alternative would provide for 3.2 meters (10.5 feet) of widening on the southbound viaduct in San Rafael.
- This alternative includes a new southbound US 101 connector to eastbound I-580.

The sequence of converting the reversible HOV lane from a southbound lane to a northbound lane follows:

- The transport vehicle would leave the north end of the project in time to reach the southern end of the project before the PM peak traffic period. The transport vehicle would pick up the moveable barrier and transition it from the east side of the reversible lane to the west side of the reversible lane as it moves south. The transport vehicle is protected from southbound vehicles by the moveable barrier, closing the southbound reversible lane as it travels south. Southbound traffic would experience a lane merge from the left at the north end of the project similar to what now occurs from the right at the Lincoln Avenue off-ramp. Northbound traffic would experience an added travel lane past the transport vehicle. When the transport vehicle reaches the southern end of the project, the reversible lane is completely open northbound from the southern end of the project to the northern end of the project. The transport vehicle would then be stored in the median at the southern end of the reversible lane, protected by concrete barriers and out of the traffic flow.

At the end of the evening commute period, the transport vehicle would move northward and convert the northbound lane into a southbound lane as follows:

- Similar to the southbound transition, the transport vehicle would be protected from northbound traffic by the barrier behind it as it transitions the barrier from west to east. Northbound traffic would experience a lane merge at the south end of the project, similar to current lane configurations. Southbound traffic would experience the addition of a lane as it passes the transport vehicle. When the transport vehicle reaches the northern end of the project, the reversible lane would be completely open for southbound traffic from the northern end of the project to the southern end of the project.

The current estimated costs for the Southbound/Reversible HOV Lane Gap Closure Alternative is as follows:

Construction	\$63,929,000
Right of Way	22,361,000
Moveable Barrier Vehicle	<u>2,200,000</u> (see below)
Total	\$88,490,000

The annual operating costs of the moveable barrier are estimated to be \$114,000 for operating the vehicle with two operators. The annual maintenance costs of the moveable barrier vehicle are estimated to be \$44,000. Capitalized costs, based on the present maintenance and operation costs, are \$158,000 per year for 20 years at an interest rate of 4.0%. The total capitalized operating costs are estimated to be \$2,200,000.

## 2.3 Alternatives Considered and Withdrawn

The following alternatives have been examined as a part of the environmental evaluation for the Marin 101 HOV Lane Gap Closure Project. Some of the alternatives were determined not to meet the project purpose and need and were withdrawn from further consideration. Other alternatives do not meet the objectives of the Marin 101 HOV Lane Gap Closure Project and should be recommended for consideration in the planning for the NWPR right of way corridor or other transportation projects. The reasons for their consideration and withdrawal follow.

The alternatives considered and withdrawn include:

- Section 2.3.1 8.0 meter (26 foot) Median Alternative
- Section 2.3.2 East and Symmetrical Widening Alternative
- Section 2.3.3 Double-Deck Structure Through San Rafael Alternative
- Section 2.3.4 Depressed Section Through San Rafael Alternative
- Section 2.3.5 Use of the NWPR Right of Way Alternative
- Section 2.3.6 Reversible HOV Lane on Northbound Side at I-580 Alternative
- Section 2.3.7 Reversible HOV Lane with Continuous Fixed Barrier Alternative
- Section 2.3.8 Build Northern Segment Only Alternative
- Section 2.3.9 Transit Only Alternatives
  - Rail Alternative
  - Ferry Alternative
  - Buses Alternative
- Section 2.3.10 Traffic Systems Management (TSM) Alternative
- Section 2.3.11 Convert Existing Lanes to HOV Lanes Alternative
- Section 2.3.12 Utilize the NWPR Right of Way as an HOV or Bus Corridor Alternative

### 2.3.1 8.0 m (26 ft.) Median Alternative

This alternative was evaluated in the early stages of the environmental and design process. Results of these evaluations determined that the impacts due to the additional widening on businesses, residents, the natural environment, aesthetics and financial costs would be much greater than a narrow median design. For this reason, the wide median alternative was dropped from further consideration.

### 2.3.2 East and Symmetrical Widening Alternative

Various design options involving a narrow median design with widening of US 101 on the east side, the west side, or symmetrically on both east and west sides were evaluated for their impacts on the environment. The evaluation showed that widening on the east and widening on both east

and west sides has greater environmental, social and cost impacts than widening on the west. Widening on the west has the least environmental impacts and is the most cost-effective. The evaluation was based on socioeconomic and traffic studies, a comparative cost estimate and project history. These include:

- The socioeconomic and relocation studies showed that a larger number of homes would be taken with widening on the east side of US 101 than widening on the west side.
- The traffic report showed that in order to widen on the east side, two local streets would have to be converted to cul-de-sacs, eliminating a continuous frontage road that provides ready access to US 101.
- Previous widening of US 101 through San Rafael has occurred on the east side of US 101, impacting the east side neighborhoods to a greater degree than the west side neighborhoods.
- The right of way acquisition for relocating the Northwestern Pacific Railroad (NWPR) right of way was started in the early 1960s with the purchase of five large parcels on the west side of US 101 to accommodate eventual widening on the west side of US 101.
- Potential residents displaced by the widening options represent demographic characteristics similar to the county as a whole. No one group is disproportionately impacted by east side or west side widening options, see the *Final Background Socioeconomic Study*, referenced in **Appendix E**.

For the above stated reasons (widening to the east increasing socioeconomic and relocation effects, greater disruption of local circulation patterns, historical widening activities, previous acquisitions on the west side of US 101, and no disproportional demographic effects), widening on the west side of US 101 was selected. The options to widen US 101 on the east side or to widen symmetrically on the east side and the west side were accordingly withdrawn from consideration.

### **2.3.3 Double-Deck Structure Through San Rafael Alternative**

Preliminary cost estimates to do a double-deck structure showed that it would be very expensive and would far exceed programmed funding. To implement this proposal while maintaining existing traffic would be difficult and costly. This alternative was also withdrawn because of adverse visual impacts and the potential to dramatically increase noise impacts.

### **2.3.4 Depressed Section Through San Rafael Alternative**

A depressed section through San Rafael has a number of design problems that would be very expensive to implement. In particular, there is the potential for high groundwater and the need to divert storm runoff from a complex hydraulic system in this area. Also, to obtain the required width for the Ultimate HOV Lane Gap Closure Alternative, considerable additional right of way would still be required. Implementing this proposal while maintaining existing traffic would be difficult and costly. This alternative was withdrawn from consideration.

### **2.3.5 Use of the NWPR Right of Way Alternative**

This alternative is to construct the Marin 101 HOV Lane Gap Closure Project in a more cost efficient manner by the partial use of the Northwestern Pacific Railroad (NWPR) right of way. This alternative proposes to acquire approximately half of the width of the NWPR right of way, for the widening of US 101, without relocating the full width of the rail corridor. The portion of the NWPR right of way affected is approximately 730 meters (2,400 feet) in length located in the Lincoln Avenue, Linden Lane, and Grand Avenue area. No residential right of way would be acquired in this area. This alternative limits acquisition of property to what is minimally required without replacing the NWPR right of way and without acquisition of sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative.

This alternative was evaluated with the current owners of the NWPR corridor, the Golden Gate Bridge, Highway and Transportation District (GGBHTD). To restore the full width of the NWPR right of way would impact the homes on the east side of Brookdale Avenue. Use of a portion of the NWPR right of way defers the right of way acquisition needed to restore the full width of the NWPR right of way and defers acquisition of sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative. This puts undue hardship and uncertainty on affected adjacent property owners and was challenged by rail advocates. This alternative was dropped from further consideration.

### **2.3.6 Reversible HOV Lane on Northbound Side at I-580 Alternative**

This alternative is identical to the Southbound/Reversible HOV Lane Gap Closure Alternative for most of the project limits, see **Section 2.2.5-The Southbound/Reversible HOV Lane Alternative**. However, for a distance of approximately 400 meters (one-quarter mile), this alternative realigns the reversible HOV lane to the northbound lanes of US 101. Columns supporting the southbound US 101 to eastbound I-580 connector straddle the southbound US 101 lanes in this area. There is insufficient space on southbound US 101 between these columns for the additional reversible HOV lane. The current Southbound Only HOV Gap Closure Alternative, a prerequisite to this option, replaces the southbound US 101 to eastbound I-580 connector and provides sufficient space in the southbound lanes for the reversible HOV lane, see **Section 2.2.4-The Southbound Only HOV Lane Gap Closure Alternative**. The replacement of the US 101 to I-580 connector eliminates the need for this alternative and it was withdrawn from consideration. For a further discussion, see the *Marin 101 Reversible HOV Lane Project Study Report* referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

### **2.3.7 Reversible HOV Lane with Continuous Fixed Barrier Alternative**

A reversible HOV lane with continuous fixed barrier adds considerable construction costs and right of way expenses compared to other moveable barrier options. The cross section requirement is equivalent to the two HOV lane option, see **Section 2.2.3-The Ultimate HOV Lane Gap Closure Alternative**. This option also greatly restricts access to the adjacent mixed-flow lanes from the HOV lane causing additional traffic problems. This alternative was withdrawn from consideration, see the *Marin 101 Reversible HOV Lane Project Study Report* referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

### **2.3.8 Build Northern Segment Only Alternative**

This alternative proposes to construct HOV lanes between Mission Avenue and North San Pedro Road in San Rafael and to purchase right of way for future HOV lanes between Mission Avenue and Andersen Drive, see **Figure 2-Marin 101 HOV Lane Gap Closure Limits**. A thorough study was conducted on the traffic impacts and feasibility of this alternative. It was concluded that building a northern segment only will not provide substantial congestion relief to HOV or mixed-flow lane users and would move the southbound bottleneck downstream to near the Second Street on-ramp. It also did not meet NEPA requirements for logical termini or independent utility; therefore, this alternative was withdrawn from further consideration.

### 2.3.9 Transit Only Alternatives

#### **Rail Alternative**

A feasibility study of intercity rail passenger service on the San Francisco Bay Area-Eureka Corridor evaluated a number of scenarios for the future use of this corridor. The assumptions made were based on a number of variables including: access to the train, termini locations, number of trains per day, speed of the trains, and costs to implement and operate. According to this study, limited service could be made available between Healdsburg and Larkspur for \$64.6 million. A subsidy from local sales taxes, GGBHTD toll revenues, county general fund revenues, or other state or federal sources would be needed to operate the trains.

The *Sonoma/Marin Multi-Modal Transportation & Land Use Study*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland, developed a number of hypothetical scenarios for transportation improvements and land use to meet present and future transportation needs. As with all of the studies for the rail corridor through Sonoma and Marin, the need for regional consensus on the improvements and identification of a source of funding would be the major challenges. *The Sonoma/Marin Multi-Modal Transportation & Land Use Study* concluded that completion of the Marin 101 HOV Lane Gap Closure Project was an integral component of the preferred scenario of transportation improvements as listed in the *Sonoma/Marin Multi-Modal Transportation & Land Use Study*. A Rail Transit Alternative does not meet the Marin 101 HOV Lane Gap Closure Project goal of completing the highway HOV lane system and was withdrawn from consideration.

#### **Ferry Alternative**

The Metropolitan Transportation Commission (MTC) *Regional Ferry Plan* and the Bay Area Council's *Ferry Plan*, referenced in **Appendix E**, call for expansion of the ferry system into northern Marin and Sonoma Counties. They suggest increasing the number of ferries at existing ferry terminals and improving access to ferry terminals as a way of reducing the number of single occupancy vehicle trips in the US 101 corridor. The MTC *Regional Ferry Plan* notes that new and improved ferry services would not have a large impact on San Francisco bound commute traffic and that a majority of ferry riders are still driving to suburban ferry terminals. Both reports recognize the need for other transportation modes, including bus, rail, HOV lanes, subscription services, etc. to efficiently connect residential and commercial centers to the ferry terminals. An HOV lane system is described as an integral part of a regional ferry plan in the MTC report. An improved ferry system, as an alternative option, cannot meet the goals of the Marin 101 HOV Lane Gap Closure Project, nor will it substantially reduce traffic delay and congestion in the US 101 corridor.

#### **Buses Alternative**

The Golden Gate Bridge, Highway and Transportation District (GGBHTD) operates a bus system within the US 101 corridor. The GGBHTD has developed a 5-year plan for increasing ridership. Options in the plan include expanding the express bus system, increasing the number of local shuttle buses and constructing more park-and-ride lots. Other proposals in the plan include a new ramp from US 101 to and from the Larkspur Ferry Terminal (LFT) and revised LFT feeder routes to include new non-stop service from the San Rafael Transit Center to the LFT via US 101.

A buses alternative does not meet the Marin 101 HOV Lane Gap Closure Project's purpose and need. As part of a multimodal transportation system, buses are an important element, but not

intended to take the place of a fully developed HOV lane system. Therefore, it was rejected as a viable alternative.

### **2.3.10 Traffic Systems Management (TSM) Alternative**

The TSM alternative includes those activities maximizing the efficiency of the present system. Activities that fall into this category are the development of park-and-ride lots, promoting ride sharing, constructing HOV lanes, installing metered on-ramps with HOV bypass lanes where feasible, and optimizing traffic signal timing.

Park-and-ride lots are an important element in promoting transit use and ride sharing. Coordinating with the County of Marin and the GGBHTD, Caltrans has designed and constructed numerous park-and-ride lots in the US 101 corridor.

Bus pullouts are also an important component of any trip-reduction strategy. These pullouts allow buses to enter and exit busy interchanges and pick up passengers without having to go through the on/off-ramp system. Numerous interchanges along the US 101 corridor have bus pullouts and handicap access. There are two bus pullouts within the project limits, located at Lucky Drive in Larkspur and North San Pedro Road in San Rafael.

An HOV lane is considered a transportation control measure (TCM) that the MTC develops in cooperation with the Bay Area Air Quality Management District (BAAQMD) and is then incorporated in the Bay Area Clean Air Plan. The completion of the HOV lane system through the project limits is part of the MTC Year 2005 HOV Lane System adopted for the San Francisco Bay Area. The Regional HOV System Plan in Marin County is TCM #20.

Included in the overall Traffic Operations System (TOS) underway for the Marin 101 corridor are:

- HOV bypass lanes at all on-ramps, required anytime an interchange or ramp is modified. This would give an advantage to buses and carpools during peak periods, if and when ramp metering is implemented.
- Changeable Message Signs (CMS) to warn motorists of problems, and a Highway Advisory Radio (HAR) system that is linked to the regional Traffic Operations Center (TOC).
- Signal timing optimization, an important measure that is an ongoing element of the *Marin County Congestion Management Plan* and is supported by Caltrans.

All of these efforts are important in efficiently managing the existing and future transportation system. Traffic Systems Management, alone, will not meet the project purpose and need. TSM measures are not a substitute for completion of the key component, a complete HOV lane system.

### **2.3.11 Convert Existing Lanes to HOV Lanes Alternative**

To convert an existing mixed-flow lane through the project limits to an HOV lane would further exacerbate the congestion in the mixed-flow lanes as well as the HOV lanes. It would increase the queue length through the study section for mixed-flow traffic, and would increase the time it takes for southbound HOVs to reach the beginning of the HOV lane system at Route 37. The increased congestion would worsen air quality. Due to these negative characteristics, this alternative was dropped from further consideration.

### 2.3.12 Utilizing the NWPR Right of Way as an HOV or Bus Corridor Alternative

The NWPR right of way runs generally parallel to US 101 within the project limits. The Golden Gate Bridge, Highway and Transportation District (GGBHTD) owns this portion of the NWPR right of way. The ongoing rail development plans and long-range regional plans for the NWPR right of way in Marin and Sonoma Counties prohibit its use for other non-rail purposes.

In addition to future rail plans, numerous financial, structural, circulation and serious traffic problems exist in the use of the rail corridor for HOV lanes or for a separate busway. For these reasons, utilizing the NWPR right of way as an HOV corridor or bus corridor has been dropped from consideration.

## 2.4 Funding

The *State Transportation Improvement Program (STIP)* is a document that programs funds that are to be allocated to individual projects by the California Transportation Commission (CTC).

The *STIP* includes the programming of funds from the State Highway Account for projects to increase the capacity of the transportation system. The *STIP* is a four-year program, with the current 1998 *STIP* serving as a transitional six-year program. The Regional Transportation Planning Agency (RTPA) for the San Francisco Bay Area, the Metropolitan Transportation Commission (MTC), proposes funding for regional transportation projects in its *Regional Transportation Improvement Program (RTIP)*. The California Department of Transportation (Caltrans) proposes funding for interregional transportation projects in the *Interregional Transportation Improvement Program (ITIP)*. The current *STIP* was adopted by the CTC in June 1998 and was subsequently amended in July 1999. Prior to 1998, MTC approved \$37.2 million in the 1996 *RTIP* for the Marin 101 HOV Lane Gap Closure Project. An additional \$14.4 million in support funding was "grandfathered" into the project from the 1996 *STIP*. The 1998 *STIP* cycle added \$1.2 million in *ITIP* funding and a total of \$29.0 million in *RTIP* funds, which includes a \$10.0 million loan from Stanislaus County to Marin County. The Reversible phase of the project received bipartisan congressional support with earmarked federal funding of \$5.25 million in the six year transportation bill, the Transportation Equity Act for the 21st Century, known as TEA 21. Remaining monies are expected to be programmed in future *STIP* years from State discretionary sources and federal highway demonstration funds.

The current total project funding as presented in the 1998 *STIP* is as follows:

<b>Funding Source</b>	<b>Southbound HOV Lane (1998 \$ in thousands)</b>	<b>Reversible HOV Lane (1998 \$ in thousands)</b>
Grandfathered 1996 <i>STIP</i> Funding	\$51,575	- 0 -
Interregional Share ( <i>ITIP</i> )	- 0 -	\$1,200
Regional Share ( <i>RTIP</i> )	\$26,796	\$2,248
TEA 21 Demonstration Funds (Project No. 1339)	- 0 -	\$5,250
<b>TOTAL</b>	<b>\$78,371</b>	<b>\$8,698</b>

## 2.5 Related Projects

Several Marin US 101 Corridor transportation-related projects are listed on the *Regional Transportation Plan (RTP)* and the *State Transportation Improvement Program (STIP)*. These include several US 101 interchange improvement projects, discussed in **Section 4.18.1-Transportation**. There are several smaller improvement projects, a Sir Francis Drake Boulevard rehabilitation project and replacement of the Harbor Street Bridge, as well as numerous local street and drainage projects.

Preliminary studies have begun for the conversion of US 101 from a 4-lane expressway to a 6-lane freeway from Novato to Petaluma. This project is not funded and would be programmed in segments. It is an HOV lane project designed to reduce commute period traffic delays.

The Marin 101 HOV Lane Gap Closure Project is the last of several HOV lane projects between Richardson Bay and Route 37. These projects and the current Marin 101 HOV Lane Gap Closure Project, when taken together, will provide congestion relief and support and encourage high occupancy vehicle travel, especially during peak commute periods.

## 2.6 Alternatives Comparison

The major issues involved in each of the four alternatives for the Marin 101 HOV Lane Gap Closure Project described in **Section 2.2-Alternatives Considered** can be compared in order to understand the relative advantages and disadvantages of each alternative. This comparison is summarized in **Table 1-Comparison of Alternatives** on the following pages.

**Table 1 Comparison of Alternatives**

<b>Issue</b>	<b>No-Build Alternative</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
<b>Project Purpose and Need</b>	Does not reduce delay  Does not encourage use of HOVs  Does not relieve congestion  Does not improve operations and safety	Reduces delay in both directions  Encourages use of HOVs  Relieves congestion  Improves operations and safety	Reduces southbound delay  Encourages use of HOVs  Relieves southbound congestion  Improves southbound operations and safety	Reduces delay in both directions  Encourages use of HOVs  Relieves congestion  Improves operations and safety
<b>HOV Lane Time Savings Year 2010</b>	None	southbound-4 minutes northbound-26 minutes	southbound-4 minutes northbound-0 minutes	southbound-4 minutes northbound-26 minutes
<b>Project Costs 1998 Estimate</b>	\$0	\$153 million	\$63 million	\$88 million
<b>Relocated Housing Units</b>	None	45	* 45	* 45
	* Includes the acquisition of sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative at Francisco Boulevard West and at Lincoln and Brookdale Avenues and includes sufficient right of way for the relocation of the NWPR corridor at Lincoln and Brookdale Avenues			
<b>Relocated Businesses</b>	None	51	** 11	** 11
	** Includes the acquisition of sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative at Francisco Boulevard West and at Lincoln and Brookdale Avenues and includes sufficient right of way for the relocation of the NWPR corridor at Lincoln and Brookdale Avenues			
<b>Noise</b>	No change - existing Leq. peak hour of 57-75 dBA	Reduced to <67 dBA at most locations	Reduced to <67 dBA at most locations	Reduced to <67 dBA at most locations
<b>Air Quality</b>	No CO exceedences	No CO exceedences	No CO exceedences	No CO exceedences

**Table 1 Comparison of Alternatives**

<b>Issue</b>	<b>No-Build Alternative</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
<b>Floodplain Encroachment Issues</b>	No additional floodplain encroachment	No "significant" floodplain encroachment due to project	No "significant" floodplain encroachment due to project	No "significant" floodplain encroachment due to project
<b>Natural Community / Habitat Issues</b>	None	Loss of 0.5 hectare (1.2 acres) of riparian and oak/bay woodland habitat  1,940 square meters of shading of waters of the U.S. at Corte Madera and San Rafael Creeks  28 piles (approx. 8.4 square meters) in waters of the U.S. at Corte Madera Creek  111 square meters of fill in waters of the U.S. at Irwin Creek	***Loss of 400 square meters (0.1 acre) of oak/bay woodlands  993 square meters of shading of waters of the U.S. at Corte Madera and San Rafael Creeks  20 piles (approx. 6.0 square meters) in waters of the U.S. at Corte Madera Creek  ***No fill in Irwin Creek	***Loss of 400 square meters (0.1 acre) of oak/bay woodlands  993 square meters of shading of waters of the U.S. at Corte Madera and San Rafael Creeks  20 piles (approx. 6.0 square meters) in waters of the U.S. at Corte Madera Creek  ***No fill in Irwin Creek
*** There may be additional impacts including: fill in Irwin Creek (111 m2 ), loss of Oak/Bay Woodland (570 m2) and loss of Irwin Creek Riparian Habitat (810 m2) due to the relocation of the NWPR corridor at Lincoln and Brookdale Avenues. These impacts would occur when the NWPR right of way is relocated.				
<b>Species of Concern and Migration Corridor Issues</b>	No impacts to species of concern  No effects on Corte Madera Creek at all	Impacts to 2 plant species of concern  No impacts in Corte Madera Creek during winter spawning season	No impacts to species of concern  No impacts in Corte Madera Creek during winter spawning season	No impacts to species of concern  No impacts in Corte Madera Creek during winter spawning season
<b>Coastal Zone Issues</b>	No new effects	Generally conforms to Coastal Zone Management Plan	Generally conforms to Coastal Zone Management Plan	Generally conforms to Coastal Zone Management Plan

**Table 1 Comparison of Alternatives**

<b>Issue</b>	<b>No-Build Alternative</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
<b>Rail Transit Issues</b>	None	Relocates full width of rail corridor to the west	Relocates full width of rail corridor to the west	Relocates full width of rail corridor to the west
<b>Hazardous Waste Issues</b>	No change in existing exposure to hazardous wastes	<p>Impacts eight contaminated sites at Francisco Blvd West</p> <p>Requires excavations for footings in potentially contaminated soils beneath San Rafael Viaduct for widening the southbound structure</p> <p>Requires demolition and replacement of the northbound structure of the San Rafael Viaduct affecting potentially contaminated soils</p>	<p>Impacts eight contaminated sites at Francisco Blvd West</p> <p>No effects at the southbound San Rafael Viaduct</p> <p>No effects at the northbound San Rafael Viaduct</p>	<p>Impacts eight contaminated sites at Francisco Blvd West</p> <p>Requires excavations for footings in potentially contaminated soils beneath San Rafael Viaduct for widening the southbound structure</p> <p>No effects at the northbound San Rafael Viaduct</p>
<b>Parking Issues</b>	No loss of parking spaces	Loss of approximately 220 parking spaces	Potential loss of 220 parking spaces if the Ultimate HOV Lane Gap Closure Alternative and the NWPR rail transit project are built	Potential loss of 220 parking spaces if the Ultimate HOV Lane Gap Closure Alternative and the NWPR rail transit project are built
<b>Pedestrian and Bicycle Issues</b>	None	<p>Temporary realignment of bicycle and pedestrian traffic</p> <p>No loss of continuity for the S.F. Bay Trail</p>	<p>Temporary realignment of bicycle and pedestrian traffic</p> <p>No loss of continuity for the S.F. Bay Trail</p>	<p>Temporary realignment of bicycle and pedestrian traffic</p> <p>No loss of continuity for the S.F. Bay Trail</p>

**Table 1 Comparison of Alternatives**

<b>Issue</b>	<b>No-Build Alternative</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
<b>Traffic Access and Circulation Issues</b>	None	<p>Improves traffic circulation in Francisco Boulevard West area conforming to local redevelopment plans</p> <p>Improves access to and from the freeway and local streets and commercial areas in several locations including to and from I-580 at the new Irene Street Interchange</p> <p>Allows reconfiguration of local streets beneath the San Rafael Viaduct in downtown San Rafael</p> <p>Replaces one lane connector from southbound US 101 to eastbound I-580 with a two lane connector</p> <p>Includes a new northbound US 101 to eastbound I-580 connector</p>	<p>Improves traffic circulation in Francisco Boulevard West area conforming to local redevelopment plans</p> <p>Improves access to and from the freeway and local streets and commercial areas in several locations but not to and from I-580</p> <p>No reconfiguration of local streets beneath the San Rafael Viaduct</p> <p>Replaces one lane connector from southbound US 101 to eastbound I-580 with a two lane connector</p> <p>No northbound US 101 to eastbound I-580 connector</p>	<p>Improves traffic circulation in Francisco Boulevard West area conforming to local redevelopment plans</p> <p>Improves access to and from the freeway and local streets and commercial areas in several locations but not to and from I-580</p> <p>No reconfiguration of local streets beneath the San Rafael Viaduct</p> <p>Replaces one lane connector from southbound US 101 to eastbound I-580 with a two lane connector</p> <p>No northbound US 101 to eastbound I-580 connector</p>
<b>Temporary Construction Issues</b>	<p>No temporary piles in Corte Madera Creek</p> <p>No shading in Corte Madera Creek</p>	<p>Approx. 160 temporary piles in Corte Madera Creek</p> <p>Temporary trestle shading of 4,300 m<sup>2</sup> (46,280 sq. ft.) of Corte Madera Creek</p>	<p>Approx. 105 temporary piles in Corte Madera Creek</p> <p>Temporary trestle shading of 2,736 m<sup>2</sup> (29,500 sq. ft.) of Corte Madera Creek</p>	<p>Approx. 105 temporary piles in Corte Madera Creek</p> <p>Temporary trestle shading of 2,736 m<sup>2</sup> (29,500 sq. ft.) of Corte Madera Creek</p>

**Table 1 Comparison of Alternatives**

<b>Issue</b>	<b>No-Build Alternative</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
<b>Temporary Construction Issues (cont.)</b>	No pile driving	Pile driving for bridge widening and temporary trestles	Pile driving for bridge widening and temporary trestles	Pile driving for bridge widening and temporary trestles
	No air pollution from construction equipment	Air pollution from construction equipment	Air pollution from construction equipment	Air pollution from construction equipment
	No increased marine activity around Larkspur Ferry Terminal	Increased marine activity around Larkspur Ferry Terminal	Increased marine activity around Larkspur Ferry Terminal	Increased marine activity around Larkspur Ferry Terminal
	No temporary lane closures	Temporary lane closures	Temporary lane closures	Temporary lane closures
	No bicycle lane closures or detours	Bicycle lane closures and detours	Bicycle lane closures and detours	Bicycle lane closures and detours
	No restricting public access to some areas along Corte Madera Creek	Temporary restriction of public access to some areas along Corte Madera Creek	Temporary restriction of public access to some areas along Corte Madera Creek	Temporary restriction of public access to some areas along Corte Madera Creek
	No construction-caused congestion on US 101	Temporary construction congestion on US 101	Temporary construction congestion on US 101	Temporary construction congestion on US 101

## Chapter 3 AFFECTED ENVIRONMENT

This chapter describes the physical, natural, social and economic setting of the project area. The chapter provides the baseline necessary to evaluate potential impacts in subsequent sections. Further information on existing conditions can be obtained from technical engineering and focussed environmental reports prepared during studies for the Marin 101 HOV Lane Gap Closure Project. These reports are available at the Caltrans District 4 Office, 111 Grand Avenue, Oakland, and are listed in **Appendix E**.

### 3.1 Topography

US 101 from Lucky Drive north to North San Pedro Road is located on the east side of the Marin Peninsula within the California Coast Ranges. The topographic features of this area include hilly-to-steep mountains and valleys containing nearly level alluvial fans, alluvial plains, and floodplains. Elevations along the project alignment range from near sea level to approximately 36 meters (120 feet) above sea level. The ranges and inter-mountain valleys give way to low-lying tidal marshes along San Francisco and San Rafael Bays. Most of the tidal marshes have been altered by the construction of protective dikes and drainage channels. The alignment of US 101 traverses these tidal marshes, floodplains, alluvial fans, alluvial plains, and low hills adjacent to San Francisco and San Rafael Bays.

### 3.2 Climate

Marin County borders the Pacific Ocean, San Francisco Bay, San Pablo Bay and San Rafael Bay. It is a coastal climate characterized by moderate temperatures, rarely exceeding 37.8(C (100(F) and seldom dropping below freezing, 0(C (32(F). The mean annual temperature in San Rafael is 15.3(C (59.6(F). Temperatures along the Pacific Coast remain moderate throughout the year while inland areas have more extreme temperatures as distance from the coast increases.

The climate is also characterized by moderate precipitation. The annual precipitation in San Rafael is 93.0 centimeters (36.6 inches). Along the coast, fog and drizzle contribute to the moisture supply. The average relative humidity near the coast is 80 percent throughout the year.

### 3.3 Geology

The bedrock within the project vicinity consists of the Jurassic-Cretaceous Franciscan Formation. The Franciscan Formation is a complex assemblage of sedimentary, volcanic and metamorphic rocks. Serpentine, while not a part of the Franciscan Formation, is associated with it. The Franciscan bedrock is exposed in the hills and ridges along the project and is covered by thick, geologically recent deposits in the intervening valleys.

Since the formation of the coastal range, natural geologic processes have been working to erode the hills and deposit alluvial materials in the low-lying areas and in the bays. Streams from the surrounding hills deposit coarser-grained material adjacent to the hills and progressively finer sediments closer to and in the bay. Fine-grained suspended particles are deposited in still waters within the Bay to form thick sequences of Bay Mud. In the Corte Madera Creek and San Rafael Creek areas, artificial fill consisting of clay, silt, sand, rock fragments, organic material, and/or various man-made debris overlay thick deposits of Bay Mud.

### 3.4 Seismicity

Three major faults, the Rodgers Creek Fault, the Hayward Fault and the San Andreas Fault, are located near the project area. These faults lie northeast, southeast and to the west of the project site, respectively, see **Figure 4-Map of Seismic Fault Lines in the Project Vicinity**. The following table, **Table 2-Seismic Fault Lines in the General Project Vicinity**, lists the faults, their nearest distance to the project site, and the estimated maximum credible event for each.

**Table 2 Seismic Fault Lines in the General Project Vicinity**

Fault	Distance to Project	Event*
Rodgers Creek	12.8 km (8.0 miles)	7.00
Hayward	15.3 km (9.5 miles)	7.50
San Andreas	17.7 km (11.0 miles)	8.25

\*Predicted Maximum 100-Year Event Estimated on the Richter Earthquake Scale

### 3.5 Hydrology

#### 3.5.1 Precipitation

For rainfall and precipitation information, see **Section 3.2-Climate**.

#### 3.5.2 Watershed Drainage

The watershed drainage within the project limits was evaluated by the Floodplain and Location Hydraulic Study, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. The drainage for eastern Marin County consists of intermittent and permanent streams draining into San Rafael and San Francisco Bays. Within the project vicinity, occasional flooding occurs in areas adjacent to Corte Madera, San Rafael and Irwin Creeks, see **Section 3.5.3-Floodplains**.

Within the project limits, surface water drains into a system of drainage inlets, ditches, unlined channels, culverts, reinforced concrete pipe and reinforced concrete box culverts. These drainage improvements are located both within and outside of the US 101 right of way. The runoff is channeled to the existing watersheds and to creeks, canals and marshes, and eventually to San Rafael and San Francisco Bays.

#### 3.5.3 Floodplains

A base floodplain, as defined by the FHWA Federal-Aid Policy Guide (23 CFR 650, Subpart A), is an area having a one-percent chance of flooding in any given year (a 100-year storm). These base floodplains are determined by the Federal Emergency Management Agency (FEMA) and shown on Flood Insurance Rate Maps. Within the project limits, two sections of US 101 are within base floodplains, see **Figure 5-Map of San Rafael 100-Year Floodplain**.

The two potential base floodplain encroachments within the project limits are in the communities of Corte Madera-Larkspur, and in San Rafael. The *Floodplain and Location Hydraulic Study*, see **Appendix E**, evaluated the potential flooding conditions associated with the existing freeway and adjacent areas.

