US 101/Willow Road Interchange Reconstruction Project

SAN MATEO (SM) COUNTY, CALIFORNIA
DISTRICT 4 – SM – 101 (Post Miles 1.60/2.20)
Expenditure Authorization 235650

Initial Study with Negative Declaration

Prepared by the
State of California Department of Transportation

Caltrans

November 2013

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Reconstruction of the Willow Road/US 101 interchange on US 101 from Post Mile 1.60 to Post Mile 2.20 in the cities of Menlo Park and East Palo Alto, in San Mateo County.

INITIAL STUDY with Negative Declaration

Submitted Pursuant to: (State) Division 13, California Public Resources Code

THE STATE OF CALIFORNIA
Department of Transportation

11.25.13
Date of Approval

for MELANIE BRENT
Deputy District Director
District 4
California Department of Transportation
CEQA Lead Agency

SCH: 2013092019

NEGATIVE DECLARATION

Pursuant to: Division 13, Public Resources Code

Project Description

The California Department of Transportation (the Department) proposes to reconstruct the Willow Road/US 101 Interchange on US 101 from Post Mile (PM) 1.60 to Post Mile 2.20 in the cities of Menlo Park and East Palo Alto, in San Mateo County.

Determination

The Department has prepared an Initial Study for this project, and following public review, has determined 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 farmlands/timberlands, cultural resources, hazardous waste, hydrology/floodplain, land use, mineral resources, paleontology, plant species, community character and cohesion, parks and recreation, utilities/emergency services, relocations, growth, traffic and transportation/pedestrian and bicycle facilities, wetlands and other waters, and threatened and endangered species.

In addition, the proposed project would have no significant effect on visual/aesthetics, geology/soils, air quality, noise, water quality, natural communities, and animal species.

for MELANIE BRENT
Deputy District Director
District 4
California Department of Transportation

11.25.13
Date

SUMMARY

The project proposes to reconstruct the Willow Road/US 101 Interchange on US 101 from Post Mile 1.60 to Post Mile 2.20 in the cities of Menlo Park and East Palo Alto, in San Mateo County.

This Negative Declaration represents the final environmental document. The Initial Study with Proposed Negative Declaration (draft environmental document) was approved in August 2013 and circulated for public review from August 31, 2013 to September 30, 2013. Changes to the previously circulated Initial Study with Proposed Negative Declaration reflect comments submitted during the public review period and editorial revisions to improve overall readability. Vertical lines in the margin denote the major changes.

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Chapter 1 – Proposed Project

1.1 INTRODUCTION

The project proposes to reconstruct the existing United States (US) 101/Willow Road (also known as State Route 114) Interchange on its existing alignment to a partial cloverleaf interchange. The California Department of Transportation (Department) is the lead agency under the California Environmental Quality Act (CEQA). The proposed project is located in the cities of Menlo Park and East Palo Alto in San Mateo County on US 101 from Post Mile (PM) 1.6 to Post Mile 2.2.

The existing facility was constructed in 1955 and is a cloverleaf interchange without collector roads. It is a major interchange that serves an essential role in connecting the southern East Bay Area to the San Francisco Peninsula via US 101 and the Dumbarton Bridge. Willow Road is a four-lane conventional State highway less than a mile in length between US 101 and Bayfront Expressway (State Route 84) in East Palo Alto. West of US 101, Willow Road is a local road in the City of Menlo Park. The Willow Road overcrossing comprises two simple spans of equal length, each of which is approximately 175.8 feet long. The bridge was widened on the north side in 1985.

The existing Willow Road overcrossing has three 11-foot-wide lanes with a 2.0-foot-wide left shoulder and a 5-foot right shoulder. The overcrossing also has a 4.0-foot-wide raised median, a 10.4-foot wide sidewalk in the westbound direction and a 6.1-foot-wide sidewalk on the eastbound direction. The total width of the structure is 101.5 feet. Vertical clearance of the overcrossing is 15 feet.

Currently, there are no dedicated bicycle lanes on Willow Road overcrossing. The existing Class II[1] bike lanes on Willow Road end on Durham Street to the west and on Newbridge Street to the east.

This project is included in the *Transportation 2035 Plan for the San Francisco Bay Area*, which is the Metropolitan Transportation Commission's (MTC) current Regional Transportation Plan (RTP), Ref. No. 21606, and in the 2011 Transportation Improvement Program (TIP), Ref. No. SM-010047. In addition, improvements to US 101 are included in the San Mateo County Transportation Expenditure Plan (Measure A) approved by voters in 1988 and extended in 2004. The project lies within the limits of the recently completed auxiliary lanes project on US 101 between the Marsh Road and Embarcadero Road/Oregon Expressway interchanges.

Funding is expected to be split: 51 percent from Measure A funds, and 49 percent from Regional Improvement Program (RIP) funds of the State Transportation Improvement Program (STIP). There is currently $50,002,000 programmed for this project.

Construction is expected to commence in 2016 and be completed by 2018.

Figure 1 is the Project Vicinity Map and Figure 2 is the Project Location Map.

1 - Per Section 890.4 of the California Streets and Highways Code: Class I Bikeway (Bike Path) provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized. Class II Bikeway (Bike Lane) provides a striped lane for one-way bike travel on a street or highway. Class III Bikeway (Bike Route) provides for shared use with pedestrian or motor vehicle traffic.

