

Highway 101 Greenbrae/Twin Cities Corridor Improvement Project

MARIN COUNTY, CALIFORNIA
DISTRICT 4 – MRN – 101 – PM 7.2/8.9
EA 1A6600

Initial Study (with Proposed Mitigated Negative Declaration)/ Environmental Assessment



**Prepared by the
State of California Department of Transportation**

The environmental review, consultation, and any other action required in accordance with applicable Federal laws for this project is being, or has been, carried out by Caltrans under its assumption of responsibility pursuant to 23 USC 327.



December 2012

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GENERAL INFORMATION ABOUT THIS DOCUMENT

What's in this document?

The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration, has prepared this Initial Study/Environmental Assessment (IS/EA) to identify and evaluate the potential environmental impacts of the alternatives being considered for the proposed project in Marin County, California. The document describes why the project is being proposed, what alternatives have been considered for the project, the existing environment that could be affected by the project, potential project-related impacts and proposed impact avoidance, minimization and/or mitigation measures.

What you should do:

- Please read this IS/EA. Additional copies of this document as well as the technical studies are available for review at the following locations:
 - Caltrans' District 4 Office, 111 Grand Avenue, Oakland, California, 94612
 - Transportation Authority of Marin (TAM), 781 Lincoln Avenue, Suite 160, San Rafael, CA 94901
 - City of Larkspur Planning Department, 400 Magnolia Avenue, Larkspur, California 94939
 - Corte Madera Town Hall Planning Department, 300 Tamalpais Drive, Corte Madera, CA 94925
 - Marin County Free Library, 707 Meadowsweet Drive, Corte Madera, CA 94925

A PDF of this document may be obtained from <http://www.dot.ca.gov/dist4/envdocs.htm>

- We welcome your comments. If you have any comments regarding the proposed project, please send your written comments to Caltrans by the deadline.
 - Submit comments via postal mail to:
Caltrans District 4
Attention: Valerie Shearer, Senior Environmental Planner
Office of Environmental Analysis, MS-8B
P.O. Box 23660
Oakland, CA 94623-0660
 - Submit comments via email to Valerie_Shearer@dot.ca.gov
- Submit comments by the deadline: February 14, 2013

What happens next?

After comments are received from the public and reviewing agencies the Caltrans, as assigned by the Federal Highway Administration may: (1) approve the environmental element of the proposed project, (2) undertake additional environmental studies, or (3) abandon the project. If the environmental process is approved and funding is appropriated, Caltrans could design and construct all or part of the project.

For individuals with sensory disabilities, this document can be made available in Braille, large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please call or write to Caltrans District 4, Attn: Valerie Shearer, Senior Environmental Planner, Office of Environmental Analysis, MS-8B, P.O. Box 23660, Oakland, CA, 94623-0660; (510) 286-5594, Voice, or use the California Relay Service TTY number, 711.

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04-MRN-101-7.2/8.9
EA 1A6600
Project ID 0400000500

Implementation of system improvements along the US 101 Greenbrae/Twin Cities Corridor (ramp widening; realignment; additional auxiliary lanes; collector-distributor roadways; and new transit, bicycle and pedestrian facilities) from postmile 7.2 to 8.9, in Marin County.

**Initial Study with Proposed Mitigated Negative Declaration/
Environmental Assessment**

Submitted Pursuant to: (State) Division 13, California Public Resources Code (Federal)
42 USC 4332(2)(C) and 49 USC 303

THE STATE OF CALIFORNIA

Department of Transportation

December 12, 2012

Date of Approval

Dan McElhinney for

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PROPOSED
Mitigated Negative Declaration
Pursuant to Division 13, Public Resources Code

Project Description

The California Department of Transportation (Caltrans) in cooperation with the Transportation Authority of Marin (TAM), propose modifications to several existing interchanges along US Highway 101 (US 101), between Tamalpais Drive in the Town of Corte Madera, and Sir Francis Drake Boulevard in the City of Larkspur. The project would include the modification, realignment, addition, and/or removal of US 101 on- and off-ramps; the construction of auxiliary lanes and collector-distributor roadways¹; as well as the construction of new transit, bicycle, and pedestrian facilities. In addition, the project would include the optimization of traffic signals at several local roadway intersections. Caltrans is the lead agency for preparing the environmental document in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

Determination

This proposed Mitigated Negative Declaration (MND) is included to give notice to interested agencies and the public that it is Caltrans' intent to adopt an MND for this project. This does not mean that Caltrans' decision regarding the project is final. This MND is subject to modification based on comments received by interested agencies and the public.

Caltrans has prepared an Initial Study for this project, and pending public review, expects to determine from this study that the proposed project would not have a significant effect on the environment for the following reasons.

The proposed project would have no effect on land use, the coastal zone, wild and scenic rivers, community character, environmental justice communities, growth, farmlands/timberlands, emergency services and traffic and transportation.

In addition, the proposed project would have no significant effect on parks and recreational facilities, property acquisitions, cultural resources, hydrology and floodplain, water quality and storm water runoff, geology, paleontology, air quality, noise utilities, traffic and transportation, cultural resources, and hazardous waste and materials.

The proposed project would have no significant impacts on visual and aesthetics; wetlands and other waters of the U.S.; and threatened and endangered species because the following mitigation measures would reduce potential effects to insignificance:

Mitigation Measure VIS-1: Comply with Local Tree Removal Ordinance.

Mitigation Measure BIO-1: Restoration of Wetland Habitat.

Mitigation Measure BIO-2: Replant/Re-Seed Salt Marsh Habitat.

Mitigation Measure BIO-3: Maintain Adequate Fish Passage

Mitigation Measure BIO-4: Fish Safe Dewatering

Mitigation Measure BIO-5: Presence of Biologist during Dewatering

Mitigation Measure BIO-6: Placement of Non-toxic Structures in Streams

¹ A collector-distributor roadway is an auxiliary road that is separated from, but generally parallel to, a highway, and connects to the mainline at several points (i.e., highway exits). The road serves to collect traffic from the highway and distribute traffic to several local roads, instead of having many direct exit or entry points on the highway itself.

Mitigation Measure BIO-7: Minimize Disturbance from Construction Access

Mitigation Measure BIO-8: Erosion Control

Mitigation Measure BIO-9: Fish Impact Pile Driving Avoidance Timeline

Mitigation Measure BIO-10: Fish Pile Driving Attenuation Requirements

Mitigation Measure BIO-11: Provide Environmental Awareness Training

Mitigation Measure BIO-12: USFWS-approved Biologist Consultation

Mitigation Measure BIO-13: Post Construction Compliance Form

Mitigation Measure BIO-14: California Clapper Rail Impact Pile Driving Avoidance Timeline

Mitigation Measure BIO-15: Halt Work if Special-status Species Observed in Work Area

Mitigation Measure BIO-16: Take Reporting

Bijan Sartipi

District Director

District 4

California Department of Transportation

Date

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List of Acronyms

AB 32	Assembly Bill 32, Global Warming Solutions Act of 2006
AB 1493	Assembly Bill 1493, Vehicular Emissions: Greenhouse Gases, 1992
ABAG	Association of Bay Area Governments
ADA	Americans with Disabilities Act
APE	area of potential effect
ARB	California Air Resources Board
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BCDC	Bay Conservation and Development Commission
BMPs	Best Management Practices
BSA	Biological Study Area
CalEMA	California Emergency Management Agency
Caltrans	California Department of Transportation
CBR	California black rail
CCCC	California Climate Change Center
CCC coho	Central California Coast coho salmon
CCR	California clapper rail
CCR	California Code of Regulations
CCCS	Central California Coast steelhead
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act

CERFA	Community Environmental Response Facilitation Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH4	Methane
CMFC	Central Marin Ferry Connection
CMP	Construction Management Plan
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO-CAT	Coastal Ocean Climate Action Team
Commission	Native American Heritage Commission
CRMP	Construction Risk Management Plan
CVCH	Central Valley chinook salmon
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DSA	Disturbed Soil Area
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Areas
ESL	Environmental Screening Level
FCAA	Federal Clean Air Act
FCVs	fuel cell vehicles
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act

FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIRM	Flood Insurance Rate Maps
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Plan
GHGs	greenhouse gases
H ₂ S	hydrogen sulfide
HFC	hydrofluorocarbons
HFC-23	fluoroform
HFC-134a	s, s, s, 2 –tetrafluoroethane
HFC-152a	difluoroethane
HOV	high-occupancy vehicle
IGR	Intergovernmental Review
IPCC	Intergovernmental Panel on Climate Change
ITS	Intelligent Transportation System
L _{max}	maximum sound level
LEDPA	least environmentally damaging practicable alternative
LOS	level of service
LUST	Leaking Underground Storage Tank
MCCMA	Marin County Congestion Management Agency
MCE	Maximum Credible Earthquake
MEP	Maximum Extent Practicable
MND	Mitigated Negative Declaration
MLD	Most Likely Descendant
MPG	miles per gallon