In Corte Madera and Larkspur, adjacent to Corte Madera Creek, US 101 is within the limits of the base floodplain. Some flooding of streets, businesses, homes, and US 101 occurs when high rainfall, high runoff, high tides and winds combine. Local agencies in these communities have taken steps to alleviate this flooding problem by installing pumps. Caltrans has agreed to assist in these and other flood control efforts in this vicinity.

The proposed project also lies within the base floodplain between the I-580/US 101 Interchange and downtown San Rafael. There have been several flooding events in the Bret Harte area of San Rafael at Irwin Street and at Woodland, Dolores, Lovell, DuBois and Harte Avenues on the west side of US 101. Caltrans Harbor Street Drain Project, scheduled for completion in the year 2000, adds an additional drainage facility in the Bret Harte area and increases drainage capacity to alleviate potential flooding.

### 3.5.4 Groundwater

Groundwater, within the project limits, is found in appreciable quantities only in alluvial deposits overlying the Franciscan bedrock in the low-lying areas of the project. This groundwater is usually encountered within the first 3 meters (10 feet) of the surface.

## 3.6 Natural Environment

### 3.6.1 Introduction

The biological resources occurring within the project limits have been evaluated and characterized in studies and reports over the past ten years. Initial biological field surveys were conducted in April and May of 1991 by Caltrans biologists. Additional field surveys were conducted in 1991 and 1992. These studies included extensive background research and fieldwork in the study area. The biological study area for the Marin 101 HOV Lane Gap Closure Project is defined as the area between the project limits and within the proposed right of way.

An initial *Natural Environment Study (NES)*, see **Appendix E**, was completed in 1995 and is available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. This study summarized, described and mapped the biological communities and special status species in the project study area.

In addition, a specific tidewater goby survey was conducted in August 1994. A California red-legged frog survey (using USFWS protocol) was conducted in August and September 1998, and a survey for California red-legged frog egg masses was conducted in January 1999.

A Marin 101 HOV Lane Gap Closure Project *Reevaluation of Natural Environment Study*, see **Appendix E**, was completed in April 1999, and is available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. This *Reevaluation* surveyed and evaluated the entire project route with an emphasis on those areas with native flora and fauna. The field surveys included a directed search for plant and animal species of concern likely to occur in the habitat and geographic vicinity. These species of concern were those listed by the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS) and/or the California Department of Fish and Game (CDFG).

The original natural communities that once occurred within the project limits have been highly modified and degraded. Extensive areas of marshlands, tidal channels and creeks have been paved-over, diked, drained and channeled. There have been numerous cuts and fills for roadways and other improvements in and through the hills. Urban commercial, light

manufacturing and associated development along the US 101 corridor have contributed to the degradation and elimination of natural habitats. Residential development, grazing and quarrying activities have also disturbed and greatly modified remaining areas of natural vegetation and wildlife within the project area.

The great majority of existing vegetation within the project right of way consists of grasses and ruderal species mixed in with roadside exotic landscaping including erosion control seed mix on road cuts. Much of the right of way is located in highly urbanized areas in the cities of Corte Madera, Larkspur and San Rafael with no roadside vegetation or landscaping. The existing natural communities are generally degraded and of limited size.

### **3.6.2 Natural Communities**

The project area contains communities that have been extensively modified by human influence. The natural communities (excepting Landscape Areas) are described according to the system of classification used by the California Natural Diversity Database (CNDDDB). These natural community descriptions are adapted from Holland (1986) and have been modified to be more specific to the project area. None of the natural communities found within the project limits and listed below are classified as sensitive by the CNDDDB. Those areas not classified as natural communities have been included as Landscape Areas.

The following descriptions are of those natural communities occurring within the project area and include listings of wildlife observed or commonly known to inhabit that community type. A list of all plants and animals observed during field surveys is available in Appendices B and C of the initial *Natural Environment Study*, referenced in **Appendix E**.

#### **Northern Coastal Salt Marsh**

Northern Coastal Salt Marsh vegetation occurs within the study area along Corte Madera Creek on tidal flats between the high-high tide line and the low-low tide line. This plant community formerly occurred in many areas within the study limits such as San Rafael Creek, the lower portion of Irwin Creek and other unnamed tidal sloughs. Urban development has resulted in the filling of most of these wetlands. Within the study area, a sparse-to-moderate cover of jaumea, alkali heath and California cordgrass represents the vegetation type. Western grebe, American coot, common goldeneye, mallard, great egret and snowy egret were all observed in the water at Corte Madera Creek. Ring-billed gulls and a turkey vulture were seen flying in the vicinity of the existing bridge.

#### **Nonnative Grassland/Ruderal**

Nonnative Grassland/Ruderal vegetation occurs on disturbed sites throughout the project area. Nonnative annual grasses and forbs and exotic shrubs have largely displaced the native vegetation and dominate this community type. The remaining native plant species in this community were observed growing on barren rock cut faces with little or no soil development where they can compete with quick growing nonnative annual grasses. Dominant grasses and forbs include slender wild oat, riggut brome, rattlesnake grass, annual rye grass, storksbill, hykon rose clover, lupine and vetch. Ruderal weedy species include yellow starthistle, mustard and fennel. Typical wildlife includes house finch, California vole, western harvest mouse and western fence lizard. Nonnative Grassland/Ruderal and Landscaping were the two dominant vegetation types in the project area.

### **Serpentine Bunchgrass**

Within the project area, small areas of vegetation associated with Serpentine Bunchgrass communities grow in association with Nonnative Grassland/Ruderal communities. These occur on rocky roadcuts along the east side of the freeway at Cal Park Hill and along the west side of the freeway at Puerto Suello Hill. The vegetation at these locations is dominated by purple needlegrass, but also contain a number of other grasses and forbs, including soap plant, slender tarplant, blue-eyed grass and buttercup. Typical wildlife includes house finch, California vole, pocket gopher and western fence lizard.

### **Coast Live Oak/Bay Woodland**

Some highly modified Oak/Bay Woodland forms a remnant upland riparian forest community along remaining open stretches of Irwin Creek. Coast live oak, bay laurel and an occasional madrone dominate north-facing slopes in the project area. The understory is generally open with some poison oak and snowberry in areas where light penetrates the canopy. California blackberry, toyon and coyote brush were observed in sunny transition areas between Nonnative Grassland/Ruderal roadside habitat and Oak/Bay Woodland. Wildlife includes Stellars jay, American robin, mockingbird, American kestrel, bushtit, southern alligator lizard and arboreal salamander.

### **Central Coast Riparian Scrub**

Central coast riparian scrub is generally dominated by willow species on fine sands or coyote bush on coarser sands. It typically forms on alluvial sands close to river and stream channels that are subject to frequent flooding. In the project area, this community ranges from open areas with annual grasses and vines to a dense thicket of willow species. This community type occurs along disturbed open segments of Irwin Creek and along the drainage tributary to Corte Madera Creek. Common plant species observed include arroyo willow, yellow willow, sandbar willow, blackberry, poison oak, horsetail and assorted nonnative annual grasses including annual rye grass and slender wild oats.

### **Landscape Areas**

Major portions of the US 101 right of way and adjacent parcels have been landscaped with a variety of introduced and native trees and shrubs including coast redwood, blue-gum and other eucalyptus, coast live oak and poplar. Within the project area, the plantings range from linear, widely spaced saplings at the US 101/I-580 Interchange in the downtown area of the City of San Rafael, to mature plantings along the noise barriers in the City of San Rafael. These landscaped areas typically provide poor quality wildlife habitat. They are usually isolated by highway ramps or right of way fencing and are subject to roadway disturbances such as noise and lights from vehicular traffic. Landscaping often consists of exotic trees, such as eucalyptus, that are planted in a linear fashion along the roadway. Generally, landscaped areas have open understories with very few native plants to provide forage and cover. However, planted areas do provide some limited habitat for adaptable, common species of wildlife such as house finch, band-tailed pigeons, California quail, mourning dove, cottontail rabbits, raccoon and striped skunk. Landscape Areas and Nonnative Grassland/Ruderal communities were the two dominant vegetation communities present in the project area.

#### **3.6.3 Species of Concern**

A formal list of species of concern for the project vicinity was requested and received from the U.S. Fish and Wildlife Service (USFWS) in accordance with Section 7(c) of the Endangered

Species Act, see **Appendix C-United States Fish and Wildlife Service–Species List**. For additional details, see the *Reevaluation of the Natural Environment Study*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

Of the species of concern potentially occurring in the San Rafael Quadrangle 7.5-minute map, two plant species were found during field studies. They are the Santa Cruz microseris and the Tiburon tarplant, see discussion below. In addition, the California brown pelican, the Central California steelhead and the Sacramento splittail may occur in the project vicinity during certain times of the year. See the discussion of each below, and for further details see the *Reevaluation of the Natural Environment Study*, referenced in **Appendix E**. No other species of concern were observed in over 20 site visits by biologists. Two, separate, in depth, biological field surveys were conducted to search for the presence of the tidewater goby and for the red-legged frog. Neither species was found in the project area.

The following plants and animals are classified by the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and/or the California Department of Fish and Game (CDFG) as endangered, threatened, proposed-endangered, proposed-threatened, candidate species (for listing) and species-of-concern. They also potentially occur within the U.S. Geological Survey (USGS) San Rafael Quadrangle where the Marin 101 HOV Lane Gap Closure Project is planned. The species and a brief description of each are listed in general order of protection afforded each species or the rarity (from most rare to less rare) of each species. Their presence or absence within the project area is also noted.

### **Salt Marsh Harvest Mouse**

Endemic to the marshes of San Francisco Bay, the salt marsh harvest mouse is endangered primarily due to destruction and modification of its habitat. In 1971, the salt marsh harvest mouse was observed 305 meters (1,000 feet) south of the mouth of Corte Madera Creek. Further trapping efforts were conducted during the late 1970s and early 1980s without positive results. No potential salt marsh harvest mouse habitat will be impacted by this project. The nearest existing population of salt marsh harvest mice to the project area is at San Clemente Creek, approximately 1.6 kilometers (1 mile) east of the town of Corte Madera. No salt marsh harvest mice were observed in the study area.

### **American Peregrine Falcon**

The peregrine falcon is a wide-ranging species whose wintering habitat includes various habitat types throughout California. Suitable winter foraging areas for resident and migratory peregrine falcons are within the project area. However, no suitable nesting habitat is present in the project area. There are no local records for this species from the California Natural Diversity Database (CNDDDB). No peregrine falcons were observed during field biological surveys, although the undeveloped lands in the project area provide potential foraging habitat for wintering peregrine falcon.

### **California Brown Pelican**

Easily recognized by its large pouch, a fully-grown brown pelican can have a wingspan of 2.1 meters (7 feet) and inhabits coastal waters. The majority of California's brown pelican nest south of the border, on islands along the Pacific coast of Baja California, Mexico, and in the Gulf of California. California brown pelicans have been observed in the project vicinity. They are temporary visitors and do not nest in the project area.

### **California Clapper Rail**

Clapper rails are known to inhabit the confluence of Corte Madera Creek. The salt marsh habitat, the major habitat for the clapper rail, is sparse and limited in size within the project limits. For this reason, the site does not provide suitable foraging or nesting habitat for this species. During more than 20 site visits by biologists, no clapper rails were seen in the project area.

### **Marbled Murrelet**

The murrelet is known to nest only in coastal old-growth forests in California, Oregon, Washington and British Columbia. This species is not present on the project site, and there are no remnants of coastal old-growth forests in the project area.

### **Northern Spotted Owl**

The northern spotted owl is found in the cool, moist woodlands of the Pacific Northwest. Northern spotted owls are not migratory birds, and they generally stay in the same area. Northern spotted owls prefer to live in old-growth forests of Douglas fir, but they have been reported to occur in almost all major types of coniferous forests. Suitable habitat does not exist for this species in the project area and none were observed during field surveys.

### **Bald Eagle**

The bald eagle was initially listed in 1978 as an endangered species throughout the lower 48 states, except in Minnesota, Michigan, Wisconsin, Washington and Oregon, where it was listed as a threatened species. The bald eagle is considered to be one of the greatest success stories since the Endangered Species Act was passed in 1973. In 1995, the U.S. Fish and Wildlife Service announced that the bald eagle would be reclassified from endangered to threatened in the lower 48 states. Appointed our Nation's symbol, it seems only fitting that the bald eagle's recovery can be attributed, partly, to a combined nationwide awareness to conserve and protect a species that has come to represent the United States. No bald eagles have been observed in the project study area.

### **California Red-Legged Frog**

California red-legged frogs are most commonly found at sites with dense vegetation close to fresh water. The frog is closely tied to its aquatic environment and is generally associated with permanent and intermittent streams with largely intact shoreline vegetation. There are no ideal locations within the project area for California red-legged frog habitat.

The area surveyed using the U.S. Fish and Wildlife survey protocol in August and September 1998 and for egg masses in January 1999 was in San Rafael along Irwin Creek from Grand Avenue south to where Irwin Creek disappears into a culvert under US 101. Irwin Creek is a perennial stream in this location and has a few pools between riffles. It is unlikely that the California red-legged frog occurs in this area since Irwin Creek is degraded and is used as a homeless encampment. Under these existing conditions, the aquatic environment is unlikely to provide habitat for this species. No frogs or amphibians of any kind were observed or heard during the protocol survey in the month of August 1998. No egg masses were observed in January 1999.

### **Tidewater Goby**

Tidewater goby is a small benthic fish native to California coastal estuaries in the lower reaches of streams from San Diego County north to Humboldt. Probably less than forty populations exist throughout their range. They are uncommon from San Francisco Bay north. A catch and release program for tidewater goby was instituted in the summer of 1994. With the help of experts from the University of California at Berkeley, Ramona Swensen and Caltrans staff surveyed the area upstream and downstream from the US 101 bridge over Corte Madera Creek. The survey found many exotic goby species, but no tidewater goby species.

### **Delta Smelt**

Delta smelt are found only in the Sacramento-San Joaquin Estuary where the Sacramento and San Joaquin Rivers flow into San Francisco Bay. They extend downstream as far as San Pablo Bay. Delta smelt are found in brackish water and, during the late winter to early summer, migrate to fresh water to spawn. They are not currently found west of the Carquinez Bridge. Delta smelt are not in any of the drainage systems in this project area, i.e., Corte Madera Creek, San Rafael Creek, or Irwin Creek.

### **Coho Salmon**

The coho salmon was historically distributed throughout the North Pacific Ocean from central California to Point Hope, Alaska. Historically, this species probably inhabited most coastal streams in Washington, Oregon, and northern and central California. Corte Madera Creek historically supported a fishery for coho salmon. Coho salmon in at least 33 stream/river systems have been identified by agencies and conservation groups as being at moderate or high risk of extinction. The most recently recorded occurrence of coho salmon in Corte Madera Creek was in 1981.

### **Central California Steelhead**

Steelhead rainbow trout were formerly distributed from Mexico to Oregon in California's coastal drainages and the Sacramento and San Joaquin river systems in the Central Valley. At present, they have been mostly eradicated from their former habitat in the Sacramento and San Joaquin river systems. Steelhead may be present during the winter spawning season in Corte Madera Creek.

### **Myrtle's Silverspot Butterfly**

Formerly widespread on the San Francisco and Marin peninsulas, the butterfly is now only known from a few sites in northern Marin County, most of which are under constant threat of development. Populations of Myrtle's Silverspot are restricted to areas immediately adjacent to the coast: dunes, scrub and grasslands. There are only four known populations of Myrtle's Silverspot; each isolated from one another by human habitations. The project site lacks the coastal dune habitat necessary for this species. No Myrtle's Silverspot were observed during field surveys and it is unlikely there are any in the project area.

### **White-Rayed Pentachaeta**

White-rayed pentachaeta is a simple, low slender annual found on open dry rocky slopes, often on soils derived from serpentine bedrock. The U.S. Fish and Wildlife Service lists this species as possibly extinct. The California Natural Diversity Database for the San Rafael Quadrangle has

five listings of occurrence for this species. Extensive plant surveys in the project area did not find this species.

### **Marin Dwarf-Flax**

Marin dwarf-flax is an annual plant of the chaparral, valley and foothill grassland, found only in Marin, San Francisco and San Mateo Counties. It is found in serpentine barrens and in serpentine grassland and chaparral. Extensive plant surveys in the project area did not turn up this species.

### **Central Valley Spring-Run Chinook Salmon**

Spring-run chinook salmon were once the predominant run in the Central Valley. Dam construction and habitat degradation has eliminated spring-run populations from the entire San Joaquin River Basin and from many tributaries to the Sacramento River Basin. Chinook salmon do not spawn in the three streams crossing this project area, and are not found in the project area.

### **Central Valley Fall-Run Chinook Salmon**

Fall-run chinook salmon are found in the Sacramento and San Joaquin River Basins. However, the populations in the San Joaquin River Basin are extremely depressed. Chinook salmon do not spawn in the streams crossing this project area, and are not found in the project vicinity.

### **South OR/CA Coastal Chinook Salmon**

Chinook salmon do not spawn in the three streams crossing the Marin 101 HOV Lane Gap Closure Project area, and are not found in the project vicinity.

### **Sacramento Splittail**

The Sacramento splittail is endemic to the California Central Valley, including the Delta, Suisun Bay, Suisun Marsh, Napa Marsh and other parts of the Sacramento-San Joaquin Estuary. The range of this California native has been greatly reduced due to dams, diversions and agriculture. Although Sacramento splittails have not been observed in Corte Madera Creek, they may be present during the winter spawning season.

### **California Tiger Salamander**

The tiger salamander is usually found in grassland and oak woodland habitat, below 457 meters (1,500 feet) in elevation, with associated scattered ponds, intermittent streams, or vernal pools. The Corte Madera Creek, San Rafael Creek and Irwin Creek drainages do not support the type of ponding habitat or vernal pools that would provide a reliable breeding area for California tiger salamander. Biological surveys of the Irwin Creek drainage and associated terrestrial habitat conducted in August 1998 found no evidence of the California tiger salamander or suitable habitat.

### **Northcoast Bird's-Beak**

Northcoast bird's-beak is a salt marsh annual plant often found associated with pickleweed. Extensive surveys of the project area did not locate any individuals or suitable habitat for the species.

### **Santa Cruz Tarplant**

Santa Cruz tarplant is an annual colonial species found in heavy soils on grassy flats along the coast. No suitable areas for the Santa Cruz tarplant exist within the project area and occurrence of this species is not expected within the project limits. No individuals were observed during numerous field surveys.

### **Gairdner's Yampah**

Gairdner's yampah can be found in wet places below 3,353 meters (11,000 feet) within many types of plant communities. No specimens of Gairdner's yampah were located within the project limits.

### **Hoover's Semaphore Grass**

Hoover's semaphore grass is a perennial with flat blades and loose racemes. No appropriate habitat for this species occurs within the project limits and no individuals were observed during field surveys.

### **Marin Knotweed**

This succulent, pale green herb grows in saline marshes in Marin County. Two extant populations were reported in 1988, the first in Escalle Marsh along Corte Madera Creek, 1.8 kilometers (1.1 miles) west of the project, and a second at Point Reyes in western Marin County. The population near Corte Madera Creek is not within the project area and will not be affected by this project.

### **Tiburon Tarplant**

Tiburon tarplant occurs in valley and foothill grasslands away from the immediate coast. Tiburon tarplant is found on soils derived from shale and sandstone, including serpentine soils, in Marin, Napa and Sonoma Counties. Biological surveys in 1991 found two distinct populations. One exists within and adjacent to Caltrans right of way on Cal Park Hill and the other is approximately 400 meters (one-quarter mile) south. Detailed field surveys were conducted in June 1991 and 1992 on the tarplant.

### **Santa Cruz Microseris**

Santa Cruz microseris grows in coniferous forest, chaparral, coastal prairie and coastal scrub on loose soil of shale or stabilized sand and on serpentine soil near the coast. In 1994, two small populations of less than 100 individuals each were found on the barren, rocky, exposed shelves in roadcut areas on Cal Park Hill.

One population is located near the roadway on the first bench and the other population is located uphill on the second bench. This plant's seeds were collected and propagated for transplantation as mitigation for the construction of the northbound auxiliary lane between Sir Francis Drake Boulevard and the Bellam Boulevard off-ramp.

### 3.6.4 Migration Corridors

The project area does not contain prominent terrestrial wildlife migration corridors. Corte Madera Creek may provide an important movement and migration corridor for over-wintering wildfowl, see **Section 3.6.3-California Brown Pelican**, and for anadromous fish, see **Section 3.6.3-Central California Steelhead and Sacramento Splittail**. Most north-south seasonal migrants, such as waterfowl, would make greater use of coastal salt marsh habitat that is less disturbed and closer to the Bay. No anadromous fish spawning habitat or breeding areas for waterfowl are within the project limits at Corte Madera Creek.

## 3.7 Hazardous Waste

### 3.7.1 Site Investigations

The following reports were prepared for the Marin 101 HOV Lane Gap Closure Project:

- *Limited Initial Site Assessment (ISA)-Volumes I and II*
- *Hazardous Waste Preliminary Site Assessment (PSA)*
- *Preliminary Site Investigation Report (SI)*
- *Asbestos Survey Report*
- *Remedial Action Report*

These studies are referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. The limits of this study area were the project limits of the Ultimate HOV Lane Gap Closure Alternative and included properties adjacent to the proposed right of way. The report results apply to all three of the build alternatives since the Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative limits are within the limits of the Ultimate HOV Lane Gap Closure Alternative. The Francisco Boulevard West area in San Rafael was identified as the area potentially containing hazardous waste contamination within the project limits.

Another investigation, the *Hazardous Waste Preliminary Investigation, Interstate Routes 101/580*, referenced in **Appendix E**, was conducted for a previous Caltrans project, the San Rafael Viaduct Seismic Retrofit Project. Areas under the US 101 elevated viaduct structure in San Rafael (the San Rafael Viaduct) were investigated. Research into the site history and the previous land uses in this area indicated potential contamination sources. Areas adjacent to the footings of the existing freeway support columns were tested for hazardous materials.

### 3.7.2 Francisco Boulevard West Site Investigation Results

The *Initial Site Assessment* for the Marin 101 HOV Gap Closure Project evaluated over 250 parcels and sites in the project vicinity for potential contamination and for project right of way requirements. The Francisco Boulevard West area in San Rafael from Rice Street to the US 101/I-580 split was identified as the area potentially containing contamination. The *Preliminary Site Investigation Report (SI)* included sampling and analyzing groundwater and soil samples and testing for asbestos in property parcels along Francisco Boulevard West in San Rafael.

The results of the hazardous waste site investigation are indicated in **Table 3-Site Investigation Results-Francisco Boulevard West**. Asbestos was the primary hazardous material found that would be generated as a waste. Soil at two sites contained elevated non-hazardous concentrations of total petroleum hydrocarbons in the diesel range (TPH-D) at depth. Though the hydrocarbons detected were heavier compounds, no diesel fuel was discovered in any of the soil samples. TPH-D values were recorded in **Table 3** for the maximum values exceeding 100 milligrams/kilogram (mg/kg) at depth. Several surface boring samples were taken directly under

asphalt pavement. The heavy hydrocarbon compounds from the asphalt tend to bias these samples in regard to TPH-D concentrations. Therefore, TPH-D values at depths below the surface, not at the soil and asphalt interface, were chosen as indicative of TPH-D contamination. Soil at one site contained elevated cadmium concentrations. The cadmium-containing soil is located approximately 200 feet west of the proposed construction boundary and will not be disturbed as part of this project. The maximum cadmium concentration in the soil samples is less than 25% of the preliminary remediation goal (PRG) of 930 mg/kg for soil in an industrial/commercial environment. See **Figure 6-Site Locations of Impacted Areas-Francisco Boulevard West** for site locations.

**Table 3 Site Investigation Results-Francisco Boulevard West**

SITE #	LOCATION	LAND USE ACTIVITIES	ASBESTOS CONTAINING MATERIALS	CONTAMINANT concentration	
				TPH-D at depth (mg/kg)	Cd (mg/kg)
1	438 Francisco Boulevard West	Fantasma Iron & Rustic Pottery	Yes		
2	446 Francisco Boulevard West	Oak N Pine Furniture	Yes		
3	502 Francisco Boulevard West	Collin's Buick/ BJ's Body Shop	Yes		
4	530 Francisco Boulevard West	Marin Home Center Plaza	No	200	
5	540 Francisco Boulevard West	RAB Motors/Mercedes Benz	No	770	
6	550 Francisco Boulevard West	Fladeboe Used Car Sales	Yes		
7	694 Francisco Boulevard West	Toy Store/Marin Auto Sports	Yes		200
8	720 Francisco Boulevard West	Baxter Court (5 tenants)	Yes		

RWQCB - Guideline for Total Petroleum Hydrocarbons (TPH) ----- 100 mg/kg  
*While this is not a regulatory clean up level, Class III (household waste) landfills use this as a cut off level for soil disposal. Soils with TPH concentrations of 10,000 mg/kg must be disposed of in a Class I (hazardous waste) landfill.*

Department of Toxic Substances Control TTLC for Cadmium (Cd) ----- 100 mg/kg  
*The preliminary remediation goal (PRG) for soil at this industrial/commercial location is 930 mg/kg. The soil cadmium is localized in the upper layer; the PRG has not been exceeded; and the groundwater has not been impacted. The soil does not need to be remediated at this time. If the soil is excavated as a waste, the total threshold limit concentration (TTLC) for cadmium of 100 mg/kg as specified in the California Code of Regulations, Title 22, would be exceeded and the soil would require disposal to a Class I (hazardous) landfill.*

### 3.7.3 San Rafael Viaduct Investigation Results

The *Hazardous Waste Preliminary Investigation, Interstate Routes 101/580*, was conducted for a previous project, the San Rafael Viaduct Seismic Retrofit Project, to determine if hazardous materials were present in San Rafael in areas where seismic retrofit work was proposed. Soil samples were taken from the area adjacent to the footings of the San Rafael Viaduct structure and tested for contamination. Soil samples from footings of both the northbound and southbound viaduct structures were investigated. Results indicate total recoverable petroleum hydrocarbons (TRPH) and lead (Pb) were the major contaminants. PolyChlorinated biphenyls (PCBs), semivolatile organic compounds (semiVOCs), volatile organic compounds (VOCs) and pesticides were present in the soil in trace amounts only and below generally applied regulatory

guidelines. The table in **Appendix D** summarizes these results. **Figure 7-Bent Locations-San Rafael Viaduct** shows the bent locations referenced in **Appendix D**.

### 3.8 Water Quality

Numerous regulatory agencies are involved in managing the area's water resources and avoiding activities that would impair the beneficial uses of those water resources. Within the vicinity of the Marin 101 HOV Lane Gap Closure Project, there are several water resource issues. There are creeks, wetlands, tidal marshes, and a navigable waterway within the project limits, see **Section 3.5-Hydrology** and **Section 3.6.2-Natural Communities-Northern Coastal Salt Marsh**. Surface water runoff from the freeway drains into the existing watershed drainage system and eventually to San Francisco Bay, see **Section 3.5.2-Watershed Drainage**. Within the project limits, groundwater is found in alluvial low-lying areas at relatively shallow depths, see **Section 3.5.4-Groundwater**.

#### 3.8.1 Regulatory Agencies

Agencies with jurisdiction over water quality issues within the project limits include:

- **U.S. Environmental Protection Agency (EPA)** acting under the Federal Clean Water Act for water quality and National Pollution Discharge Elimination System (NPDES).
- **California Water Quality Control Board (WQCB)** acts under Section 401 of the Federal Clean Water Act to insure that local water quality issues are addressed.
- **San Francisco Bay Regional Water Quality Control Board (RWQCB)** adopts a *Regional Water Quality Control Plan*, implements the NPDES program and issues permits.
- **U.S. Army Corps of Engineers (ACOE)** via Section 404 of the Federal Clean Water Act and Section 10 of the Rivers and Harbors Act regulates construction and fill on receiving water quality.
- **Bay Conservation and Development Commission (BCDC)** is granted authority through the McAteer-Petris Act to implement the Coastal Zone Management Act.

#### 3.8.2 Current Water Quality Basin Plan

The San Francisco Bay Regional Water Quality Control Board has developed and implemented a *Water Quality Control Plan (Basin Plan)* for the San Francisco Bay region. The *Basin Plan* establishes water quality conditions consistent with specific beneficial uses of each water resource. Within the limits of the Marin 101 HOV Lane Gap Closure Project, the San Francisco Bay *Basin Plan* includes specific beneficial uses and water quality objectives for Corte Madera Creek and San Rafael Creek. The *Basin Plan* also lists potential beneficial uses of groundwater in the San Rafael Basin, see **Section 3.5.4-Groundwater**.

The existing and potential beneficial uses listed in the *Basin Plan* for Corte Madera Creek are Cold Freshwater Habitat, Fish Migration, Preservation of Rare and Endangered Species, Water Contact Recreation, Non-Contact Water Recreation, Fish Spawning, Warm Freshwater Habitat and Wildlife Habitat. San Rafael Creek has similar existing and potential beneficial uses. There are no existing beneficial uses for groundwater in the San Rafael Basin listed in the *Basin Plan*. The potential beneficial uses listed for groundwater in the San Rafael Basin are Municipal Supply, Industrial Process Supply, Industrial Service Supply and Agricultural Water Supply.

The beneficial uses and water quality objectives listed in the San Francisco Bay Regional Water Quality Control Board (RWQCB) *Water Quality Control Plan* provide a standard for activities affecting water quality in the San Francisco Bay region.

### 3.9 Farmland

There is no farmland within the project limits.

### 3.10 Coastal Zone

A portion of the proposed project crossing Corte Madera Creek is within the jurisdiction of the San Francisco Bay Conservation and Development Commission (BCDC). Coordination has been ongoing with BCDC regarding activities in, above, and adjacent to Corte Madera Creek in an effort to preserve and enhance public access and to minimize fill in Corte Madera Creek.

BCDC was established by the McAteer-Petris Act of 1965 (Government Code Section 66600 et seq.) to develop a Bay Plan and to regulate fill and development in the San Francisco Bay. In 1969, the McAteer-Petris Act was amended to make BCDC a permanent state agency and to turn the policies of the Bay Plan into law. BCDC is also the federally designated state coastal management agency for the San Francisco Bay segment of the California coastal zone authorized under the Federal Coastal Zone Management Act. Federally assisted or funded projects with activities in the BCDC jurisdictional area require BCDC determination of consistency with the Coastal Zone Management Program prior to federal approval.

The jurisdiction of BCDC includes the shoreline of the San Francisco Bay and portions of the Sacramento/San Joaquin River Delta. BCDC has authority over land use decisions in San Francisco Bay, in areas subject to tidal action, in submerged lands, and in a shoreline band extending 30.5 meters (100 feet) inland from the mean high water (MHW) mark. In areas with existing marshlands, BCDC jurisdiction includes up to the line at 1.5 meters (5 feet) above mean sea level (MSL) with a corresponding change in the 30.5 meter (100 foot) shoreline band. Section 66610 (e)(8) of the McAteer-Petris Act specifically includes Corte Madera Creek under BCDC jurisdiction, but excludes the Larkspur and Greenbrae Boardwalk areas.

Approval from BCDC of conformity with the McAteer-Petris Act will be required for fill and other activities in BCDC jurisdictional areas at Corte Madera Creek.

### 3.11 Cultural Resources

This section evaluates cultural resources within the project area including archaeological resources and historic architectural resources. Cultural resources investigations, see *Historic Property Survey Reports (2)* and *Addendum Historic Property Survey Report* referenced in **Appendix E**, were conducted in accordance with Section 106 of the National Historic Preservation Act to document the findings summarized below.

The National Historic Preservation Act of 1966 (NHPA), as amended, requires federal agencies with jurisdiction over any proposed action to take into account the effect of the action on historic properties. Under Section 106 of the NHPA, federal agencies must evaluate the effect on historic resources of any federal, federally assisted, or federally licensed action.

The Area of Potential Effects (APE) was established in consultation with the Federal Highway Administration (FHWA). For archaeology, the APE was set as the limits of the project and the proposed new right of way boundary. For historic architecture, the APE also included the first row of buildings beyond the maximum right of way limit.

### 3.11.1 Initial Cultural Resources Evaluation Results

An *Archaeological Survey Report*, a *Historic Architectural Survey Report*, and a *Historic Resource Evaluation Report-Northwestern Pacific Railroad* are presented and summarized in the initial *Historic Property Survey Report, 1989*, referenced in **Appendix E**, and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. The project APE for both the archaeological and the historic property studies are delineated on maps in this initial *Historic Property Survey Report 1989 (HPSR 1989)*. The findings of the initial *HPSR 1989* are that the Marin 101 HOV Lane Gap Closure Project will not involve or affect properties listed in or eligible for inclusion in the National Register of Historic Places. *HPSR 1989* was submitted to the Federal Highway Administration (FHWA) and the State Historic Preservation Officer (SHPO). Both FHWA and SHPO concurred that the project will not involve or effect any sites or properties listed in or eligible for inclusion in the National Register of Historic Places, see **Appendix C** for these notices.