Figure 1 – Project Vicinity Map

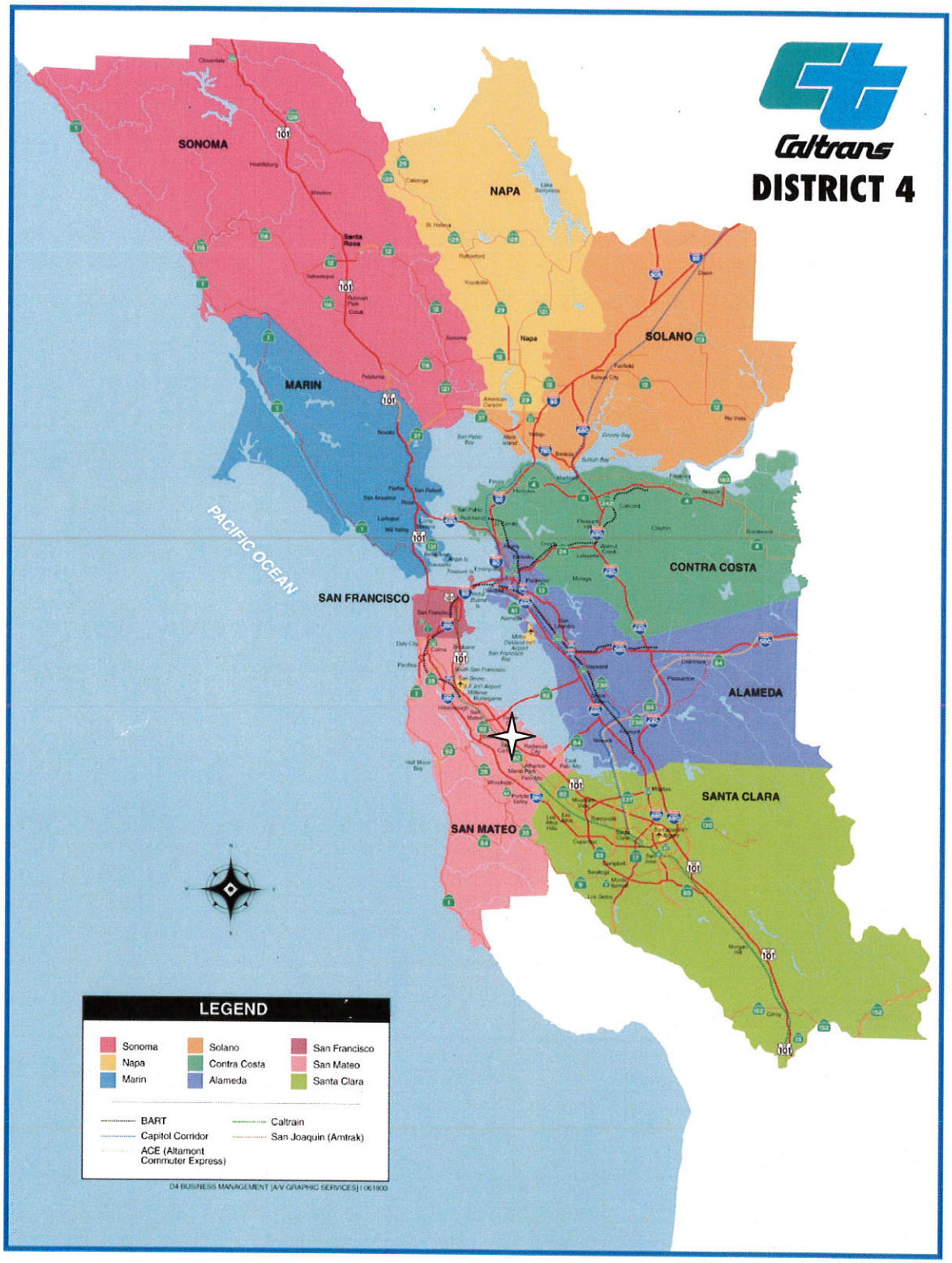
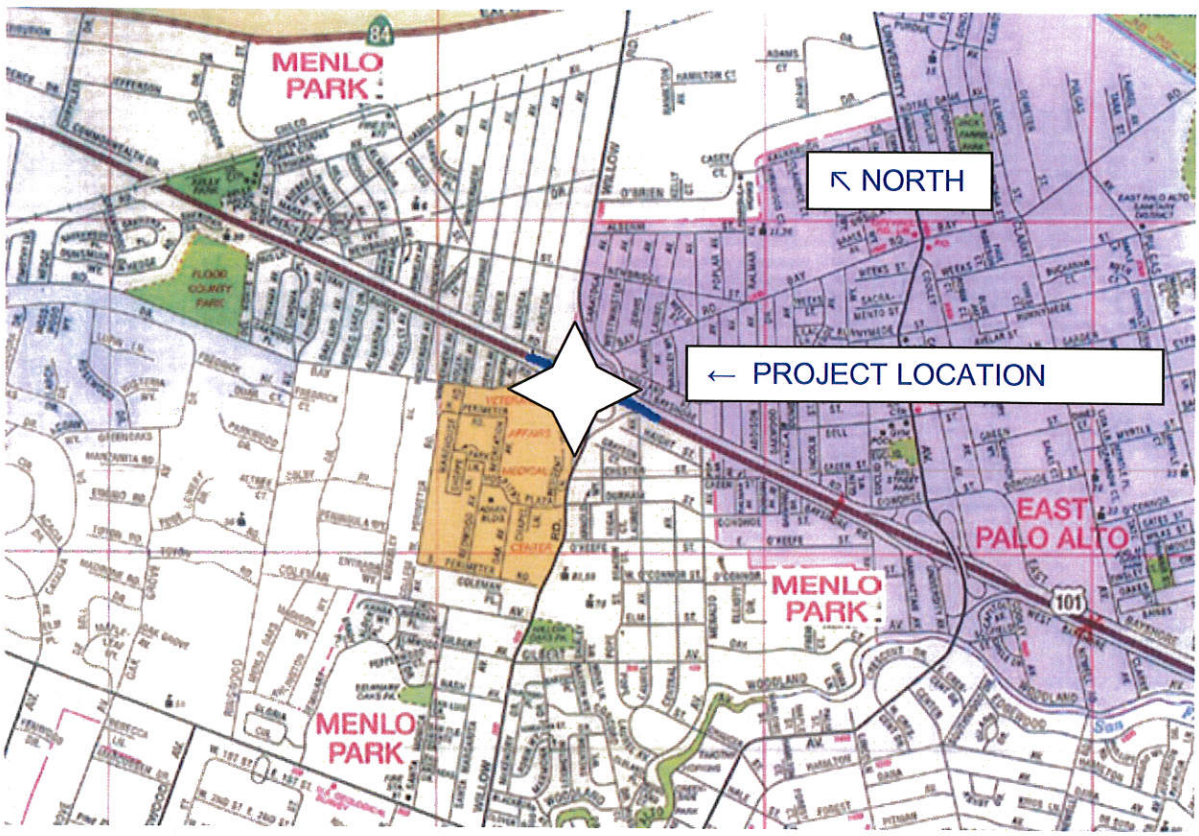