MPO	Metropolitan Planning Organization
MS4	municipal separate storm sewer system
MSAT	mobile source air toxics
MTC	Metropolitan Transportation Commission
MVM	million vehicle miles
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NADR	Noise Abatement Decision Report
NAGS	North American green sturgeon
NAHC	Native American Heritage Commission
NAS	National Academy of Science
NB	Northbound
NCSM	Northern-Coastal Salt Marsh
NEPA	National Environmental Policy Act
NES	Natural Environment Study
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Administration
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOC	Notification of Construction
NPDES	National Pollutant Discharge Elimination System
O ₃	ozone
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Act
OSTP	Office of Science and Technology Policy

PA	Programmatic Agreement
Pb	lead
PFC	perfluorocarbon
PID	Project Initiation Document
PM	particulate matter
PM _{2.5}	particulate matter broken down into particles of 2.5 micrometers or smaller
PM ₁₀	particulate matter broken down into particles of 10 micrometers or smaller
POAQC	Project of Air Quality Concern
PS&E	Plans, Specifications, and Estimates
PSR	Project Study Report
RAP	Relocation Assistance Program
RCRA	Resource Conservation and Recovery Act
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SB	Southbound
SB 83	Senate Bill 83, Vehicle Registration Fee, 2010.
SF Air Basin	San Francisco Bay Area Air Basin
SF ₆	sulfur hexafluoride
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLR	Sea Level Rise
SMART	Sonoma-Marin Area Rail Transit
SMHM	Salt marsh harvest mouse
SO ₂	sulfur dioxide
SWDR	Storm Water Data Report

SWMP	Statewide Stormwater Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAM	Transportation Authority of Marin
TDF	travel demand forecasting
TDM	Transportation Demand Management
TIP	Transportation Improvement Program
TMDLs	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
TWG	Tidewater goby
U.S.	United States
US 101	US Highway 101
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
VMT	vehicle miles traveled
VRF	Vehicle Registration Fee
WDR	Waste Discharge Requirements
WPCP	Water Pollution Control Plan
WUS	Waters of the United States
Zone 9	Marin County Flood Control and Water Conservation District Flood Zone 9

Chapter 1

Proposed Project

1.1 Introduction

The California Department of Transportation (Caltrans), in cooperation with the Transportation Authority of Marin (TAM), propose modifications to several existing interchanges along US Highway 101 (US 101), between Tamalpais Drive in the Town of Corte Madera, and Sir Francis Drake Boulevard in the City of Larkspur. Collectively, the Town of Corte Madera and the City of Larkspur are known as the “Twin Cities”. This segment of US 101 also includes an unincorporated area of Marin County known as Greenbrae that straddles both sides of the highway near Lucky Drive. Given the jurisdictional boundaries surrounding this segment of US 101, this area is commonly referred to as the Greenbrae/Twin Cities Corridor.

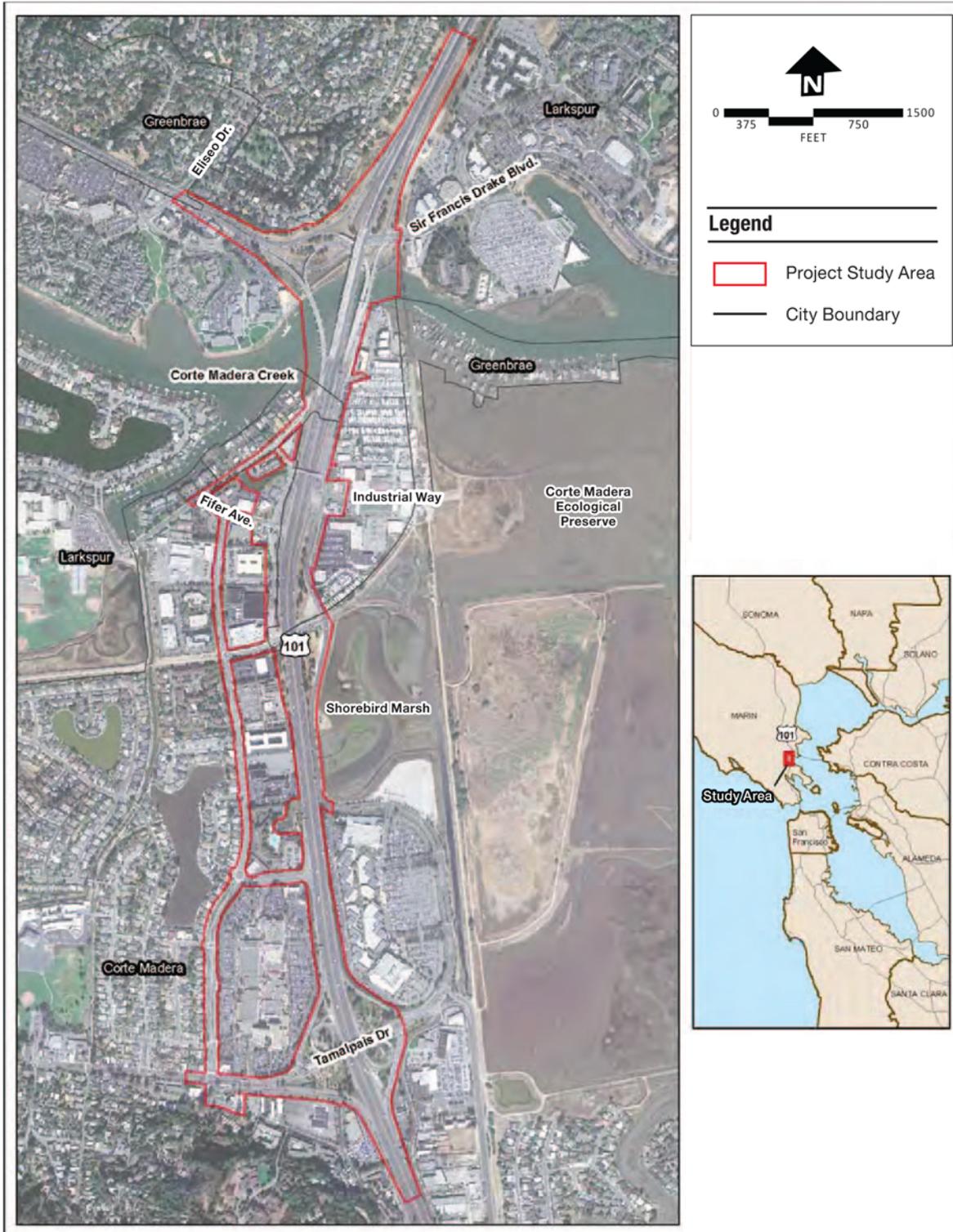
The Greenbrae/Twin Cities Corridor provides a vital regional transportation facility for drivers traveling between Sonoma and Marin Counties to San Francisco and San Mateo Counties to the south and Contra Costa County to the east. The Greenbrae/Twin Cities Corridor also provides essential local connections for drivers traveling between the Town of Corte Madera, the City of Larkspur, and the City of San Rafael. **Figure 1-1** shows the regional project location.

Due to existing design and operational deficiencies (i.e., short weaving distances between the on- and off-ramps, insufficient roadway capacity, and signal queue and delay), the Greenbrae/Twin Cities Corridor experiences heavy traffic congestion in the southbound (SB) direction during the morning peak commute hours (7 a.m. to 9 a.m.) and in the northbound (NB) direction during the evening peak commute hours (4 p.m. to 6 p.m.). Traffic congestion in this area limits local and regional mobility, and has the potential to spill over into neighboring communities as drivers seek alternate routes to avoid the congestion along US 101. Traffic forecasts show that traffic volumes during peak commute hours along US 101 through the Greenbrae/Twin Cities Corridor are expected to increase by 36 percent by 2035, which will further exacerbate traffic congestion in this area.¹

The Highway 101 Greenbrae/Twin Cities Corridor Improvement Project (project) will include the modification, realignment, addition, and/or removal of US 101 on- and off-ramps; the construction of auxiliary lanes and collector-distributor roadways²; as well as the construction of new transit, bicycle, and pedestrian facilities. In addition, the project will include the upgrading of traffic signals at several local roadway intersections. Implementation of the project will improve many of the design and operational deficiencies in the Greenbrae/Twin Cities Corridor, as discussed further below.