### 3.11.2 Supplemental Cultural Resources Evaluation Results

In response to changes in the initial APE, an additional archaeological surface investigation for the Marin 101 HOV Lane Gap Closure Project was conducted in early 1999 to update the cultural resources evaluation. Two archaeological sites and one possible archaeological site were found within or adjacent to the project APE. A *First Addendum Positive Archaeological Survey Report* and a historical architectural review were combined into a new *Historic Property Survey Report 1999 (HPSR 1999)*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. *HPSR 1999* was forwarded to FHWA and SHPO for their approval. The California State Historic Preservation Officer (SHPO) again agreed that the Marin 101 HOV Lane Gap Closure Project did not involve or effect any sites or properties listed in or eligible for inclusion in the National Register of Historic Places, see **Appendix C** for the SHPO concurrence letter.

An extension of the Marin 101 HOV Lane Gap Closure Project to the south may be required to provide a moveable barrier vehicle storage site when the vehicle has completed its southbound trip. This vehicle storage site is in the freeway median area. No additional right of way is required to make room for this median storage area. Caltrans archaeologists have researched and surveyed this highway median strip and have determined that the project will not affect any cultural resources.

### 3.11.3 Addendum Cultural Resources Evaluation Results

An *Addendum Historic Property Survey Report 1999 (Addendum HPSR 1999)*, referenced in **Appendix E** and completed in September 1999, included evaluations of four buildings and five bridges which have passed fifty years of age since the completion of the *HPSR 1989*, or are expected to pass fifty years of age prior to completion of the project. The *Addendum HPSR 1999* concluded that none of these properties are eligible for listing on the National Register of Historic Places.

The *Addendum HPSR 1999* was forwarded to FHWA and SHPO for their approval. The California State Historic Preservation Officer (SHPO) again agreed that the Marin 101 HOV Lane Gap Closure Project did not involve or effect any properties or bridges listed in or eligible for inclusion in the National Register of Historic Places. See **Appendix C** for the SHPO concurrence letter to the *Addendum HPSR 1999*.

As a result of these archaeology and historic resource surveys, the potential archaeological and potential historic architectural cultural resources within the APE were identified and are presented below.

### 3.11.4 Archaeological Resources

Prior to archaeological field surveys, the California Archaeological Site Survey records at the Northwest Information Center of the Historical Resources Information System at Sonoma State University were checked to locate previously recorded sites in the project area. Twelve prehistoric sites were identified within a mile of the project APE. Research at the Northwest Information Center of the Historical Resources Information System also indicated two prehistoric archaeological sites recorded within the APE.

The project area was thoroughly inspected. Although limited by the heavily developed nature of most of the area, Caltrans District 4 archaeologists surveyed the project area on foot. They concentrated on investigating unpaved ground and locating previously recorded sites within or immediately adjacent to the project limits.

The initial field investigation determined that both of the recorded archaeological sites within the APE are mostly destroyed, and that the remnants of the sites were outside the APE. Recent field investigations inventoried one archaeological site and one possible archaeological site within the project APE. One additional archaeological site was inventoried adjacent to, but outside of the project APE. No project construction activities are planned for these areas and these sites will not be affected by the current project, see the *Historic Property Survey Report 1999* referenced in **Appendix E**.

A great deal of archaeological research and field work has been conducted in Marin County over the last century and is referenced in the initial *Historic Property Survey Report 1989*, referenced above and in **Appendix E**. The Coast Miwok Indians historically inhabited the project area. The San Rafael area was part of the Huimen tribelet, which extended from what is now the Golden Gate Bridge to Point San Pedro. Principal settlements occurred along the shoreline from San Rafael south.

There were several Mexican land grants in the San Rafael area. The City of San Rafael grew around the site of the Mission San Rafael Arcangel, established in 1817. The Mission San Rafael Arcangel was abandoned in 1834. At that time, the San Rafael area was sparsely inhabited by Europeans. San Rafael became the county seat of Marin County in 1851.

### 3.11.5 Historic Architectural Resources

The Section 106 process involves identifying historic properties listed on the National Register of Historic Places or those found to meet National Register eligibility criteria, and working with the State Historic Preservation Officer (SHPO) to determine the effect of the proposed action on the property.

#### Structures

There are no structures within the project APE meeting the criteria of eligibility for inclusion on the National Register of Historic Places. See **Appendix C** for the State Historic Preservation Officer's (SHPO) concurrence with the findings of the *Historical Property Survey Reports, HPSR 1989* and *HPSR 1999*, and the *Addendum HPSR 1999*.

There are 181 buildings in the study area for this project. Caltrans District 4 architectural historians initially surveyed a large portion of the historical architecture Area of Potential Effects (APE). Other Caltrans District 4 architectural historians subsequently surveyed the buildings within the project APE and not included in this initial survey. The findings of these surveys are included in the *Historic Architectural Survey Report (HASR)* and in the initial *Historic Property*

*Survey Report 1989 (HPSR 1989)* for the Marin 101 HOV Lane Gap Closure Project. All of these structures were determined by the State Historic Preservation Officer (SHPO) to be ineligible for National Register status, see SHPO concurrence notifications in **Appendix C**.

An *Addendum Historic Property Survey Report* was completed in September of 1999 which included evaluations of four buildings and five bridges which have passed fifty years of age since the completion of the 1989 HPSR, or are expected to pass fifty years of age prior to completion of the project. The *Addendum HPSR 1999* concluded that none of these properties are eligible for listing on the National Register of Historic Places, see SHPO concurrence notification in **Appendix C**.

There are two buildings within the APE that are included in the San Rafael Historical Resources Inventory, 12 Brookdale Avenue and 1811 Grand Avenue. These buildings do not possess sufficient architectural distinction and were determined ineligible for listing on the California Register of Historic Resources. They are not considered historic properties for the purposes of CEQA.

In 1989, the Federal Highway Administration (FHWA), in consultation with the State Historic Preservation Officer (SHPO), determined the proposed project will have no effect on properties listed in or eligible for inclusion in the National Register of Historic Places. Caltrans architectural historians reaffirmed this finding in 1997 and 1999, and the SHPO concurred in 1999, see **Appendix C**.

### **Bridges**

The bridges within the project limits are Corte Madera Creek Bridge, California Park Overhead, US 101/I-580 Connector, San Rafael Viaduct, San Rafael Harbor Bridge, Linden Lane Undercrossing, Lincoln Lane Undercrossing and San Pedro Undercrossing. These bridges were evaluated as part of the Caltrans Historic Bridge Survey Inventory of 1986 and found to be in Category 5, not eligible for National Register listing.

Five of these bridges were rated Category 5 in the Caltrans *Statewide Bridge Survey* of 1986 because they were not yet fifty years old at the time of the survey: 101/580 Connector, San Rafael Viaduct, San Rafael Harbor Bridge, Linden Lane Undercrossing and Lincoln Avenue Undercrossing. These five bridges are now more than fifty years old or are expected to pass fifty years of age prior to the completion of this project. They were evaluated in the *Addendum HPSR 1999* and determined to be ineligible for National Register listing, see **Appendix C**.

### **Railroads**

A *Historical Resources Evaluation Report-Northwestern Pacific Railroad Tracks Within Project APE* is included in the initial *Historic Property Survey Report 1989 (HPSR 1989)*, referenced above and in **Appendix E**. There are two sections of Northwestern Pacific Railroad (NWPR) track and related structures within the project APE. One is located north of downtown San Rafael and the other is south of the San Rafael downtown area. Neither of these sections of NWPR track appear to be eligible for listing in the National Register of Historic Places.

The northern section includes approximately 1,158 meters (3,800 feet) of railroad track immediately adjacent to the west of US 101 right of way. This track extends south from the Lincoln Avenue exit from US 101 to just north of Paloma Avenue. South of this point, the NWPR track veers west, away from the project APE, into downtown San Rafael. This section also includes three small railroad-related structures: a small timber trestle, an arched concrete culvert, and the Linden Lane Undercrossing.

The southern segment is not continuous within the project APE. The NWPR right of way and the project APE converge at only three points. One is a small section of track near Rice Drive. Another is a timber trestle over Bellam Boulevard and under US 101, dating to the 1950s. The third is an approximately 610 meter (2,000 foot) section of NWPR right of way, with intermittent track, north of Sir Francis Drake Boulevard.

The individual structures found along the track are not individually eligible for National Register listing. The small sections of NWPR right of way and track also do not appear to be eligible for National Register listing. This is because they do not meet the significance criteria for the National Register and because they lack integrity. These findings are included in the *Historic Property Survey Report 1989*. The State Historic Preservation Officer (SHPO) concurs with the findings, see **Appendix C**. For additional details about the NWPR right of way, see the *Historical Resources Evaluation Report-Northwestern Pacific Railroad Tracks Within Project APE* contained in the initial *Historic Property Survey Report 1989*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

## 3.12 Traffic and Circulation

This section describes the existing surface transportation facilities and traffic conditions in the US 101 corridor in the vicinity of the proposed project. This includes the state highway system, local traffic circulation, public transit, pedestrian and bicycle routes, and parking as they affect the US 101 corridor traffic. For a detailed analysis of the data, refer to the *Traffic Study Report*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

### 3.12.1 Existing Facilities and Traffic Study Area

The US 101 corridor study area for the traffic analysis is from Route 131, located 4 kilometers (2.5 miles) south of the proposed project, to Rowland Avenue, 12 kilometers (7.5 miles) north of the project, see **Figure 8-Map of Traffic Study Area**. Within this study area the existing US 101 facility is a divided, controlled-access freeway with variable lane configurations. Within the project limits, US 101 generally has three continuous lanes in each direction. A fourth lane in each direction exists north of the proposed project and to the south of the proposed project. This fourth lane is restricted to high occupancy vehicles, HOVs, during the peak commute hours. During the remainder of the day, the HOV lanes are open to all vehicles regardless of occupancy.

To the north and south of the project limits, the fourth lane is restricted to high occupancy vehicles containing two or more occupants (HOV 2+) during peak traffic periods. Southbound US 101 has HOV restrictions during morning peak periods from 6:30 to 8:30 AM, Monday through Friday. The peak traffic periods and HOV lane restrictions for northbound US 101 are from 4:30 to 7:00 PM, Monday through Friday. These lanes serve as mixed-flow traffic lanes during non-peak periods.

In addition to the continuous through lanes described above, auxiliary lanes exist at various locations on US 101 throughout the study area. These auxiliary lanes provide an additional lane between an on-ramp and the next off-ramp to facilitate traffic entering and exiting the freeway. Additional information on the locations of auxiliary lanes is available in the *Traffic Study Report* referenced in **Appendix E**.

Throughout the project limits, numerous intersections connect US 101 to local streets (non-freeway/non-highway facilities). These include a mix of intersections having both on and off-ramps or intersections having only an on-ramp or an off-ramp. Within the project limits, there is a terminal junction where I-580 terminates at the junction with US 101. One lane freeway-to-freeway connectors join westbound I-580 to northbound US 101 and southbound US 101 to

eastbound I-580. Additional information on the intersections and on and off-ramp details is available in the *Traffic Study Report* referenced in **Appendix E**, or see the project maps in **Appendix A-Project Mapping**.

A portion of Route 580 from the intersection with US 101 south to the Irene Avenue on-ramp is within the proposed project limits. This portion of Route 580 is a divided, controlled-access freeway with two lanes of mixed-flow traffic in each direction.

### 3.12.2 Existing Traffic Conditions

#### Average Weekday Traffic

The existing average weekday traffic (AWDT) for US 101 was obtained at three locations in the study area. At Route 131 there are 111,000 vehicles per day (vpd). At Manuel Freitas Parkway the AWDT is 160,000 vpd and the AWDT at Route 37 is 117,000 vpd.

#### Peak Period Traffic

Results of the Traffic Study Report, referenced above and in **Appendix E**, indicate that US 101 through Marin County exhibits pronounced traffic peaking characteristics. Morning (AM) southbound and afternoon (PM) northbound peak-hour volumes on US 101 are shown for selected locations in **Table 4-Existing Southbound Marin 101 Vehicle Occupancy** and **Table 5-Existing Northbound Marin 101 Vehicle Occupancy**.

**Table 4 Existing Southbound Marin 101 Vehicle Occupancy**

Direction: Southbound Peak Hour: AM (7:30-8:30) Location: Route 131				Direction: Southbound Peak Hour: AM (7:30-8:30) Location: Manuel T. Freitas Parkway			
Vehicle Occupancy	% of Vehicles	Person Flow (Persons/Hr)	Occupancy Rate	Vehicle Occupancy	% of Vehicles	Person Flow (Persons/Hr)	Occupancy Rate
1	84%	5095		1	78%	5047	
2	12%	1434		2	17%	2250	
3+	2%	329		3+	2%	366	
Buses	1%	2275		Buses	0%	385	
Vanpools	0%	110		Vanpools	0%	100	
Cycles	0%	23		Cycles	1%	45	
Trucks	1%	68		Trucks	2%	143	
<b>TOTAL</b>	<b>100%</b>	<b>9334</b>	<b>1.5</b>	<b>TOTAL</b>	<b>100%</b>	<b>8336</b>	<b>1.3</b>
HOV Subtotal	15%	4148/44%	4.6	HOV Subtotal	19%	3101/37%	2.5
HOV Lane Usage	59%	2586/28%	4.9	HOV Lane Usage	105%	3052/37%	2.5
HOV Lane Violation Rate 1.3%				HOV Lane Violation Rate 13.9%			

The weekday morning southbound traffic peak hour is from 7:00 to 8:00 AM. The AM peak-hour volumes on southbound US 101 are generally between 6,000 and 7,000 vehicles per hour south of I-580, and between 7,000 and 8,000 vehicles per hour north of I-580. The highest volume location is 8,380 vehicles per hour between the Second Street on-ramp in central San Rafael and the I-580 off-ramp, as indicated in **Table 6-Marin 101 Existing Traffic Volumes**.

**Table 5 Existing Northbound Marin 101 Vehicle Occupancy**

Direction: Northbound Peak Hour: PM (4:30-7:30) Location: Route 131				Direction: Northbound Peak Hour: PM (4:30-7:30) Location: Manuel T. Freitas Parkway			
Vehicle Occupancy	%of Vehicles	Person Flow (Persons/Hr)	Occupancy Rate	Vehicle Occupancy	%of Vehicles	Person Flow (Persons/Hr)	Occupancy Rate
1	78%	3685		1	79%	5604	
2	17%	1604		2	15%	2124	
3+	2%	270		3+	3%	673	
Buses	2%	2660		Buses	1%	2660	
Vanpools	0%	150		Vanpools	0%	110	
Cycles	1%	27		Cycles	1%	83	
Trucks	1%	47		Trucks	1%	69	
<b>TOTAL</b>	<b>100%</b>	<b>8443</b>	<b>1.8</b>	<b>TOTAL</b>	<b>100%</b>	<b>11323</b>	<b>1.3</b>
HOV Subtotal	21%	4684/55%	4.8	HOV Subtotal	19%	5567/49%	2.5
HOV Lane Usage	58%	2919/35%	5.1	HOV Lane Usage	50%	2256/20%	2.5
HOV Lane Violation Rate 7.9%				HOV Lane Violation Rate 2.6%			

The weekday afternoon northbound traffic peak hour occurs in the northbound direction from 4:00 to 5:00 PM. The PM peak-hour volumes on northbound US 101 are generally between 5,000 and 7,000 vehicles per hour south of I-580, and between 7,000 and 8,000 vehicles per hour north of I-580. The highest volume location is 8,460 vehicles per hour between the Lincoln Avenue on-ramp and the North San Pedro Road off-ramp in San Rafael, as indicated in **Table 6-Marin 101 Existing Traffic Volumes**.

**Table 6 Marin 101 Existing Traffic Volumes**

	South of Paradise Drive Interchange	North of I-580 Interchange	North of Lincoln Avenue Ramps	North of Manuel T. Freitas Parkway
<b>SOUTHBOUND 101 AM PEAK HOUR VOLUMES</b>				
HOV	1010	1680	1580	1460
Mixed-Flow	5690	6700	6310	5840
Total	6700	8380	7890	7300
<b>NORTHBOUND 101 PM PEAK HOUR VOLUMES</b>				
HOV	1370	1510	1690	1540
Mixed-Flow	5480	6020	6770	6170
Total	6850	7530	8460	7710

### Existing High Occupancy Vehicle (HOV) Traffic

The peak-hour, peak-direction volumes of HOV (2+) with two persons or more on US 101 were developed from Caltrans vehicle occupancy counts taken by the Office of Highway Operations in October 1993. HOV (2+) also include carpools, vanpools and buses.

As indicated in **Table 4-Existing Southbound Marin 101 Vehicle Occupancy** and **Table 5-Existing Northbound Marin 101 Vehicle Occupancy**, the AM peak-hour proportion of HOV (2+) on southbound US 101 is approximately 15% of the total traffic south of I-580 and approximately 19% north of I-580. The PM peak-hour proportion of HOV (2+) on northbound US 101 is approximately 20% throughout the study area.

## Traffic Delays

Existing southbound AM peak-period operations result in delays of over 25 minutes for mixed-flow traffic in the analysis area. The congestion primarily occurs between the Rowland Avenue on-ramp and the Mission Avenue off-ramp. The existing southbound HOV lane facilities located to the north and south of the proposed project save approximately 19 minutes of travel time. Existing northbound PM peak-period operations result in delays of nearly 8 minutes for mixed-flow traffic in the analysis area. The existing northbound HOV lane facilities save approximately 3-1/2 minutes overall travel.

## Current Vehicle Occupancy

The AM peak-hour vehicle occupancy for all vehicles on southbound US 101 is approximately 1.5 persons per vehicle at Route 131 and approximately 1.3 persons per vehicle at Manuel T. Freitas Parkway, as shown in **Table 4-Existing Southbound Marin 101 Vehicle Occupancy**. Respectively, 84% and 78% of the total vehicles were single occupancy vehicles. As noted above, 15% and 19%, respectively, of the vehicles at these two locations were HOV (2+) including buses and vanpools.

The PM peak-hour vehicle occupancy on northbound US 101 is approximately 1.8 persons per vehicle at Route 131 and approximately 1.3 persons per vehicle at Manuel T. Freitas Parkway, as shown in **Table 5-Existing Northbound Marin 101 Vehicle Occupancy**. Respectively, 78% and 79% of the total vehicles at these two locations were single occupancy vehicles. As noted above, approximately 20% were HOV (2+) including buses and vanpools.

## Truck Traffic

The AM and PM peak-hour peak direction proportions of trucks and buses (combined) on US 101 are less than three percent of total vehicular traffic, as shown in **Table 4-Existing Southbound Marin 101 Vehicle Occupancy** and **Table 5-Existing Northbound Marin 101 Vehicle Occupancy**.

### 3.12.3 Public Transit

Commuter bus routes, predominantly Golden Gate Bridge, Highway and Transportation District, operate on US 101 during peak traffic periods. Vehicle classification counts provided by Caltrans include the following data. During the AM peak hour on southbound US 101, 65 buses were observed at Route 131 and 11 buses at Manuel T. Freitas Parkway. During the PM peak hour on northbound US 101, 76 buses were counted at both observation locations. The average bus occupancy factor provided is 35 persons per bus. Observations have confirmed that many of the buses operating on US 101 are full during peak periods.

At some of the US 101 interchanges in the study area, a bus stop design that allows buses to avoid the local ramp terminal intersections is provided. Buses exiting the freeway at an off-ramp can use a special connector roadway that provides access to a bus stop and then connects with the downstream on-ramp to reenter the freeway. Pedestrian walkways connect the bus stops to the local street sidewalks. Most of the bus stop locations provide shelters.

### 3.12.4 Rail Transit

There are no operating rail systems within the project limits. The rail right of way originates at Paradise Drive in Corte Madera and extends northward through Marin and Sonoma Counties, generally paralleling US 101. See **Section 3.11.5-Historic Architectural Resources-Railroads**

for a description of the portions of rail right of way that are within the proposed project limits. Also see **Section 3.13.1-Land Use Characteristics-Existing Land Use** for information on the proposed uses of the rail right of way.

### 3.12.5 Non-Motorized Transit

The non-motorized transit facilities associated with the traffic study area include existing and proposed trails for use by bicyclists and/or pedestrians. A portion of the existing Marin County Class II bike lane connects the Lucky Drive-Corte Madera Creek area in Larkspur to Merrydale Road in north San Rafael, as shown in **Figure 9-Map of Existing Bike Lanes**. This existing bike lane is within the project vicinity at Lucky Drive, Corte Madera Creek and Sir Francis Drake Boulevard. The bike lane then veers eastward away from US 101 around Cal Park Hill and intersects the freeway again at Andersen Drive in San Rafael. South of Merrydale Road in northern San Rafael, the existing bike lane again enters the project vicinity and parallels US 101 on the west side of the freeway. Other pedestrian facilities in the study area include the existing bike and pedestrian systems in the Corte Madera shoreline area, the Greenbrae Pedestrian Overcrossing and the existing San Rafael sidewalk system.

Bicycle racks for bicycle parking are available at the Central San Rafael Transit Center and at the Larkspur Ferry Terminal. Most of the Golden Gate Bridge, Highway and Transportation District buses have bicycle racks. Bicycles also travel for free on the Larkspur ferries.

### San Francisco Bay Trail

In 1989, the Association of Bay Area Governments (ABAG) prepared the Bay Trail Plan for a 644-kilometer (400-mile) multi-use trail system traversing the perimeter of San Francisco and San Pablo Bays through nine Bay Area counties. The plan provides a recommended route and policies to guide trail design and implementation. The Bay Trail Plan designated many existing trails as segments of the Bay Trail, and it proposed new trail segments that would make the Bay Trail continuous. The Bay Trail Plan did not specify the exact locations, features and connections of the trail segments. The existing bike and pedestrian facilities within the Caltrans right of way in Larkspur between the Greenbrae Pedestrian Overcrossing and Sir Francis Drake Boulevard, including the pedestrian and bicycle paths over Corte Madera Creek, are shown in **Figure 9-Map of Existing Bike Lanes** and on **Sheets S-1, R-1 and U-1 of Appendix A-Project Mapping**. The Bay Trail Plan has designated this segment as a portion of the Bay Trail system. The San Francisco Bay Trail also crosses the US 101 right of way in San Rafael at Andersen Drive and at Third Street, see **Appendix A-Project Mapping, Sheets S-3, S-4, R-3, R-4, U-3 and U-4**.

### 3.12.6 Parking

Within the limits of the existing HOV lane system on US 101 (from Richardson Bay Bridge to Route 37) there are five Caltrans park-and-ride lots. Two lots are within the limits of the Marin 101 HOV Lane Gap Closure Project, at Heatherton Street and at Lincoln Avenue. There are five, non state-owned park-and-ride lots within the project limits, including the central San Rafael Transit Center and the Larkspur Ferry Terminal. The spaces at the Caltrans park-and-ride lots and at the Larkspur Ferry Terminal are open to all vehicles with no preferred spaces for HOVs. The San Rafael Transit Center does not have a parking facility. In central San Rafael, on-street and commercial parking is available within the project area as well as outside of the project area. Parking spaces are discontinuous and generally inadequate in downtown San Rafael and along major streets parallel to US 101, such as Lincoln Avenue. Commercial and on-street parking also exists along Francisco Boulevard West. The high utilization of available parking results in the requirement that new businesses provide new parking in order to conform to city guidelines.

### 3.13 Land Use and Socioeconomic Issues

The *Final Background Socioeconomic Study*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland, identifies socioeconomic and land use issues in the Marin 101 HOV Lane Gap Closure Project. The study area includes the immediate project area subject to primary impact and a regional study area, subject to indirect secondary impacts. These areas are shown in **Figure 10-Map of Socioeconomic Study Area**. The regional study area includes portions of the City of San Rafael, City of Larkspur, Town of Corte Madera, and unincorporated areas of Marin County.

#### 3.13.1 Land Use Characteristics

##### Existing Land Use

Major land uses in the project area are described in detail below and shown on **Figure 11-Generalized Land Use Map**. Commercial and light industrial uses dominate the central and southern portion of the study area and are served by the existing US 101-transportation corridor. This corridor includes the Northwestern Pacific Railroad (NWPR) right of way, a potential rail transit corridor (see below), in addition to the existing US 101 freeway. In San Rafael, land uses are associated with the business and the government services of San Rafael, the largest city in the county. Land uses in the northern portion of the study area are primarily residential, both single and multifamily.

In the southern portion of the study area, the existing highway right of way crosses over the shoreline area of Corte Madera Creek and then passes by the residential areas of Greenbrae on the west and the light commercial, residential and open space areas of Larkspur Landing on the east. From the San Rafael City Limits to Andersen Drive, land uses are mostly residential on the west side of the highway and light industrial and commercial on the east.

Within the City of San Rafael, land use is commercial with office uses located southeast of the US 101/I-580 Interchange and at Grand Avenue. Marin Square, a center of more than two dozen stores, services and offices, is located on Bellam Boulevard right off US 101. Specialized marine uses are located on the east side of the highway near the San Rafael Canal, between Harbor Avenue and the Montecito Shopping Center. Mixed retail/office use is located between Second Street and Mission Avenue on the west and Second and Fourth Streets on the east. Residential/office uses are clustered around Fifth and Mission Avenues on the east.

Land use along the east side of the northern portion of the study area is single family residential with some duplex and multifamily residential uses located between Belle and Mission Avenues, and south of North San Pedro Road. Dominican College is located along the east side in this area. A portion of the Parks and Open Space District is adjacent to the highway right of way at the northern end of this segment. On the west side between US 101 and Lincoln Avenue, the land use is mostly high-density residential and mixed-use residential/office with duplex residential use along Brookdale Avenue. North of Lincoln Avenue onwards to North San Pedro Road, land use is primarily public/quasi-public. High-density residential uses are located south of North San Pedro Road along Merrydale Road.

Within the project limits, the Northwestern Pacific Railroad (NWPR) right of way generally parallels US 101. The Golden Gate Bridge, Highway and Transportation District (GGBHTD) owns this portion of the NWPR right of way from Paradise Drive to Novato. The NWPR right of way has been acquired as a future commuter rail corridor. A rail transit project for this portion of the NWPR right of way is not currently funded nor is it a component of the *Regional*

*Transportation Plan.* See **Section 3.12.4-Rail Transit** and **Section 3.11.5-Historic Architectural Resources-Railroads** for more information on the NWPR right of way.

The Northwestern Pacific Rail Authority (NWPR) owns the NWPR right of way from Novato to Healdsburg. The NWPR is a Joint Powers Authority (JPA) consisting of the GGBHTD, the County of Marin, and the North Coast Rail Authority (NCRA). The NCRA holds title to the NWPR right of way from Healdsburg to Arcata. The current status of the portion from Corte Madera to the Town of Ignacio is "discontinued." The remaining portion from Ignacio to Lombard and Arcata is considered "active."

### **Developable Land**

Based on *Association of Bay Area Governments' Projections '94*, referenced in **Appendix E**, the vacant and redevelopable land available for development in Marin County is 8,215 hectares (20,300 acres) or 6.1 percent of the total county land area. 78 percent of this developable land, 6,394 hectares (15,800 acres), is available for residential use. The remainder of the available developable land, approximately 1.3- percent of the total county land area, is for commercial, public institutions, and industrial development.

The *Marin Countywide Plan* estimates the potential for approximately 20,000 new housing units in the county, both in single and multifamily developments. Most of the potential for residential development is in the Las Gallinas Valley and Novato Planning Areas.

### **Development Trends**

Development trends and growth projections for Marin County and the study area are primarily derived from data presented in the community development, land use and housing elements of the Marin Countywide Plan, the City of San Rafael General Plan 2000, and ABAG Projections '94. Supplemental information is provided in the general plans of the other study area cities and through interviews with local planning officials.

The project limits are within the urban core of Marin County. There are no major vacant parcels available for development in the project area; however, several parcels in the San Rafael Redevelopment District have been identified as having reuse or additional development potential. Proposed development plans for these sites include major new office development and preservation of existing building and automotive industrial uses along Francisco Boulevard West. Along US 101 frontage, redevelopment of sites needing highway visibility is proposed.

The population of Marin County increased by 3.4 percent during the decade between 1980 and 1990 and is expected to grow by 17 percent between 1990 and 2010. Most of this growth in population and housing is projected for the areas of Novato and San Rafael.

### **Jobs/Housing Balance**

The significance of a jobs/housing balance is based on the premise that when sufficient jobs are available locally to meet the employment needs of the local resident base, the resultant commute traffic and congestion will be reduced. If the local job market exceeds the number of affordable houses in the area, then persons working locally will tend to commute from outlying areas where housing is available. Other factors influencing where people live and work include vacancy rates, job types, income and personal choice of whether to live and work in the same locale.

The *Final Background Socioeconomic Study*, referenced above and in **Appendix E**, indicates job growth in Marin County has outpaced the growth of the supply of housing. This condition is exacerbated by the fact that while Marin County housing costs are among the highest in the Bay

Area, payroll from Marin County jobs is among the lowest in the region. Statistics from the Bureau of Economic Analysis indicate that average wages and salaries of individuals who work in Marin County are approximately 88 percent of the average wage in the Bay Area. Jobs in the county are projected to increase by 27 percent between 1990 and 2010 and households are projected to increase by 18 percent in the same period. In the project vicinity, the number of jobs will surpass both the housing supply and the number of employed residents in San Rafael, Larkspur and Corte Madera.

### Population Growth Characteristics

Marin County experienced the slowest population growth rate of any county in the San Francisco Bay Area Region during the last decade. Between 1980 and 1990, the county grew by 3.4 percent. ABAG projects that by 2010 the population could increase by 17 percent to approximately 270,000 if the land designated for residential use is developed and occupied. The population in the planning areas of Novato and San Rafael represented approximately 50 percent of the total county population in 1990. These areas are projected to retain a similar proportion of the population in 2010.

#### 3.13.2 Local and Regional Planning

Within the study area, projects are subject to regulation by state, regional and local agency plans and policies. The Bay Conservation and Development Commission (BCDC) is the state coastal zone management agency in the project area. BCDC ensures conformance with the coastal zone management programs and the San Francisco Bay Plan. Marin County is one of nine counties that comprise the San Francisco Bay Area Region. The Metropolitan Transportation Commission (MTC) Regional Transportation Program (RTP) provides a regional plan for the Bay Area's overall transportation system. The Association of Bay Area Governments (ABAG) is responsible for the development and administration of regional plans and policies for the nine Bay Area counties. The ABAG Regional Plan is committed to a city-centered concept of development in order to promote compact growth for reasons of cost efficiency in public services and to retain open space resources as community separators.

At the local level, the Marin Countywide Plan is consistent with the concept of the ABAG Regional Plan. The Marin Countywide Plan established three environmental corridors dividing the county into distinct zones for development and land use planning purposes. These zones are:

- the Coastal-Recreational Corridor designated for open space, recreation and agricultural land uses which includes preservation of existing coastal communities;
- the Inland-Rural Corridor in the central and northwestern part of the county, which is primarily agricultural but includes other uses such as resource and habitat preservation and preservation of small communities; and
- the City-Centered Corridor along US 101, which is the location of Marin County's eleven cities and is reserved for more urban development focused around activity centers. The City-Centered Corridor also includes Bay front, streamside and ridge areas designated for protection of environmental resources and views.

The *Marin Countywide Plan* divides the county into seven planning areas, six of these areas (Novato, Las Gallinas Valley, San Rafael Basin, Upper Ross Valley, Lower Ross Valley and Richardson Bay) make up the City-Centered Corridor. The seventh planning area (West Marin) encompasses both the Coastal-Recreational Corridor and Inland-Rural Corridor. The general plans of eleven cities and seventeen communities also guide development within the county. **Figure 12-Map of Planning Areas and Neighborhoods** shows these planning areas and neighborhoods in the project study area. Each of the cities and towns regulate land use within its own jurisdiction and their plans are reviewed and revised when necessary for consistency with the *Marin Countywide Plan*.

There are several of these local-planning jurisdictions within the project limits. In addition to Marin County, these include: the Cities of San Rafael and Larkspur, the San Rafael Redevelopment Agency, the Town of Corte Madera, the Planning Areas of San Rafael Basin, Las Gallinas, Lower Ross Valley, and the Communities of Kentfield/Greenbrae, San Quentin and the Greenbrae Boardwalk.

### 3.13.3 Social Environment

Demographic characteristics of the affected environment are derived from 1990 U.S. Census Tract data and the *Association of Bay Area Governments' Projections '94*, referenced in **Appendix E**. Census tracts for the study area are identified on **Figure 13-Map of Census Tracts**. Statistical distribution for household size and composition, ethnicity, age, and income levels are generally similar to that of Marin County as a whole. However, census tract information, which is disproportionate in comparison to the county as a whole, is discussed below under the appropriate demographic characteristic.

#### Household Size and Composition

Data on household size and composition in the study area was provided by the *Association of Bay Area Governments' Projections '94* and the 1990 U.S. Census. The 1990 Census total of 95,006 households in Marin County was 6,200 more than in 1980, an increase of 7 percent. In projections through 2010, households are expected to increase by another 18 percent to a total of 111,930 households. Sixty-two percent of this growth is projected to occur in San Rafael and Novato.

Census Tracts 1090, 1192 and 1060, see **Figure 13-Map of Census Tracts**, have the greatest number of households in the study area. These census tracts include, respectively, the high-density apartment areas of the Lincoln Avenue neighborhood of San Rafael and Greenbrae, as well as the neighborhoods of northern San Rafael. Census tracts with the fewest households are 1121 and 1212. The greatest total number of families are in Census Tract 1090 which includes the San Rafael neighborhoods of Sun Valley, Fairhills and Lincoln. Census Tract 1122, the neighborhood of East San Rafael, has the largest number and highest percentage of single parents.