Figure 2 – Project Location Map



1.2 PURPOSE AND NEED

Purpose

The purpose of the project is to reduce operational deficiencies and congestion for motorists, bicyclists and pedestrians caused by short weaving segments between the off- and on- loop ramps within the US 101/Willow Road interchange that substantially contribute to localized backups and upstream queuing on US 101.

Need

There are short weaving segments between the off- and on- loop ramps along US 101 and on the Willow Road overcrossing. These weaving conflicts reduce speed, cause bottlenecks, and create upstream queuing on US 101. This short weaving length between the ramps within the Willow Road interchange also creates weaving conflicts between traffic entering and existing eastbound and westbound Willow Road.

This need for this project is based on the analysis and conclusions presented in a prepared Traffic Operation Analysis Report – US 101/Willow Road Interchange Improvements (TOAR) dated May 22, 2012. The TOAR was approved by the Department's Office of Highway Operations.

Existing Condition

The freeway portion of the network analyzed in the TOAR includes the Route 101 mainline and all ramps, from the Oregon Expressway interchange to the south to the Woodside Road interchange to the north. In general, this freeway segment of US 101 has an eight-lane cross-section with three mixed-flow lanes and one high-occupancy-vehicle (HOV) lane in each direction. Within the study area, Willow Road is a four-lane arterial running east-west across US 101.

The vehicular speed data for US 101, and the traffic volume data for US 101, the interchange ramps and the study intersections detailed in the TOAR, cover the AM peak period (defined as 6:00 AM to 10:00 AM) and PM peak period (defined as 3:00 PM to 7:00 PM), and were derived from a number of sources, including the Department and the City of Menlo Park.

The TOAR study includes four signalized intersections along Willow Road from Durham Street to O'Brien Drive, including Bay Road and Newbridge Street, and the US 101 segments from north of the Woodside Road interchange to south of the Embarcadero Road/Oregon Expressway interchange.

A description of the weekday AM peak period operating and queuing conditions by facility and direction, followed by a similar discussion for the PM peak period, are given in the following paragraphs.

AM Peak Period - Southbound US 101

In its existing condition, southbound US 101 between the University Avenue on-ramp and Oregon Expressway/Embarcadero Road off-ramp is a bottleneck during the AM peak period with the queue extending as far as the Woodside Road interchange. A minor bottleneck has also been observed between the Oregon Expressway/Embarcadero Road on-ramp and the

San Antonio Road off-ramp, with the queue spilling back into the Oregon Expressway/Embarcadero Road interchange.

AM Peak Period - Northbound US 101

Northbound US 101 has no congestion during the AM peak period within the study limits.

AM Peak Period - Ramps/Connectors/Intersection

In its existing condition, the northbound off-ramp to westbound Willow Road is congested during the AM peak period because of the lane drop, where the ramp merges with Willow Road, to the west of Bay Road. However, the ramp queues were of short duration and did not affect mainline operations. There is no other congestion on the ramps during the AM peak period.

In the westbound direction of Willow Road, queuing results because of the lane drop west of Bay Road, beginning late in the second hour of the AM peak period and dissipates in the last hour of the peak period. At the peak, the queue extends just west of Newbridge Street.

PM Peak Period - Southbound US 101

In its existing condition, a bottleneck develops between the Oregon Expressway/Embarcadero Road on-ramp and the San Antonio Road off-ramp during the PM peak period. The queue from this bottleneck extends as far as the Woodside Road interchange.

PM Peak Period - Northbound US 101

There is no bottleneck on the freeway mainline. However, traffic slows down in the vicinity of the on-ramp from Oregon Expressway/Embarcadero Road. Traffic flows on the freeway mainline are controlled by bottlenecks upstream of the study segment.

PM Peak Period - Ramps/Connectors

Southbound US 101 on-ramps from Oregon Expressway/Embarcadero Road have queues because of a combination of the congestion on the US 101 mainline and the high demand at this on-ramp during most of the PM peak period. Queues begin to dissipate toward the end of the PM peak period.

During the PM peak period, the northbound US 101 on-ramps from Oregon Expressway/Embarcadero Road are congested.

The northbound US 101 off-ramp to eastbound Willow Road has a queue that extends from the Newbridge Street intersection onto this off-ramp. The queue on eastbound Willow Road extends beyond the merge with the northbound US 101 off-ramp. This congestion starts around 5:30 PM and dissipates around 6:45 PM.

No Project Condition

For the No Build Alternative, significant congestion is expected on US 101 in both directions during both peak periods. Traffic operations for year 2040 on US 101 and Willow Road in both the AM and PM peak are as follows:

AM Peak Period

With no project, the primary southbound bottleneck will be within the segment between the Oregon Expressway/Embarcadero Road off-ramp and on-ramp during the AM peak period. The queue from this bottleneck is expected to extend through the study area to just north of the Woodside Road interchange. This congestion, in turn, would affect operations on westbound Willow Road and northbound US 101. The loop on-ramp from westbound Willow Road currently backs up because of the heavy congestion on southbound US 101 at the merge. The queue from this loop on-ramp is projected to extend onto westbound Willow Road beyond O'Brien Drive. The congestion on westbound Willow Road would then constrain the flow from the northbound US 101 loop off-ramp, causing it to back up onto the northbound freeway mainline, with the queue expected to extend well south of the Oregon Expressway/Embarcadero Road interchange.