¹ The percent change in future traffic volumes was calculated by comparing existing traffic volumes with future 2035 forecasts (without project) per US 101 segment, and finding the average change (refer to **Table 2.2-20**).

² A collector-distributor roadway is an auxiliary road that is separated from, but generally parallel to, a highway, and connects to the highway at several points (i.e., highway exits). The road serves to collect traffic from the highway and distribute traffic to several local roads, instead of having many direct exit or entry points on the highway itself.



Regional Project Location

Figure

The project is sponsored by the TAM, and funded by the Regional Measure 2 Program administered by the Metropolitan Transportation Commission (MTC).³ Caltrans is the lead agency for preparing the environmental document in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

Related Transportation Planning Documents

The project is included in the FY 2010/2011 MTC Transportation Improvement Program (TIP) (TIP ID MRN050001).⁴ MTC approved the financially constrained TIP on October 27, 2010. On December 14, 2010, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) approved the TIP. MTC's 2009 Regional Transportation Plan (RTP), Transportation 2035 also identifies the need to improve local access to US 101, from Tamalpais Drive to just north of Sir Francis Drake Boulevard (RTP ID 21325). The proposed project will include improvements that are consistent with the RTP.

The 25-Year Transportation Vision for Marin County⁵ identified the US 101/Sir Francis Drake Boulevard interchange and the US 101/Tamalpais Drive interchange as the highest priorities for future projects. The need for congestion relief on regional highways and local roads was also identified. This project is consistent with the focus of the County's vision.

1.2 Purpose and Need

1.2.1 Project Purpose

The purpose of the project is to reduce traffic congestion within the Greenbrae/Twin Cities Corridor by alleviating the short merging, diverging, and weaving areas along US 101.⁶ The project intends to improve the efficiency of US 101, and improve safety, without increasing overall capacity through the corridor. This will be accomplished through the reconfiguration of existing US 101 interchanges, and the construction of auxiliary lanes and collector-distributor roadways.⁷ In addition, project improvements to existing transit and pedestrian/bicycle facilities, and the construction of new facilities, are intended to make these alternative modes (i.e., buses, bicycles, and pedestrians) more attractive and efficient in order to reduce traffic volumes in the Greenbrae/Twin Cities Corridor.

The project is expected to provide the following benefits within the Greenbrae/Twin Cities Corridor:

³ On March 2, 2004, voters passed Regional Measure 2, raising the toll on the seven State-owned toll bridges in the San Francisco Bay Area by \$1.00. This extra dollar is to fund various transportation projects within the region that have been determined to reduce congestion or to make improvements to travel in the toll bridge corridors.

⁴ The project ID number, as adopted in the TIP in 2010, has changed as part of subsequent TIP revisions, and was originally listed as MRN05000 (http://www.mtc.ca.gov/funding/tip/2011/project_comprehensive_funding_tipcycle.pdf). The current TIP number (MRN050001) has been verified in the MTC online Fund Management System (FMS) database.

⁵ Moving Forward: A 25-Year Transportation Vision for Marin County. 2003.

⁶ Merging occurs when two separate traffic streams join to form a single stream. Diverging occurs when one traffic stream separates to form two separate traffic streams. Weaving occurs where a merge area is closely followed by a diverge area.

⁷ An auxiliary lane is an additional lane on a highway to connect an on-ramp and an off-ramp. Caltrans does not consider an auxiliary lane a "capacity improvement", as this type of improvement facilitates weaves and merges between interchanges and improves operations of the existing travel lanes, but is not lengthy enough that it provides additional capacity for through traffic.

- Reduce traffic congestion along US 101;
- Improve local roadway access to and from US 101;
- Improve accessibility to local and regional transit;
- Improve pedestrian and bicycle access through the Greenbrae/Twin Cities Corridor; and
- Improve the safety and operation of US 101.

1.2.2 Project Need

1.2.2.1 Capacity, Transportation Demand, and Safety

Existing Capacity and Level of Service

The Greenbrae/Twin Cities Corridor experiences heavy traffic congestion in the southbound (SB) direction during the morning peak commute hours (7 a.m. to 9 a.m.) and in the northbound (NB) direction during the evening peak commute hours (4 p.m. to 6 p.m.). The most substantial existing problem areas are:

- The NB US 101/Sir Francis Drake Boulevard off-ramp does not have adequate capacity to handle the current traffic volumes. This causes traffic to back up onto US 101.
- The SB US 101/Sir Francis Drake Boulevard on-ramp does not have adequate capacity to handle the current traffic volumes, and does not meet Caltrans' current design standards. This causes traffic to back up onto Sir Francis Drake Boulevard in both the eastbound and westbound directions.

During the morning peak commute hours (7 a.m. to 9 a.m.), SB US 101 experiences congestion from south of the US 101/I-580 interchange to the Fifer Avenue off-ramp. The cause of this congestion are the bottlenecks at the intersection of Sir Francis Drake Boulevard and Eliseo Drive, which generates queues that extend into SB US 101, and the high traffic volumes entering the highway from Sir Francis Drake Boulevard at the highway weave section between Sir Francis Drake Boulevard and Fifer Avenue. Vehicle queues on the SB US 101 on-ramps from east and westbound Sir Francis Drake Boulevard occasionally extend back beyond the on-ramp merge point.

During the evening peak commute hours (4 p.m. to 6 p.m.), NB US 101 experiences substantial traffic congestion from south of the Tamalpais Drive interchange to the Sir Francis Drake Boulevard off-ramp. The northbound vehicle queue extends south of the Tamalpais Drive interchange to beyond the East Blithedale Avenue/Tiburon Boulevard interchange. This congestion is caused by the combination of the high number of vehicles entering NB US 101 at Tamalpais Drive and exiting at the Sir Francis Drake Boulevard off-ramp.

There are two locations in the Greenbrae/Twin Cities Corridor where closely spaced on- and off-ramps exacerbate traffic congestion. In order to exit or enter the highway, drivers must weave through traffic at the following locations:

- NB US 101 between the on-ramp at Industrial Way and the off-ramp at Sir Francis Drake Boulevard. Traffic entering the highway at the Industrial Way on-ramp is prohibited by lane striping only. Motorists make movements across two lanes to join highway traffic, interfering with drivers exiting the highway at Sir Francis Drake Boulevard.

- SB US 101 between the on-ramp at Sir Francis Drake Boulevard and the off-ramp at Fifer Avenue. The Sir Francis Drake Boulevard on-ramp and the off-ramp at Fifer Avenue carry substantial traffic volumes during both the morning and evening peak commute hours. The weave distance between these two ramps is 770 feet, which causes vehicles to make quick merges.

In addition to regional traffic accessing the highway, this set of ramps is used by local traffic to access points south of Corte Madera Creek. Without this access, local traffic will require an additional three miles of out-of-direction travel to reach these areas.

Level of Service (LOS) is a measure of actual traffic conditions and the perception of such conditions by motorists. There are six LOS ratings, ranging from LOS A (free traffic flow with low traffic volumes and high speeds, resulting in low vehicle densities) to LOS F (traffic volumes exceeding the capacity of the infrastructure, resulting in forced flow traffic operations, slow speeds, and high vehicle densities). LOS E or F is typically considered unacceptable by Caltrans, and indicates a need for improvement.

During peak commute hours on US 101, the majority of northbound highway segments within the Greenbrae/Twin Cities Corridor are operating at LOS E or F, including the area South of Tamalpais Drive, the Tamalpais Drive off-ramp, the eastbound Tamalpais Drive on-ramp, the westbound Tamalpais Drive on-ramp, Tamalpais Drive to Industrial Way, the Industrial Way off-ramp, and the Sir Francis Drake Boulevard off-ramp. **Section 2.2.5, Traffic and Transportation**, provides a detailed analysis of the existing traffic operations, and system-wide deficiencies within the Greenbrae/Twin Cities corridor. Additionally, several southbound segments are operating at LOS F in the morning peak commute hours. Traffic forecasts show that traffic volumes during peak commute hours along US 101 through the Greenbrae/Twin Cities Corridor are expected to increase by 36 percent by 2035, which will further exacerbate congestion along the highway.

Safety

Collision records for US 101 through the Greenbrae/Twin Cities Corridor include accident data from January 2007 through December 2009. Based on the information from these three years, several ramps within the Greenbrae/Twin Cities Corridor have higher accident rates than the statewide average (see **Table 1-1**).⁸

Northbound US 101 ramps with higher accident rates than the statewide average include the northbound Industrial Way off-ramp, which has an accident rate of 1.86 per million vehicle miles versus the statewide average of 0.95 per million vehicle miles. The southbound Sir Francis Drake Boulevard on-ramp has a higher fatalities plus injury rate, but lower accident total. This reflects fewer but more severe accidents in this area.