In 1990, the total household population for the county was 221,548 with approximately 2.33 persons per household. Projections for 2010 indicate a total household population of 258,600 with 2.31 persons per household.

#### Ethnic Mix

An ethnic profile of the existing population is derived from 1990 Census data. The racial categories used are White, Black, American Indian/Eskimo/Aleutian, Asian/Pacific Islander and Other. Persons of Hispanic origin were sampled separately and are included in more than one ethnic category.

Ethnic composition within the study area is proportionately similar to that of Marin County. Whites constitute 89 percent of the population in the county and 86 percent of the population in the study area. Persons of Hispanic origin represent eight percent of the population in the county and 12 percent of the population in the study area. Census Tract 1122, see **Figure 13-Map of Census Tracts**, the neighborhood of East San Rafael, has the highest percentage of ethnic minorities in the project area and is disproportionate in comparison to the county.

## Age Distribution

According to 1990 U.S. Census data, the median age in Marin County is 38.1. Most of the age distribution in the study area is proportionately similar to that of the entire county.

Census Tract 1192, see **Figure 13-Map of Census Tracts**, which includes the Larkspur neighborhood of Bon Air Hill, has a disproportionately higher median age of 48.9. Many of the residents in the Bon Air Hill neighborhood are elderly and consequently this census tract has the largest number of people over 60 years old of any community in Marin County. Census Tract 1082 at the northern end of the project limits has a relatively high median age of 44.0. The lowest median age of 28.0 occurs in Census Tract 1122, the community of East San Rafael.

## Income

Marin County has the highest median household income of all the San Francisco Bay Area Counties. Marin County also had the highest increase of household income during the 1980s. The highest median household incomes in the study area occur in Census Tracts 1200, 1211 and 1212, see **Figure 13-Map of Census Tracts**, which include portions of the communities of Larkspur and Corte Madera.

Census Tracts 1110 and 1122, see **Figure 13-Map of Census Tracts**, which include the low income neighborhoods of downtown San Rafael and East San Rafael, respectively, have the lowest median household incomes. East San Rafael, Census Tract 1122, also has 20 percent of the households below the poverty level, the highest percentage in the study area and significantly higher than the county as a whole. Census Tracts 1101 and 1110 also have relatively high levels of households below the poverty level. Most of the households below poverty level in these two census tracts occur in their respective San Rafael neighborhoods of Montecito, which has a high percentage of elderly and low income housing, and downtown San Rafael.

### 3.13.4 Community/Neighborhood Characteristics

The proposed project alignment would pass through portions of neighborhoods in the Planning Areas of Marin County, the Town of Corte Madera, the City of Larkspur and the City of San Rafael. The term "neighborhood" refers to areas that combine population characteristics with certain physical features or distinguishing characteristics. Neighborhoods adjacent and near the project area are identified and briefly characterized below and are shown in **Figure 12-Map of Planning Areas and Neighborhoods**.

The southern portion of the project is within the Town of Corte Madera Planning Area and the South, North and East Planning Areas of the City of Larkspur. The Larkspur South Planning Area is located south of Corte Madera Creek, east of Magnolia Avenue, and west of US 101. Neighborhoods, including Greenbrae Marina and Greenbrae Boardwalk, in this planning area and in the general vicinity of the project consist of single family houses, open space, parks and the water environment of Larkspur Creek, Corte Madera Creek and Lucky Creek. Redwood High School is located in this planning area. The neighborhood closest to the project alignment is an unincorporated portion of the Greenbrae Boardwalk neighborhood consisting of single family houses located along Lucky Drive and Corte Madera Creek.

Larkspur North is located north of Corte Madera Creek and west of US 101. This planning area is dominated by the neighborhood of Greenbrae. The southwestern portion of this community is unincorporated while the northeastern half lies within Larkspur. Greenbrae is an area of single family ranch houses and mature landscaping. On the south side of Sir Francis Drake Boulevard, the planning area includes the neighborhoods of Bon Air, Bon Air Hill and Bon Air Landing/South Eliseo. Bon Air consists of two residential single family developments, which

are part of a Master Plan for the entire Bon Air area, including the Bon Air Shopping Center and commercial offices. Both developments have good access to Corte Madera Creek and US 101. The Bon Air Hill and Bon Air Landing/South Eliseo neighborhoods consist primarily of multiple family buildings.

Larkspur East, located east of US 101, includes the neighborhoods of Greenbrae East, Greenbrae Boardwalk and Larkspur Landing Circle. US 101 separates this area from the rest of the Larkspur community, including the library and schools. The residential portion of Greenbrae East consists of two mobile home parks adjacent to Redwood Highway. Both of these mobile home parks provide affordable housing, much of which is occupied by the elderly. The parks have easy access to stores, the Larkspur Ferry, and open space along the bay.

The Greenbrae Boardwalk neighborhood bordering Corte Madera Creek, Northwestern Pacific Railroad (NWPR) right of way, and the Corte Madera Marsh Ecological Reserve is a houseboat colony of fifty houses which can only be accessed by foot from a common parking lot.

Larkspur Landing Circle is an area of multifamily developments that lie between other commercial uses including office buildings, a hotel, and a regional-specialty shopping center. This neighborhood offers a variety of services, employment opportunities, excellent transportation, and other amenities such as views of both the mountains and water.

North of Larkspur, US 101 enters the San Rafael Basin Planning Area and the neighborhoods of California Park, East San Rafael and Francisco Boulevard West.

East San Rafael, also known as the "Canal neighborhood" is a major residential community and employment center located in the area south of the San Rafael Canal and east of US 101. The residential portion of the neighborhood, located northwest of Bellam Boulevard, consists primarily of large apartment buildings and condominium complexes with single family homes along the Canal. The majority of the units are rentals. Non-residential uses in the neighborhood include an older industrial area north of Bellam Boulevard and west of Belvedere Street, a new light industrial/office area south of Bellam Boulevard, and a light industrial/office and industrial area between I-580 and US 101. Natural features in the neighborhood include the San Rafael Canal, a Bay park band shoreline, wetlands, and the San Quentin Ridge hillside.

Francisco Boulevard West is a commercial and industrial neighborhood south of downtown and west of US 101. This neighborhood also includes the tributary residential areas of California Park and Bret Harte.

The project alignment continues north into the neighborhoods of Montecito and the Downtown Activity Center, see **Figure 12-Map of Planning Areas and Neighborhoods**. Residential development in Montecito is older, mixed and relatively high density, composed of duplexes/fourplexes, apartments, and smaller single family homes. Commercial areas, including the Montecito Shopping Center, are located along Second, Third and Fourth Streets. Specialized marine uses are concentrated between the shopping center and the San Rafael Canal. San Rafael High School is also located in this neighborhood.

The Downtown Activity Center is the area defined by Mission Avenue, US 101, Second Street, and the beginning of the Miracle Mile at Fourth Street. This neighborhood is an important specialty retail, financial, employment, and cultural center for the City of San Rafael and Marin County. City of San Rafael policy encourages a balance of mixed uses in the Downtown Activity Center Neighborhood, including residential, retail, office and public facilities. Downtown residences provide a significant amount of housing for low and moderate-income people. The center for civic and cultural events is located in the vicinity of Mission and Fifth Avenues. Residents and downtown workers are provided recreational facilities at Boyd and Albert Parks.

North of the Downtown Activity Center are the neighborhoods of Lincoln and Dominican-Black Canyon. The Lincoln neighborhood, west of US 101, has a diverse mixture of housing types and styles. High density, renter-occupied units occur along the Lincoln Avenue Corridor, while lower-density single family homes are found on the hillside areas of San Rafael Hill. The Brookdale area, which sits between the NWPR right of way and Lincoln Avenue, north of the Linden Lane Undercrossing, is a street of single family residences.

Dominican-Black Canyon is a residential neighborhood bordered by US 101 on the west, and includes the hills of Harry A. Barbier Memorial Park on the east. Most residences are single family homes although there are some duplexes. Housing values and rents are significantly higher than the Planning Area median. Dominican College, located in the neighborhood, also provides residents with cultural and informal recreational facilities.

The northern portion of the proposed project passes through the Civic Center and the Northgate Activity Center neighborhoods. The Civic Center neighborhood consists primarily of low-density single family homes bordered by park land/open space and the Marin County Civic Center. The Gallinas School is located in this neighborhood.

The Northgate Activity Center neighborhood encompasses the Marin County Civic Center, Northgate Shopping Center, and the Terra Linda residential and employment area. The southern portion of the neighborhood, which is in the vicinity of the proposed project, includes the Marin County Civic Center and its related activities on the east side of US 101, and the high density residential and commercial facilities along Merrydale Road on the west side of the highway.

### 3.14 Noise

Information presented in this section is based on a *Traffic Noise Impact Report* prepared for the Marin 101 HOV Lane Gap Closure Project. This *Traffic Noise Impact Report* is referenced in **Appendix E** and is available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. This section describes the existing noise environment in the project area and the Federal Highway Administration (FHWA) Noise Abatement Criteria.

Noise is often defined as unwanted sound and is perceived subjectively by each individual. Sound is measured and quantified in terms of a logarithmic scale in units called decibels (dB). Research on human sensitivity to noise has shown that a 3 dB increase in the sound level is barely noticeable, while a 10 dB increase would be perceived as twice as loud. Human hearing is not equally sensitive to sound in all frequencies. A frequency-dependent adjustment called A-weighting has been devised so that sound may be measured in a manner similar to the way the human hearing system responds. An A-weighting provides a generally accepted descriptor for traffic noise. The A-weighted sound level decibel is often abbreviated "dBA." The level of environmental noise fluctuates with the cycle of human activities. The sound level descriptor used in the *Traffic Noise Impact Report*, see **Appendix E**, is the "hourly energy equivalent sound level," Leq(h). Leq(h) is a useful means of describing the measurement of varying sound levels over an interval of time, in this case one hour. It is a particularly stable and predictable unit for the description of traffic noise and is well correlated to people's reaction to noise.

#### 3.14.1 Noise Sensitive Areas

Noise sensitive areas are usually identified as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals. Far away receptors, such as residences on hillsides, would typically only be considered if their noise levels approach or exceed 67 dBA. Further evaluation of reflective noise and alternative noise

barrier locations and types are planned during the final design phase at the request of the Marin County Congestion Management Agency.

The major residential areas along the project alignment are located west of US 101 between Sir Francis Drake Boulevard and Auburn Street, and on both sides of US 101 between Mission Avenue and North San Pedro Road. Other noise sensitive areas include:

- the Marin Mobile Home and RV Park, located east of US 101 and south of Corte Madera Creek;
- two motels near the US 101/I-580 Interchange, located east of US 101; and
- Coleman School and Marin Civic Ballet School, located east of US 101 in the City of San Rafael.

There are no hospitals adjacent to or nearby the project route. Land uses along I-580 and the remainder of US 101 consist of general commercial, office space and light industrial use.

The existing measured values of peak-hour Leq(h) in the project area varied between 57 and 75 dBA, which are considered typical for areas adjacent to a major traffic route. **Table 7-Highest Measured Noise Levels** lists the measurement locations and the highest average hourly noise levels measured. The locations of the noise measurements are shown in **Figure 14-Map of Noise Measurement Sites**. For more specific details about the noise study see the *Traffic Noise Impact Report*, referenced above and in **Appendix E**.

**Table 7 Highest Measured Noise Levels**

Site No.	Measurement Location	Leq(h) (dBA)
1	Apartment on Merrydale Road	62
2	25 Tarrant Court	61
3	Shamrock Apartment (Tarrant Ct. & San Pablo Ave.)	60
4(a)	24 Merrydale Road #18	60
4A	Apartment complex at end of Merrydale Road	63
4B	Apartment complex on Merrydale Road	57
5(a)	1761 Lincoln Avenue	66
6(a)	138 Villa Avenue	66
7(a)	243 Glen Park Avenue	60
8(a)	22 Brookdale Avenue	59
9(a)	1 Brookdale Avenue	63
10	Marin Civic Ballet School	61
11	25 Plum Tree Court	62
12(a)	710 Belle Avenue	65
13	1011 Irwin Avenue	69
14(a)	39 Stevens Place	64
15(a)	37 Albion Street	75
16	Motel Bermuda on Francisco Boulevard	67
17(a)	132 Via La Cumbre	69
18	72 Via La Cumbre	61
19	Marin Mobile Home Park	70
20	14 Lucky Drive	74
21(a,CT)	121 Altena Street	75
22(a,CT)	380 Tiburon Boulevard	67
23(a,CT)	83 Corte Placida	67
24(a,CT)	95 Corte Placida	65
25(a,CT)	200 Via La Cumbre	70

Note: (a) denotes 24-hour measurement  
 (CT) denotes measurement conducted by Caltrans  
 Noise measurements 1-20 were taken by Engineering Science, Inc., noise consultants.

### 3.14.2 Noise Abatement Criteria

Federal Highway Administration (FHWA) regulations for the implementation of noise abatement are found in Title 23, United States Code of Federal Regulations Part 772 - Procedures for Abatement of Highway Traffic Noise and Construction Noise. Both FHWA regulations and Caltrans policy require consideration of noise abatement for freeway projects on new alignment or major freeway reconstruction projects when the predicted future traffic noise levels approach or exceed the noise abatement criteria, or when the predicted noise levels increase substantially.

The FHWA Noise Abatement Criteria (NAC) are based on traffic characteristics which yield the noisiest hour Leq(h) for various land use activities, see **Table 8-Noise Abatement Criteria**. A noisiest hour Leq(h) of 67 dBA for Activity Category B is applicable to the exterior of residential areas identified in this report as well as parks and other recreational facilities. The noisiest hour Leq(h) of 72 dBA is applied to the exterior of commercial and industrial areas, which are classified as Activity Category C. All receptors in this report fall into these two activity categories. As a reference, **Table 9-Common Indoor and Outdoor Noise Levels** shows the relative loudness of various common indoor and outdoor activities.

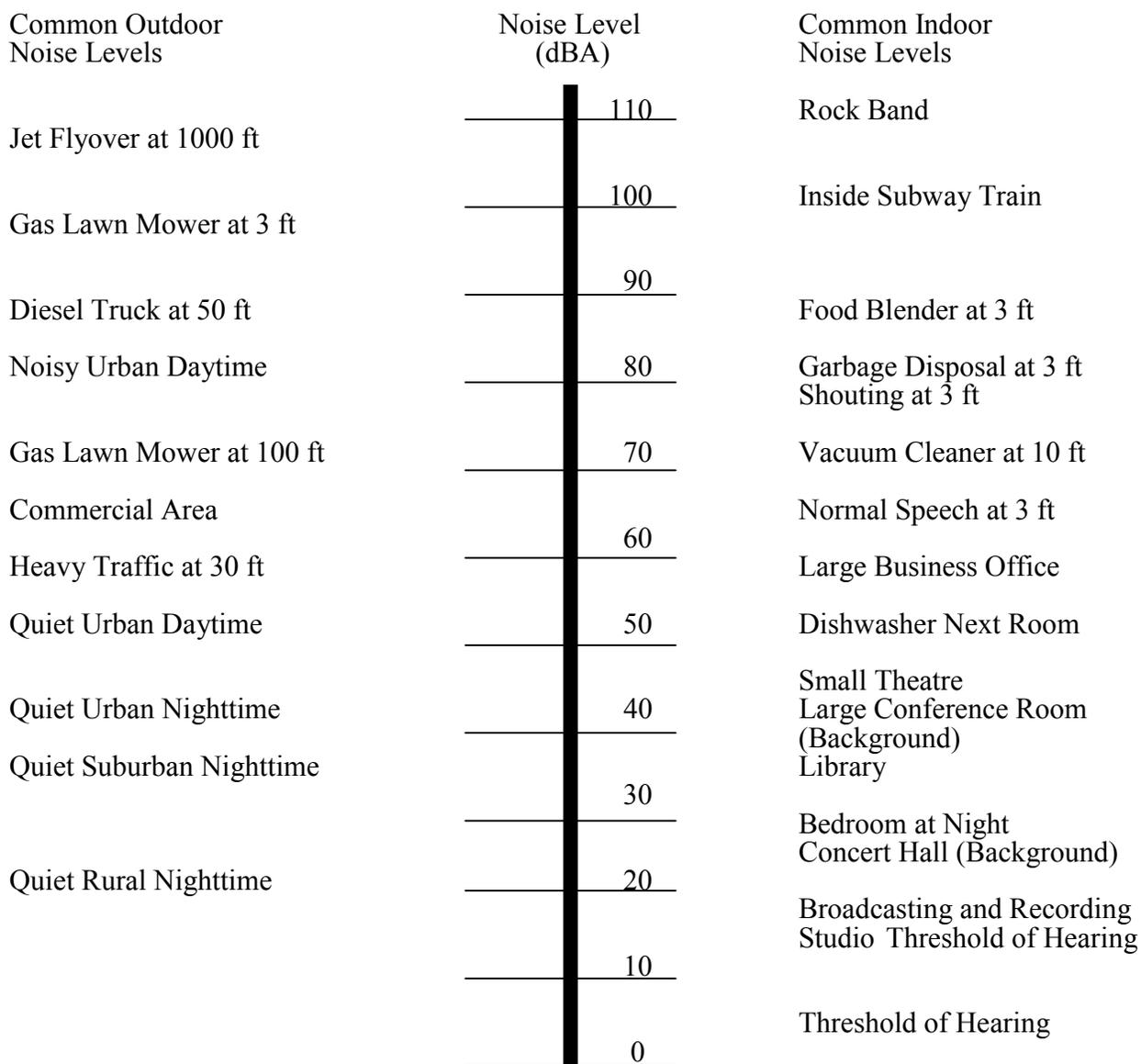
**Table 8 Noise Abatement Criteria**  
[Hourly A-Weighted Sound Level-Decibels (dBA)]

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

Note: This table is excerpted from Caltrans Traffic Noise Analysis Protocol.

Noise abatement is considered when the predicted worst hourly noise levels approach or exceed the NAC or when a substantial noise increase has been identified. The term "approach or exceed" is defined as 1 dBA less than the criterion value. For example, a receptor in Activity Category B receiving a future noise level of Leq(h) 66 dBA would qualify for consideration for noise abatement. FHWA does not define substantial increase; it is a choice left to individual state highway agencies. Based on FHWA regulations, Caltrans has defined substantial increase in the Caltrans Traffic Noise Analysis Protocol, October 1998, as a 12 dBA or greater increase over existing noise levels.

**Table 9 Common Indoor and Outdoor Noise Levels**



### 3.14.3 Reflective Noise

#### Reflected Noise and Noise Barriers

One of the issues raised in recent years concerning negative effects of noise barriers is reflected noise. The complex nature of noise barrier reflections, the difficulties in measuring them, and the controversy surrounding the relevance of their impacts deserve a detailed discussion.

More noise barriers have been constructed in California than in any other state and there are many different configurations in alignment, profile and height. Noise barriers are located along one or both sides of highways of different widths, along ramps, connectors and interchanges, in urban, suburban, and sometimes rural regions under varying traffic conditions. The receivers, for which they were designed, are located in different types of terrain, topography, and climatic conditions. The combinations and permutations associated with the vast variety of conditions inevitably increase the possibilities of creating controversies over the extent of noise reflections

by barriers. Hence, it is only natural that noise reflection issues are on the rise in California, especially since almost all California barriers are made of noise reflective material with hard, relatively smooth surfaces (masonry, concrete). In most cases, when measured, noise increases due to reflections turn out to be so small that most people do not notice them. The people that do perceive increases in noise are usually suddenly made aware of freeway noise by some event that triggers the awareness, such as the construction of the noise barrier. Measured increases due to noise reflections of more than 3 dBA have never been measured by Caltrans.

Many of the alleged increases in noise were actually due to changes in meteorology. Atmospheric refraction due to wind shear and temperature gradients can account for 10 to 15 dBA variations when the same sources are measured from distances of 1.5 to 3 kilometers (approximately 1 to 2 miles).

### **Noise Barrier Reflections**

The effects of single noise barrier reflections are distance dependent. At distant receivers, the ratios of direct/reflected noise path lengths as well as those for near/far lane distances approach one. When this is the case, contributions of direct and reflected noise from each lane contributes roughly the same energy (of course there will always remain a slight loss of acoustical energy due to imperfect reflections). For receivers close to the highway, however, the distance ratios become less than one and the noise at the receiver is dominated by direct noise from the near lanes. The result is less contribution from reflected noise.

Noise sources are distributed over the width of the highway. The paths of reflected noise are always longer than the direct noise paths. Noise barriers are not perfect reflectors and the traffic stream most likely interferes with the reflections. Because of these factors, reflected noise contributions are less than those of direct noise, and seldom increase noise levels by more than 1 or 2 dBA. The human ear cannot perceive such small increases.

Noise contributions from parallel barrier reflections are dependent on the distance from the source to the receiver. Noise contributions of reflections between parallel barriers degrade the performance of each noise barrier (insertion loss). How much degradation takes place depends of course on the site geometry and barrier configurations. There is an important relationship between the ratio of the separation between parallel barriers and the average height of the barriers on the amount of insertion loss degradation. As a rule, if the ratio of the separation distance between two parallel barriers to the average height of the two parallel barriers is 10:1 or greater, the insertion loss degradation is less than 3 dBA, and not noticeable to the human ear. This has been supported by Caltrans research and by research done by others.

### **Minimizing Reflections**

When designing parallel noise barriers, it is recommended that a 10:1 ratio (separation distance to barrier height) is maintained between the two barriers, in order to avoid the possibility of perceivable barrier performance degradations.

Sound absorption has been promoted as a solution for noise reflection where actual problems would be identified. Structural integrity, effectiveness, safety, cost, and other factors contribute to the potential use of sound absorptive material. Sound absorptive materials can either be an inherent property of the barrier or can be added on to an existing barrier (retrofit). Either way, the cost of the barrier will likely increase substantially.

### **Effects of Noise Barriers on Distant Receivers**

With the proliferation of noise barriers in California, some recent public concern has emerged that under certain conditions of topography and meteorology, noise barriers increase noise levels at receivers between 1/2 kilometer to 3 kilometers (more than 1/4 mile to 2 miles) from freeways. The concerns are based on subjective perception only. No objective evidence based on noise measurements has ever been advanced that noise barriers increase noise levels at any distance. Caltrans' experience has been that atmospheric conditions can cause noise levels at those distances to fluctuate by more than 10 dBA, with or without noise barriers.

Refraction is the principle atmospheric process responsible for the fluctuations. A vertical gradient of either temperature or wind velocity produces a corresponding vertical gradient of sound velocity. This causes sound waves to refract (bend) either upwards or downwards. Upward refraction occurs during sound propagation in upwind direction or normal temperature lapse conditions (air temperatures decreasing with height). This tends to send noise skyward, leaving a noise "shadow" near the ground and thereby reducing noise levels. This occurs with or without noise barriers. Downward refraction occurs during sound propagation in downwind direction, or in temperature inversions (temperature increasing with height above the ground). Downward refraction tends to send skyward noise down, concentrating noise near the ground, thereby increasing noise levels, both with and without a barrier.

### **Caltrans Reflective Noise Studies**

On the issue of reflective noise, Caltrans has done two very detailed studies, one along Route 405 in the Los Angeles community of Brentwood, and another along Highway 99 in south Sacramento. These studies dealt with the acoustical performance of parallel noise barriers and the possibility of noise reflection problems.

The Route 405 study was part of a demonstration project to test acoustically absorptive treatment on one of two parallel masonry noise barriers. The project was initiated by Caltrans District 7 (Los Angeles) in response to concerned home owners in Brentwood living at distances of 0.3 - 0.6 kilometer (0.2 to 0.4 mile) away from the freeway. The terrain between the residences and the freeway ranged in height from -6 meters to +15 meters (-20 feet to +50 feet) relative to the freeway and was occupied by single and multi-story residential units. Some homeowners perceived an increase in noise when the opposite noise barrier was constructed about seven years after the near noise barrier had been completed.

The Division of New Technology, Materials and Research (TransLab), was contacted to perform the before and after treatment noise study. TransLab's approach was to take simultaneous noise measurements at 14 different locations. Eleven were in the vicinity of the freeway noise barriers at distances up to 61 meters (200 feet) from the near noise barrier and at heights of up to 7 meters (23 feet) above the ground. The remaining three were located near residences. Concurrent meteorological observations (wind speed, direction, temperature and humidity) and lane-by-lane traffic counts on the Route 405 freeway, on/off ramps, and Sunset Boulevard were also taken. Fifteen "before" and ten "after" measurements were taken at the freeway sites; twenty-seven "before" and twenty-two "after" at the three distant sites. The "before" and "after" data were carefully matched by wind speed and direction, and normalized for traffic variations.

Detailed analysis showed that the acoustical material reduced the noise by an average of one dBA. Human ears cannot perceive a change of one dBA. Since the acoustic material was an almost perfect noise absorber of the reflective noise, the after treatment condition, in essence, simulated a no noise barrier condition on the opposite side of the freeway. From the results, Caltrans concluded that there was no reflection noise problem. However, fluctuations in noise levels at 0.3 kilometer (0.2 mile) and greater were as large as 8 dBA with relatively minor

changes in wind speed and direction. Wind was the single most important factor in changing noise levels at distances beyond 61 meters (200 feet) from the barrier, even greater than differences in traffic volumes.

In 1991, TransLab completed the Sacramento Highway 99 study, which represented one of the first systematic attempts to quantify the effects of multiple reflections between parallel masonry noise barriers for configurations representative of many barrier locations in California. The research consisted of extensive noise, traffic, and meteorological measurements and analyses during three stages:

1. without any noise barriers,
2. after construction of the near noise barrier, and
3. after completion of the far noise barrier.

More than one hundred 15-minute measurements were taken at 11 locations, simultaneously, ranging from 0 to 61 meters (200 feet) behind the near barrier and at heights of 1.5 to 7 meters (5 to 23 feet) above the ground. The objective was to determine how much the performance of the near barrier would be decreased by the reflections off the far barrier. The staged data were carefully matched by meteorology. The results indicated that the average reduction in near noise barrier performance ranged from 0 to 1.4 dBA. Barrier degradation of less than 3 dBA is not noticeable to the human ear. The data showed large fluctuations in noise that occurred during all three stages (i.e., with or without noise barriers) as a result of meteorological conditions. Under all measured conditions, however, the barrier provided adequate insertion loss (5 dBA reduction).

The above studies were performed under carefully documented "real world" conditions and showed no evidence of reflection problems. However, the studies did clearly demonstrate the profound effect of meteorological conditions on traffic noise levels.

### **Reflective Noise Studies by Others**

The U.S. Department of Transportation, Volpe National Transportation Systems Center, completed two parallel barrier studies during the period of October 1986 through April 1994. The studies were funded by the highway agencies of seventeen states, including California.

The first study examined the performance of two parallel experimental highway noise barriers constructed on opposite sides of a two-lane asphalt service road at Dulles International Airport near Washington, D.C. The barriers were constructed in such a way that they could be configured to have absorptive and/or reflective roadside facades, or be independently tilted outward, away from the roadway, at angles of 7, 15 and 90 degrees. A 90-degree tilt angle simulated effective removal of the barrier. The barrier behind which noise measurements were made was 152 meters (500 feet) long. The barrier on the opposite side was 76 meters (250 feet) long and centered on the 152-meter barrier. For each of the twelve individual barrier configurations, noise and meteorological measurements were made at ten locations behind the 152-meter barrier and ten locations in an adjacent open field site, using the same distances from the noise sources and heights above the ground. The noise sources were four individual test trucks and an artificial fixed point source (speaker system) used to simulate a pass by of each test truck.

A second site along Interstate 495 in Montgomery County, Maryland, was used to measure parallel barrier degradation under more realistic yet still severe conditions of free-flowing traffic but with a width-to-height ratio of 9:1. The degradations were measured using ten microphone locations behind a parallel barrier section and simultaneously at ten locations behind a single noise barrier adjacent to the parallel barriers. In this configuration the maximum degradation reached 2.8 dBA.

Together with the Caltrans studies, it is our conclusion that parallel barrier sites with a width-to-height ratio of 10 or more would have a degradation of less than 3 dBA, an imperceptible noise increase over a single barrier.

All these reflective noise studies clearly indicate a degradation of less than 3 dBA at parallel barrier sites with a width-to-height ratio of 10 or more.

### **Noise Levels Behind a Single Noise Barrier**

The perceived increases in noise levels behind a single noise barrier on the same side of a freeway, relates in part to the above-mentioned studies. The noise level fluctuations at distant receivers are far more influenced by varying meteorological conditions than the presence or lack of a noise barrier. There is no question that noise barriers are effective in the vicinity of highways, within 100 meters (330 feet) or so. Caltrans has collected enough data over the years to substantiate this.

Caltrans has also experienced, in the course of many measurements, that beyond 100 meters (330 feet) or so, noise levels often approach ambient levels (the noise levels associated with normal day-to-day activities in the community). For obvious reasons, a noise barrier cannot attenuate noise below these levels. However, Caltrans has never experienced noise increases (over no-barrier noise levels) at any distance behind noise barriers.

Some claim that noise waves go over the noise barrier and come back to the ground. This is diffraction and is actually responsible for noise attenuation, rather than an increase in noise, when compared with the direct noise received without a noise barrier.

Another popular perceived increase in noise due to noise barriers is that the noise barrier lifts the noise over tiers of homes that normally would shield the receiver. Yet, a noise barrier will not more elevate the noise source over tiers of homes than the intervening homes will. Noise barriers are generally restricted in height to 4.8 meters (16 feet), an amount approximately equal to the average height of residential development.

### **Existing Noise Barriers in San Rafael as a Result of Previous Highway 101 Widening**

A *Noise Impact Report*, see **Appendix E**, was prepared in June 1981 by Caltrans to evaluate the noise impact of the Highway 101 widening project in San Rafael in the 1980s. Existing traffic noise levels ranged between 67 and 76 dBA (Leq(h)) along the freeway side of the receptors tested. The noise prediction method used in this study was based on the FHWA model. This model was based on the Leq(h) descriptor which is derived from the National Reference Energy Mean Emission Level as a function of speed. The inputs for this model were traffic speeds, volumes, geometric configurations, receptor distances, and volumes of medium and heavy trucks. The federal design Leq(h) noise level of 67 was exceeded at various receptors. Noise barriers were proposed as an abatement measure at these locations.

A map, see **Appendix I**, of the Noise Measurement Sites from the 1981 *Noise Impact Report* shows locations of the noise measurement sites. The street addresses where the noise measurements were taken and the actual, measured Leq(h) noise levels are also included.

The location of the noise barriers proposed by the 1981 *Noise Impact Report* are shown on the map in **Appendix I-Proposed Noise Wall Location**. The heights of the proposed noise barriers are also shown on this exhibit. The noise barriers that were built as a result of the highway widening were erected to abate highway noise levels exceeding 67 dBA (Leq(h)). These noise barriers were cost-effective and met the consensus of the affected property owners.

At the time of this study, Caltrans did not have a good understanding of reflected noise and the width to height ratio of 10:1. Subsequently, this concept was not used or discussed in the noise study.

### Before and After Noise Barrier Study in San Rafael (1983–1988)

At the request of the Department of Public Works of San Rafael, Caltrans conducted a before and after noise barrier study in the mid-1980s to evaluate the effectiveness of the proposed noise barriers in San Rafael. A summary of the test results is shown in **Table 10-Marin 101 Comparison of Noise Levels Before and After Completion of Noise Walls**. As shown in **Table 10**, noise measurements were taken in 1983 before the construction of the noise barriers in San Rafael. In 1988, after the construction of the noise barriers, noise measurements with minimal meteorological matching were taken at the same locations as that of 1983. Based on the result of the study, the noise barriers were acoustically effective and reduced noise levels as predicted.

**Table 10 Marin 101 Comparison of Noise Levels  
Before and After Completion of Noise Walls**

Site	Leq(h) Before	Time	Leq(h) After	Time	Approximate Distance from Freeway
Villa Motel	69*	8-8:30 a.m. (9/07/83)	59	8-8:30 a.m. (2/10/88)	150 ft west
344 Prospect	64*	7-7:30 a.m. (9/07/83)	61*	7-7:30 a.m. (2/10/88)	750 ft west
234 Coleman	57*	8-8:30 a.m. (9/07/83)	57	8-8:30 a.m. (2/10/88)	1,300 ft west
48 Villa	71*	1-1:30 p.m. (9/07/83)	62	1-1:30 p.m. (2/09/88)	125 ft east
3 Corte Mesa	66*	4-4:30 p.m. (9/07/83)	61	4-4:30 p.m. (2/09/88)	500 ft east
159 Dominican	64*	5-5:30 p.m. (9/07/83)	61	5-5:30 p.m. (2/09/88)	1,100 ft east
230 Villa	65*	2:45-3 p.m. (9/19/86)	57*	11:30-11:45 a.m. (2/17/88)	175 ft east

\* Denotes spot noise reading (others are 24-hour readings).

### Current Noise Complaints

A portion of US 101, between Linden Lane and North San Pedro Road, traverses a small valley. There are houses on the hills on both sides of US 101 overlooking the freeway. Some homeowners located on the hills overlooking the freeway have expressed concern that the noise increased after the construction of the noise barriers alongside the freeway. Continuing research by Caltrans and others have provided some understanding of these problems. Single noise barriers are known to increase noise levels by 0.5 to 2.4 dBA at an elevated receptor directly across the highway.