On Willow Road, considerable congestion is also expected in the eastbound direction due to the constraint at the ramp meter on the on-ramp to southbound US 101. The queue from this meter would spill back onto eastbound Willow Road impacting the Bay Road and Durham Street intersections. The average travel time on northbound US 101 within the study limits would be about 13.2 minutes with an average individual delay of 7.9 minutes. The average travel time on southbound US 101 would be about 12 minutes. The average individual delay would be 6.6 minutes.

PM Peak Period

With no project, a major bottleneck on northbound US 101 is projected to occur within the weaving section between the eastbound Willow Road loop on-ramp and the westbound Willow Road loop off-ramp during the 2040 PM peak period. The queue from this bottleneck is expected to extend well south of the Oregon Expressway/Embarcadero Road interchange. On southbound US 101, the weave section between the westbound Willow Road loop on-ramp and the eastbound Willow Road loop off-ramp is expected to be a minor bottleneck during the PM peak period. On Willow Road, significant congestion is again expected in the eastbound direction due to the constraint at the ramp meter on the on-ramp to southbound US 101. The average travel time on northbound US 101 would be about 10.7 minutes. The average individual delay would be 5.4 minutes. The average travel time on southbound US 101 would be about 11.4 minutes with an average individual delay of 6.1 minutes.

With no project, the Average Individual Travel Time and Delay for year 2040 in both northbound and southbound directions of US 101 are shown on Table 1 below.

Table 1 – Average Individual Travel Time and Delay (No Project)

Location	Peak (AM)		Peak (PM)	
	Travel Time (minutes)	Delays * (minutes)	Travel Time (minutes)	Delays * (minutes)
101 Northbound	13.2	7.9	10.7	5.4
101 Southbound	12.0	6.6	11.4	6.1

Table 2 below shows the intersection delay time for the four intersections.

Table 2 – Intersection Delay (No Project)

Intersection	Peak (AM)		Peak (PM)	
	Delay (Seconds)	LOS[2]	Delay (Seconds)	LOS[2]
Willow Rd at Durham Street	56	E	45	D
Willow Rd at Bay Road	74	E	61	E
Willow Rd at Newbridge Street	58	E	40	D
Willow Rd at O'Brien Drive	36	D	13	B

[2]LOS = "level of service" – Please see Traffic and Transportation/Pedestrian and Bicycle Facilities section of Chapter 2 for "level of service" discussion.

Current and Forecasted Traffic

The following traffic volumes apply to US 101 and Willow Road. Traffic volumes for 2011 and projected at year 2040 annual two-way average daily traffic (AADT) and peak-hour volumes are summarized in Table 3 below. Because this project is an operational improvement, the 2040 AADT for the Build and No Build Alternatives (discussed in the Alternatives section of this chapter) are the same volumes. In addition, the difference in existing AADT and 2040 AADT is due to the natural traffic demand and growth, and is not due to capacity increase.

Table 3 – Existing/Estimated Year 2040 Annual Average Daily Traffic (AADT)

Facility	Location	AADT (vehicles per day)		AM Peak Hour Volume (vehicles per hour)		PM Peak Hour Volume (vehicles per hour)	
		Existing	Year 2040	Existing	Year 2040	Existing	Year 2040
US 101	South of Willow Road (Route 114)	211,122	305,989	13,809	19,344	12,703	19,106
US 101	North of Willow Road (Route 114)	195,711	284,902	12,666	17,695	11,649	17,700
Willow Road (Route 114)	East of Route 101	41,679	55,592	3,304	3,824	3,660	5,343
Willow Road	West of US 101	50,711	64,691	2,909	3,590	2,741	3,602
Ramp	SB on from EB Willow Road (Route 114)	9,091	16,219	760	1,688	590	1,002
Ramp	NB off to EB Willow Road (Route 114)	6,971	9,302	690	1,100	1,170	1,693
Ramp	SB off to EB Willow Road (Route 114)	5,725	11,727	240	408	560	1,270
Ramp	NB on from EB Willow Road (Route 114)	5,544	8,130	390	406	360	409
Ramp	SB on from WB Willow Road	6,122	8,812	940	940	800	800
Ramp	NB off to WB Willow Road	12,633	16,857	550	712	470	578
Ramp	NB on from WB Willow Road	5,219	7,652	490	914	420	858
Ramp	SB off to WB Willow Road	5,339	6,381	340	566	360	387

NB = Northbound; SB = Southbound, EB = Eastbound, WB = Westbound

Accident Rates

A three-year Traffic Accident Surveillance and Analysis System (TASAS) output for the period between April 1, 2008 and March 31, 2011 for the mainline US 101 is presented on Table 4 below:

Table 4 – Traffic Accident Surveillance and Analysis System Summary for US 101

Location	Total # Accidents	Actual Accident Rate			Statewide Average Accident Rate		
		Fatal	Fatal+ Injury	Total	Fatal	Fatal+ Injury	Total
Mainline between University Ave Overcrossing to Marsh Rd (Route 84/101) Separation	512	0.004	0.240	0.95	0.004	0.280	0.900

The accident rate on the study segment of US 101 for this period was 0.95 accidents per million vehicle miles (MVM) compared to the statewide average of 0.940 accidents per MVM for similar facilities. The actual accident rate for collisions with injuries or fatalities was lower than the state average (0.24 versus 0.28 accidents per MVM). There were two fatalities on the study segment of U.S. 101 in this three-year period, with the resultant accident rate equal to the statewide average (0.004 accidents per MVM).

The majority of accidents were sixty seven percent rear-end and fourteen percent sideswipe collisions. Approximately twelve percent were "hit object" collisions. The primary collision factor in the majority of accidents (sixty six percent) was speeding, followed by other violations (twelve percent) and improper turns (fourteen percent).