⁸ Caltrans, 2012c.

Table 1-1: Collision Rates

Location	Total Collisions			Actual Collision Rate			Statewide Average Collision rate		
	Total	Fatality	Injury	Fatality	Fatality + Injury	Total	Fatality	Fatality + Injury	Total
Industrial Way off-ramp	6	0	1	0.000	0.31	1.86	0.004	0.28	0.95
Sir Francis Drake Boulevard on-ramp	9	0	6	0.000	0.31	0.46	0.002	0.26	0.75
Tamalpais Drive off-ramp	9	0	6	0.000	0.46	0.69	0.004	0.42	1.20
Fifer Avenue on-ramp	1	0	1	0.000	0.21	0.21	0.002	0.16	0.55

Note: Bold indicates actual collision rate is greater than statewide average collision rate.

Southbound US 101 ramps with higher accident rates than the statewide average include the Tamalpais Drive off-ramp and the Fifer Avenue off-ramp. Both of these locations have a higher fatalities plus injury rate, but lower accident total. This reflects fewer but more severe accidents in this area.

1.2.2.2 Roadway Deficiencies

There are several locations within the Greenbrae/Twin Cities Corridor where current weaving and/or merging distances do not meet Caltrans' standard design requirements. Caltrans' standard weaving distance is 1,600 feet. The weaving distance between the SB US 101/Sir Francis Drake Boulevard on-ramp and the Lucky Drive off-ramp is approximately 840 feet. In addition, there are short merge distances on the ramps themselves. Traveling past the Lucky Drive off-ramp, the lane drop is approximately 480 feet long; while Caltrans' standard is 720 feet (approximately 0.3-mile).

Caltrans requires a distance of one mile between interchanges. There is approximately one mile between the Sir Francis Drake Boulevard and Tamalpais Drive interchanges; however, the intermediate ramps of Fifer Avenue/Lucky Drive, Madera Boulevard, and Industrial Way are all substandard. For instance, the distance between the Tamalpais Drive and Madera Boulevard interchanges is 1,584 feet.

1.2.2.3 Modal Interrelationships and System Linkages

Existing multi-use paths are heavily used by pedestrians and bicyclists to reach residential, commercial, and community destinations, as well as local and regional transit facilities along the Greenbrae/Twin Cities Corridor. Access to alternative modes of transportation, such as the Larkspur Ferry Terminal, regional and local bus stops, and multi-use bicycle and pedestrian pathways is constrained by the limited connectivity across Corte Madera Creek, as well as to the east and west sides of US 101. This situation is further exacerbated by the existing pedestrian overcrossing at Nellen Avenue, which does not comply with the standards of the Americans with Disabilities Act (ADA).

The ADA establishes guidelines for handicap accessible routes, including the ramps that lead to a pedestrian overcrossing. Any part of an accessible route with a ramp cannot have a slope greater than 1:12 (ratio of ramp height to ramp length). Additionally, for every 30 feet of ramp, there must be a

landing at the end of the ramp that is 5 feet in length. If there is a direction change, this landing must be 5 feet by 5 feet. The ramps at the existing Nellen Avenue pedestrian overcrossing do not meet the guidelines put forth in the ADA, as they consist of a tight spiral, with no landings, and greater incline than the maximum slope allowed.

The Greenbrae/Twin Cities Corridor contains gaps between existing and planned bicycle and pedestrian facilities, such as the Central Marin Ferry Connection Multi-Use Pathway and the Cal Park Hill Tunnel to the north, and pedestrian and bicycle facilities south of Corte Madera Creek. These gaps create poor linkages within alternative modes (pedestrian, bicycle, transit and ferry service), hindering the overall effectiveness of the multi-modal options in the corridor.⁹

1.2.3 Logical Termini and Independent Utility

Logical termini for a project are defined as rational end points for transportation improvements. These rational end points should facilitate a thorough review of the environmental impacts. A project with independent utility is defined as improvements that are usable and provide a reasonable expenditure even if no additional transportation improvements are made in the area.

As described above, the Greenbrae/Twin Cities Corridor area contains design and operational deficiencies (i.e., short weaving distances between the on- and off-ramps, insufficient roadway capacity, and signal queue and delay), which result in heavy traffic congestion in the SB direction during the morning peak commute hours (7 a.m. to 9 a.m.) and in the NB direction during the evening peak commute hours (4 p.m. to 6 p.m.). Traffic congestion in this area limits local and regional mobility, and has the potential to spill over into neighboring communities as drivers seek alternate routes to avoid the congestion along US 101. Traffic forecasts show that traffic volumes during peak commute hours along US 101 through the Greenbrae/Twin Cities Corridor are expected to increase by 36 percent by 2035, which will further exacerbate traffic congestion in this area.

The Highway 101 Greenbrae/Twin Cities Corridor Improvement Project will include the modification, realignment, addition, and/or removal of US 101 on- and off-ramps; the construction of auxiliary lanes and collector-distributor roadways along US 101 between Tamalpais Avenue on the south and Sir Francis Drake Boulevard on the north. The project would also construct new transit, bicycle, and pedestrian facilities in this same area. Improvements would also occur on local streets including Redwood Highway, Wornum Drive and Tamal Vista Boulevard. The location of the proposed improvements was developed in conjunction with TAM and Caltrans in order to capture the regional growth envisioned in the Marin County General Plan and General Plans of other local jurisdictions. These improvements are of sufficient length and scope to address the transportation needs and environmental matters within the Greenbrae/Twin Cities Corridor area. In addition, the project would result in improvements to the current traffic conditions and multi-modal needs within the Greenbrae/Twin Cities Corridor without any additional transportation improvements being made in the area. As such the project is considered to have

⁹ The Central Marin Ferry Connection project will create a new multi-use pathway extending the Cal Park Hill Multi-Use Pathway to the south by constructing a new elevated crossing over Sir Francis Drake Boulevard with an access ramp leading down to an existing multi-use pathway adjacent to the roadway. The new path is intended to further promote non-motorized commute alternatives and enhance recreational travel while providing safe, direct and convenient pedestrian/bicycle access between local transit facilities, schools, business centers and residential communities.

independent utility. Furthermore the project would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

1.3 Project Description

1.3.1 Alternatives

1.3.1.1 Build Alternative

Project improvements will include the modification, realignment, addition, and/or removal of US 101 on- and off-ramps, as well as the construction of new auxiliary lanes and collector-distributor roadways. Retaining walls and/or concrete barriers will be provided where there are grade differences between roadways. Project improvements will also include the construction of new transit, bicycle, and pedestrian facilities. In addition, the project will include traffic signal coordination at ten roadway intersections.¹⁰ The following discussion describes the improvements that will be implemented under the Build Alternative. **Figure 1-2** illustrates the proposed improvements under the Build Alternative. The estimated cost to construct the Build Alternative is approximately \$143,700,000.