### Marin 101 HOV Lane Gap Closure Project Noise Impact Report - June 1997

The *Noise Impact Report* of June 1997, see **Appendix E**, was based on the Code of Federal Regulations (23 CFR 772) and Caltrans policy in assessing the noise impacts and recommending noise abatement measures to reduce impacts to acceptable levels. After a detailed study, noise

barriers were recommended. These barriers met the Federal Highway Administration (FHWA) and Caltrans noise abatement criteria. The reasonableness and feasibility, including cost-effectiveness, of each noise barrier will be further evaluated as more detailed design information becomes available. The exact dimensions, locations and aesthetics of noise barriers will be determined during the final design phase.

This study was done under an approved state-of-the-art methodology, which is still acceptable, and which does not take into account reflective noise for the purposes of impact identification only. As demonstrated above, with reference to various reflective noise studies, reflective noise does not, in itself, constitute a need for noise abatement.

Furthermore, it is Caltrans policy to avoid noise reflections through appropriate design measures, such as avoiding barrier configuration with aspect ratios less than 10:1, or if unavoidable, the choice of an appropriate barrier material, if feasible and reasonable.

### **3.15 Visual Environment**

This section describes the existing visual environment of the project area in terms of both motorists and area residents. The information is based on the *Visual Resources Technical Report* prepared for this project. The visual analysis followed Federal Highway Administration guidelines for visual impact assessment of highway projects. The analysis includes visual quality criteria, view distance categories, viewers and viewer sensitivity, and landscape units. For specific details, see the *Visual Resources Technical Report* referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

#### **3.15.1 Visual Resources**

The visual components of the project area are those physical features upon which visual experience is based. The landscape components forming the visual resources are landforms, bodies of water, vegetation and man-made developments. These include views of Mount Tamalpais, San Francisco and San Pablo Bays, surrounding hills and ridges with grass and oak vegetation, and views of residential and commercial development adjacent to US 101. Other distinctive visual resources include views of the Richmond-San Rafael Bridge, Corte Madera Creek and certain residential areas.

Within the project limits, US 101 is not officially designated as a State Scenic Highway nor identified as eligible for designation. A negative feature of the project area is the abundance of nondescript commercial and industrial development.

#### **3.15.2 Landscaped Freeway Status**

If a freeway contains a continuous planting parallel to the highway centerline for at least 305 meters (1,000 feet), it is classified as a Landscaped Freeway. Portions of US 101 and I-580 are classified as Landscaped Freeway. Landscaped Freeway status controls outdoor advertising along the freeway.

### 3.15.3 Project Views

#### Motorists

US 101 passes through the summit of Cal Park Hill located near the southern limit of the project and through the summit of Puerto Suello Hill located near the northern limit of the project. Between these hills, the view orientation of motorists constantly changes. Views from the highway toward visual resources open and close as the highway winds through commercial and residential communities from Corte Madera and Greenbrae, north through San Rafael.

Noise barriers, landscaping, and suburban and commercial development that enclose the highway corridor define existing foreground views. Foreground and midground views are directed toward nearby landforms, waterbodies, vegetation and man-made development. There are occasional background views from various points along the highway corridor. The most prominent views are:

- From the south side of Cal Park Hill looking south to Mount Tamalpais, San Francisco Bay and Corte Madera marsh.
- From Greenbrae and Southern Heights Ridge in San Rafael looking north, midground views reveal the highway corridor and the US 101/I-580 Interchange whereas background vistas include the San Rafael Viaduct, Dominican College, residential areas at the foot of the surrounding ridges, the surrounding mountain ranges, San Pablo Bay, the Marin Islands and the Richmond-San Rafael Bridge.
- From the San Rafael Viaduct looking south to the Richmond-San Rafael Bridge.

#### Residents

Most residents within the project limits see the project area from a midground or background perspective. Few see the project area as a foreground view. The most prominent views are:

- From Greenbrae, south of Cal Park Hill, midground views reveal Larkspur Landing to the east, and the US 101/Sir Francis Drake Boulevard Interchange, Corte Madera Creek and associated marshland to the south. These views are subjected to the close proximity of the highway corridor and west-facing cut slope at the top of Cal Park Hill. Views of Larkspur Landing are filtered by the highway planting on the east-facing fill slope.
- From Greenbrae and Southern Heights Ridge in San Rafael, background views reveal the highway corridor, the US 101/I-580 Interchange, the San Rafael Viaduct and Dominican residential areas at the foot of the surrounding ridges. Distant views of the surrounding mountain ranges, San Pablo Bay, the Brother Islands and the Richmond-San Rafael Bridge are also revealed.
- From the area south of Dominican College, mid to long-range views of the San Rafael Viaduct and portions of the highway are seen.
- From north of the San Rafael Viaduct on the east and west sides of the highway, filtered mid-range views of the highway exist, and residents in the areas immediately adjacent to existing noise barriers have short-range views of these barriers, specifically in the Brookdale and Villa Avenue neighborhoods.

Further discussion of specific prominent visual elements, vividness, intactness and unity is available in the Visual Resources Technical Report, referenced above and in **Appendix E**.

## 3.16 Air Quality

The following section characterizes air pollutants from transportation sources and describes existing air quality conditions in the project area. Applicable federal and state air quality standards, policies and protocols are also presented.

### 3.16.1 Meteorology and Air Quality

Air quality in a region is a function of emissions, topography and meteorology. The San Francisco Bay Area is a large shallow basin ringed by hills and valleys. This topography gives the area potential for trapping and accumulating air pollutants. Depending on the meteorological conditions, the actual pollution concentrations present in the air fluctuate widely from season to season and from day to day. Pertinent meteorological parameters include temperature, sunlight, wind speed, wind direction, atmosphere stability and mixing height. Normally, natural ventilation in the Bay Area is adequate in dispersing most of the pollution. However, conditions during warm, windless, and sunny days favor the photochemical reactions of ozone formation, thus creating smog. Carbon monoxide and particulate matter reach their highest levels in late fall and winter when air temperature inversion can occur at night. But the shallow inversions that cause the pollutant buildup usually do not persist when destroyed by heat in the afternoon.

### 3.16.2 Air Pollutants

Major pollutants directly emitted from automobiles are carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>) and hydrocarbons (HC). Indirect emissions include ozone (O<sub>3</sub>) and suspended particulate matter (PM<sub>10</sub>).

#### Carbon Monoxide (CO)

Incomplete oxidation of carbon in the fuel produces carbon monoxide (CO). CO is a relatively stable and site-specific pollutant with major concentrations generally found immediately adjacent to roadways. Almost 70% of the Bay Area's CO comes from motor vehicles.

#### Nitrogen Oxides (NO<sub>x</sub>)

The mixture of nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) is known as nitrogen oxides (NO<sub>x</sub>). They are involved in a photochemical reaction that produces ozone (O<sub>3</sub>). At higher concentrations, damage has been noticed in sensitive crops and laboratory animals. Over half of the NO<sub>x</sub> in the Bay Area is produced by motor vehicle exhaust.

#### Hydrocarbons (HC)

Hydrocarbons (HC), or organic gases, result from incomplete combustion of fuels. Aerosol sprays, paints, solvents and gasoline are also a source of hydrocarbons. Hydrocarbons react with NO<sub>x</sub> in the presence of sunlight to produce ozone. Over 50% of the public's total exposure to toxic air contaminants in the Bay Area comes from two organic compounds found in motor vehicle exhaust, benzene and 1,3-butadiene.

#### Ozone (O<sub>3</sub>)

Ozone is the primary constituent of photochemical smog. It is not emitted directly into the atmosphere, but is produced through a complex series of chemical reactions involving HC and

NO<sub>x</sub> in the presence of sunlight. Motor vehicle exhaust emissions contribute more than half of the pollutants that forms O<sub>3</sub> in the Bay Area.

### Suspended Particulate Matter (PM<sub>10</sub>)

PM<sub>10</sub> is the term used to describe small particles of any composition and origin with a diameter of 10 micrometers or less. Such particles are so small that they are not visible. They are a threat to health because they penetrate and lodge deep in the lungs. PM<sub>10</sub> emissions by motor vehicles are largely formed in the atmosphere from NO<sub>x</sub> and organic compounds, from brake and tire wear, and from vehicle travel over materials previously deposited on the travel surface.

#### 3.16.3 Ambient Air Quality

Under the federal Clean Air Act, EPA established the National Ambient Air Quality Standards (NAAQS) for air pollutants: CO, O<sub>3</sub>, NO<sub>2</sub>, PM<sub>10</sub> and SO<sub>2</sub> (sulfur dioxide), see **Table 11-State and Federal Air Quality Standards**. NAAQS are divided into two categories: primary standards designed to protect human health and secondary standards to protect property and aesthetics. The State of California has adopted the California Ambient Air Quality Standards (CAAQS) in addition to the NAAQS. Both NAAQS and CAAQS for CO are established for the average exposure times of 1-hour and 8-hours. The NAAQS are standards not to be exceeded more than once per year, while the CAAQS are not to be exceeded at any time.

**Table 11 State and Federal Air Quality Standards**

Pollutant	Averaging Time	California Standards	National Standards	
			Primary	Secondary
Ozone(O <sub>3</sub> )	1 hour	0.09 ppm	0.12 ppm	Same
	8 hours	----	0.08 ppm	Same
Carbon Monoxide (CO)	1 hour	9 ppm	9 ppm	Same
	8 hours	20 ppm	35 ppm	Same
Nitrogen Dioxide (NO <sub>2</sub> )	Annual Average	----	0.053 ppm	Same
	1 hour	0.25 ppm	----	----
Sulfur Dioxide (SO <sub>2</sub> )	Annual Average	----	0.03 ppm	----
	24 hours	0.05 ppm	0.14 ppm	----
	3 hours	----	----	0.50 ppm
	1 hour	0.25 ppm	----	----
Particulate Matter (PM <sub>10</sub> )	Annual Mean	30 ug/m <sup>3</sup>	50 ug/m <sup>3</sup>	50 ug/m <sup>3</sup>
	24 hours	50 ug/m <sup>3</sup>	150 ug/m <sup>3</sup>	150 ug/m <sup>3</sup>

ppm - parts per million concentration  
ug/m<sup>3</sup> - microgram per cubic meter

#### 3.16.4 Air Quality Regulations

Areas with air pollution levels that violate the established National Ambient Air Quality Standards (NAAQS) are called non-attainment areas. These non-attainment areas must develop air pollution control plans, called clean air plans, and compile them into a *State Implementation Plan (SIP)*. The *SIP* has an air pollutant emissions budget and transportation plans must be consistent with the basis and timetable of the *SIP* emissions budget. The 1990 Clean Air Act Amendments give preference to transportation projects that reduce motor vehicle emissions.

In 1993, the Environmental Protection Agency (EPA) required transportation-related projects and federal actions to conform to the local *SIP* air pollutant emission budget and be in the *Transportation Improvement Program (TIP)* and the *Regional Transportation Plan (RTP)*.

The air quality impact of this project has been addressed in accordance with the following legislation: the Clean Air Act and its Amendments, the EPA Final Regulations (1998), NEPA and CEQA.

### 3.16.5 Existing Air Quality

The San Francisco Bay Area has exceeded the National Ambient Air Quality Standards (NAAQS) for ozone in 1995 and 1996 and the more stringent California Ambient Air Quality Standards (CAAQS) ozone levels are exceeded each year. The Bay Area has met the carbon monoxide standards. The Bay Area has not been classified for PM<sub>10</sub> levels by the EPA, but violations of the more stringent CAAQS for PM<sub>10</sub> occur throughout the Bay Area.

In the statewide network of continual air quality monitoring stations, the nearest station is located on Fourth Street in San Rafael and is managed by the Bay Area Air Quality Management District (BAAQMD). At this station, there were no reported exceedences of the NAAQS or the CAAQS CO concentrations in recent years. **Table 12-Area's Highest Recorded Annual CO Concentrations** lists the recorded highest annual CO concentrations of recent years at the San Rafael station.

**Table 12 Area's Highest Recorded Annual CO Concentrations**

YEAR	1-HOUR	8-HOUR
1992	9 ppm	4 ppm
1993	8 ppm	5 ppm
1994	6 ppm	3 ppm

ppm: parts per million

## Chapter 4 CONSEQUENCES AND MITIGATION

This chapter discusses the potential beneficial and adverse social, economic and environmental consequences resulting from the alternatives under consideration and the proposed measures to mitigate adverse impacts.

### 4.1 Topography

There are no tangible terrain-related consequences of any project alternative, or of any combination of project alternatives, on the environment or on any social or economic resource.

### 4.2 Climate

There are no tangible climatic consequences of any project alternative, or of any combination of project alternatives, on the environment or on any social or economic resource.

### 4.3 Geology

No project alternative, or the cumulative effect of any combination of project alternatives, will have a tangible geological impact on the environment or on any social or economic resource. However, with the exception of the No-Build Alternative, all other alternatives have some geotechnical engineering constraints. These constraints include settlement problems, erosion issues, slope stability, and the presence of serpentine rock. These are discussed below and in the project *Geotechnical Report*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

#### 4.3.1 Geotechnical Engineering Constraints

The potential effects of these geotechnical constraints on the project and on the environment can be effectively managed by applying existing engineering solutions. The following sections discuss the project alternatives, the geotechnical consequences on the project and the environment, and the potential engineering solutions.

#### Settlement

With the exception of the No-Build Alternative, all the other alternatives involve widening and construction activities in areas of fill underlain by soft Bay Mud. This combination of fill over a thick layer of Bay Mud has potential for settlement problems, see **Table 13-Geologic Constraints and Project Alternatives**. As discussed in **Section 3.3-Geology**, these conditions exist in the Corte Madera Creek-Lucky Drive area and in the US 101/I-580 Interchange-Central San Rafael area. These areas are shown in **Figure 5-Map of the San Rafael 100-Year Floodplain**.

The Southbound Only HOV Lane Gap Closure Alternative requires widening in the Corte Madera Creek-Lucky Drive and the US 101/I-580 Interchange-Central San Rafael areas described above. The Southbound/Reversible HOV Lane Gap Closure Alternative involves additional widening in both of these areas as well as widening of the southbound San Rafael Viaduct structure in downtown San Rafael. The Ultimate HOV Lane Gap Closure Alternative requires structure widening in the Corte Madera Creek area and the San Rafael Viaduct area.

This alternative also requires roadway widening in the US 101/I-580 Interchange area of San Rafael.

Specific foundation design for structures in areas of fill underlain by soft Bay Mud may be required. Special design measures, such as sub-excavation of unsuitable soils, wick drains, or surcharging and settlement periods, may be required to manage settlement problems for roadway construction on grade.

### **Erosion**

The existing soils along the project alignment are considered to be highly erosive. Special erosion control measures may be required during and after construction activities. All of the project alternatives, with the exception of No-Build, have the potential for erosion problems. See **Table 13-Geologic Constraints and Project Alternatives**.

Temporary and permanent erosion control measures will be included as part of the storm water runoff requirements of the National Pollutant Discharge Elimination System (NPDES) for all of the alternatives. These may include fertilizer-seed mulch applied to exposed soils during or soon after construction, stepping or serration of cut slopes, punched-in straw or jute netting to protect soils during the revegetation period, and other established erosion control specifications.

### **Slope Stability**

There are two areas of potential slope stability problems identified in the *Geotechnical Report*, referenced in **Appendix E**, within the project limits. One is along the west side of US 101 through Cal Park Hill. The other area of poor slope stability is on the east side of US 101 through Puerto Suello Hill. Throughout the remainder of the project, the relief is low and slope stability is not an issue.

All of the project alternatives, with the exception of No-Build, have some construction in areas of potential slope instability, see **Table 13-Geologic Constraints and Project Alternatives**. The Southbound Only HOV Lane Gap Closure Alternative has widening on the west side of US 101 over Cal Park Hill. This is an area of poor slope stability. The Southbound/Reversible HOV Lane Gap Closure Alternative has additional widening activities in this area on the west side of US 101 over Cal Park Hill. The Ultimate HOV Lane Gap Closure Alternative requires widening on the east side of Cal Park Hill and Puerto Suello Hill in areas of potential slope instability.

In areas of poor slope stability, excavations, other than minor cuts and fills, will require additional geotechnical investigation to establish the stability, engineering feasibility, and design specifications.

### **Serpentine**

Serpentine is found within the study area interspersed within the exposed bedrock, see **Section 3.3-Geology**. Construction activities in the Cal Park Hill and Puerto Suello Hill areas may encounter serpentine. All of the project alternatives, with the exception of No-Build, have some construction in areas of potential serpentine, see **Table 13-Geologic Constraints and Project Alternatives**.

As reported in the *Geotechnical Report*, referenced in **Appendix E**, serpentine rocks within the project limits have shown no visible asbestos. Serpentine material is any material that contains at least ten percent (10%) serpentine as determined by a registered geologist.

Testing of serpentine material for asbestos content is done by the Air Resources Board (ARB) Test Method 435, a sampling and analytical procedure for evaluating asbestos content. Materials containing asbestos levels of less than five percent (<5%) are not considered hazardous and can be used without any mandatory precautions or protective measures. Materials with asbestos content of greater than five percent (>5%), as determined by ARB Test Method 435, are defined as "asbestos-containing serpentine material."

Asbestos-containing serpentine materials are subject to the California Air Resource Board's *Final Regulation Order, Section 93106, Asbestos Airborne Toxic Control Measure - Asbestos-Containing Serpentine*, prohibiting their use for surfacing applications and regulating the sale, offer for sale, or supply of asbestos-containing serpentine material. Bay Area Air Quality Management District (BAAQMD) Rule 11-14, *Asbestos-Containing Serpentine*, controls emissions of asbestos from unpaved road surfaces and other surfacing operations. Excavation activities which may involve exposure to asbestos as a natural constituent must comply with the California Occupational Safety and Health Administration (Cal/OSHA) standards for asbestos as outlined in the California Code of Regulations, Title 8, *Construction Safety Orders, Section 1529, "Asbestos."*

Caltrans will also provide standard special provisions for all contracts that include removal or disturbance of asbestos-containing serpentine materials. These measures include strict control of dust emissions into the atmosphere by watering during excavation, burial of serpentine materials in embankments, and serrating the cut slopes and covering the exposed slopes with 0.3 meter (one foot) of topsoil.

**Table 13 Geologic Constraints and Project Alternatives**

<b>Project Alternatives</b>	<b>Potential Settlement Issues</b>	<b>Potential Erosion Problems</b>	<b>Potential Slope Stability Problems</b>	<b>Potential Serpentine Issues</b>
<b>No-Build</b>	As Existing	None	None	None
<b>Southbound Only HOV Lane Gap Closure Alternative</b>	Roadway and Structure	At Numerous Sites	West Side at Cal Park Hill	Cal Park Hill and Puerto Suello Hill
<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>	Roadway and Structure	At Numerous Sites	West Side at Cal Park Hill	Cal Park Hill and Puerto Suello Hill
<b>Ultimate HOV Lane Gap Closure Alternative</b>	Roadway and Structure	At Numerous Sites	West Side at Cal Park Hill; East Side at Puerto Suello Hill	Cal Park Hill and Puerto Suello Hill

**Conclusion**

There are geotechnical constraints present along the proposed project alignment for each of the project alternatives, except the No-Build. These constraints can be effectively managed with engineering design and specifications. There are no tangible geotechnical impacts on the environment or on social or economic resources associated with this project.

## 4.4 Seismic Risk

There are no known faults, active or inactive, underlying the project alignment. The most significant geologic risk to the project is ground shaking resulting from an earthquake on one of the nearby active faults, see **Section 3.4-Seismicity**. Strong ground shaking in the project area is likely during the design life of the project and may cause one or more of the following:

- densification of loose, granular soils;
- cracking, spreading and settlement of embankment materials;
- liquefaction of natural ground resulting in secondary ground failures, such as cracking, settlement and/or spreading-type landslides; and/or
- shear failure of embankment.

Any damage due to densification, cracking, spreading, or settlement of embankments will likely consist of deflections and misalignment of pavement which can usually be quickly repaired. Seismic retrofitting of the bridges throughout the project limits is complete. The structures proposed for this project would be designed to withstand a maximum credible event on the nearby faults without collapse. For further details, see the project *Geotechnical Report* referenced in **Appendix E**. This project will have no tangible seismic impact on the environment or on social or economic resources associated with this project.

## 4.5 Hydrology

### 4.5.1 Watershed Drainage

The *Floodplain and Location Hydraulic Study*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland, describes the drainage improvements in the US 101 corridor associated with the nine watersheds within the project limits. The *Floodplain and Location Hydraulic Study* outlines which structures would need to be relocated, realigned, replaced or improved to meet any additional runoff attributable to the proposed project. The total area of the proposed highway widening is very small compared to the total watershed area and the project area is highly urbanized and already primarily composed of impermeable surfaces, such as streets, parking lots, and commercial business. The *Floodplain and Location Hydraulic Study* concluded that additional runoff generated by the proposed project is negligible.

### 4.5.2 Floodplains

For federal actions, including federally financed construction and improvements, Federal Executive Order 11988, Floodplain Management, requires the responsible federal agency to avoid, to the extent possible, the long and short term adverse effects associated with the modification of floodplains and to avoid direct or indirect support of incompatible floodplain development whenever there is a practicable alternative. Before taking an action, each federal agency shall:

- determine whether a proposed action will occur in a floodplain,
- consider alternatives to avoid adverse effects and incompatible floodplain development,
- prepare a notice explaining why the action is proposed to be located in a floodplain,
- provide opportunity for early public review of an action in a floodplain, and
- minimize potential harm to or within the floodplain.

This section summarizes the impacts of project alternatives on the base floodplains, see **Section 3.5.3-Floodplains**. This includes encroachments in the base floodplain areas, the potential flood related risks, and the potential for incompatible floodplain development attributable to the

proposed project. Analysis of the impacts of project alternatives, pursuant to 23 CFR 650 Subpart A and Executive Order 11988, results in determination that no "significant encroachment" will result from any of the project alternatives or from a combination of project alternatives. The No-Build Alternative will have no impact on beneficial floodplain value. The other project alternatives, or any combination of alternatives, will have a minimal effect on existing beneficial floodplain values, such as wildlife, plants, outdoor recreation, etc.

### Longitudinal Encroachment

A floodplain encroachment may be classified as longitudinal or transverse. A longitudinal encroachment occurs when an action or structure crosses a base floodplain in an area beyond the "normal channel boundaries." A transverse encroachment occurs when an action crosses an area of the floodplain within the "normal channel boundaries." With the exception of the No-Build Alternative, all of the project alternatives result in longitudinal floodplain encroachment in both of the base floodplain areas within the project limits. A transverse encroachment also exists where Corte Madera Bridge crosses Corte Madera Creek, see **Figure 5-Map of San Rafael 100-Year Floodplain**.

### Risks and Impacts

Following the guidelines in 23 CFR 650 Subpart A, three types of construction or floodplain impacts attributable to the proposed project were evaluated to reach the determination of no significant encroachment.

- One type of impact is the project's potential flood-related interruption or termination of a transportation facility needed for emergency vehicles or as a community's sole evacuation route.
- The second type of impact is the risk of flood-related property loss and hazard to life attributable to an encroachment.
- The third impact type is the potential to "support base floodplain development," i.e., incompatible floodplain development.

The total area of proposed highway widening within the base floodplains is very small compared to the total area of the base floodplains. The project alternatives, or any combination of alternatives, will not perceptibly increase the base flood elevation or increase the flood risk. The increased risk of interruption of US 101 and/or I-580 attributable to flooding is negligible. Existing alternate routes via local streets are also available. The proposed alternatives cause no increased risk of interruption or termination of a transportation facility needed for emergency vehicles or needed as an evacuation route.

No alternative or combination of alternatives would result in a significant increase in the potential for flooding, flood-related property loss or hazard to life for the following reasons:

- the proposed areas of highway widening in the base floodplain are very small compared to the total area of the base floodplains,
- the project will not raise or lower the existing "as built" profile of the highway within the base floodplain area,
- the *Floodplain and Location Hydraulic Study*, referenced in **Appendix E**, specified improvements, including relocation of drainage inlets, extension of transverse culverts, and relocation of longitudinal culverts, to be made to the existing drainage system to accommodate widening, and
- the *Floodplain and Location Hydraulic Study* concluded that additional runoff generated by the project would be minor, see **Section 4.5.1-Watershed Drainage**.

Therefore, the project alternatives, or any combination of alternatives, will not perceptibly increase the base flood elevation or flood risk to property or to human life.

## Floodplain Development

Within the existing project vicinity, the base floodplain area is highly urbanized and already composed of impermeable surfaces, such as streets, parking lots and commercial business. Very few, if any, natural and beneficial floodplain values exist within the proposed project area. Each of the project alternatives, with the exception of the No-Build, require median and/or shoulder widening of roadways and widening of bridge structures in base floodplain areas. In this urbanized setting, the proposed project predominantly displaces land uses that are already defined as incompatible floodplain development. This widening will not displace significant natural or beneficial floodplain uses. The entire area is currently fully developed and the proposed project will have no effect on supporting or encouraging additional floodplain development.

A *Floodplain Evaluation Report Summary* has been completed pursuant to Executive Order 11988, Floodplain Management, see *Floodplain Evaluation Report Summary* in **Appendix C**. The *Floodplain Evaluation Report Summary* states that no "significant encroachment" will result from any of the project alternatives or from a combination of any of the project alternatives.

## 4.6 Natural Environment

### 4.6.1 Introduction

This section evaluates the potential adverse effects of the Marin 101 HOV Lane Gap Closure Project alternatives on the natural resources, including habitats and species of concern, occurring within the project limits. There was considerable effort dedicated to investigating options to avoid and minimize the effects of the project on the natural environment. The existing alignment of US 101 and a variety of other factors, see **Section 2.3-Alternatives Considered and Withdrawn**, have limited the choices and limited the design options to avoid impacts to natural resources. This section describes potential mitigation to minimize the remaining adverse effects.

The natural resources include the habitats (e.g., wetlands and oak/bay woodlands) and the plant and wildlife populations that permanently or temporarily inhabit them. **Section 3.6.2-Natural Communities** describes existing natural communities within the project limits and lists typical plant and wildlife species in each. A map showing the locations of these natural communities is available in the *Natural Environment Study Reevaluation*, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland. The specific plant and animal species of concern listed by the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS) and/or the California Department of Fish and Game (CDFG) and potentially occurring within the project area are described in **Section 3.6.3-Species of Concern**.

The Marin 101 HOV Lane Gap Closure Project has two types of impacts to natural resources in the US 101 corridor:

- Temporary, construction-related impacts on the natural resources are transitory and end upon completion of construction. These temporary construction effects are avoided or minimized by specific restrictions listed in Caltrans *Standard Specifications* and/or by conditions required by permitting and regulatory agencies, see **Section 4.17-Temporary Effects During Construction**.
- Unavoidable permanent habitat and species impacts on natural resources resulting from the project generally require replacement strategies for mitigation of habitat and individual species losses. The Marin 101 HOV Lane Gap Closure Project mitigation/replacement strategies are specified in the *Conceptual Riparian and Tree Replacement Mitigation for the*

Marin 101 HOV Lane Gap Closure Project Report, referenced in **Appendix E** and available for review at the Caltrans District 4 Office, 111 Grand Avenue, Oakland.

**4.6.2 Construction Impacts and Project Alternatives**

Potential temporary impacts to natural resources from Marin 101 HOV Lane Gap Closure Project construction activities are similar for all of the build alternatives. Considerable effort was made to limit construction impacts and to avoid and minimize adverse effects on the natural environment due to construction. Construction activities, such as widening, grading, pile driving, bridge construction, demolition, roadway construction and paving, are involved in each of the build alternatives. Temporary construction impacts to the natural environment at Corte Madera Creek are discussed in **Section 4.10.2-Coastal Zone Temporary Impacts**. See **Section 4.17-Temporary Effects During Construction** for a discussion of these impacts and their mitigation.

**4.6.3 Natural Environment Impacts and Project Alternatives**

The potential permanent adverse effects on the natural resources and potential habitat losses due to the Marin 101 HOV Lane Gap Closure Project build alternatives include:

- concrete piles in Corte Madera Creek, wetlands and waters of the U.S.;
- shading of Corte Madera Creek, wetlands and waters of the U.S. due to bridge widening;
- shading of San Rafael Creek/Canal, wetlands and waters of the U.S. due to a widened San Rafael Viaduct;
- fill in Irwin Creek, wetlands and waters of the U.S. between Myrtle Avenue and the Irwin Creek culvert under US 101;
- loss of oak/bay woodland habitat (trees) at the Irwin Creek area;
- loss of riparian habitat at Irwin Creek; and
- disruption of two populations of plant species of concern on Cal Park Hill.

The following table, **Table 14-Comparison of the Natural Environment Impacts by Alternative**, quantifies the effects on each of the natural resources, listed above, for each of the project alternatives.

**Table 14 Comparison of the Natural Environment Impacts by Alternative**

<b>Issues</b>	<b>No-Build</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/Reversible HOV Lane Gap Closure Alternative</b>
Piles in Corte Madera Creek (waters of the U.S.)	None	8.4 square meters (90 square feet) 28 piles	6.0 square meters (65 square feet) 20 piles	6.0 square meters (65 square feet) 20 piles
Shading Corte Madera Creek (waters of the U.S. and wetlands)	None	1780 square meters (0.45 acres)	913 square meters (0.23 acres)	913 square meters (0.23 acres)
Piles in San Rafael Creek (wetlands)	None	Several Piles	1 Pile	1 Pile
Shading San Rafael Canal (waters of the U.S. and wetlands)	None	160 square meters (1722 square feet)	80 square meters (861 square feet)	80 square meters (861 square feet)
Fill in Irwin Creek	None	111 square meters (1200 square feet)	*None	*None

Issues	No-Build	Ultimate HOV Lane Gap Closure Alternative	Southbound Only HOV Lane Gap Closure Alternative	Southbound/Reversible HOV Lane Gap Closure Alternative
Loss of Oak/Bay Woodland	None	0.5 hectare (1.2 acre)	*400square meters (0.1 acre)	*400square meters (0.1 acre)
Loss of Irwin Creek Riparian Habitat	None	810 square meters (0.20 acre)	*None	*None
Disruption of Species of Concern	None	2 Plant Species	None	None

\* There may be additional impacts including: fill in Irwin Creek (111 m<sup>2</sup>), loss of Oak/Bay Woodland (570 m<sup>2</sup>) and loss of Irwin Creek Riparian Habitat (810 m<sup>2</sup>) due to the relocation of the NWPR corridor at Lincoln and Brookdale Avenues. These impacts would occur when the NWPR right of way is relocated.

#### 4.6.4 Mitigation Plans

The goals of a mitigation plan are to avoid and minimize adversely affecting sensitive natural resources and to compensate for losses of these resources if impacts are unavoidable. Caltrans biologists and landscape architects prepare conceptual mitigation plans for the unavoidable project-related effects of the Marin 101 HOV Lane Gap Closure Project and to meet permit requirements. Unavoidable impacts to wetlands, to waters of the U.S., and to sensitive habitats are mitigated by in-kind restoration or replacement. Additional restoration would be consolidated into larger blocks of contiguous oak/bay woodlands and into riparian habitat. The successful implementation of the mitigation will ensure that no net loss of waters of the U.S. and no cumulative loss of sensitive habitat result from the Marin 101 HOV Lane Gap Closure Project.

#### Mitigation of Impacts to Wetlands and Waters of the U.S.

All of the build alternatives for the Marin 101 HOV Lane Gap Closure Project include permanent piles in Corte Madera Creek to support the widening of the bridge. The U.S. Coast Guard will assume jurisdiction over the bridge widening activities at Corte Madera Creek under Section 9 of the Rivers and Harbors Act, see **United States Coast Guard Letter** located in **Appendix C**.

The Army Corps of Engineers does not consider piles used to support transportation facilities in jurisdictional wetlands and in waters of the U.S. as fill under Section 404 of the Clean Water Act. See **Record of Meeting, 17 December, 1999**, in **Appendix C**. None of the build alternatives include fill, other than the placement of piles, in jurisdictional wetlands or waters of the U.S. at Corte Madera and San Rafael Creeks. The tidal wetlands and the adjacent isolated wetlands at these sites will be fenced as an environmentally sensitive area (ESA). An Army Corps of Engineers' Section 404 Permit would not be required for these activities at Corte Madera and San Rafael Creeks, see **Record of Meeting, 17 December, 1999**, in **Appendix C**.

Construction of the Southbound Only HOV Lane Gap Closure Alternative and/or the Southbound/Reversible HOV Lane Gap Closure Alternative does not directly impact Irwin Creek between Linden Lane and Myrtle Avenue. In this area, Irwin Creek will be fenced as an environmentally sensitive area (ESA) for these alternatives.

The Ultimate HOV Lane Gap Closure Alternative and/or construction of the relocated NWPR facility will include fill and other impacts to sections of Irwin Creek and will also include clearing of riparian and other woodland habitat.

Federal Highway Administration (FHWA) and Caltrans acknowledge their commitment to mitigate impacts to Irwin Creek and to sensitive habitats due to the project-related relocation of the Northwestern Pacific Railroad (NWPR) right of way and/or future construction of the Ultimate HOV Lane Gap Closure Alternative. Currently, there are no specific plans or schedule for a rail transit project in the NWPR right of way. The project sponsors accept the responsibility to provide adequate in-kind mitigation for impacts to waters of the U.S. at Irwin Creek and to other sensitive habitats, including riparian and woodland habitats, that result from the relocation of the NWPR right of way, construction of the Ultimate HOV Lane Gap Closure Alternative and related activities.