A summary of the collisions that occurred on ramps within the study area is also presented in Table 5 below for the three-year Traffic Accident Surveillance and Analysis System (TASAS) summary for the period between April 1, 2008 and March 31, 2011.

Table 5 – Traffic Accident Surveillance and Analysis System for Ramps

Location	Total # Accidents	Actual Accident Rate			Statewide Average Accident Rate		
		Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
SB on from EB Willow Road (D*)	0	0.000	0.000	0.000	0.003	0.180	0.570
NB off to EB Willow Road (D)	4	0.000	**0.270**	0.350	0.005	0.130	0.380
SB off to EB Willow Road (L*)	5	0.000	**0.360**	0.900	0.003	0.300	1.060
NB on from EB Willow Road (L)	2	0.000	0.000	0.420	0.004	0.210	0.720
SB on from WB Willow Road (L)	2	0.000	**0.230**	0.230	0.000	0.210	0.730
NB off to WB Willow Road (L)	5	0.000	**0.290**	**0.720**	0.004	0.200	0.680
NB on from WB Willow Road (D)	1	0.000	0.000	0.190	0.003	0.110	0.320
SB off to WB Willow Road (D)	3	0.000	0.190	0.580	0.004	0.240	0.750

(D*) = Diagonal Ramp, (L) = Loop Ramp, **Bold** = Accident Rates Higher than Statewide Average, SB = Southbound, WB = Westbound, EB = Eastbound, NB = Northbound

1.3 PROJECT DESCRIPTION

The project proposes to reconstruct the existing United States (US) 101/Willow Road (also known as State Route 114) Interchange on its existing alignment to a partial cloverleaf interchange. The project is located in San Mateo County on US 101 at the Willow Road interchange from Post Mile 1.60 to Post Mile 2.20. The project covers a distance of 0.6 miles. The portion of US 101 within the project limits currently consists of eight to ten lanes, two of which are High Occupancy Vehicle (HOV) lanes. The purpose of the project, as defined in the previous section, is to address the operational deficiencies of the US 101/Willow Road interchange.

In addition to the reconstruction of the interchange, other major components of the project include:

- Reconstruct the Willow Road overcrossing to provide eight lanes, dedicated bicycle lanes, sidewalks and a standard vertical clearance;
- Realign and widen the diagonal off-ramps from US 101 to Willow Road to provide additional storage;
- Construct signalized intersections at the realigned diagonal off-ramp terminals;
- Realign and widen the diagonal on-ramps to provide HOV bypass lane(s), in conjunction with the modification of existing ramp metering system;
- Realign and widen the diagonal and loop on-ramps to provide HOV bypass lane(s), in conjunction with the modification of the existing ramp metering system;

- Modify and realign the frontage roads adjacent to the overcrossing;
- Reconstruct portions of the existing sound walls; and
- Construct retaining walls along the diagonal off-ramps.

1.4 ALTERNATIVES

This section describes the design alternatives that were developed to meet the identified need through accomplishing the defined purpose, while avoiding or minimizing environmental impacts. The alternatives are the Build Alternative and the No Build Alternative. The Department Project Development Team (PDT) has selected the Build Alternative.

Build Alternative

The Build Alternative proposes to replace the Willow Road overcrossing in its existing alignment and modify the full cloverleaf interchange to a partial cloverleaf. This Build Alternative is also known as *"Alternative 1B (Type L-9 Condensed Partial Cloverleaf)"* in Department project-specific documents and is depicted in Figure 3.