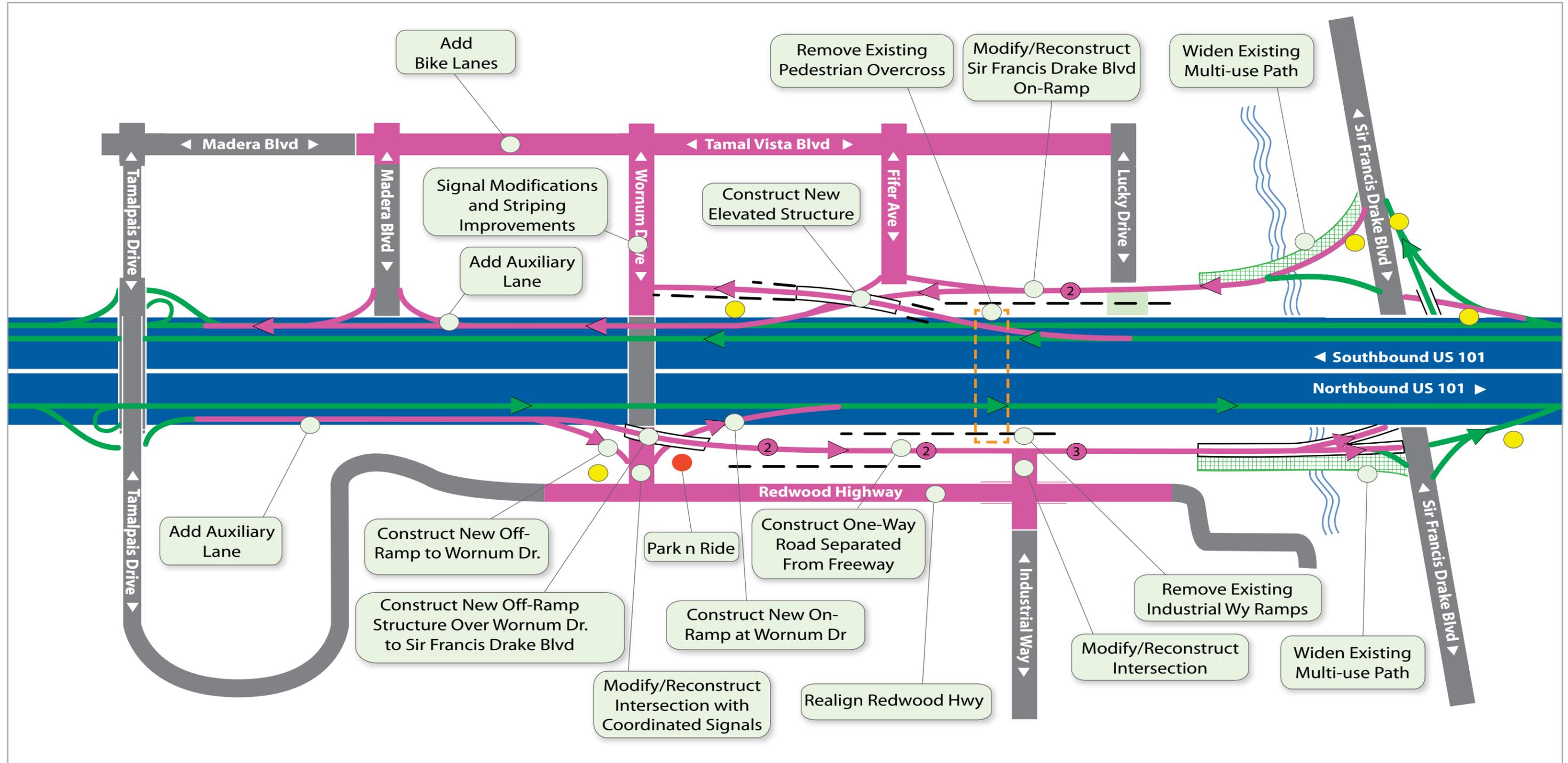
Improvements along US 101

Southbound Direction

The Build Alternative includes design improvements to SB US 101, from Sir Francis Drake Boulevard to Tamalpais Drive. These improvements will consist of widening and realigning the existing southbound Sir Francis Drake Boulevard interchange, which involves the relocation of the SB US 101/Sir Francis Drake Boulevard on-ramp to south of Fifer Avenue. The on-ramp will be reconfigured and extended as a new collector-distributor roadway. The existing Fifer Avenue ramps connecting to SB US 101 will be relocated to the new Sir Francis Drake Boulevard collector-distributor prior to merging onto the highway, which will eliminate the current SB US 101 weaving segment in this area. In addition, a southbound auxiliary lane will be constructed from the Sir Francis Drake Boulevard on-ramp to the Tamalpais Drive off-ramp. These and other SB US 101 design improvements under the Build Alternative will include:

- Widening the SB US 101/Sir Francis Drake Boulevard on- and off-ramps to two lanes;
- Widening the SB US 101/Sir Francis Drake Boulevard on-ramp so that it connects with the highway south of Fifer Avenue. The on-ramp will be reconfigured and extended as a new two-lane collector-distributor roadway. This collector-distributor will be separated from the highway by a concrete barrier and will have ramp metering equipment installed;
- Realigning the SB US 101/Fifer Avenue on- and off-ramps to connect with the new SB US 101/Sir Francis Drake Boulevard collector-distributor before merging onto the highway;
- Providing new regional transit stops at Fifer Avenue ramps and the Sir Francis Drake Boulevard off-ramp. Constructing new local transit stops on eastbound and westbound Sir Francis Drake Boulevard.

¹⁰ The Build Alternative proposes to optimize the traffic signal timing so that traffic can travel along a street with fewer stops for red lights at every intersection.



Legend

	Existing		Relocate/Improve Transit Stop		Remove Existing Pedestrian Overcross	NOT TO SCALE
	Proposed Improvements		Number of Lanes		Widen Existing Multi-use Path	
	Retaining Wall/Barrier		Corte Madera Creek			

Source: Jacobs, 2012.

Figure 1-2 Proposed Project (back)

- Constructing a new SB US 101/Wornum Drive off-ramp that will cross over the SB US 101/Sir Francis Drake Boulevard on-ramp;
- Constructing an auxiliary lane from the realigned SB US 101/Fifer Avenue on-ramp to the SB US 101/Tamalpais Drive off-ramp; and
- Installing ramp metering equipment at each of the on-ramp locations.¹¹

Northbound Direction

The Build Alternative includes design improvements to NB US 101 from Tamalpais Drive to Sir Francis Drake Boulevard. The reconfiguration of existing US 101 interchanges, and the construction of collector-distributor roadways will remove the existing deficiencies related to weaving distances and lane drops, as described in **Section 1.2.2.2** above. Although the nonstandard distances between the interchanges along the project corridor will still not entirely meet Caltrans' current design standards, the proposed improvements will alleviate the conflicts caused by closely spaced interchanges, thereby improving traffic operations and safety.

The northbound improvements will consist of the reconfiguration of the Sir Francis Drake Boulevard and Industrial Way ramps, and the construction of new on- and off-ramps at Wornum Drive. The proposed design will include Wornum Drive improvements, and relocating the Industrial Way on-ramp from the highway to the new Sir Francis Drake Boulevard ramps. In addition, a northbound auxiliary lane will be constructed from the Tamalpais Drive on-ramp to the new Wornum Drive off-ramp. This design will improve access to NB US 101 by adding the Wornum Drive connection and by reducing the congestion at the Sir Francis Drake Boulevard off-ramp. These and other NB US 101 design improvements under the Build Alternative will include:

- Relocating the NB US 101/Sir Francis Drake Boulevard off-ramp approximately 200 feet south of the existing Wornum Drive undercrossing;
- Removing the NB US 101/Industrial off-ramp;
- Realigning the NB US 101/Industrial Way on-ramp to merge onto the new NB US 101/Sir Francis Drake Boulevard off-ramp, with no connection to the highway. A new signalized intersection will be constructed at Industrial Way and Redwood Highway;
- Constructing a new NB US 101/Wornum Drive on-ramp, which will travel under the proposed new NB US 101/Sir Francis Drake Boulevard off-ramp;
- Constructing a northbound auxiliary lane from the existing NB US 101/Tamalpais Drive on-ramp to the new NB US 101/Wornum Drive off-ramp; and
- Installing ramp metering equipment at each of the on-ramp locations.¹²

¹¹ Activation of ramp metering along US 101 is not part of the Highway 101 Greenbrae/Twin Cities Corridor Improvement Project. Caltrans will initiate a separate project to study activation of ramp metering in the US 101 corridor. See Ramp Metering discussion.

¹² Activation of ramp metering along US 101 is not part of the Highway 101 Greenbrae/Twin Cities Corridor Improvement Project. Caltrans will initiate a separate project to study activation of ramp metering in the US 101 corridor. See Ramp Metering discussion.

Improvements to Local Roadways

The Build Alternative includes modifications to the local roadway network connecting to US 101, which are intended to improve roadway operations and access. Key improvements will include:

- Optimizing the signal timing at ten intersections along Tamal Vista, between Lucky Drive and Madera Boulevard;
- Constructing a new signalized intersection on Wornum Drive at the SB US 101 off-ramp termini, and at the NB US 101 on- and off-ramp termini;
- Constructing a collector-distributor road from the new NB US 101/Sir Francis Drake Boulevard off-ramp terminus just south of Wornum Drive, which will cross over the new NB US 101/Wornum Drive on-ramp, and extend to the existing bridge crossing Corte Madera Creek; and
- Realigning Redwood Highway from Wornum Drive to approximately 800 feet north of Rich Street, and constructing sidewalks along the east side of Redwood Highway.