When there is an approved plan for transit in the NWPR right of way or when the Ultimate HOV Lane Gap Closure Alternative is approved, the relocation of the NWPR right of way or the construction of the Ultimate HOV Lane Gap Closure Project would require mitigation for impacts to Irwin Creek. To mitigate impacts to waters of the U.S. and the riparian habitat at Irwin Creek, the *Reevaluation of Natural Environment Study*, see **Appendix E**, proposes creation of an open channel for Irwin Creek on the east side of Brookdale Avenue from just south of Grand Avenue to Linden Avenue. This section is west of the proposed relocated NWPR right of way, see **Figure 15-Irwin Creek Daylighting Concept** and **Figure 16-Irwin Creek Daylighting Concept Cross Section A**. The conceptual mitigation plan creates an open channel for Irwin Creek adding 143 square meters (1,540 square feet) of waters of the U.S., and allows replacement of riparian trees and habitat on site. It is proposed that opening an additional channel for Irwin Creek will mitigate the worst-case scenario of impacts to Irwin Creek (a fill of 111 square meters or 1,200 square feet) due to the relocation of the NWPR right of way and/or the Ultimate HOV Lane Gap Closure Alternative.

### **Mitigation of Impacts to Woodlands**

Each of the Marin 101 HOV Lane Gap Closure Project build alternatives includes activities that would adversely affect oak/bay woodland habitats within the project limits. The Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative affect approximately 400 square meters (4300 square feet) of oak/bay woodlands at Cal Park Hill and in the Linden Lane and Grand Avenue area. The relocation of the NWPR right of way requires additional clearing of riparian and other woodland habitats west of US 101 from north of Myrtle Avenue to south of Linden Lane.

Construction of the Ultimate HOV Lane Gap Closure Alternative (including the relocation of the NWPR right of way) would affect 0.5 hectares (1.2 acres) of oak/bay woodland habitat throughout the project. In addition up to 810 square meters (0.20 acre) of riparian habitat in the area west of US 101 from north of Myrtle Avenue to south of Linden Lane would be lost.

The *Reevaluation of Natural Environment Study*, see **Appendix E**, includes a consolidation of habitat and tree replacement into two areas to mitigate tree and oak/bay woodland losses. These areas are within the current state right of way, west of US 101, and between Fair Drive and Merrydale Road, see **Figure 17-Potential Tree Planting Mitigation Areas**. Specific details of planting specifications, numbers, species, etc. are available in the *Reevaluation of Natural Environment Study*. Conceptual drawings of the two sites display possible tree planting schemes and overall site appearance, see **Figure 18-Mitigation Cut Slope Site 1 Oak/Bay Forest** and **Figure 19-Mitigation Site 2 Oak/Bay Forest**.

## Mitigation of Impacts to Species of Concern

All of the build alternatives include construction activities at Corte Madera Creek. Three animal species of concern, the California brown pelican, the Central California steelhead, and the Sacramento splittail, may occur in the project vicinity during certain times of the year, see **Section 3.6.3-Species of Concern**. The California brown pelican is a casual visitor to the project vicinity and does not nest in the project area at Corte Madera Creek. The Marin 101 HOV Lane Gap Closure Project would have no effect on this species. The Central California steelhead and the Sacramento splittail may potentially migrate through the project area during the winter spawning season, see **Section 3.6.4-Migration Corridors**. The Marin 101 HOV Lane Gap Closure Project will prohibit any in-creek project-related activities from October 15 to June 1 to avoid impacting these species. Caltrans biologists, acting through the Federal Highway Administration, have consulted with the United States Fish and Wildlife Service and the National Marine Fisheries Service regarding these species. The United States Fish and Wildlife Service concurs that the project is not likely to adversely affect listed species, see **United States Fish and Wildlife Service Letter** in **Appendix C**. The National Marine Fisheries Service also gave the project a "no effect" opinion, see **Record of Meeting, November 10, 1999**, in **Appendix C**.

Two plant species of concern, the Tiburon tarplant and Santa Cruz microseris, are present within the project limits on the cut slopes of Cal Park Hill. The No-Build Alternative, the Southbound Only HOV Lane Gap Closure Alternative, and the Southbound/Reversible HOV Lane Gap Closure Alternative would not affect these plant species of concern. These plant populations may be adversely impacted by the Ultimate HOV Lane Gap Closure Alternative, see **Table 14-Comparison of the Natural Environment Impacts by Alternative**. The *Reevaluation of Natural Environment Study*, referenced in **Appendix E**, recommends establishing an environmentally sensitive area (ESA) prior to any construction in the area and fencing off the plant populations. Where the plants are unavoidably impacted by widening or by construction activities, removal and storage of topsoil and/or collection of seeds for the reestablishment of the population is proposed. The mitigation will include reestablishment of the plants after construction and monitoring for two years.

### 4.6.5 Coordination and Consultation

Coordination and agreement with regulatory and permitting agencies regarding mitigation plans for the adverse impacts of the Marin 101 HOV Lane Gap Closure Project are required. Over the past several years, Caltrans has been in contact with federal and state agencies regarding this project. These include the Army Corps of Engineers (ACOE), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the California Department of Fish and Game (CDFG), and the Bay Conservation and Development Commission (BCDC), see **Appendix C**.

## 4.7 Hazardous Waste

### 4.7.1 Introduction

Hazardous waste impacts would occur if construction workers or members of the public were exposed to hazardous wastes during grading, excavation, demolition, or other project-related activities or if hazardous waste migration were increased by project activities. Disposal of contaminated materials, soils, or groundwater could also transport contaminants out of the project area and possibly increase public health concerns.

#### 4.7.2 Francisco Boulevard West-Impacts of Alternatives

The asbestos containing materials are located in buildings on six parcels along Francisco Boulevard West. Total petroleum hydrocarbons in the heavier diesel range (THP-D) is located in the upper levels of the soil in the front of two parcels in the construction zone along Francisco Boulevard West. Each of the three build alternatives, the Ultimate HOV Lane Gap Closure Alternative, the Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative, include the same widening on the west side of the existing freeway and the relocation of the existing frontage road, Francisco Boulevard West. All the build alternatives would involve acquisition of portions of these contaminated sites. The No-Build Alternative would not involve acquisition or construction on any of these eight impacted sites.

Six parcels along Francisco Boulevard West have been identified as having asbestos containing materials that must be removed and disposed of prior to building demolition activities. This asbestos will be properly removed from buildings prior to demolition and properly disposed of in accordance with state and federal law. Two parcels had soil lenses containing total petroleum hydrocarbons in the heavier diesel range (TPH-D) exceeding 100 mg/kg at depth. One parcel contained cadmium laden soil. This cadmium laden soil is outside the boundaries of the project construction and will not be disturbed, see **Section 3.7.2-Francisco Boulevard West Site Investigation Results** and **Figure 6-Site Locations of Impacted Areas-Francisco Boulevard West**.

The asbestos abatement for the six parcels is expected to cost approximately \$83,000. All work will be completed in accordance with all applicable National Emission Standards for Hazardous Air Pollutants, Resource Conservation and Recovery Act, and federal and State of California Occupational Safety and Health Administration regulations as well as other applicable sections of the California Code of Regulations and pertinent local ordinances. The local areas of elevated hydrocarbon soil, encountered during construction, will be handled appropriately. If excavation and disposal of any of the TPH-D laden soil is required, the soil will be disposed of in a Class II non-hazardous landfill in accordance with all state and local regulations. The maximum disposal cost for the TPH-D soil is expected to be approximately \$77,000.

#### 4.7.3 San Rafael Viaduct-Impacts of Alternatives

Beneath the existing San Rafael elevated viaduct structure, tests of the soil adjacent to column footings indicate several areas of hazardous waste contamination. The principle contaminants include total recoverable petroleum hydrocarbons (TRPH) and Lead (Pb). See **Section 3.7.3-San Rafael Viaduct Investigation Results**.

The No-Build Alternative and the Southbound Only HOV Lane Gap Closure Alternative have no activities which will impact the contaminated soils beneath the San Rafael Viaduct structure.

Both the Southbound/Reversible HOV Lane Gap Closure Alternative and the Ultimate HOV Lane Gap Closure Alternative require construction and excavation beneath the existing northbound and/or southbound San Rafael Viaduct structures. Both the Southbound/Reversible HOV Lane Gap Closure Alternative and the Ultimate HOV Lane Gap Closure Alternative require 4.6 meters (15 feet) of widening to the west of the existing southbound elevated structure in downtown San Rafael. This widening is within the existing right of way and will require the construction of footings, columns and a widened roadway deck. The Ultimate HOV Lane Gap Closure Alternative also requires the complete replacement of the northbound elevated viaduct structure. This will include demolition and removal of the existing northbound structure and construction of a new northbound elevated viaduct structure.

#### 4.7.4 Mitigation

To minimize the potential adverse, project-related effects on workers and on public health due to the presence of hazardous materials, all project and construction activities in contaminated areas will follow established Caltrans procedures. The presence of contamination can potentially impact construction timing and costs. Caltrans policy is to acquire property that is free of contamination. Where that is not possible, Caltrans seeks reimbursement from the responsible party for hazardous waste cleanup.

Caltrans already owns the property beneath the northbound and southbound San Rafael elevated viaduct structures. The excavation of footing areas for remedial cleanup activities are not practical prior to construction. Therefore, removal and disposal of materials would occur during construction activities.

An additional asbestos and lead paint demolition investigation will be conducted and contaminants will be abated prior to the demolition of existing buildings and improvements on Francisco Boulevard West. The findings and recommendations of the *Hazardous Waste Site Investigation (SI)* will be incorporated in the project plans and specifications in conformance with regulatory agency policies.

A Health and Safety Plan will be in place to protect workers, the public, and the environment from construction activities where exposure could result from contact with contaminated soil or hazardous wastes or during excavation, transport and/or disposal of contaminated materials. This plan includes personal protective equipment, safe work practices, site control, exposure monitoring, decontamination procedures and an emergency response plan. Oversight, notification, or permitting by the Department of Toxic Substance Control (DTSC) and/or the Regional Water Quality Control Board may be required.

With these measures, the potential hazardous waste impacts associated with project-related activities would be minimal.

### 4.8 Water Quality

This section evaluates the potential of the Marin 101 HOV Lane Gap Closure Project to adversely affect the water quality and the beneficial uses of water resources in the project vicinity. This evaluation includes both the construction phase and the ongoing operation of the freeway. The San Francisco Bay Regional Water Quality Control Board has developed and implemented a *Water Quality Control Plan (Basin Plan)* for the San Francisco Bay region. The *Basin Plan* includes specific beneficial uses and water quality objectives for Corte Madera Creek and San Rafael Creek, and potential beneficial uses of groundwater in the San Rafael Basin, see **Section 3.8.2-Current Water Quality Basin Plan**.

#### 4.8.1 Construction Impacts and Mitigation

All of the project alternatives, with the exception of the No-Build Alternative, involve construction activities to widen the existing roadway throughout the length of the project.

- At Corte Madera Creek, these activities may include driving piles, building a temporary trestle and/or using barges for transport and construction activities. Both the US 101 southbound on-ramp bridge and the US 101 mainline bridge will be widened.
- Construction activities at San Rafael Creek will include the driving of one or more piles in the banks of San Rafael Creek and constructing spans and roadway decking over the creek area.

- Demolition of existing improvements (frontage roads, noise barriers, buildings, etc.), grading and the construction of a new lane(s) will occur throughout the length of the project.

All of these construction activities have the potential to degrade water quality and threaten the beneficial uses of water resources in the project area. Prior to the start of construction activities, a Storm Water Pollution Prevention Plan (SWPPP) or a Water Pollution Control Plan (WPCP) will be required to outline construction best management practices (BMP) to be used to minimize adverse effects on receiving waters. These plans spell out detailed control measures to be followed, such as sediment retention plans, materials handling and storage, spill prevention and erosion blankets. These and other specific pollution control measures will be included in the project design specifications. These measures to limit erosion, sedimentation and the release of chemicals to the water bodies will minimize any degradation of water quality during construction.

#### 4.8.2 Storm Water Runoff Impacts and Mitigation

Existing storm water runoff from US 101 and I-580, from bridges and from other transportation facilities, contribute to the pollutant load of runoff waters entering the creeks, ditches and channels, and eventually San Rafael and San Francisco Bays, see **Section 3.5.2-Watershed Drainage**. The accumulation of pollutants on the roadway surface appears to be related to traffic volumes and the level of service (i.e., the amount of congestion). The actual pollutant loading from the existing state roadway system to the surface waters has not been determined, since site-specific data is required to perform such calculations. Storm water runoff from US 101 and I-580 are only a small fraction of the total quantity of surface runoff draining into local creeks, channels and into San Rafael and San Francisco Bays. Similarly, the increase in the quantity of the existing runoff due to the widening of US 101 and I-580 will be a very small component of the overall surface drainage.

All of the build alternatives, the Southbound Only HOV Lane Gap Closure Alternative, the Southbound/Reversible HOV Lane Gap Closure Alternative and the Ultimate HOV Lane Gap Closure Alternative, will increase the roadway surface area of US 101 and I-580. Although the volume of highway runoff will increase with this increase in the surface area, it is unlikely that pollutant loading will increase proportionally. This is because much of the widening of US 101 occurs in a highly urban setting. The existing adjacent land uses include frontage roads, parking lots and commercial buildings. These areas are already impervious surfaces and contribute their own pollutant load to the receiving water bodies. The proposed freeway widening of the build alternatives replaces one impervious surface with another. In these areas, there may not be a net increase in the quantity or net decrease in the quality of the surface runoff.

Studies have shown that stop-and-go traffic patterns have the potential to produce more pollutants than free-flowing traffic. Therefore, improving the level of service on the freeway may reduce the amount of pollutants on the roadway. The improvements proposed for US 101 would reduce traffic congestion and may reduce the pollutants in storm water runoff.

None of the proposed alternatives will affect a principle or sole-supply aquifer, designated under the Safe Drinking Water Act, or affect a wellhead protection area authorized under the 1996 Amendment to the Safe Drinking Water Act. There are no sensitive water resources such as water supply reservoirs, ground recharge areas, or high quality streams that will be affected by the Marin 101 HOV Lane Gap Closure Project.

The beneficial uses and water quality objectives listed in the San Francisco Bay Regional Water Quality Control Board (RWQCB) *Water Quality Control Plan* provide a standard for activities affecting water quality in the San Francisco Bay region, see **Section 3.8.2-Current Water Quality Basin Plan**. The existing drainage system and the proposed improvements are designed

to collect and remove surface water from the traveled way and adhere to the best management principles of storm water pollution prevention as contained in current permits and approvals, including that required for construction.

Caltrans adheres to the Caltrans *Water Quality Handbook*. This includes Construction Staff Guidelines, Construction Contractors Guidelines and Specifications, and Maintenance Staff Guidelines. Economically achievable measures to contain pollutants from nonpoint sources are a part of the Marin 101 HOV Lane Gap Closure Project. Permanent control measures, including design-based erosion protection and control, landscaping activities, and hydraulic improvements, among others, are designed to protect and enhance the water quality of receiving water bodies.

Caltrans will require from its contractors a Storm Water Pollution Prevention Plan or a Water Pollution Control Plan containing erosion control measures such as soil stabilization practices and sediment control practices, including silt fences, inlet protection and check dams as necessary. Best Management Practices will be required including sediment tracking control practices, wind erosion control practices, non-storm water management and waste management and disposal control measures. Additional water quality, erosion, and hazardous waste provisions, to avoid contaminating waterways or groundwater, may also be required in the construction contract and/or in Caltrans Standard Specifications and special provisions.

Analysis of the available data and the proposed widening alternatives suggests that the increase of pollutant loading will be minimal due to the proposed freeway widening activities.

## 4.9 Farmland

There is no farmland within the project limits and the Marin 101 HOV Lane Gap Closure Project will not involve nor affect any farmland resources.

## 4.10 Coastal Zone

The Marin 101 HOV Lane Gap Closure Project will affect land and water within the Bay Conservation and Development Commission (BCDC) jurisdiction at Corte Madera Creek, see **Section 3.10-Coastal Zone**. There are both permanent impacts (fill and shading) and temporary impacts (construction trestles, barges and access restrictions). This section identifies the potential impacts and the coordination effort with BCDC to conform to the requirements of the McAteer-Petris Act.

### 4.10.1 Permanent Impacts

Each of the build alternatives will require widening of the US 101 mainline Corte Madera Creek Bridge and widening of the Sir Francis Drake Boulevard southbound on-ramp bridge. All of the build alternatives require 4.6 meters (15 feet) of widening on the west side of the mainline bridge structure and a minor widening on the south portion of the southbound on-ramp bridge structure. The Ultimate HOV Lane Gap Closure Alternative will also require 4.6 meters (15 feet) of widening on the east side of the mainline bridge structure. **Table 15-Permanent Piles and Shading Impacts at Corte Madera Creek** indicates the quantity of piles and shading in Corte Madera Creek for each alternative.

A major portion of the work in Corte Madera Creek, constructing the support structures for the proposed widening, was previously completed during the Corte Madera Creek Bridge Seismic Retrofit Project. However, additional piles are required for the southern portion of the mainline bridge and for the southbound on-ramp bridge. **Table 15-Permanent Piles and Shading Impacts at Corte Madera Creek** indicates the total fill area of the piles for each alternative.

**Table 15 Permanent Piles and Shading Impacts at Corte Madera Creek**

<b>Alternatives</b>	<b>No-Build</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/ Reversible HOV Lane Gap Closure Alternative</b>
Piles in Corte Madera Creek	None	28 Piles 8.4 square meters (90 square feet)	20 Piles 6 square meters (65 square feet)	20 Piles 6 square meters (65 square feet)
Shading Corte Madera Creek	None	1,780 square meters (0.45 acres)	913 square meters (0.23 acres)	913 square meters (0.23 acres)

#### 4.10.2 Temporary Impacts

There are also temporary construction impacts associated with pile driving and with the construction of the widened bridge sections. These include temporary construction trestles, barges and heavy equipment activities on the adjacent shoreline. Construction trestles provide access to work sites for workers, equipment and construction materials. **Table 16-Temporary Piles and Shading Impacts at Corte Madera Creek** indicates the estimated area of temporary trestle-related construction impacts within BCDC jurisdiction. Construction activities placing temporary piling in Corte Madera Creek will be limited to a construction window during the dry season to avoid impacting spawning species.

Barges may be used to transport workers, equipment and construction materials to the site. These barges will not be allowed to rest on Bay Mud and will not have access to shallow areas outside of the deeper channel. No dredging will be permitted on this project.

Heavy equipment and other construction activities will occur within BCDC jurisdiction on the Corte Madera Creek shoreline adjacent to the bridge and to the construction trestles. Estimates of these areas are: 1,260 square meters (13,600 square feet) on the north end of the mainline structure and 900 square meters (9,700 square feet) at the south end adjacent to the southbound on-ramp. This is a total of 2,160 square meters (23,300 square feet). These activities will not impact the tidal wetlands or the adjacent isolated wetlands at Corte Madera Creek. The affected uplands will be returned to their existing condition at the completion of the project.

**Table 16 Temporary Piles and Shading Impacts at Corte Madera Creek**

<b>Alternatives</b>	<b>No-Build</b>	<b>Ultimate HOV Lane Gap Closure Alternative</b>	<b>Southbound Only HOV Lane Gap Closure Alternative</b>	<b>Southbound/ Reversible HOV Lane Gap Closure Alternative</b>
Piles in Corte Madera Creek	None	49 square meters (522 square feet)	31 square meters (332 square feet)	31 square meters (332 square feet)
Shading Corte Madera Creek	None	4,300 square meters (1.1 acres)	2,736 square meters (0.68 acres)	2,736 square meters (0.68 acres)

Other temporary impacts may include limiting public access to some areas along Corte Madera Creek adjacent to the bridge and temporarily closing the pedestrian and bike lane on the west

side of the southbound on-ramp from Sir Francis Drake Boulevard. Alternate routes will be provided for pedestrians and bicyclists with no loss of continuity.

Caltrans has consulted with BCDC on the Marin 101 HOV Lane Gap Closure Project for several years. This coordination has included meeting with BCDC regarding this project and coordinating through correspondence. This coordination has resulted in BCDC providing a preliminary consistency determination for this project, see BCDC's letter in **Appendix C**. Caltrans has discussed impacts and possible mitigation plans for construction activities and for access impacts. Caltrans is working on a plan to permanently enhance public and bicycle access to Corte Madera Creek to offset any interruption of public access, especially the temporary closing of one of the bike lanes over the bridge. The Commission's staff and representatives from Caltrans have worked together successfully on other past projects. Caltrans will strive to ensure that the activities of the Marin 101 HOV Lane Gap Closure Project in BCDC jurisdiction are consistent with the Commission's laws and policies.

## 4.11 Cultural Resources

In 1989 and again in 1999, Caltrans archaeologists and architectural historians, the Federal Highway Administration (FHWA), and the State Historic Preservation Officer (SHPO) have concluded that the Marin 101 HOV Lane Gap Closure Project will not involve or effect any sites or properties listed in or eligible for inclusion in the National Register of Historic Places. See **Appendix C** for these notices. These findings apply to the Southbound Only HOV Lane Gap Closure Alternative, the Southbound/Reversible HOV Lane Gap Closure Alternative and the Ultimate HOV Lane Gap Closure Alternative.

### 4.11.1 Archaeological Resources

One archaeological site and one possible archaeological site were inventoried within the project Area of Potential Effects (APE). One additional archaeological site was inventoried adjacent to, but outside, the project APE. None of the alternatives under consideration for the Marin 101 HOV Lane Gap Closure Project will involve or effect any of these sites, see **Section 3.11.1-Initial Cultural Resources Evaluation Results, Section 3.11.2-Supplemental Cultural Resources Evaluation Results, Section 3.11.3-Addendum Cultural Resources Evaluation Results and Section 3.11.4-Archaeological Resources**.

These three resources are identified as environmentally sensitive areas (ESA) and will have a high visibility protective barrier (e.g., flagging, fencing, etc.) established around each resource to keep construction activities out. An archaeological monitor will be on site during construction activities at the archaeological site near Mission Avenue and Irwin Street, see *the Historic Property Survey Report 1999*, referenced in **Appendix E**, for more information.

### 4.11.2 Historic Architectural Resources

There were no properties listed in or eligible for inclusion in the National Register of Historic Places identified within the Marin 101 HOV Lane Gap Closure Project APE, see **Section 3.11.1-Initial Cultural Resources Evaluation Results, Section 3.11.2-Supplemental Cultural Resources Evaluation Results, Section 3.11.3-Addendum Cultural Resources Evaluation Results and Section 3.11.5-Historic Architectural Resources**.

## 4.12 Traffic and Circulation Impacts and Mitigation

### 4.12.1 Introduction

The *Traffic Study Report* for the Marin 101 HOV Lane Gap Closure Project presents an analysis of existing conditions and future year scenarios for the US 101 corridor with the No-Build Alternative and with alternatives closing the gap in the HOV lane system. The total peak-hour demand projections for future years indicate increases over existing volumes. Increases in delay and congestion are expected.

### 4.12.2 Traffic Operations

A peak-period demand/capacity constraint technique for freeway analysis was used to develop traffic information for future year conditions on US 101 in the study area, see **Section 3.12.1-Existing Facilities and Traffic Study Area**. These peak period traffic estimates apply to the traffic study area of US 101 between Tiburon Boulevard/Route 131 and Rowland Avenue, see **Figure 8-Map of Traffic Study Area**. See the *Traffic Study Report*, referenced in **Appendix E**, for further information.

### Results

This section displays the predicted impacts of each of the alternatives of the Marin 101 HOV Lane Gap Closure Project on the peak period traffic delays through the study area. **Table 17-HOV Lane Delay Times** compares the maximum travel time HOV lane delays (in minutes):

- on southbound US 101 between the north end of the theoretical southbound morning backup and Route 1, and
- on northbound US 101 between the south end of the theoretical northbound evening backup and Route 37.

**Table 17 HOV Lane Delay Times**

Future Years	No-Build Alternative		Southbound Only HOV Lane Gap Closure Alternative		Southbound/Reversible HOV Lane Gap Closure Alternative		Ultimate HOV Lane Gap Closure Alternative	
	SB	NB	SB	NB	SB	NB	SB	NB
	HOV LANE		HOV LANE		HOV LANE		HOV LANE	
2000	32.8	28.6	23.8	28.6	23.8	N/A	N/A	N/A
2010	26.5	31.7	22.7	31.7	22.7	5.9	22.5	5.9

For **Table 17-HOV Lane Delay Times** and **Table 18-Mixed-Flow Lanes Delay Times** the Southbound/Reversible HOV Lane Gap Closure Alternative's southbound AM peak delay times were derived from the Southbound Only HOV Lane Gap Closure Alternative's southbound AM peak delays. The northbound PM peak delay times for the Southbound/Reversible HOV Lane Gap Closure Alternative were derived from the Ultimate HOV Lane Gap Closure Alternative's northbound PM peak delays.

These results support one of the Marin 101 HOV Lane Gap Closure Project goals of reducing the traffic delay for high occupancy vehicles during peak traffic periods. Decreasing peak period delay times of buses and other public transit vehicles using the HOV lanes encourages public

transport. Faster connections to other public transit modes (e.g., rail and ferry) will encourage their use.

As a secondary benefit, increases in carpools, vanpools, buses and other HOV-lane travelers reduce the traffic delays and congestion in the mixed-flow lanes. **Table 18-Mixed-Flow Lanes Delay Times** compares maximum travel time mixed-flow lane delays (in minutes):

- on southbound US 101 between the north end of the theoretical AM southbound backup and Route 1, and
- on northbound US 101 between the south end of the theoretical PM northbound backup and Route 37 for mixed-flow lanes for each alternative (if available) for year 2000 and 2010.

**Table 18 Mixed-Flow Lanes Delay Times**

Future Years	No-Build Alternative		Southbound Only HOV Lane Gap Closure Alternative		Southbound/Reversible HOV Lane Gap Closure Alternative		Ultimate HOV Lane Gap Closure Alternative	
	HOV LANE		HOV LANE		HOV LANE		HOV LANE	
	SB	NB	SB	NB	SB	NB	SB	NB
2000	44.8	37.9	30.8	37.9	30.8	N/A	N/A	N/A
2010	40.2	39.9	28.9	39.9	28.9	25.0	28.8	25.0

#### 4.12.3 Railroad Impacts and Mitigation

All alternatives of the Marin 101 HOV Lane Gap Closure Project are compatible with development of rail transit on the Northwestern Pacific Railroad (NWPR) right of way. In all build alternatives, proposed widening on the west side of US 101 for the HOV lanes impacts the NWPR right of way. This will affect a portion of the NWPR right of way from approximately 244 meters (800 feet) south of Linden Lane to approximately 152 meters (500 feet) north of Myrtle Avenue. The Marin 101 HOV Lane Gap Closure Project proposes to relocate the NWPR right of way further to the west. The relocated NWPR right of way will maintain the full width of the existing NWPR right of way and will be continuous with the existing NWPR right of way to the north and south.

#### 4.12.4 Bicycle and Pedestrian Impacts and Mitigation

All of the build alternatives will have some temporary construction-related interruptions of bicycle and pedestrian lanes at the Greenbrae Pedestrian Overcrossing, at the southbound on-ramp across Corte Madera Creek and at Puerto Suello Hill, see **Section 4.17-Temporary Effects During Construction**. In addition, each of the Marin 101 HOV Lane Gap Closure Project build alternatives will change the alignment of the existing bicycle and pedestrian lane on the west side of US 101 at Puerto Suello Hill. The existing bicycle and pedestrian lane occupies state right of way and connects Lincoln Avenue and Merrydale Road, see **Figure 9-Map of Existing Bike Lanes** and **Appendix A-Project Mapping, Sheets S-9, R-9 and U-9**. Caltrans will move the existing bike lane further to the west.

At the Greenbrae Pedestrian Overcrossing, the Southbound/Reversible HOV Lane Gap Closure Alternative will require the removal of the center overcrossing supports and construction of a freespan overcrossing. This requires temporary closure of the Overcrossing structure. All of the build alternatives require widening of the southbound Sir Francis Drake Boulevard on-ramp to US 101 and will all cause temporary closure of one of the pedestrian and bicycle crossings over

Corte Madera Creek. The pedestrian and bicycle facility on the east side of the Corte Madera Bridge over Corte Madera Creek will not be affected and will allow for a continuous trail.

### **San Francisco Bay Trail**

State Senate Bill 100, passed in 1987, directed the Association of Bay Area Governments (ABAG) to develop a plan for a 644-kilometer (400-mile) hiking and bicycling trail that will encircle the Bay. In 1989, ABAG completed the *Bay Trail Plan* for a bicycle and pedestrian trail system around the perimeter of San Francisco and San Pablo Bays. The *Bay Trail Plan* designated many existing trails as segments of the Bay Trail, and proposed new trail segments that would make the Bay Trail continuous. The *Bay Trail Plan* did not specify the exact location, features, or connections of these trail segments. The existing bicycle and pedestrian facilities within the Caltrans right of way from Lucky Drive, over Corte Madera Creek, to Sir Francis Drake Boulevard have been designated as a segment of the San Francisco Bay Trail, see **Section 3.12.5-Non-Motorized Transit** and **Appendix A-Project Mapping, Sheets S-1, R-1 and U-1**.

The *Bay Trail Plan* also establishes policies for trail design, environmental protection, transportation access, and implementation of the Bay Trail. *Bay Trail Plan* policies are intended to compliment, rather than supplant the regulations and guidelines of the local managing agencies. Bay Trail Policy Number 42 states: "The *Bay Trail Plan* recognizes the authority of managing agencies to set policy regarding the use of trails within their jurisdiction."

There are bicycle and pedestrian lanes over Corte Madera Creek on both the east side and the west side of the US 101 Corte Madera Creek Bridge structures. As discussed above, all of the build alternatives would include widening of the southbound Sir Francis Drake Boulevard on-ramp structure over Corte Madera Creek. This would require temporarily closing the west side bicycle and pedestrian lane over Corte Madera Creek. The Marin 101 HOV Lane Gap Closure Project will not affect the pedestrian and bicycle path over Corte Madera Creek on the east side of the Corte Madera Bridge. Therefore, project-related activities would not substantially impair the continuity of the San Francisco Bay Trail.

### **San Francisco Bay Trail and Section 4(f)**

Section 4(f) of the Department of Transportation (DOT) Act of 1966 (49 USC 303) applies whenever a United States Department of Transportation action involves the use of a publicly-owned public park, recreation area, wildlife or waterfowl refuge, or land from a historic site. The existing bike and pedestrian facilities between Lucky Drive and Sir Francis Drake Boulevard have been designated as a segment of the San Francisco Bay Trail, see above and **Section 3.12.5-Non-Motorized Transit**. This segment of the San Francisco Bay Trail lies within Caltrans right of way. As a recreational trail on public land, this existing segment of the Bay Trail is a Section 4(f) resource. However, when the Bay Trail is not limited to a specific alignment within the highway right of way and any project-related permanent or construction-related temporary adjustments or changes in the alignment of the highway or the trail would not impair the continuity of the trail, a Section 4(f) use does not occur. See Federal Highway Administration (FHWA) Section 4(f) Policy Paper, Question (12)(C) Trails on Highway Rights of Way.

The San Francisco Bay Trail also passes under US 101 in San Rafael at Andersen Drive and at Third Street. Likewise, there will be no permanent project-related or temporary construction-related adjustments affecting the continuity of the San Francisco Bay Trail at these locations. Therefore, there is not a Section 4(f) use of the resource.

Temporary construction activities associated with widening the bridge structure would temporarily close the west bicycle and pedestrian lane over Corte Madera Creek on the southbound Sir Francis Drake Boulevard on-ramp structure. The pedestrian and bicycle lane over Corte Madera Creek on the east side of the Corte Madera Bridge will not be affected by the project. The bicycle and pedestrian Greenbrae Pedestrian Overcrossing is also within the designated Bay Trail segment. The Southbound/Reversible HOV Lane Gap Closure Alternative would require replacement of the Greenbrae Pedestrian Overcrossing structure and temporary closure during construction. The San Francisco Bay Trail also passes under US 101 in San Rafael at Andersen Drive and Third Street. Each of these sites may be affected by the construction activities of each of the build alternatives.

Pursuant to 23 CFR 771.135(p)(7), a Section 4(f) use does not occur if the following conditions are met:

- The duration of occupancy is less than the time needed for construction of the project and there is no change in ownership.
- The scope, nature and magnitude of the changes to the Bay Trail system are minimal.
- There is no permanent physical change or interference with the activities or purpose of the Bay Trail, i.e., construction activities would not impair the continuity of the San Francisco Bay Trail.
- The trail will be fully restored.
- The Marin County Parks, Open Space & Cultural Commission is the local agency responsible for the countywide bicycle and pedestrian trail system. This includes bicycle and pedestrian facilities within Caltrans right of way from the Greenbrae Pedestrian Overcrossing to Sir Francis Drake Boulevard. The Marin County Parks, Open Space & Cultural Commission concurs with the above conditions, see **Appendix C**.

With these conditions satisfied, the temporary and minimal effects would not constitute a use within the meaning of Section 4(f).