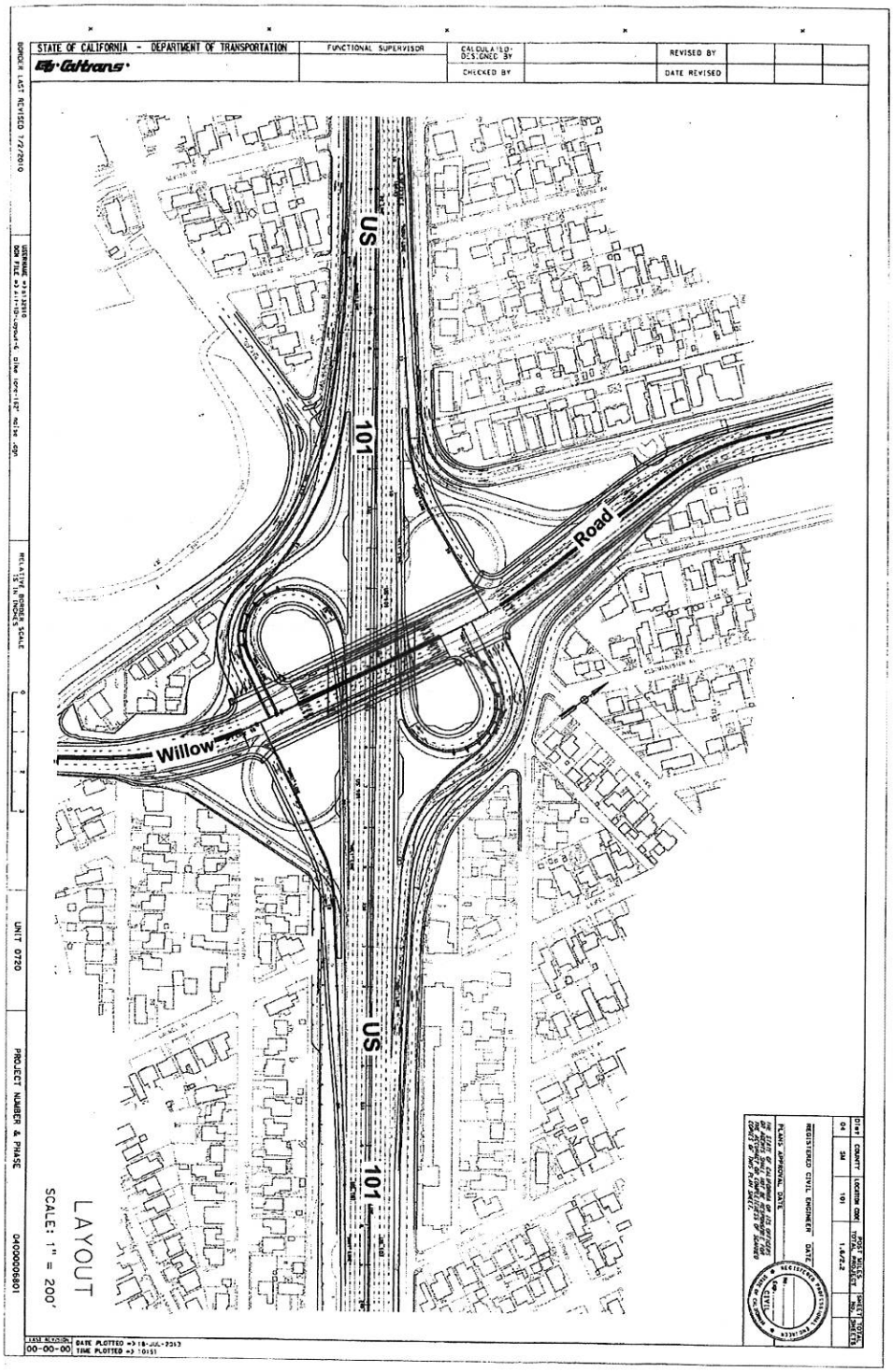


Figure 3 – Build Alternative Preliminary Layout

The modification of the interchange consists of the following elements:

1. Remove the existing Willow Road overcrossing and replace it with a two-span structure to carry traffic-lanes (two 11-foot lanes and two 12-foot lanes), an 8.0 feet wide Class I bike path, a 6.0 feet wide Class II bike lane, a 4.0 feet wide shoulder and a 10 feet wide sidewalk on each side. The proposed overcrossing will meet the standard vertical clearance of 16.5 feet.

2. Eliminate the existing northbound loop off-ramp to westbound Willow Road (Route 114) in the northeast quadrant of the interchange.

3. Eliminate the existing southbound loop off-ramp to eastbound Willow Road (Route 114) in the southwest quadrant of the interchange.

4. Reconstruct and widen the existing northbound diagonal off-ramp to eastbound Willow Road in the southeast quadrant of the interchange. The ramp will be widened to accommodate two lanes. At its terminus, the ramp will be further widened to provide two left-turn lanes and two right-turn lanes. All lanes will be 12-foot wide with a 4.0-foot-wide left shoulder and an 8.0-foot-wide right shoulder. A new traffic signal will be installed at the ramp terminus.

5. Reconstruct and widen the existing southbound diagonal off-ramp to westbound Willow Road in the northwest quadrant of the interchange. The ramp will be widened to accommodate two lanes. At its terminus, the ramp will be further widened to provide two left-turn lanes and two right-turn lanes. All lanes will be 12-foot wide with a 4.0-foot-wide left shoulder and an 8.0-foot wide right shoulder. A new traffic signal will be installed at the ramp terminus.

6. Realign and widen the existing northbound diagonal on-ramp from the westbound Willow Road in the northeast quadrant of the interchange. The ramp will be widened to accommodate one single-occupancy-vehicle (SOV) lane and one high-occupancy-vehicle (HOV) bypass lane, a 4.0-foot-wide left shoulder and an 8.0-foot-wide right shoulder. Currently, this on-ramp is metered and will continue to be metered after the project.

7. Realign and widen the existing southbound diagonal on-ramp from the eastbound Willow Road in the southwest quadrant of the interchange. The ramp will be widened to provide one SOV lane and one HOV bypass lane with a 4.0-foot wide left shoulder and an 8.0-foot wide right shoulder. This ramp is currently metered and it will continue to be metered after the project.

8. Realign and widen the existing northbound loop on-ramp from the eastbound Willow Road in the southeast quadrant of the interchange. The ramp will be widened to accommodate one SOV lane and one HOV bypass lane, a 4.0-foot-wide left shoulder and an 8.0-foot-wide right shoulder. This ramp is currently metered and it will continue to be metered after the project.

9. Realign and widen the existing southbound loop on-ramp from the westbound Willow Road in the northwest quadrant of the interchange. The ramp will be widened to accommodate one SOV lane and one HOV bypass lane, a 4.0-foot-wide left shoulder and an 8.0-foot-wide right shoulder. This ramp is currently metered and it will continue to be metered after the project.

The reconfiguration of the Willow Road Interchange and its diagonal on/off ramps also includes the following improvements:

1. Reconstruction of sound walls at the following locations:
    a. along the diagonal on-ramp right shoulder in northeast quadrant;
    b. along the diagonal on-ramp right shoulder in southwest quadrant;
    c. along the diagonal off-ramp right shoulder in southeast quadrant; and
    d. along the diagonal off-ramp right shoulder in northwest quadrant.
2. Construction of retaining walls at the following locations:
    a. between the US 101 southbound loop on-ramp and diagonal off-ramp; and
    b. between the US 101 northbound loop on-ramp and diagonal off-ramp.

Bicycle and Pedestrian Access

Willow Road is designated as both a city (Menlo Park and East Palo Alto) and county (San Mateo) Class II bikeway route, connecting Menlo Park to East Palo Alto. The existing dedicated Class II bike lane falls short of this interchange, terminating on either side of the interchange. Pedestrian access is currently provided via sidewalks on either side of the overcrossing that provide connectivity between East Palo Alto and Menlo Park.

The Build Alternative proposes to construct a 6.0-foot-wide Class II bike lane and an 8.0-foot-wide Class I bike path in each direction for a total of four bicycle facilities on the Willow Road overcrossing structure. The project will also improve pedestrian access via 10-foot-wide sidewalks to be constructed on both sides of the new overcrossing. Additionally, compliance with the Americans with Disabilities Act (ADA) will be provided for throughout the project.