Improvements to Pedestrian, Bicycle, and Transit Facilities

The Build Alternative includes improvements to pedestrian, bicycle, and transit facilities within the Greenbrae/Twin Cities Corridor, which are intended to encourage the use of public transit and other alternative transportation options. Key improvements will include:

- Replacing the bus stop at the existing SB US 101/Lucky Drive/Fifer Avenue off-ramp with two new bus stops:
 - one at the SB US 101/Sir Francis Drake Boulevard off-ramp terminus, and
 - one on the west side of the realigned Fifer Avenue on-ramp before connecting with the new SB US 101/Sir Francis Drake Boulevard on-ramp extension.
- Relocating the bus stop from the existing NB US 101/Industrial Way ramp system to the proposed NB US 101/Wornum Drive off-ramp;
- Constructing a new regional bus stop at the NB US 101/Sir Francis Drake Boulevard on-ramp;
- Removing the existing non-ADA compliant pedestrian overcrossing near Lucky Drive/Nellen Avenue;¹³
- Adding pedestrian and bicycle facility improvements along Sir Francis Drake Boulevard, Lucky Drive, Fifer Avenue, between Fifer Avenue and Wornum Drive, along Wornum Drive, and along Redwood Highway;
- Providing pedestrian and bicycle improvements along Tamal Vista Boulevard, which include curb and gutter improvements, re-striping, signal upgrading, and bike and pedestrian facility improvements;
- Constructing a southbound bike lane and a northbound multi-use path along Redwood Highway to allow for safe bicycle operations;

¹³ Caltrans is committed to carrying out the 1990 Americans with Disabilities Act (ADA) by building transportation facilities that provide equal access for all persons. The same degree of convenience, accessibility, and safety available to the general public will be provided to persons with disabilities.

- Widening the existing multi-use path from Redwood Highway, along the existing NB US 101 off-ramp crossing of Corte Madera Creek, to eastbound Sir Francis Drake Boulevard;
- Widening the existing multi-use path from Lucky Drive/Nellen Avenue along the existing SB US 101 on-ramp crossing of Corte Madera Creek, to eastbound Sir Francis Drake Boulevard;
- Improving and optimizing the signal timing at the NB US 101/Sir Francis Drake Boulevard off-ramp intersections, the Redwood Highway/Industrial Way intersection, and the Redwood Highway/Wornum Drive intersection. Signal timing will address pedestrian and bicycle needs while providing optimal traffic operations; and
- Constructing a new 65 space surface park and ride lot on the northeast corner of the US 101/Wornum Drive interchange.

TAM is currently in the planning stages of the Central Marin Ferry Connection project, which will improve the current pedestrian and bicycle connections along Sir Francis Drake Boulevard between the existing Larkspur Ferry Terminal and a potential future Sonoma-Marin Area Rail Transit (SMART)¹⁴ Commuter Rail station just north of Sir Francis Drake Boulevard. These improvements will also connect to the pedestrian and bicycle pathways proposed under the Build Alternative.

The project will improve pedestrian connections to several new regional bus stops and to the proposed park and ride lot that will be located at the Wornum Drive/Redwood Highway intersection. This will shorten the walking distance between the bus stops. In addition, a new ADA-compliant accessible route will provide needed connections to the north and southbound bus stops. Removal of the existing non-compliant ADA pedestrian overcrossing near Lucky Drive/Nellen Avenue, in combination with the enhanced pedestrian and bicycle access along Lucky Drive, Fifer Avenue, between Fifer Avenue and Wornum Drive, will improve the bicycle and pedestrian access in the area. Pedestrian and bicycle improvements proposed as part of the project will effectively close the gap in these facilities and improve access through the corridor.

Utility Relocation

The proposed improvements under the Build Alternative will require the relocation of existing sewer lines in both the northbound and southbound directions. Northbound US 101 improvements will also require the relocation of gas and electrical lines. All utilities will remain within state rights-of-way. Refer to **Section 2.2.4, Utilities**, for a complete discussion of potential effects to utility services.

Ramp Metering

Ramp meters are proposed for all on-ramps along US 101 within the Greenbrae/Twin Cities Corridor. While the Build Alternative will include the installation of ramp metering equipment, the project does not propose, or analyze the effects from the operation of ramp metering in this area. An analysis will be undertaken in a future study by others to capture the corridor-wide effects of ramp metering, and to ascertain the feasibility of their operation.

¹⁴ SMART is a future planned passenger train and bicycle and pedestrian path planned to run from Cloverdale in Sonoma County to the San Francisco-bound ferry at Larkspur Landing in Marin County.

Construction Methods

The Build Alternative will be constructed in multiple stages in order to minimize traffic delays and congestion caused by construction activities. The exact staging of the construction phases will be determined during the final design process. It is anticipated that the proposed construction will require temporary roadway and shoulder closures and detouring, which will be planned for in a Transportation Management Plan for use during construction. The plan will include press releases to notify and inform motorists, business community groups, local entities, emergency services, and elected officials of upcoming road closures and detours.

Pavement modifications will typically entail one to two feet of excavation below the ground surface. Some improvements will entail deeper excavations from the placement of numerous structural pilings, and will be associated with the widening of the SB US 101/Sir Francis Drake Boulevard on-ramp and the construction of the northbound auxiliary lane from the existing NB US 101/Tamalpais Drive on-ramp to the new NB US 101/Wornum Drive off-ramp. Deeper excavations and the placement of numerous structural pilings will occur at depths of at least 75 to 90 feet below ground surface. The majority of the open excavations throughout the Build Alternative improvement areas will vary from 4 to 20 feet below ground surface.

Transportation System Management Elements

System management strategies increase the efficiency of existing transportation facilities without increasing the number of through lanes. Examples of system management strategies include ramp metering, auxiliary lanes, turning lanes, reversible lanes and traffic signal coordination. System management also encourages a unified urban transportation system that integrates multiple forms of transportation modes such as pedestrian, bicycle, automobile, rail, ferry, and mass transit. Although Transportation System Management measures alone could not satisfy the purpose and need of the project, the following Transportation System Management measures have been incorporated into the Build Alternative for this project:

- Constructing auxiliary lanes along US 101;
- Increasing the number of bus stops;
- Constructing a park and ride lot;
- Improving the non-ADA compliant pedestrian facilities;
- Constructing bicycle lanes and multi-use pathways; and
- Implementing traffic signal coordination on the local roadways.

Transportation Demand Management Alternatives

There are several transportation demand management strategies within the San Francisco Bay Area that are used to reduce the number of vehicle trips within the Greenbrae/Twin Cities Corridor. Rideshare offers carpoolers reduced bridge tolls as well as access to carpool lanes. There are also vanpools for larger groups of commuters. Transportation demand management may also involve the provision of contract funds to regional agencies that are actively promoting ridesharing, maintaining rideshare databases, and providing limited rideshare services to employers and individuals. Increased vehicle occupancy reduces traffic volumes during peak commuting periods; however, without the construction of

the improvements described above, successful implementation of a transportation demand management alternative will not improve local roadway access to and from US 101, or improve the safety and operation of the highway. Transportation demand management alternative by itself will not satisfy the purpose of the project.

1.3.1.2 No-Build Alternative

The No-Build Alternative will make no physical or operational improvements to US 101 or the connecting roadways thereby prolonging existing conditions within the Greenbrae/Twin Cities Corridor. As previously discussed, traffic volumes during peak commute hours along US 101 through the Greenbrae/Twin Cities Corridor are expected to increase by 36 percent by 2035. Under the No-Build Alternative, no improvements will be made to address the current operational deficiencies of the highway, and traffic congestion in this area will worsen. This increase in traffic congestion will decrease the safety and operation of US 101. No improvements will be made to the existing on- and off-ramps within the Greenbrae/Twin Cities Corridor, and therefore local roadway access to and from the highway will continue to experience long traffic queues and bottlenecks. The No-Build Alternative will not make changes to the existing transit stops, bicycle, or pedestrian facilities that are difficult to access and are non-ADA compliant, and therefore, will not improve access to local and regional transit and alternative modes of transportation.

1.3.2 Planned Development

Land Use Assumptions

For purposes of this environmental analysis, traffic forecasts were produced that are consistent with the most recent set of regionally-adopted land use projections from the Association of Bay Area Governments (ABAG), the Marin County General Plan, and the General Plans of Larkspur and Corte Madera. This approach allows for consistency with recent ABAG projections, while still reflecting Marin County's expectation of zonal distribution of new development, consistent with their most recent long-range planning efforts.