#### **4.12.5 Access and Circulation Impacts**

The Marin 101 HOV Lane Gap Closure Project impacts to local access and circulation patterns as a result of the proposed build alternatives are minor. No existing through streets are permanently closed by the project and improvements to existing access and circulation (e.g., US 101 access to Francisco Boulevard West) are improved. Existing access and circulation would not change under the No-Build Alternative.

Temporary lane closures, detours and other construction-related effects may occur during project construction. Construction staging, Caltrans standard specified practices, and local agency policies will minimize these impacts.

#### **4.12.6 Parking Impacts**

Caltrans and San Rafael City staff have coordinated the estimated parking impacts of the Marin 101 HOV Lane Gap Closure Project. Businesses in the Francisco Boulevard West area have known for many years that the freeway would be expanded westward toward their properties. Some of the businesses will lose display areas and parking. Surplus state property may be available in close proximity for some of the businesses, although the exact amount of property for future parking needs will not be known until later in the design and acquisition process. The following businesses on Francisco Boulevard West will be seriously impacted by the project:

- Sonnen Motors will lose substantial parking. Sufficient parking may remain for this business. Caltrans and others, e.g., the San Rafael Redevelopment Agency, will work with this business to mitigate parking losses.

- Toys-R-Us, Borders Books and Music, Exercise Equipment, and Barbecues Galore may lose parking and may not meet the city's parking requirements. Options may exist for parking on adjacent land.
- Solaria and Marin Autosports may be displaced. Developable land may be available on these sites.

All of the build alternatives, including the Southbound/Reversible HOV Lane Gap Closure Alternative, will impact an estimated 220 parking spaces on the west side of US 101, primarily in the Francisco Boulevard West area. The Ultimate HOV Lane Gap Closure Alternative will also impact additional parking spaces at the new Irene Street Interchange on I-580. A number of businesses will experience loss of parking and may require replacement parking spaces. The No-Build Alternative would not result in the displacement of existing parking.

Some limited parking may be created as a result of the Marin 101 HOV Lane Gap Closure Project. However, the precise number of spaces is unknown prior to final design. Proposed redevelopment in San Rafael may create additional parking.

### **4.13 Land Use, Planning and Socioeconomic Impacts**

The proposed Marin 101 HOV Lane Gap Closure Project is not expected to result in significant adverse effects to local land uses, land use plans or policies, or socioeconomic conditions. The Marin 101 HOV Lane Gap Closure Project has the goal of reducing traffic congestion and delay in the US 101 corridor and improving the operations and safety of the transportation facility.

#### **4.13.1 Land Use Impacts and Consistency with Local Plans**

The Marin 101 HOV Lane Gap Closure Project is consistent with plans developed to improve the operation of US 101 and to develop alternatives to single occupancy vehicles. Completion of the HOV lane system from Richardson Bay Bridge to Route 37 is a vital component of the Metropolitan Transportation Commission's (MTC) *Regional Transportation Plan (RTP)*, the MTC's *Regional Improvement Program (RIP)*, the MTC's *HOV Lane Master Plan*, the Transportation Element of the *Marin Countywide Plan*, and the *Marin County Congestion Management Plan*.

The Marin 101 HOV Lane Gap Closure Project is also consistent with the stated plans, goals and policies of the County of Marin, Cities of San Rafael and Larkspur, and the Town of Corte Madera which support improvements to the US 101 corridor. The No-Build Alternative would not achieve these goals.

All of the build alternatives of the Marin 101 HOV Lane Gap Closure Project involve right of way acquisition. Widening requires conversion of residential and nonresidential land uses to public right of way in the City of San Rafael. West side widening options between Mission Avenue and North San Pedro Road require conversion of residential uses to state right of way. In addition, portions of the Francisco Boulevard West commercial district are required for the additional HOV lane(s) and will be converted from commercial, nonresidential use to state transportation uses. These types of land acquisitions are considered to be land use impacts of the proposed project, see **Section 4.13.6-Residential and Business Relocation** for further discussion.

#### **4.13.2 Growth Inducement**

A growth inducement analysis for the Marin 101 HOV Lane Gap Closure Project has been prepared to estimate:

- the effect each of the proposed alternatives would have on development in the project area,
- the reason for the anticipated effects, and
- whether or not the effect would be significant in terms of local and regional plans.

The study has found no growth inducement impact from the proposed project alternatives. Projected residential growth pressures, based on job accessibility, which would occur as a result of the build alternatives, are not significantly different from those of the No-Build. Consequently, residential growth pressures that occur within the identified growth areas are almost entirely independent of transportation improvements made by the proposed alternatives.

#### **4.13.3 Local Services and Tax Revenue**

No public facilities would be displaced by the Southbound/Reversible HOV Lane Gap Closure Alternative. Some changes in local circulation would have an effect on travel patterns to and from some of these facilities.

Domestic water services, wastewater facilities and solid waste disposal are not expected to be affected by the proposed project alternatives. There will be the need to relocate various utility lines within the project limits, but this should not disrupt service.

#### **Local Tax Revenue Impacts**

The potential tax revenue impact of each project alternative would result from the conversion of private residences and business property to public right of way for the project. Estimates include the loss of revenue from permanent encroachments and full and partial takes on residential and business property. Although the project may result in an initial loss of property revenues for the City of San Rafael and for Marin County, this potential impact would be temporary. Following the acquisition of their property for highway right of way, the residents and businesses will relocate nearby, see **Section 4.13.6-Residential and Business Relocation**. Only very minor transient impacts are expected on the total sales tax revenue of the project area.

#### **4.13.4 Jobs and Economic Activity**

Funds created in economic output include the multiplier effect of a dollar of direct highway construction being respent in service or other sectors of the economy. Economic activity generated by the proposed project alternatives is anticipated to benefit the Bay Area region and would also support highway construction markets for labor and materials outside of the area.

Job loss associated with business relocations is estimated at approximately 300 to 410 jobs. This is a temporary job loss until the businesses relocate, see **Section 4.13.6-Residential and Business Relocation**.

#### **4.13.5 Environmental Justice**

When the technical studies began for the Marin 101 HOV Lane Gap Closure Project, there was the possibility that widening on one side or the other would discriminate either on the basis of ethnicity or on the basis of economic class. In addition, there were requests from the City of San Rafael staff and comments during scoping meetings that led to technical studies to evaluate the impacts of the widening design options. The *Background Socioeconomic Study Report*, using census tract data and projections by the Association of Bay Area Governments (ABAG), demonstrated that the impacts from widening on either side of US 101 will not adversely affect any particular ethnic group or economic class. Development of this project was consistent with Title VI of the Civil Rights Act and the Director's Policy Statement (see Preface).

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed February 11, 1994, also directs federal agencies "... to make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority populations and low-income populations in the United States." As discussed in this section, it has been determined that the Marin 101 HOV Lane Gap Closure Project will not have disproportionate impacts on low-income or minority populations.

Marin County has the highest household median income, \$48,544, of any Bay Area county. There are no low-income populations in the study area. The lowest income tract in proximity to the corridor is Tract 1122 with a reported median income of \$32,286 and a 20.0% below poverty level. Other adjoining tracts have median incomes up to \$51,565.

The project provides to all users of the freeway the benefit of reduced congestion and delay. In fact, the Southbound/Reversible HOV Lane Gap Closure Alternative will benefit all peak traffic period commuters by shortening their commute times.

Ethnic composition within the study area is proportionately similar to that of Marin County. Whites constitute 89 percent of the population in the county, and 86 percent in the study area. Persons of Hispanic origin represent eight percent of the population of the county, and 12 percent in the study area. Census Tract 1122, the neighborhood of East San Rafael, has the highest percentage of ethnic minorities in the project area and is disproportionate in comparison to the county.

There is a Hispanic population in a portion of Tract 1122, a San Rafael neighborhood that is located about 0.8 kilometer (half a mile) east of US 101. This ethnic enclave is not homogenous, and is not negatively impacted by the project. The socioeconomic report did not identify groups of minorities or low-income groups living in closer proximity to the project.

The project will not impact individual health or cumulative human health nor have environmental effects, including social and economic effects, which may include, but are not limited to:

- bodily impairment, infirmity, illness or death;
- air, noise and water pollution and soil contamination;
- destruction or disruption of man-made or natural resources;
- destruction or diminution of aesthetic values;
- destruction of or disruption of the availability of public and private facilities and services;
- adverse employment effects;
- displacement of persons, businesses, farms, or nonprofit organizations;
- increased traffic congestion, isolation, exclusion or separation of minority or low-income individuals within a given community or from the broader community; and
- the denial of, reduction in, or significant delay in the receipt of benefits of FHWA programs, policies, or activities.

#### **4.13.6 Residential and Business Relocation**

Residential and business relocations that would result from the proposed project are summarized in **Table 19-Residential and Business Relocation**.

**Table 19 Residential and Business Relocation**

Maximum Units Displaced	Southbound Only HOV Lane Gap Closure Alternative	Southbound/ Reversible HOV Lane Gap Closure Alternative	Ultimate HOV Lane Gap Closure Alternative	No-Build
Single Family	10	10	10	0
Duplexes	12	12	12	0
Apartments	23	23	23	0
Businesses	11	11	51	0

### Residential Impacts

All potential residential displacements would occur in San Rafael and are located along the west side of US 101 from south of Linden Lane to north of Myrtle Lane. The residents potentially displaced by the west side widening option represent demographic characteristics that are similar to the county, with no one group disproportionately impacted by the project.

The widening in this area is the same for each of the build alternatives and would cause the displacement of 10 single-family residences, 6 duplexes and 5 multifamily residences. The estimated number of households displaced by the west side widening would be 45. Current net assessed value, including land and improvement values, for potentially displaced residential property along the west side alignment totals \$3,556,874.

Under the No-Build Alternative, there are no residential displacements.

### Business Impacts

All of the potential nonresidential displacements are commercial displacements in the City of San Rafael, see **Table 19-Residential and Business Relocation**. The Southbound/Reversible HOV Lane Gap Closure Alternative and the Southbound Only HOV Lane Gap Closure Alternative would displace approximately 11 commercial properties in the Francisco Boulevard West area of San Rafael. An estimate of 300 to 410 employees could potentially be displaced by construction activities and 25 to 45 jobs may be lost as a result of businesses choosing not to relocate. Assessed net values for these locations total \$2,241,523.

The Ultimate HOV Lane Gap Closure Alternative would have additional impacts on nonresidential parcels on Gary Place and on the north side of I-580. The No-Build Alternative would have no nonresidential displacements.

#### 4.13.7 Relocation Mitigation

Each resident and business owner will be made aware of their rights, entitlements and eligibility under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

### Residential

The Relocation Payment Program will help eligible residential occupants by paying certain costs and expenses. These costs are limited to those necessary for, or incidental to, the purchase or

rental of the replacement dwelling, and actual reasonable moving expenses to a new location within 80 kilometers (50 miles) of the displacement property.

Residential replacement dwellings will be in equal or better neighborhoods at rents and prices within the financial ability of the families and individuals displaced, and reasonably accessible to their places of employment. Before any displacement occurs, comparable replacement dwellings will be offered to displacees that are open to all persons regardless of race, color, religion, sex, or national origin, and consistent with the requirements of Title VI of the Civil Rights Act of 1964.

In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, Caltrans will provide relocation advisory assistance to any person, business, farm, or nonprofit organization displaced as a result of the acquisition of real property for public use. Caltrans will assist displacees in obtaining comparable replacement housing by providing current and continuing information on the availability and prices of both houses for sale and rental units that are "decent, safe and sanitary." Nonresidential displacees will receive information on comparable properties for lease or purchase.

### **Nonresidential**

All businesses will be provided with advisory assistance under the Relocation Assistance Program. The compensation for the affected businesses will include market value of their property and monetary benefits for moving of their personal items to their new locations. This includes the reconnection and reinstallation of trade fixtures and other related items. Search expenses in locating a new site may be compensated, if properly documented, as well as telephone reconnection and reprinting of certain business paper products. Eligible businesses may be entitled to certain re-establishment expenses. All affected businesses may be eligible for a fixed payment in lieu of actual moving expenses, searching expenses and other property losses.

### **Availability of Replacement Residential and Nonresidential Property**

A review of sources of information for the evaluation of property availability showed that there are adequate replacement properties for owner-occupied single family residences and tenant-occupied apartments in the City of San Rafael. It would be necessary to go to a secondary replacement area to find replacements for rental duplexes and single family residences. The secondary area would be Larkspur, San Anselmo and Fairfax.

A survey of available commercial properties reveals that there are adequate available sites for displaced businesses both for sale and lease in the City of San Rafael.

#### **4.13.8 Summary**

The Marin 101 HOV Lane Gap Closure Project will not substantially disrupt or affect a distinct ethnic or economic group. It does not divide existing neighborhoods or adversely affect important cultural or religious facilities. There are comparable replacement dwellings for the residential and commercial properties that are required for freeway widening. The adverse economic impacts are minor and temporary. The proposed project does not have significant socioeconomic impacts.

Relocation assistance and information is available pursuant to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. The Uniform Relocation Act benefits for all displaced persons, businesses, nonprofit organizations, etc. are described in **Appendix H**.

## 4.14 Noise

### 4.14.1 Noise Impacts

The *Traffic Noise Impact Report*, referenced in **Appendix E**, studied the existing ambient noise levels and worst-case future traffic noise levels at receptors within the Marin 101 HOV Lane Gap Closure Project limits, see **Figure 14-Map of Noise Measurement Sites**. This analysis follows the Code of Federal Regulations (23 CFR Part 772) and Caltrans guidelines in assessing the noise impacts and recommending noise abatement measures to reduce impacts to acceptable levels, see **Section 3.14.1-Noise Sensitive Areas** and **Section 3.14.2-Noise Abatement Criteria**. After analyzing the noise impacts at sensitive receptors within the project vicinity, the same eleven noise barriers were recommended for each of the build alternatives. With these noise barriers, future noise levels at a total of 66 single family houses, 20 apartment buildings and one mobile home park can be reduced to provide a readily noticeable noise reduction (minimum of 5 dBA). **Table 20-Noise Barriers** presents a list of all proposed barriers under the build alternatives.

### 4.14.2 Noise Barriers

The barriers that would be necessary to provide appropriate noise abatement for adjacent properties meet the Federal Highway Administration (FHWA) and Caltrans noise abatement criteria. The required height and length of each noise barrier and other information are listed in **Table 20-Noise Barriers**. The location of each noise barrier is clearly shown on the project layout sheets in **Appendix A-Project Mapping**.

No abatement measures would be provided for the No-Build Alternative because no improvements would be constructed. Noise abatement measures are not recommended at 20 impacted receptor locations under the build alternatives because abatement measures would be ineffective in reducing the noise levels due to either terrain conditions or traffic noise generated from local streets.

Noise barriers may not be constructed as the first order of work in certain areas due to limitations on construction staging or other construction activities that would preclude doing the barriers first. Some noise barriers may need to be built after the opening of the new southbound lane.

**Table 20 Noise Barriers**

Noise Barrier				Predicted Future Peak Noise Levels (dBA)		Number of Protected Receptors
No.	Height (meters)	Length (meters)	Location	w/o Barrier	w/ Barrier	
S457*	4.3	204.2	Shoulder	7	6	7 SFR
	3.7	109.7	Shoulder			
S458	4.3	338.3	Shoulder	69 - 71	65	Mobile Home Park 3 Apts.
S475*	4.3	152.4	Inside R/W	76 - 69	57 - 58	6 SFR
S493	5.0	227.1	Inside R/W	67 - 70	62 - 65	6 SFR
S517	4.3	96.0	@ R/W	67 - 75	61 - 69	6 SFR
	5.0	36.6	@ R/W			
	3.7	61.0	@ R/W			

Noise Barrier				Predicted Future Peak Noise Levels (dBA)		Number of Protected Receptors
No.	Height (meters)	Length (meters)	Location	w/o Barrier	w/ Barrier	
S596*	3.0	125.0	Viaduct	71 - 74	65 - 66	4 SFR
	4.3	172.2	Viaduct			
S600	4.3	74.7	Shoulder	74	66	3 SFR
S633	4.3	294.2	@ R/W	70 - 77	62 - 66	32 SFR 10 Apts.
	3.7	248.3	@ R/W			
	4.3	452.6	@ R/W			
	3.7	146.2	@ R/W			
S655	3.7	271.3	Shoulder	69	64	2 SFR 4 Apts.
S661	4.3	128.0	Shoulder	73	67	1 Apt
S675	3.7	167.6	Shoulder	70	65	2 Apts.

\*see Section 4.14.3-Noise Barriers Deleted From Project  
R/W-State Right of Way SFR-Single Family Residence

The reasonableness and feasibility, including cost-effectiveness, of each noise barrier will be further evaluated as more detailed design information becomes available. The exact dimensions, locations and aesthetics of noise barriers will be determined during the final design phase. Design of noise barriers will be presented to adjacent property owners for review, comment and approval. Alternative designs that reduce the visual presence of noise barriers in sensitive locations will be evaluated for engineering feasibility and safety. Final design and construction drawings will be reviewed to account for any changes made to the grading and/or layout of the proposed project and surrounding areas prior to final approval.

#### 4.14.3 Noise Barriers Deleted From Project

Three of the proposed noise barriers, S457, S475 and S596, identified by an asterisk in **Table 20-Noise Barriers**, were deleted from the Marin 101 HOV Lane Gap Closure Project for the following reasons:

- Noise barrier S457, located on the west side of the southbound US 101 on-ramp bridge over Corte Madera Creek, was found to be not cost-effective, not structurally feasible, and to be blocking views (identified by the Bay Conservation and Development Commission). Noise barrier S457 was removed from the project.
- Noise barrier S475 is located on Via La Cumbre, on the west side of US 101. The affected property owners have petitioned Caltrans not to build this noise barrier. Noise barrier S475 was removed from the project.
- Noise barrier S596 is located on the east side of the northbound San Rafael Viaduct. It was determined to be not cost-effective and not structurally feasible. Noise barrier S596 was removed from the project.

Cost-effectiveness of noise abatement is determined as outlined in Caltrans protocol for traffic noise analysis for new highway construction and reconstruction projects. The reasonableness factors described below determine the reasonable allowance for each noise barrier:

- Absolute noise levels.
- The increase of future predicted noise levels with project over existing noise levels.
- Achievable noise reduction provided by the proposed noise abatement.

- If the majority of benefited residences (more than 50%) were in existence before January 1, 1978.

In addition, federal guidelines limit noise abatement costs to less than \$45,000 per residence, or 50% of the total project construction cost, not including abatement.

#### 4.14.4 Reflective Noise

Further evaluation of reflective noise and the final design of the noise barrier locations and types will occur during the final design phase at the request of the Marin County Congestion Management Agency. Affected areas, specifically the hillsides, will be evaluated for possible reflective noise. Alternative noise barrier materials and design will be further evaluated. Noise barrier locations and designs will need to be considered for cost-effectiveness, will need to provide tangible benefits, and must be feasible to engineer. The following **Table 21-Predicted Future Noise Levels** lists the predicted future noise levels for various locations of the Marin 101 HOV Lane Gap Closure Project.

**Table 21 Predicted Future Noise Levels**

Rec. No	Location	Exist. Noise Level (dBA)	Predicted Future Noise Levels, Leg (h) dBA						Barrier No.	Barrier Location
			No Build (dBA)	Build Alternatives						
				w/o New Barrier	w/ New Barrier of Height					
				3.0 (m)	3.7 (m)	4.3 (m)	5.0 (m)			
1	Lucky Drive (S.F.)	74(M)	73	73	68	67(R)(T)	66(R)	65	S457	Shoulder
2	Marin Mobile Home Park	71(M)	72	71	68(T)	66	65(R)	64	S458	Shoulder
2A	Marin Mobile Home Park	70(E)	70	69	67	66(T)	65(R)	64	---	Shoulder
3	Via La Cumbre (S.F.)	64(E)	68	69(I)	68	66	66	65	---	---
3A	Via La Cumbre (S.F.)	61(M)	66	67	58(T)(	57	57(R)	56	S475	In R/W
3B	Via La Cumbre (S.F.)	64(E)	68	69	63(T)	61	58(R)	57	S475	In R/W
4	Via La Cumbre (S.F.)	65(E)	69	70(I)	---	---	---	---	---	---
5	Via La Cumbre (S.F.)	69(M)	71	71(I)	---	---	---	---	---	---
5A	Via La Cumbre (S.F.)	70(M)	70	71(I)	---	---	---	---	---	---
6A	Corte Placida (S.F.)	65(M)	70	70	69	68(T)	66	65(R)	S493	In R/W
6	Corte Placida (S.F.)	67(M)	67	68	64(T)	63	62	62(R)	S493	In R/W
7A	Corte Placida (S.F.)	67(E)	67	67	64(T)	63	63	62(R)	S493	In R/W
7	Via La Cumbre (S.F.)	67(M)	66	66(I)	---	---	---	---	---	---
8	Bret Harte Rd. (S.F.)	66(E)	66	68(I)	---	---	---	---	---	---
9	Tiburon Blvd. (S.F.)	75(E)	75	75(I)	---	---	---	---	---	---
10	Altena St. (S.F.)	75(M)	74	75(I)	---	---	---	---	---	---
10A	Altena St. (S.F.)	71(E)	72	74	67	66	65(R)	65	S517	R/W
11	Albion St. (S.F.)	70(E)	71	72	68	67(T)	66	66(R)	S517	R/W
11A	Albion St. (S.F.)	65(E)	66	67	63(T)	61(R)	61	60	S517	R/W
12	Albion St. (S.F.)	75(M)	74	75	---	69(R)	68	68	S517	R/W
13	Woodland Ave. (S.F.)	64(E)	65	65(I)	---	---	---	---	---	---
14	Francisco Blvd. E. (Motel)	66(E)	67	69(I)	---	---	---	---	---	---
15	Francisco Blvd. E. (Motel)	67(M)	69	70(I)	---	---	---	---	---	---
16	Hetheron St. (S.F.)	69(E)	70	73(I)	---	---	---	---	---	---
17A	Stevens Ave. (S.F.)	64(E)	64(S)	66(S)(I)	---	---	62	62	---	---
17	Stevens Ave. (S.F.)	64(M)	64(S)	66(S)(I)	---	---	63	62	---	---
18	Plum Tree Lane (Apt.)	62(M)	64(S)	65(S)(I)	---	---	63	62	---	---
18A	Lincoln Ave. (S.F.)	62(E)	64(S)	72	68	67	65(R)(T)	64	S633	R/W
19	Lincoln Ave. (S.F.)	63(E)	65(S)	70	70	68	66(R)(T)	64	S633	R/W
19A	Lincoln Ave. (S.F.)	63(E)	65(S)	71	67	66(R)(T)	64	63	S633	R/W
21	Brookdale Ave. (S.F.)	63(M)	63(S)	74	68	66(R)(T)	65	64	S633	R/W
21A	Grand Ave (S.F.)	63(E)	63(S)	75	66(T)	64	63(R)	62	S633	R/W
21B	Grand Ave. (S.F.)	65(E)	65(S)	77	69	67	66(R)(T)	65	S633	R/W
22	Irwin St. (S.F.)	69(M)	69	71	65(T)(R)	65	64	64	S596	Viaduct
22A	Mission Ave. (S.F.)	71(E)	73	74	68(T)	67	66(R)	65	S596	Viaduct
22AA	Irwin St. (S.F.)	70(E)	72	74	69	67	66(R)	66	S600	Shoulder

Rec. No	Location	Exist. Noise Level (dBA)	Predicted Future Noise Levels, Leg (h) dBA						Barrier No.	Barrier Location
			No Build (dBA)	Build Alternatives						
				w/o New Barrier	w/ New Barrier of Height					
				3.0 (m)	3.7 (m)	4.3 (m)	5.0 (m)			
22B	Belle Ave. (S.F.)	65(M)	65(S)	66(S)(I)	---	---	65	64	---	---
23	Belle Ave. (S.F.)	63(E)	64(S)	64(S)(N)	---	---	---	---	---	---
24	Elm St. (S.F.)	61(E)	62(S)	63(S)(N)	---	---	---	---	---	---
25	Marin Civic Ballet School	61(M)	64(S)	64(S)(N)	---	---	---	---	---	---
26	Grand Ave. (S.F.)	59(E)	59(S)	65(S)(I)	---	---	---	---	---	---
26A	Grand Ave. (S.F.)	62(E)	63(S)	63(S)(N)	---	---	---	---	---	---
27	Villa Ave. (S.F.)	59(E)	59(S)	63(S)(N)	---	---	---	---	---	---
28	Villa Ave. (S.F.)	63(E)	63(S)	65(S)(I)	---	---	---	---	---	---
29A	Lincoln Ave. (S.F.)	63(E)	64(S)	77	67	66	64(R)(T)	63	S633	R/W
29B	Lincoln Ave. (S.F.)	62(E)	63(S)	74	64	62(R)	62	61	S633	R/W
30	Lincoln Ave. (S.F.)	66(M)	67	70	66	65(R)(T)	64	63	S633	R/W
30A	Lincoln Ave. (S.F.)	63(E)	69	69	65(T)	64(R)	64	63	S655	Shoulder
31	Lincoln Ave. (S.F.)	73(E)	73	73	69	68	67(R)(T)	66	S661	Shoulder
32	Villa Ave. (S.F.)	66(E)	66(S)	66(S)(I)	---	---	65	64	---	---
33	Villa Ave. (S.F.)	66(M)	66(S)	67(S)(I)	---	---	65	64	---	---
34	Park Ave. (S.F.)	60(M)	60(S)	61(S)(N)	---	---	---	---	---	---
35	Villa Ave. (S.F.)	64(E)	64(S)	64(S)(N)	---	---	---	---	---	---
36	Merrydale Rd. (Apt.)	59(M)	62	62(N)	---	---	---	---	---	---
36A	Merrydale Rd. (Apt.)	63(M)	68	70	66	65(R)	64	63	S675	Shoulder
36B	Merrydale Rd. (Apt.)	60(E)	62	64(N)	---	---	---	---	---	---
36C	Merrydale Rd. (Apt.)	57(M)	62	63(N)	---	---	---	---	---	---
38	San Pablo Ave. (Apt.)	60(M)	63(S)	64(S)(N)	---	---	---	---	---	---
38A	San Pablo Ave. (Apt.)	60(E)	62(S)	63(S)(N)	---	---	---	---	---	---
39	Tarrant Ct. (S.F.)	57(E)	59	59(N)	---	---	---	---	---	---
39A	Tarrant Ct. (S.F.)	61(M)	63	63(N)	---	---	---	---	---	---

Note:

- (E) Estimated noise level based on measurements at a similar location
- (I) Barriers not feasible due to topography or other noise source
- (M) Actual measured noise level
- (N) No barrier required according to Noise Abatement Criteria
- (R) Noise level with barrier of recommended height
- (S) Noise level with the existing noise barrier remain
- (S.F.) Single-Family house
- (T) Barrier height needed to block the line-of-sight of truck exhaust stacks

### The Upcoming Noise Evaluation

Caltrans and the Marin Congestion Management Agency (Marin CMA) have committed to further evaluate the noise issue in San Rafael. This evaluation will refine the design of the newly proposed noise barriers on US 101 and address possible reflected noise at homes on the hillsides above and behind the noise barriers.

Caltrans and the Marin CMA are still working on the details of the scope of work. An independent consultant will be selected. They will be asked to measure the existing noise levels on the hillsides, collect data on traffic and meteorology, calibrate the noise model, predict future noise levels at homes on the hillsides with and without the proposed new noise barriers. The noise consultant will be asked to explore every possibility for noise abatement including, but not limited to: selection of sound absorbing materials; new noise barriers, if warranted; modified noise barrier designs; as well as extensive landscaping where future predicted noise levels for outside residential use will approach or exceed 67 dBA, Leq(h) due to traffic noise from US 101.

There has been no commitment made to the use of sound absorbing material or any other means of noise abatement other than the noise barriers proposed in the June 1997 *Noise Impact Report*. Any abatement measure proposed by the consultant as a result of the new noise investigation will

have to be reasonable, feasible, cost-effective and it must have the final approval of the Marin CMA, the Metropolitan Transportation Commission (MTC) and Caltrans.

Per current policy and guidelines, Caltrans avoids noise reflections through appropriate design measures, such as avoiding barrier configurations with aspect ratios less than 10:1.

The consultant will be directed to use the most appropriate noise model, approved by the Federal Highway Administration (FHWA). SOUND32 is the Caltrans version of STAMINA2/OPTIMA and calculates hourly noise levels based on FHWA Traffic Noise Prediction Model RD-77-108. The latest FHWA traffic noise model (TNM Version 1) was approved by FHWA in March 1998. TNM does not adequately predict the effects of noise barrier reflections. Future scheduled revisions of the TNM model will include the ability to calculate barrier reflections. Other computer models, subject to Caltrans and FHWA approval, may be used when appropriate.

## **4.15 Visual Environment**

### **4.15.1 Visual Quality Criteria**

The visual impacts of a proposed transportation project are assessed by determining the existing visual quality of the project area and then assessing the effects of the project on these existing views and visual resources.

The criteria used to assess these visual relationships are vividness, intactness and unity. They are defined as follows:

- Vividness - the memorability of landscape components as they combine to form striking and distinctive visual patterns.
- Intactness - the integrity of the landscape and degree to which the landscape is free from visual encroachment.
- Unity - the degree to which the landscape elements form a coherent, harmonious visual pattern.

### **View Distance Categories**

Views within the project area are separated into three categories: foreground views, midground views, and background views. As the height, density and proximity of existing trees and structures adjacent to the highway increase, foreground views will dominate the viewshed while mid and background views become obscured. High points and views through areas where elements are below sight line will reveal mid and background elements.

### **Viewers and Viewer Sensitivity**

The project area hosts two primary viewer groups, residents and motorists. Residents include occupants in residential neighborhoods and commercial districts adjacent to the highway corridor. For those who live along the highway corridor, viewer sensitivity is high and changes proposed for their neighborhoods will be intensely scrutinized and challenged.

Motorists view the project area while traveling on adjacent city streets as well as US 101 and I-580. Because the duration of a motorist's viewing time is substantially less than that of a resident, motorists possess a somewhat reduced level of sensitivity, exacerbated by the transient nature of their experience through the project area.

#### 4.15.2 Landscape Units

A landscape unit has a distinct visual character consisting of a combination of the visual elements of landform, vegetative cover and the built environment. The relationship amongst these elements is different for each landscape unit and defines the unit's visual character. Because of this diversity within the project area, five different landscape units have been identified for this project:

- Landscape Unit I - south of Sir Francis Drake Boulevard Interchange to the top of Cal Park Hill.
- Landscape Unit II - top of Cal Park Hill to the north end of the Cal Park Overhead.
- Landscape Unit III - south of the Bellam Boulevard Undercrossing on I-580 to the south end of the San Rafael Viaduct on US 101.
- Landscape Unit IV - south end of the San Rafael Viaduct to north of the San Rafael Viaduct.
- Landscape Unit V - north of the San Rafael Viaduct to the top of Puerto Suello Hill.

#### 4.15.3 Visual Impacts and Mitigation

The most visually sensitive areas affected by the proposed project would be residential neighborhoods, commercial developments, and existing planting both within and outside the highway right of way. The removal of existing residential homes and highway planting, combined with a reduced separation between the highway right of way and adjacent structures, would increase the visual prominence of the proposed freeway facilities and disrupt the visual integrity of existing residential and commercial communities. Summarized below are the most prominent visual impacts.

Noise barriers and freeway widening activities have very similar visual effects for all of the build alternatives. In the Francisco Boulevard West area and the Lincoln Avenue/Brookdale Avenue area, sufficient right of way for the Ultimate HOV Lane Gap Closure Alternative will be acquired under each of the build alternatives. Each of the build alternatives also has the same proposed noise barriers and so each build alternative will have similar visual effects due to the construction of noise barriers.

The two noise barriers proposed for the west side of US 101, north of Corte Madera Creek, will have minimal impact on the residents' views. Noise barrier S493 may block views toward the west residential hillside, see **Appendix A-Project Mapping** for location of noise barriers.

Widening in Landscape Unit II to the east of US 101 would result in minimal visual impacts to surrounding residents or motorists.

Replacement of the southbound US 101 to eastbound I-580 connector in Landscape Unit III would remove interchange landscaping installed in 1986. Structures proposed for the interchange should be designed with attention to large-scale aesthetics and detail.

Widening to the west between the US 101/I-580 Interchange and the central San Rafael Viaduct will move Francisco Boulevard West and US 101 closer to the fronts of adjacent businesses. The loss of front setback from the street, the loss of landscaping along the front of property and the increased proximity to Francisco Boulevard West and US 101 would reduce the visual quality for both motorists and businesses along Francisco Boulevard West. The McPhails building complex, R.A.B. Motors, and all the Francisco Boulevard West businesses could be adversely impacted in this way by all of the build alternatives. R.A.B. Motors would have its front setback from Francisco Boulevard West severely reduced. The McPhails complex and others would be impacted to a lesser degree. **Figure 20-Simulation of Proposed Project-Southbound/Reversible HOV Lane Gap Closure Alternative** presents a view of the proposed widening and relocation of Francisco Boulevard West in the Southbound/Reversible HOV Lane

Gap Closure Alternative. Planned improvements to enhance the visual quality within the area include:

- providing a planting strip along the highway,
- undergrounding the overhead utilities, and
- an aesthetically pleasing replacement for the existing glare screen.