On the overcrossing, the Class I facility will be between the 4.0-foot-wide shoulder and 10-foot-wide sidewalk, with a barrier separation between the shoulder and Class I facility. The Class II facility will be between the third lane (the right through-lane) and the fourth lane (the right-turn lane) in both directions. The Class I facility will be only on the overcrossing. The Class II facility will conform to the existing Willow Road facility at both ends of the overcrossing in a manner to be determined during the design phase of the project.

Traffic Operating Systems (TOS) and Ramp Metering (RM) Plan

Traffic operation systems (TOS) are devices, including ramp metering, that are employed to monitor and control current traffic conditions. The proposed northbound loop, northbound diagonal and southbound diagonal on-ramps will accommodate one SOV lane and one HOV bypass lane in conjunction with the installation or modification of existing ramp metering systems, except for the southbound loop on-ramp, which will provide two SOV lanes. A ramp-metering exception to design standards for not providing HOV bypass lanes on the southbound loop on-ramp was approved. Conduits for future fiber will be replaced or modified and will provide mainline crossovers to TOS and RM cabinets on opposite sides of the freeway, as necessary.

At the time of construction, all existing TOS/RM elements will be kept operational throughout the construction phase of this project. The northbound and southbound ramp meters at the Willow Road interchange, and any other TOS/RM elements that may be affected by this project will be relocated, modified or fully replaced, as necessary.

Maintenance Vehicle Pullout (MVP) and California Highway Patrol (CHP) Enforcement Areas

MVP and CHP enforcement areas will be provided along ramps to maintain and service ramp metering, to enforce vehicle occupancy requirements, to provide space for landscaping equipment, and to assist disabled vehicles. The exact locations for the proposed MVP and CHP areas will be determined during the design phase of the project.

No Build Alternative

The No Build Alternative includes the recently completed auxiliary lanes project within this US 101 corridor that was implemented without the Build Alternative, which is discussed further on page 28. The No Build Alternative would make no improvements to the US 101/Willow Road interchange. The existing constraints caused by the overcrossing and ramp configurations would continue to impair system performance. Even though the No Build Alternative does not meet the purpose and need of the project, it serves as a baseline against which to compare the Build Alternative.

1.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER DISCUSSION

Since the project's inception, the Build Alternative has consistently focused on the reconstruction of the US 101/Willow Road interchange, in order to satisfy the purpose and need of the project. Within that framework, numerous design variations were considered but rejected because these variations do not meet the project purpose and need, would require significant right-of-way (full and partial) acquisitions, would greatly impact local traffic circulation and/or require modification to some localized access points.

The following is a list of the rejected design variations:

1. Design Variant known as *"Alternative 1A (Type L-9 Partial Cloverleaf)"* in Department project-specific documents:

   This design variant was determined to not be viable because it requires full and partial right-of-way acquisitions, realignments of local streets, parcel access modifications, and introduction of new circulation such as one-way traffic. In the northeast quadrant (northeast being Menlo Park), partial private and public right-of-way acquisition would be required to realign the frontage road. Willow Road would be realigned and Pierce Road would be converted to a one-way street (northbound) between Willow Road and Carlton Avenue. In the southeast quadrant (East Palo Alto), full and partial right-of-way acquisitions and parcel-access modifications would be required. East Bayshore Road will be rerouted to Newbridge Street via Menalto Avenue. Saratoga Avenue, Westminster Avenue, Bay Road, Holland Street and Laurel Avenue would experience new cul-de-sac or elbow-connection modifications to maintain access to existing residences and allow existing businesses to remain. The southwest quadrant (Menlo Park) would require full parcel acquisitions, and slight modifications to some of the access points (driveways), sidewalks and parking lots of several business parcels along

eastbound Willow Road. The affected parcels in this part of Menlo Park are commercial business. The northwest quadrant (Menlo Park) would require partial and full right-of-way acquisition to implement traffic circulation within this neighborhood. The realignment of Bay Road would modify existing circulation. The existing portion of Van Buren Road would be permanently closed to southbound through traffic between Sevier Avenue and Bay Road. A one-way northbound maneuver would be permitted along Van Buren Road between Madera Avenue Sevier Avenues of Menlo Park. Access to all other parcels in this quadrant would be maintained, with the exception of two vacant business parcels currently located between Bay Road and the existing southbound US 101 off-ramp.

2. Design Variant known as *"Alternative 2 (Type L-9 Partial Cloverleaf with Auxiliary Lane)"* in Department project-specific documents:

Similar to the previous variant, this design variation was determined not to be viable because it requires substantial full and partial right-of-way acquisitions, realignments of local streets, parcel-access modifications and introduction of new circulation such as one-way traffic. In the northeast quadrant (Menlo Park), Willow Road would be widened and Pierce Road would be realigned and converted to a one-way street approximately to Madera Avenue. In the southeast quadrant (East Palo Alto), full and partial right-of-way acquisitions and modifications to property access would be required. East Bayshore Road would be rerouted to Newbridge Street via Menalto Avenue. Saratoga Avenue, Westminster Avenue, Bay Road, Holland Street and Laurel Avenue would be subject to new cul-de-sac or elbow-connection modifications in order to maintain access to existing residences and businesses. Fences, walls and sidewalks would be removed and replaced. The southwest quadrant (Menlo Park) will require full parcel acquisitions and slight modifications to some of the access points (driveways), sidewalks and parking lots of several business parcels along eastbound Willow Road. The affected parcels in this part of Menlo Park would be commercial businesses. The Northwest quadrant (Menlo Park) would require partial and full right-of-way acquisitions to implement traffic circulation within this neighborhood. The realignment of Bay Road would modify existing circulation. The existing portion of Van Buren Road would be permanently closed to southbound through traffic between Sevier Avenue and Bay Road. A one-way northbound maneuver would be permitted along Van Buren Road between Madera Avenue and Sevier Avenue in Menlo Park. Access to all other parcels in this quadrant would be maintained, with the exception of two vacant business parcels currently located between Bay Road and the existing southbound US 101 off-ramp.