Future land development projects in the vicinity of the Greenbrae/Twin Cities Corridor include:

- Twin Cities Police Authority: public facility (Larkspur)
- The Rose Garden: 85 residential units (Larkspur)
- Drake's Way: 24 residential units (Larkspur)
- Drake's Cove (also known as Larkspur Landing Circle): mixed-use development, hotel and 126 multi-family residential units (Larkspur)
- 195-205 Tamal Vista residences (also known as the WinCup development) – mixed-use development, commercial and 180 multi-family residential units (Corte Madera)

Transportation Projects

It is anticipated that the following currently planned and funded transportation projects outside the project limits but within Marin County will be constructed and operational by the year 2035:

- US 101 Gap Closure Project¹⁵
- US 101/Marin City interchange modification
- Tiburon interchange improvements
- US 101/I-580 interchange improvements¹⁶
- I-580 to Shoreline Parkway/Andersen Drive connection
- Bel Marin Keys Boulevard and Atherton Avenue capacity improvements
- US 101 southbound auxiliary lane between Miller Creek and N. San Pedro Road
- South Novato Road improvements (four lanes from Center Road to US 101)
- McInnis Parkway extension from current terminus to Miller Creek
- Central Marin Ferry Connection¹⁷
- Sonoma-Marin Area Rail Transit (SMART)¹⁸
- Doherty Drive Bridge Replacement
- Bon Air Bridge Replacement
- North-South Greenway bicycle transportation corridor

1.3.3 Final Decision-Making Process

After the public circulation period, all comments will be considered, and Caltrans will select a preferred alternative and make the final determination of the project's effect on the environment. In accordance with CEQA, Caltrans will prepare a Mitigated Negative Declaration (MND) (See **Appendix A**, CEQA Evaluation Checklist). Similarly, if Caltrans determines the action does not significantly impact the environment, Caltrans, as assigned by FHWA, will issue a Finding of No Significant Impact (FONSI) in accordance with NEPA.

1.3.4 Alternatives Considered but Withdrawn from Further Consideration

The County of Marin identified the need to improve the Greenbrae/Twin Cities Corridor as early as 1999, when TAM [formerly known as Marin County Congestion Management Agency (MCCMA)] solicited proposals to complete a Project Study Report (PSR) for the US 101/Sir Francis Drake Boulevard (Greenbrae) interchange. In 2002 the MCCMA released the Interim Planning Report for the project. The report consisted of seven alternatives recommended for study. After a series of city council meetings, the City of Larkspur and the Town of Corte Madera Council selected Alternative 4: Construct Wornum Drive

¹⁵ The US 101 Gap Closure Project includes the construction of HOV lanes for northbound and southbound US 101 from North San Pedro Road to the Town of Corte Madera (this project was completed in 2009).

¹⁶ US 101/I-580 interchange improvements were completed in 2010.

¹⁷ The Central Marin Ferry Connection project would create a new multi-use pathway, extending the Cal Park Hill Multi-Use Pathway to the south by constructing a new elevated crossing over Sir Francis Drake Boulevard with an access ramp leading down to an existing multi-use pathway adjacent to the roadway. This new path is intended to promote non-motorized commute alternatives and enhance recreational travel while providing safe, direct, and convenient pedestrian/bicycle access between local transit facilities, schools, business centers, and residential communities.

¹⁸ The SMART project would provide passenger rail service from Larkspur in Marin County to Cloverdale in northern Sonoma County with 14 rail stations, several passing sidings, a rail maintenance facility and shuttle service at selected locations. The project also includes the implementation of a bicycle/pedestrian pathway generally within or adjacent to the rail corridor.

Full-Service Interchange. Alternative 4 presented a new full-service interchange at US 101 and Wornum Drive that will eliminate the existing Lucky Drive/Industrial Way, Fifer Avenue, and Madera Boulevard interchanges. This alternative was presented with the caveat of numerous potential changes to the project design. Caltrans also reviewed the Interim Planning Report and provided input on the alternatives.

In 2003, MTC, Caltrans, and MCCMA included the “Greenbrae Interchange” project in the 2006/2008 Statewide Transportation Improvement Program Cycle and the need for improvement in the corridor was recognized as a high priority at the regional planning level. Subsequently, in 2004, Regional Measure 2 was approved, providing funds to further develop the improvements. A project development team was formed to develop geometric concepts and screen alternatives; however, the process lacked public and local involvement, and the MCCMA and local politicians raised concerns about Caltrans’ project development process. Caltrans was asked to stop work on the project development while the MCCMA (which became TAM) investigated better ways for the transportation officials to collaborate with community stakeholders. The project team was tasked with providing a context sensitive process to ensure that the design of the project reflected the goals of the people who live, work and travel in the area.

Prior to further development of initial concepts and screening, the first in a series of public workshops was held on October 14, 2006. The project development team attended the workshop and interfaced with various stakeholders to understand their needs and interests. The project development team also worked to understand the community’s priorities and the concerns of highway users and the local motorists. In addition, the public workshop served as a vehicle to educate the community about the physical and technical constraints that exist in the Greenbrae/Twin Cities Corridor. Key issues and concerns raised by stakeholders at Public Workshop 1 included:

- Need to prioritize improvements and fast track the implementation of the project
- Need to balance needs of regional and local traffic
- Retaining the Madera hook ramps and avoiding impacts to local access
- Concerns that a new interchange at Wornum will impact local streets
- Concerns about Caltrans’ project development process
- Impacts to properties and businesses
- Concerns about right-of-way acquisition
- Need to improve bicycle/pedestrian multi-modal facilities
- Concerns about impacts to biological resources, noise, flooding, soil contamination, vibration from traffic (associated with putting more traffic on Lucky Drive), and impact to wetlands
- Need to coordinate with the Central Marin Ferry Connection projects
- Need to address operations problems at the Tamalpais interchange
- Need to address weaving problems on the highway
- Need to address transit facility needs relating to SMART, Golden Gate Transit and local transit routes
- Traffic impacts caused by the highway on Tamal Vista Boulevard, Tamalpais Drive, Madera Avenue, Sir Francis Drake Boulevard, and Lucky Drive

- Local access to Redwood High School, shopping centers, and the neighborhoods

Following Public Workshop 1, the project development team performed extensive studies to examine the geometric feasibility of the alternatives, and to develop a screening process that will take into account input from stakeholders given at the public workshop and at individual stakeholder meetings. TAM also met with engineers from the City of Larkspur and the Town of Corte Madera several times to collect input from staff and from the city councils. During these meetings, TAM tested options such as constructing a new bridge crossing over Corte Madera Creek to separate local and highway traffic, and to explore the cities' willingness to consider closing some or all of the hook ramps between Tamalpais Drive and Sir Francis Drake Boulevard. During these meetings, both City Councils made it very clear to TAM and the project team that local access is critical, closing the hook ramps will not be acceptable, and local support for the project must address local ingress and egress needs. Recognizing that removal of the hook ramps in the Greenbrae/Twin Cities Corridor will require a City Council resolution from both Corte Madera and Larkspur, and approval of a new Freeway Agreement, the project team continued to work on developing alternatives to address these concerns.

Over 20 improvement design concepts/variations have been developed and considered by TAM during the past three years, as summarized in **Appendix B**. The project team used existing traffic information, field observations, constructability reviews, construction cost, right of way requirements, geometric design standards, initial environmental constraints information, and transit, pedestrians, and bicycle facility requirements to screen the initial alternatives down to four southbound design options and four northbound design options. These options were presented at Public Workshop 2 on March 27, 2007 to test stakeholder reactions and to collect input on features that will be acceptable to the community.

Following Public Workshop 2, the project development team reported back to Caltrans on the input received from the community. An initial feasibility analysis was performed to reduce the number of alternatives for which detailed evaluations will be conducted. The criteria used to evaluate the alternatives consisted of (1) a comprehensive traffic operational analysis of each alternative and each potential combination of alternatives, (2) project estimated cost, (3) general community and local Council acceptance, and (4) an initial assessment of environmental concerns. Many of the initial alternatives were screened out based on information from discussions with Caltrans and city engineers, during which it was determined that those alternatives will result in worsened traffic conditions on the highway and local roads, and will reduce access to and from the highway. As a result of the feasibility analysis, traffic findings, and alternatives screening, two southbound design options and two northbound design options were selected for a more detailed assessment of potential environmental issues. The results of the initial assessment of environmental concerns for the four alternatives described below are summarized in **Table 1-2**.

Table 1-2: Initial Assessment of Environmental Concerns

 No Impact  Potential Impact  Impact	Year 2035 No-Build Alternative	SB Alternatives		NB Alternatives	
	No Project	A	C	D	E
Impacts to threatened and endangered species					
Impacts to Waters of the US, including wetlands					
Noise, Air Quality, and visual impacts to residential neighborhoods					
Noise, Air Quality, visual, and construction impacts to local businesses					
Flooding potential along US 101 and local roads					

Southbound Alternative A – Frontage Road consisted of removing the southbound off-ramp at Fifer Avenue and constructing a one-way southbound street from the southbound on-ramp from Sir Francis Drake Boulevard to Wornum Drive. Southbound traffic wishing to exit onto Fifer Avenue will exit at Sir Francis Drake Boulevard and use the new street connection to continue south to Fifer Avenue.