Noise barrier S600, see **Appendix A-Project Mapping** for noise barrier location, at the northern end of the northbound viaduct in Landscape Unit IV will have moderate visual impacts on the highway motorist, on pedestrians and on surface-street motorists. Views for the motorist toward the residential neighborhoods and mature trees to the east are of moderate visual quality.

Widening to the west in Landscape Unit V will reduce visual quality in the Brookdale Avenue neighborhood. The balance and harmony of old homes on either side of the street, the unique architectural features of many of these homes, the mature row of street trees, and the riparian area along Irwin Creek all combine to create an intimately-diverse, oasis-like community. In addition, the stand of Eucalyptus trees between Lincoln Avenue and the railroad right of way, north of Brookdale Avenue, displays exceptional size and stature. Widening would result in the removal of many of these trees. Homes removed along the east side of Brookdale would be replaced with landscaping along Brookdale Avenue. **Figure 21-Simulation of Proposed Project-Southbound/Reversible HOV Lane Gap Closure Alternative** is a view of the proposed noise barrier along Brookdale Avenue at the proposed Caltrans right of way line.

Positive visual impacts for freeway motorists would result from relocation of the wall west to the proposed right of way line reducing the tunnel effect created by the barriers. Increased space between the new shoulder and relocated noise barrier south of Lincoln Avenue will allow for landscaping. Planting of trees and shrubs in this area will help to soften and reduce the singular plane surface of the noise barriers and maintain planting continuity throughout the corridor.

For further detail and additional visual simulations of the project, see the *Visual Impact Assessment* listed in **Appendix E**.

## 4.16 Air Quality

### 4.16.1 Introduction

The purpose of this section is to evaluate the air quality impacts of the proposed Marin 101 HOV Lane Gap Closure Alternatives on local and regional air quality and establish project conformity with the 1990 Federal Clean Air Act Amendments (FCAAA).

Regional conformity with the *State Implementation Plan (SIP)* is evaluated by the Metropolitan Transportation Commission (MTC) and the Federal Highway Administration (FHWA) during approval of projects for the *Regional Transportation Plan (RTP)* and the *Transportation Improvement Program (TIP)*.

Project-level (local) compliance with National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) is determined by analysis of the potential concentration of air pollutants at local receptors; e.g., the potential carbon monoxide (CO) level at a local intersection.

### 4.16.2 Air Quality Impact Reports

An initial *Air Quality Impact Report - Marin 101 HOV Lane Gap Closure Project* produced for this project is referenced in **Appendix E** and available for review at the Caltrans District 4

Office, 111 Grand Avenue, Oakland. This report modeled traffic factors and other factors to evaluate the potential worst-case carbon monoxide (CO) one-hour and eight-hour concentrations at local receptors in the project area.

To evaluate the Southbound/Reversible HOV Lane Gap Closure Alternative at a level of detail similar to the other project alternatives, a *Revised Air Quality Impact Report - Route 101 HOV Gap Closure Project from Lucky Drive to North San Pedro Road in Marin County, California* was prepared. This *Revised Air Quality Impact Report*, see **Appendix E**, evaluates the potential air quality impacts of each of the Marin 101 HOV Lane Gap Closure build alternatives.

The *Revised Air Quality Impact Report* evaluates the Southbound/Reversible HOV Lane Gap Closure Alternative and the other two build alternatives by the same protocol and to a similar level of detail. A new analysis protocol, the Transportation Project-Level Carbon Monoxide Protocol, was used and indicated the project will meet air quality standards and will cause no exceedences of state or federal CO standards. The report also determined conformity of the Southbound/Reversible HOV Lane Gap Closure Alternative and the Southbound Only HOV Lane Gap Closure Alternative with the *State Implementation Plan (SIP)*.

### 4.16.3 Regional Air Quality

The impacts of several of the transportation related pollutants are reasonably analyzed only from a regional perspective. This is due to their formation mechanism and/or their dispersion patterns in the atmosphere. The Metropolitan Transportation Commission (MTC) includes an analysis of the impacts of these pollutants (carbon monoxide, hydrocarbons and nitrous oxides) at the regional level in MTC's conformity analysis of the *Regional Transportation Plan (RTP)* and the *Transportation Improvement Program (TIP)*.

The San Francisco Bay Area Air Basin has been designated as a maintenance area for carbon monoxide (CO) and a non-attainment area for ozone. For PM<sub>10</sub>, the area is undesignated for federal standards and non-attainment for state standards.

The Southbound Only HOV Lane Gap Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative are included in the 1998 conforming *Regional Transportation Plan (RTP)* and the 1998 *Regional Transportation Improvement Program (RTIP)*. The current project design concept and scope are essentially the same as the design concept and scope in the *RTP* and *RTIP* listings. All applicable transportation control measures, as stated in the *State Implementation Plan (SIP)* which was approved by the Environmental Protection Agency, are included in the project, including construction of HOV lanes. The two project alternatives therefore meet the regional tests for conformity with the *State Implementation Plan*.

### Transportation Control Measures

Transportation control measures (TCM) promote a more efficient use of the transportation system and are incorporated in the *State Implementation Plan (SIP)* which was approved by the Environmental Protection Agency (EPA). The Marin 101 HOV Lane Gap Closure Project includes numerous transportation control measures. MTC's TCM #20 calls for the development of HOV lanes. HOV lanes are a TCM that the MTC developed in cooperation with the Bay Area Air Quality Management District (BAAQMD) and are incorporated in the Bay Area Clean Air Plan.

There are currently 28 TCMs that the MTC tracks for success of implementation either through direct funding approval or assistance in getting funds. In Marin County, Caltrans is involved in many of these, in particular TCM #20, the Regional HOV System Plan.

As part of the overall Traffic Operations System (TOS) underway for the Marin 101 corridor, HOV bypass lanes at on-ramps will be required anytime an interchange or ramp is modified. This will give an advantage to buses and carpools during peak periods, if and when ramp metering is implemented. The TOS also includes Changeable Message Signs (CMS) to warn motorists of problems and a Highway Advisory Radio (HAR) system that is linked to the regional Traffic Operations Center (TOC). Signal timing optimization is also an important measure that is an ongoing element supported by Caltrans and the Marin County Congestion Management Plan. All of these efforts are important in managing the existing and future system to make it more efficient.

#### **4.16.4 Local Air Quality**

The air quality impact of this project has been addressed in accordance with the following legislation: the Clean Air Act and its Amendments, the EPA Final Regulations (1998), the National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA).

The project-level air quality analysis in the Draft Environmental Impact Statement/Report (DEIS/R) was evaluated using microscale CO protocol applicable in 1996. This analysis included the Southbound Only HOV Lane Gap Closure Alternative and the Ultimate HOV Lane Gap Closure Alternative. For details, see the *Air Quality Impact Report - Marin 101 HOV Lane Gap Closure Project*, referenced in **Appendix E**.

Prior to the Final Environmental Impact Statement/Report (FEIS/R), a new air protocol was approved changing the air conformity rules for the Bay Area. This current analysis protocol, the Transportation Project-Level Carbon Monoxide Protocol, is discussed below. The *Revised Air Quality Impact Report - Route 101 HOV Gap Closure Project from Lucky Drive to North San Pedro Road in Marin County, California* uses the new Transportation Project-Level Carbon Monoxide Protocol.

The current air quality analysis protocol is the Transportation Project-Level Carbon Monoxide Protocol, dated December 1997, and prepared by the Institute of Transportation Studies, University of California. This protocol was approved by MTC in Resolution No. 3075 on June 24, 1998. Use of this protocol was recommended by the Bay Area Interagency Conformity Task Force, which is the interagency consultation group established pursuant to EPA's conformity regulation and the Bay Area's conformity *SIP*. Since the Bay Area was designated a maintenance area for CO on June 1, 1998, the protocol indicates that an analysis by comparison is appropriate for this project. This involves a comparison of the proposed facility with existing facilities within the Air District. Both mainline and intersection comparisons were performed.

#### **Project-Level Results**

Results indicate each of the build alternatives of the Marin 101 HOV Lane Gap Closure Project would be smaller and less congested than comparable facilities within the same Air District. Since the comparable facilities are in an area that meets air quality standards (CO maintenance area), this project will also meet air quality requirements. There will be no significant impact on air quality and no exceedences of state or federal CO standards resulting from any of the build alternatives.

#### **4.16.5 Conformity Statement**

The San Francisco Bay Area Air Basin has been designated as a maintenance area for carbon monoxide (CO) and a non-attainment area for ozone. For PM<sub>10</sub>, the area is undesignated for federal standards and non-attainment for state standards. The Southbound Only HOV Lane Gap

Closure Alternative and the Southbound/Reversible HOV Lane Gap Closure Alternative are included in the 1998 conforming *Regional Transportation Plan (RTP)* and the 1998 *Regional Transportation Improvement Program (RTIP)*. The current project design concept and scope are essentially the same as the design concept and scope in the *RTP* and *RTIP* listings. The project, as described in the *RTP* and *RTIP*, conforms to the *State Implementation Plan (SIP)*. All applicable transportation control measures, including HOV lanes, as stated in the *SIP* are included in the project. The two project alternatives therefore meet the regional tests for conformity with the *State Implementation Plan*.

## **4.17 Temporary Effects during Construction**

### **4.17.1 Project Alternatives**

Potential temporary impacts to natural resources from Marin 101 HOV Lane Gap Closure Project construction activities exist for all of the build alternatives. The existing alignment of US 101 and a variety of other factors, see **Section 2.3-Alternatives Considered and Withdrawn**, have limited the widening choices and limited options to avoid impacting natural resources. There is widening, grading, pile driving, bridge construction, demolition, roadway construction, paving, and other construction activities in each of the build alternatives. The differences between the effects of each alternative are in the duration and severity of the construction activities. These include:

- the duration of the construction period,
- the extent of grading,
- construction of one bridge lane or two bridge lanes, and
- construction of one freeway-to-freeway connector or two connectors.

### **4.17.2 Construction Impacts**

Typical roadway, structure and marine construction activities and their potential adverse impacts to natural resources are associated with all of the build alternatives. These activities and potential impacts may include, but are not limited to:

- air pollution from dust and construction equipment,
- increased storm water runoff, nonpoint pollution and soil erosion,
- construction noise,
- increased siltation, sedimentation, and water turbidity due to creek bank and subsurface construction activities in Corte Madera Creek,
- increased marine activity (boats and barges) in and around Corte Madera Creek and the Larkspur Ferry Terminal,
- disruption of traffic, lane closures and detours, bicycle path closures and detours,
- pile driving of permanent and temporary piles,
- construction of temporary trestles in Corte Madera Creek along the southbound on-ramp structure and mainline structure, and
- construction of shoreline ramps for getting workers and equipment on and off trestles.

### **4.17.3 Construction Impacts and Mitigation**

Adverse impacts due to construction activities will be avoided, minimized, or rectified by a combination of Caltrans standard specifications and procedures for construction and by additional conditions supplied by permitting and regulatory agencies.

### **Air Quality**

All of the build alternatives will generate air pollution during construction. These include equipment emissions and exhaust from construction equipment and other vehicles, odors from construction materials, wind blown dust from grading and hauling, etc. These effects are temporary and localized.

Construction equipment emissions are accounted for in the regional air quality plan and the contractor is required by Caltrans Standard Specifications and special provisions to meet the Air Quality Management District (AQMD) and other applicable emission control rules for construction equipment that may be in effect at the time of construction.

Wind blown dust and particulate matter is another major contaminant of construction-generated air pollution. Sufficient watering activities will be required to accompany dust-generating construction activities. Caltrans Standard Specifications and special provisions include these provisions, and all applicable (e.g., AQMD) air quality control rules also apply.

### **Noise Impacts**

Noise is a natural component of major construction activities. Noise generated by grading equipment, other heavy construction machinery, and/or pile-driving activities can negatively affect nearby residents and businesses. All of the build alternatives of the Marin 101 HOV Lane Gap Closure Project will have noise generating activities. However, the noise impacts will be relatively temporary due to the staging and to the overall length of the project. Whenever possible, work will be scheduled for weekday hours. Contractors will be required to comply with local noise ordinances. Caltrans also includes noise control requirements in the project special provisions.

### **Water Quality**

Construction activities have the potential to pollute nearby water resources by leaking or spilled chemicals, storm water runoff, erosion, etc. A Regional Water Quality Control Board Certification/Waiver will be required. Economically achievable measures are required to contain pollutants from nonpoint sources through the use of available nonpoint pollution control practices, technologies and operating methods.

Caltrans will require from its contractors a Storm Water Pollution Prevention Plan or a Water Pollution Control Plan containing erosion control measures such as soil stabilization practices and sediment control practices, including silt fences, inlet protection and check dams as necessary. Best Management Practices will be required including sediment tracking control practices, wind erosion control practices, non-storm water management and waste management and disposal control measures. Additional water quality, erosion, and hazardous waste provisions, to avoid contaminating waterways or groundwater, may also be required in the construction contract and/or in the Standard Specifications and special provisions.

### **Traffic**

The purpose of the Marin 101 HOV Lane Gap Closure Project is to reduce traffic congestion and delays through the Marin US 101 corridor. US 101 peak-period delays for longer distance commuters and for short-trip travelers will shorten with completion of the HOV lane system. Construction activities on US 101 and on adjacent streets may temporarily cause congestion and delays. Lane closures and detours will be restricted to off-peak periods whenever possible. Lane

closures may occur during night hours for a limited duration. Caltrans requires that the freeway always remain open.

Widening of the Sir Francis Drake Boulevard on-ramp to southbound US 101, over Corte Madera Creek, will result in a temporary closure of the bicycle and pedestrian path on the southbound on-ramp. Alternative bicycle and pedestrian routes over Corte Madera Creek are available on the east side of the US 101 bridge and to the west of the project at Bon Air Road. Temporary rerouting of bicycle and pedestrian traffic on the Greenbrae Pedestrian Overcrossing will occur late in the project related to the installation of the moveable barrier. Alternate routes between the east and west sides of US 101 are available both north and south of the Greenbrae Pedestrian Overcrossing.

### **Natural Environment**

There are temporary construction impacts to the Corte Madera Creek area associated with pile driving and with the construction of the widened bridge sections. These include temporary construction trestles, barges in Corte Madera Creek and heavy equipment activities on the adjacent shoreline. Construction trestles will provide access to work sites. Construction activities and temporary fills in Corte Madera Creek will be limited to a construction window of six months during the dry season to avoid impacting spawning species. Barges may be used to transport workers, equipment and construction materials to the site. These barges will not be allowed to rest on Bay Mud and will not have access to shallow areas outside of the deeper channel. No dredging will be permitted on this project.

Heavy equipment and other construction activities on the shoreline adjacent to the bridge may impact upland areas. These activities will not be allowed in the tidal wetlands nor in the adjacent isolated wetlands at Corte Madera Creek, see **Section 4.6.4-Mitigation Plans**. The affected uplands will be returned to their existing condition at the completion of the project.

Other temporary impacts may include limiting the public access to some areas along Corte Madera Creek adjacent to the bridge and temporary detour of the bike lane on the west side of the southbound on-ramp from Sir Francis Drake Boulevard.

### **Safety**

Improved freeway operations and safety is one of the stated goals of the proposed project. All proposed improvements, roadway changes, maintenance work and construction activities must meet high safety standards. Special provisions require safety plans and regular safety meetings for workers. The safety of drivers on the freeway is the foremost concern of Caltrans operations, maintenance and design members. Safety is a key component in the purpose and construction of highway projects.

## **4.18 Cumulative Impacts**

Council on Environmental Quality regulations define cumulative effects as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and foreseeable future actions...." This section evaluates the adverse and beneficial consequences of the Marin 101 HOV Lane Gap Closure Project when added to the environmental effects of past, present, and reasonably foreseeable future actions on specific resources and on the human environment. The cumulative analysis evaluates project-specific impacts in concert with those of other past, present, and future projects within the Marin 101 HOV Lane Gap Closure Project's spatial and temporal vicinity.

#### 4.18.1 Transportation

Completion of the Marin 101 HOV Lane Gap Closure Project, in concert with previous Marin US 101 HOV lane projects, see **Section 1.3-Project Background**, completes the HOV lane system from Richardson Bay to Route 37. This continuous HOV lane allows high occupancy carpool, vanpool, and bus riders to use the HOV lane to reduce delays during peak traffic periods. A complete HOV lane system also removes the current US 101 bottlenecks in the Lucky Drive and North San Pedro Road areas where the current HOV lanes end. Congestion in the multi-flow lanes would also be reduced by the shift of HOV traffic out of these lanes. There are future HOV lane projects proposed for the US 101 corridor and listed in the *Regional Transportation Plan (RTP)*. These include the construction of HOV lanes on US 101 in Marin County north of Route 37 and in Sonoma County in the Santa Rosa area. Together, these projects provide a long-term transportation benefit to Marin County.

Operational improvements resulting from the Marin 101 HOV Lane Gap Closure Project will improve freeway operations and safety. There are other past and future projects, such as the recent construction of the northbound auxiliary lane between Sir Francis Drake Boulevard and Andersen Drive that also improve operations and safety. These projects and the Marin 101 HOV Lane Gap Closure Project improve operations and safety by providing longer merging distances for on and off-ramps, increased lane and shoulder widths, additional lanes for freeway-to-freeway connectors, and other operational improvements. The cumulative result of these projects is reduced congestion, enhanced freeway operations, and increased safety.

There are temporary construction impacts to traffic on US 101, I-580, and on local streets due to the Marin 101 HOV Lane Gap Closure Project. The presence of construction activities, such as temporary lane and ramp closures, and lane reconfigurations due to the Marin 101 HOV Lane Gap Closure Project would lead to increased congestion, especially during peak traffic periods, see **Section 4.17.3-Construction Impacts and Mitigation**. Temporary traffic congestion caused by construction of other projects simultaneously with construction congestion of the Marin 101 HOV Lane Gap Closure Project could cause a cumulative temporary adverse impact on traffic.

Within the Marin US 101 corridor, the 1998 *RTP* includes interchange improvement projects at:

- US 101/Lucas Valley Road Interchange,
- US 101/Greenbrae Interchange, and
- US 101/Tiburon Interchange.

The current *Transportation Improvement Program (TIP)* includes:

- a Sir Francis Drake Boulevard rehabilitation project in Larkspur,
- the Harbor Street drainage structure replacement project in San Rafael,
- a project to rebuild a retaining wall and install a concrete barrier from I-580 to Second Street in San Rafael, and
- replacement of the Harbor Street Bridge in San Rafael.

The Harbor Street drainage project is currently underway and will be completed prior to the construction of the Marin 101 HOV Lane Gap Closure Project.

Specific details of construction schedules for these projects are not available, but these projects are relatively small in scope and duration. Given the small number of projects in the Marin 101 HOV Lane Gap Closure Project vicinity, their limited scope and duration, and the temporary nature of their effects on local and freeway traffic, the cumulative impacts of temporary construction activities on traffic is minimal.

#### 4.18.2 Growth

A growth inducement analysis for the Marin 101 HOV Lane Gap Closure Project has concluded that there is no growth inducement effect from the proposed project build alternatives, see **Section 4.13.2-Growth Inducement**. The projected residential growth pressures resulting from the Marin 101 HOV Lane Gap Closure Project build alternatives are not significantly different from those of the No-Build. Consequently, residential growth pressures that occur within the identified growth areas are almost entirely independent of the transportation improvements of the Marin 101 HOV Lane Gap Closure Project. Therefore, there would not be a cumulative growth inducing impact as a result of the Marin 101 HOV Lane Gap Closure Project.

#### 4.18.3 Air Quality

Air quality cumulative impacts are addressed at the regional level by analyzing the air quality impacts of transportation projects in the *Regional Transportation Plan (RTP)* and the *Transportation Improvement Program (TIP)*. The Metropolitan Transportation Commission (MTC) is responsible for determining the conformity of the *RTP* and the *TIP* with local air quality goals as presented in the *State Implementation Plan (SIP)*. The Marin 101 HOV Lane Gap Closure Project appears in the *Regional Transportation Plan (RTP)* and the *Transportation Improvement Program (TIP)* and has been determined to conform to the *SIP*. Therefore, the cumulative effects of the Marin 101 HOV Lane Gap Closure Project and other projects would not result in significant adverse air quality impacts.

#### 4.18.4 Natural Environment

The potential adverse effects of the Marin 101 HOV Lane Gap Closure Project include:

- concrete piles in Corte Madera Creek, wetlands and waters of the U.S.;
- shading of Corte Madera Creek, wetlands and waters of the U.S. due to bridge widening;
- shading of San Rafael Creek/Canal, wetlands and waters of the U.S. due to a widened San Rafael Viaduct;
- fill in Irwin Creek, wetlands and waters of the U.S. between Myrtle Avenue and the Irwin Creek culvert under US 101;
- loss of oak/bay woodland habitat (trees) at Irwin Creek;
- loss of riparian habitat at Irwin Creek; and
- disruption of two populations of plant species of concern on Cal Park Hill.

See **Section 4.6.3-Natural Environment Impacts and Project Alternatives**.

The Marin 101 HOV Lane Gap Closure Project includes mitigation to avoid and minimize adverse effects on habitat and includes replacement mitigation to insure no net loss of sensitive habitat, see **Section 4.6.4-Mitigation Plans**. Regulatory agencies, including the Army Corps of Engineers, Bay Conservation and Development Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game, Regional Water Quality Control Board, and others require that the Marin 101 HOV Lane Gap Closure Project avoid, minimize and compensate to meet the no net loss standard.

Within the limits of the Marin 101 HOV Lane Gap Closure Project, the US 101 corridor is primarily an urban commercial and residential zone. The original natural communities that once occurred within the project limits have been highly modified and degraded, see **Section 3.6.1-Natural Environment Introduction**. Urban commercial, light manufacturing and associated development along the US 101 corridor for over 100 years have contributed to the degradation and elimination of natural habitats. Residential development, grazing and quarrying activities

have also disturbed and greatly modified remaining areas of natural vegetation and wildlife within the project vicinity.

The Marin 101 HOV Lane Gap Closure Project will cause no net loss of sensitive habitat. Neither will the project contribute indirectly, through growth inducement, to the destruction of natural habitat. The Marin 101 HOV Lane Gap Closure Project mitigation plans will help in the effort to preserve natural habitats in the highly urbanized US 101 corridor. There would be no Marin 101 HOV Lane Gap Closure Project contribution to a cumulative net loss of natural habitats.

#### **4.18.5 Visual Environment**

The Marin 101 HOV Lane Gap Closure Project includes impacts on several residential neighborhoods, commercial developments, and existing planting within and outside the highway right of way. These changes would affect the visual environment of the project area, see **Section 4.15.3-Visual Impacts and Mitigation**. The removal of existing residential homes, the reduced separation between the highway right of way and adjacent structures, construction of noise barriers, and the loss of highway planting would increase the visual prominence of the proposed freeway facilities and may disrupt the visual integrity of existing residential and commercial communities.

Within the project vicinity, none of the related transportation projects discussed in **Section 4.18.1-Transportation** have similar visual impacts on residents and motorists within the Marin 101 HOV Lane Gap Closure Project vicinity. There have been previous projects, over 10 years ago, within the current project limits that have included widening of US 101 and construction of noise barriers. These previous projects may have had an adverse effect on the visual environment due to the construction of noise barriers. Some of these existing barriers will be removed and replaced by new noise barriers due to widening of the Marin 101 HOV Lane Gap Closure Project.

In the Metropolitan Transportation Commission's (MTC) proposed 20-year plan, there are no projects with noise barriers in the Marin 101 HOV Lane Gap Closure Project vicinity. The lack of foreseeable future projects with noise barrier construction and the lack of projects with noise barrier construction over the last 10 years indicate that the cumulative effect of noise barrier construction on the visual environment due to the Marin 101 HOV Lane Gap Closure Project is minor.

Positive visual impacts for motorists include reducing the noise barrier tunnel effect by widening the US 101 corridor and increasing the shoulder widths. Landscape plantings of trees and shrubs will also improve appearances. Other landscape projects or beautification efforts by Caltrans, local agencies, businesses and residents will contribute to improving the visual environment for residents and for motorists in the project vicinity.

#### **4.18.6 Business and Residential Relocations**

The Marin 101 HOV Lane Gap Closure Project includes business and residential relocations as a result of freeway widening activities. The net effect of these business relocations is to support the redevelopment and conversion of land uses in the Francisco Boulevard West area. Jobs and economic activity will result from these land use changes. None of the current transportation-related projects in the Marin 101 HOV Lane Gap Closure Project vicinity have relocation impacts. Within the project limits, no other projects are known that convert commercial and residential parcels to other use.

There are also no projects in the recent past or the reasonably foreseeable future that relocate residents and businesses in the project vicinity. The residential and business relocations resulting from the Marin 101 HOV Lane Gap Closure Project are not contributing to any overall trend and do not have a significant cumulative effect.

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## **Chapter 5 SHORT-TERM USES/LONG-TERM PRODUCTIVITY**

### **5.1 Introduction**

This chapter discusses the relationship between the short-term uses of man's environment and the maintenance and enhancement of long-term productivity. For this project, the proposed short-term uses of the environment and resources are consistent with maintenance of the long-term productivity of the study area. The long-term productivity of San Rafael, Larkspur, Corte Madera, Marin County and the Bay Area depends on an adequate transportation system in the project area. The flow of goods, services and people is being hampered by the lack of a continuous HOV lane system and the lack of improvements to the existing highway configuration. The future of commerce, tourism, and freedom of movement can be related to an improved interregional multimodal transportation system.

### **5.2 Long-Term Benefits**

Long-term productivity will be enhanced by the project. While there may be short-term adverse effects on residents and businesses, overall productivity will be enhanced by reduced travel delay, by improved access to business and employment centers, and by improved interregional travel. Completing the HOV system on US 101 between Richardson Bay Bridge and Route 37 will not preclude other future modal transportation enhancements including expanded express bus transit, operational improvements, and mass transit alternatives, including rail.

A dependable transportation system provides long-term benefits, despite minor short-term costs such as right of way acquisition, displacement of businesses and residents, construction energy use, and state and federal investments.

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## **Chapter 6 IRREVERSIBLE COMMITMENT OF RESOURCES**

### **6.1 Commitment of Resources**

The Marin 101 HOV Lane Gap Closure Project will involve irreversible and irretrievable commitments of resources including money, materials and labor.

#### **6.1.1 Land Use**

Changes in land use resulting from the project are irreversible commitments. The conversion of commercial and residential land for additional highway right of way would result in permanent changes. However, the relocation of Francisco Boulevard West will open other opportunities for redevelopment.

#### **6.1.2 Energy**

The proposed project would require both direct and indirect expenditures of energy. Direct energy impacts result from the fuel consumed in construction vehicles and heavy construction equipment. Indirect energy losses include power generation and the mining and refining of raw materials for construction. Some of the construction materials used can be recycled. These materials are not in short supply and their use would not affect their availability.

#### **6.1.3 Other Benefits**

Other direct benefits include temporary employment during construction and reduced traffic congestion and fuel consumption. Indirect benefits include incentives to rideshare and improved operation and safety of US 101 resulting from the Marin 101 HOV Lane Gap Closure Project. The net effect is positive, especially considering the savings derived from a more efficient highway facility.

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## Chapter 7 MAJOR INVESTMENT STUDY

### 7.1 Bay Area Partnership MIS Screening Criteria

An analysis for a Major Investment Study (MIS) was prepared as a required element for all major transportation improvements that have federal funding, as outlined in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The Marin 101 HOV Lane Gap Closure Project had extensive alternative analyses prior to this requirement and was considered to be a "pipeline" project by the Metropolitan Transportation Commission (MTC) in 1995. The following documentation fulfills the requirements of both the Federal Highway Administration (FHWA) guidance for "pipeline" projects and the MTC Project Screening Criteria. See **Appendix B** for the MIS Project Screening Criteria.

### 7.2 Major Investment Study Documentation

On February 1, 1994, the FHWA issued interim guidance for implementing a Major Investment Study (MIS) for "pipeline" projects. Criterion to be considered in implementing the guidance is shown in bold type, followed by a description of its applicability to the Marin 101 HOV Lane Gap Closure Project.

#### **Nearness of the Study to Completion**

- Environmental technical studies on a variety of alternatives for the Marin 101 HOV Lane Gap Closure Project have been underway since 1988.
- A Notice of Intent/Notice of Preparation was issued by FHWA and Caltrans for the Marin 101 HOV Lane Gap Closure Project in March 1993.
- Technical studies supporting the environmental analysis were completed in September 1999.

The Marin 101 HOV Lane Gap Closure Project was in the final stages of development of the Environmental Impact Statement/Report and was required by FHWA guidance to begin the MIS analysis "as early in the process as possible and document results in [the] draft and final environmental document." A "pipeline" MIS for the Marin 101 HOV Lane Gap Closure Project was prepared by a consultant in 1994, and is the basis of information in this section.

#### **Circumstances that Limit or Dictate the Type of Modal Alternatives Considered**

- Limited right of way width is available for expansion of the existing freeway.
- The HOV lane segments to the north and south of the project limits were installed with substantial previous public investment.
- Marin County voters rejected 1990 and 1998 county referendums that would have funded light rail transit on the adjacent Northwestern Pacific Railroad (NWPR) right of way.
- The NWPR right of way and US 101 parallel each other in parts of Marin County and therefore could serve portions of the same transportation corridor. Two studies of the feasibility of the NWPR right of way for potential use as commuter or light rail transit have been completed, the most recent completed in July 1997.
- The Marin 101 HOV Lane Gap Closure Project is consistent with the *Regional Transportation Plan*, is funded in the *Regional Transportation Improvement Program*, and is the number one priority project of the Marin County Congestion Management Agency.
- Limited funding is available for transportation improvements.

US 101 is the only developed continuous north-south transportation corridor in Marin County. Acquisition of the unused NWPR right of way, which parallels, overlaps and crosses most of the US 101 corridor has been completed, although the portion south of Paradise Drive has been sold for other purposes. Closure of the HOV lane gap and completion of the existing system of auxiliary lanes is expected to provide improved conditions for commute traffic and local traffic while limiting the amount of new right of way required.

Multimodal alternatives have a high potential for success in the Marin US 101 corridor. At present, there is bus transit and ferry service within the corridor. The vacant NWPR right of way has been acquired with federal funding assistance as a possible future commuter rail corridor or HOV facility. The rail transit project is not currently funded, nor is it a component of the *Regional Transportation Plan* or *Regional Transportation Improvement Program*.

The proposed HOV lane gap closure is a transportation control measure (TCM) which would increase the efficiency of existing commuter bus service and carpools on US 101. It is an element of TCM #20 of the Metropolitan Transportation Commission (MTC), acting as the Metropolitan Planning Organization (MPO). Auxiliary lane installation would improve access for buses to the San Rafael Transit Center and the Larkspur Ferry Terminal, encouraging expanded use of multimodal transportation options. A north-south bikeway plan has been approved by the county. Alternatives for transportation improvements within the limits of the Marin 101 HOV Lane Gap Closure Project area have been designed in cooperation with the Marin Bikeways Committee and Marin County Parks and Open Space.

### **Range of Alternatives Considered in the Original Study Scope**

- Corridor-level analysis of the Marin US 101 corridor was conducted by the US 101 Action Committee starting in 1979. The committee recommended completion of US 101 in Marin County as an eight-lane facility, with the added lanes being extensions of the HOV lane system.
- In 1991, the Marin Delegation of the US 101 Action Committee, a regional planning effort, reached a consensus that the HOV lane system should be completed and extended northward to the Sonoma County line.
- Public open houses were held in the corridor in June and December 1993, and a public meeting was also held in San Rafael on November 17, 1994, to solicit comments from the community on alternatives to be studied.
- The Notice of Intent/Notice of Preparation (NOI/NOP) was distributed in March 1993 to federal, state and local agencies.
- Consultation has been ongoing, and concurrence has been reached with the FHWA, the Marin County Congestion Management Agency and the Metropolitan Planning Commission (MTC) on the alternatives to be studied.

A wide range of alternatives has been investigated by Caltrans and the county's transportation planning process. Planning and programming actions by participating transportation agencies have resulted in allocation of funding for the implementation of the Marin 101 HOV Lane Gap Closure Project.

Two public open houses, one of which was the December 1993 Scoping Open House, have been conducted in the corridor to solicit comments from residents about alternatives to be studied and issues which should be addressed in the environmental analysis. Alternatives, which have been suggested, include:

- Region-wide transportation analysis for Sonoma and Marin Counties that has been funded by Caltrans, called the Sonoma/Marin Land Use Transportation Study.
- Light rail transit on the NWPR right of way.

- Stacking (double-decking) of US 101 and the NWPR right of way to minimize right of way requirements.
- Placing bus/carpool lanes on the NWPR right of way.
- Reconstruction of US 101 through San Rafael as a below ground level freeway, decked to screen it and provide a linear parkway. This would essentially be a tunnel.
- Conversion of existing freeway lanes to HOV lanes.
- Construction of the HOV lanes only, without extension of the auxiliary lane system.
- Using the NWPR right of way for the HOV lanes until such time as a rail project is funded, then acquiring the homes and other properties necessary to replace the NWPR right of way.

These alternatives have been reviewed as part of this analysis. Some were determined not to meet the project purpose and need and were withdrawn from further consideration. Others are not appropriate as part of the US 101 MIS analysis and should be recommended for consideration in the study of alternatives for the NWPR right of way corridor.

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