3. Design Variant known as *"Alternative 3 (Type L-9 Partial Cloverleaf with Single Point Entrance Ramp)"* in Department project-specific documents:

This design variant was determined to not be viable because it requires further right-of-way (full and partial right-of-way) acquisitions, realignments of local streets, parcel access modifications, and introduction of new circulation such as one-way traffic. The northeast quadrant (Menlo Park) would require partial private and public right-of-way acquisition to realign and widen Willow Road and Pierce Road to approximately Hollyburne Avenue. To preserve a multi-family residence located at the southeast corner of Pierce Road/Sevier Road, stretches of this frontage road would be proposed to be either one-way or cul-de-sac. Pierce Road between Willow Road and Carlton Avenue would be one-way and access to the multi-family residence would be maintained via Madera Avenue. Through traffic along Pierce Road would be redirected at Sevier Avenue or Madera Avenue to Newbridge Street. The southeast quadrant (East Palo

Alto) would require full and partial (public, private and business) right-of-way acquisitions, parcel access modifications, roadway modification, realignments and introduction of new circulation to the neighborhood. East Bayshore Road would be re-routed to Newbridge Street via Menalto Avenue. Saratoga Avenue, Westminster Avenue, Bay Road, Holland Street and Laurel Avenue would experience new cul-de-sac or elbow-connection modifications in order to maintain access to existing residences and businesses. Fences, walls and sidewalks would be removed and replaced. The southwest quadrant (Menlo Park) would require full parcel acquisitions and modifications to some of the access points (driveways), sidewalks, and parking lots of a few businesses along eastbound Willow Road. Affected parcels in this part of Menlo Park are commercial businesses. The northwest quadrant (Menlo Park) would require partial and full right-of-way acquisitions and modification of the existing circulation within the neighborhood. A portion of the Van Buren would be permanently closed to southbound through traffic between Sevier Avenue and Bay Road. A one-way northbound maneuver will be permitted along Van Buren between Madera Avenue and Sevier Avenue.

4. Design Variant known as *"Alternative 4A (Type L-1 Compact Diamond)"* in Department project-specific documents:

This alternative was determined to not be viable because it requires substantial full and partial right–of-way acquisitions, realignments of local streets, parcel-access modifications and introduction of new circulation such as one-way traffic. In the northeast quadrant (Menlo Park), partial private and public right–of-way acquisition would be required to realign the frontage road. Willow Road would be realigned and Pierce Road would be converted to a one-way street (northbound) between Willow Road and Carlton Avenue. In the southeast quadrant (East Palo Alto), full and partial right-of-way acquisitions and modifications to access to properties would be required. East Bayshore Road would be rerouted to Newbridge Street via Menalto Avenue. Saratoga Avenue, Westminster Avenue, Bay Road, Holland Street and Laurel Avenue would be subject to new cul-de-sac or elbow-connection modifications in order to maintain access to existing residences and businesses. Fences, walls and sidewalks would be removed and replaced. In the southwest quadrant (Menlo Park), partial and full right-of-way acquisitions would be required. Slight modifications to some of the access points (driveways), sidewalks, and parking lots of a several business parcels along eastbound Willow Road would be required. The northwest quadrant (Menlo Park) would require partial and full right-of-way acquisition of properties to maintain existing traffic circulation within this neighborhood. The realignment of Bay Road would modify the existing circulation. The existing part of Van Buren Road within the project limits would be permanently closed to southbound through traffic between Sevier Avenue and Bay Road. A one-way northbound maneuver would be permitted along Van Buren Road between Madera Avenue and Sevier Avenues of Menlo Park. Access to all other parcels in this quadrant would be maintained with the exception of two vacant business parcels currently located between Bay Road and the existing southbound US 101 off-ramp.

In addition to the roadway re-circulation modifications and right-of-way impacts, this design variation has more delay time on the intersection than the Build Alternative. For the Build Alternative, the level of service for Willow Road at the southbound US 101 ramps for the AM and PM peak periods is C, whereas the levels of service for this design variation (Alternative 4A), for AM and PM peak periods are F and D, respectively.

5. Design Variant known as *"Alternative 4B (Type L-1 Condensed Compact Diamond)"* in Department project-specific documents:

This design variant was determined to not be viable because it requires a combination of partial public, private and business right-of-way acquisitions. In the northeast quadrant (Menlo Park), partial public right-of-way acquisitions would be required to realign Willow Road and Pierce Road approximately to Carleton Avenue. In the southeast quadrant (East Palo Alto), the overall modification would require partial public, private and business right-of-way acquisitions. East Bayshore Road would be narrowed and realigned between Menalto Avenue and Holland Street in support of the proposed northbound US 101 off-ramp. Due to the realignment of Willow Road east of the interchange, fences, walls and sidewalk would be modified. In the southeast quadrant (Menlo Park), public right-of-way would be required to modify some of the access point (driveways) and sidewalks of a few business parcels along the eastbound Willow Road. The northwest quadrant (Menlo Park) would not require any circulation modifications. Slight realignments or modifications to Bay Road and Van Buren could be accommodated within public right-of-way and so would require no acquisitions.

This design variant has less impact on the right-of-way than the Build Alternative. However, it has more delay time than the Build Alternative. For this design variant, the levels of service for Willow at southbound US 101 ramp would be F and D for AM and PM peak periods respectively, while the level of service for the Build Alternative is C for both AM and PM peak periods for the Willow Road/southbound US 101 ramp.

1.6 PERMITS AND APPROVALS NEEDED

No project-specific permits or regulatory approvals are required for the project.