Southbound Alternative C – Braided Ramps¹⁹ consisted of constructing a new southbound on-ramp from Sir Francis Drake Boulevard that will cross under a new southbound off-ramp to Wornum Drive. A southbound one-way street will be constructed between Wornum Drive and Madera Boulevard which will include a new southbound on-ramp at Wornum Drive. The southbound on- and off-ramps at Madera Boulevard will be closed.

Northbound Alternative D – Sir Francis Drake Boulevard Fly-Over removed the existing NB US 101 off-ramp to Sir Francis Drake Boulevard and constructs two new ramps, one providing access from NB US 101 to eastbound Sir Francis Drake Boulevard at a street intersection, and the other an elevated ramp crossing over Sir Francis Drake Boulevard and providing access from Redwood Highway and Industrial Way to NB US 101. The northbound off-ramp to westbound Sir Francis Drake Boulevard will remain.

Northbound Alternative E – Wornum Braid will construct new NB US 101 on- and off-ramps at Wornum Avenue using a half diamond configuration. Northbound traffic traveling to Sir Francis Drake Boulevard will exit US 101 just south of Wornum Drive, cross over the northbound Wornum Drive on-

¹⁹ Braided ramps are elevated highway structures that cross over and under each other.

ramp, and continue north along a collector-distributor road to Industrial Way and Sir Francis Drake Boulevard. The existing northbound off-ramp at Industrial Way will be removed and the existing northbound Industrial Way hook on-ramp will be modified to merge into the new one-way off-ramp that extends to Sir Francis Drake Boulevard.

Southbound Alternatives A and C, and Northbound Alternatives D and E, were presented at Public Workshop 3 on March 8, 2008. At the workshop, stakeholders demonstrated a solid understanding of the alternatives and variations. The public tended to support the concept of braided ramps (over the other alternatives), and expressed some concern regarding their desire to maintain or improve access to local businesses. The potential closure of the southbound Madera Boulevard ramps was still a concern; however, some felt that with an alternative access point such as the proposed parallel street access to Madera Boulevard, it will be acceptable.

In 2009, a Notice of Preparation for a draft environmental impact report was published for the project, which started an official 45-day public scoping/comment period. Over 200 comments were received from local agencies and the general public. Key issues and concerns raised by the scoping comments were similar to those raised in the previous public workshops, and included:

- Adding greenhouse gas emissions reduction and climate change
- Concerns that removing the Lucky Drive exit may create congestion points at the Wornum Interchange and Tamal Vista Boulevard
- Concerns that modifying the Sir Francis Drake Boulevard on-ramp will cause noise and vibration impacts to nearby properties
- Requirements for improved access to properties located off Wornum that will be needed if Nellen Avenue is removed
- The need for new signage and traffic lights on local streets, particularly near Wornum Drive and the Cost Plus Plaza shopping center
- The need to limit construction impacts by building southbound Phase 1 and Phase 2 concurrently
- Visual impacts related to building new ramp structures at the Wornum Intersection
- Noise impacts related to elevated structures, such as the braided ramp structure at Lucky Drive.
- The need to address flooding on local streets
- The need to relocate bus stops at destinations such as parking lots or shopping centers. It was suggested that the project team explore the option of providing an integrated park and ride lot
- The need to provide visual simulations of the northbound and southbound improvement options together
- Concerns about adverse effects to water quality and water flow to Corte Madera Creek
- Concerns about cumulative impacts of the project and its relationship to other projects such as the Central Marin Ferry Connection

The majority of comments submitted expressed support for Southbound Option C and Northbound Option E, and preference over Northbound Option D. This environmental analysis evaluates the northbound and southbound phases together, as one Build Alternative. The main concern heard from the community was

the proposed modifications to Madera Boulevard access. There were several suggestions made with emphasis on retaining the existing Madera on- and off-ramps. Many comments did not support changing access to Madera Boulevard from a direct on- and off-ramp to frontage roads. As a result of these concerns, the Build Alternative no longer includes the closure or modification of the existing Madera Boulevard ramps.

Many community members supported the provision of separated bike lanes and improved pedestrian connections, such as the ones included in the Build Alternative. Some concern was raised regarding a previously proposed multi-use pathway that will follow the old railroad right-of-way, and how the alignment could negatively affect sensitive habitat and the adjacent Shorebird Marsh/Corte Madera Ecological Preserve. This pathway has been eliminated from the Build Alternative. Concerns regarding the general environmental resource areas (i.e. visual, noise, flooding, etc.) are addressed in detail as part of **Chapter 2, Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures, and Appendix G**, in this environmental document.

As a result of the public comments received both during Workshop 3, and in response to the Notice of Preparation, the TAM Board of Directors directed further screening of the alternatives and further discussions with the city councils and Caltrans. The extensive alternatives evaluation and screening process that TAM has carried out over the last six years has led to the development of a Build Alternative that addresses many of the concerns raised by the public, local stakeholders, and local agencies. The Build Alternative no longer includes elements of previous alternatives that could have resulted in adverse effects to the environment. Given the reduced potential for adverse environmental effects associated with the Build Alternative, Caltrans determined that the preparation of an environmental impact report was no longer warranted.

Table 1-3 presents a summary of the final screening results that lead to a decision to carry forward in the environmental document with one Build Alternative that includes modified versions of the Southbound C and Northbound E alternatives.

The Build Alternative will incorporate several transportation management strategies. As such, the formulation of a separate transportation management strategy alternative is not necessary.

Transportation demand management programs are currently in place in the Greenbrae/Twin Cities Corridor. While it is possible that the implementation of additional transportation demand management programs and incentives in Marin County (and surrounding communities) will reduce existing and projected future travel demand along US 101, the transportation demand management program will not fulfill the project's purpose and need.

Table 1-3: Summary of Alternatives Considered but Withdrawn or Modified

Alternative	Summary and Reason for Withdrawal or Modification
Southbound Option A	Additional traffic analysis revealed that, under 2035 conditions, Southbound Option A will have high volumes of traffic on the SB US 101/Sir Francis Drake Boulevard on-ramp, which will result in longer travel times for motorists coming from the areas west of US 101 destined for SB US 101. As a result of the traffic findings, this alternative was dropped from further consideration.
Southbound Option C	To address stakeholder concerns about removing the southbound Madera Boulevard hook ramps and the need to provide easy access to the Town Center, Southbound Option C was modified to include a frontage road system between Wornum Drive and Tamalpais Boulevard, and the reconstruction of the Tamalpais interchange. However, due to funding limitations and opposition from the Town of Corte Madera regarding the modifications to the hook ramps at Madera Boulevard, this alternative was further refined and the improvements associated with the Tamalpais interchange and the frontage road system were dropped from further consideration.
Northbound Option D & Option E	<p>It was determined that either Northbound Option D or Option E could be paired with the southbound option to implement a complete transportation solution for the project. However, individual stakeholders, the Town of Corte Madera, the City of Larkspur, and the TAM board all expressed their support of Northbound Option E and their opposition to Option D. The community has also expressed their support for Northbound Option E at numerous public open houses. On November 18, 2009 the City of Larkspur passed a resolution to send a letter to Caltrans making recommendations and outlining issues of concern regarding this project.</p> <p>To fully examine Northbound Option D and Option E, TAM worked closely with Caltrans to study the two alternatives. After a series of meetings and further analysis, TAM and Caltrans concluded that the Northbound Option E potentially had fewer adverse impacts to environmental resources, better interchange geometric features, and that it should be paired with the Southbound Option C to create the Build Alternative for the project. Northbound Option D was removed from further consideration.</p>

1.4 Permits and Approvals Needed

Table 1-4 identifies the permits/approvals that will be required for project construction.

Table 1-4: Permits and Approvals

Agency	Permit/Approval	Status
United States Army of Engineers	Section 404 Permit – Nationwide Section 10 Permit (required only if the Coast Guard declines to assert its jurisdiction)	To be obtained prior to construction To be obtained prior to construction
United States Coast Guard	Section 9 Permit	To be obtained prior to construction
United States Fish and Wildlife Service NOAA Fisheries	Section 7 Consultation for Threatened and Endangered Species	To be obtained prior to approval of the environmental document
California Department of Fish and Game	1602 Agreement Incidental Take Permit (to be determined)	To be obtained prior to construction
California Regional Water Quality Control Board	Section 401 Permit	To be obtained prior to construction
Bay Conservation and Development Commission	Bay Conservation and Development Commission Permit	To be obtained prior to construction

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