D. TRAFFIC, TRANSPORTATION, CIRCULATION AND PARKING

INTRODUCTION

This section presents the results of the transportation impact analysis (TIA) conducted for the proposed Abbott Laboratories development. The site location and surrounding roadway network are presented on Figure IV.D-1. The purpose of the transportation analysis is to identify potential impacts of the proposed development on the surrounding transportation system. Intersections, rather than midblock roadway segments, are typically the critical capacity-controlling locations for urban and suburban roadway networks. Therefore, the following 21 study intersections (all signalized, unless indicated otherwise) have been selected as those most likely to be affected by the proposed project, warranting detailed study in this EIR:

1. El Camino Real (State Route 82) / Whipple Avenue
2. Winslow Street – Industrial Road / Whipple Avenue
3. Veterans Boulevard – US 101 Southbound Off-Ramp / Whipple Avenue
4. US 101 Northbound Off-Ramp / Whipple Avenue
5. East Bayshore Road / Bair Island Road
   (*analyzed only in scenarios that include the Blomquist Street extension*)
6. El Camino Real (SR 82) / Jefferson Avenue
7. Veterans Boulevard / Jefferson Avenue
8. Veterans Boulevard / Maple Street
9. Blomquist Street / Maple Street (*unsignalized)*
10. Alameda de las Pulgas / Woodside Road (State Route 84)
11. Middlefield Road / Woodside Road (SR 84)
12. Bay Road / Woodside Road (SR 84)
13. Broadway / Woodside Road (SR 84) / US 101 Southbound Off-Ramp
14. Veterans Boulevard / Woodside Road (SR 84)
15. Blomquist Street – East Bayshore Road / Seaport Boulevard
16. Chesapeake Drive / Seaport Boulevard
17. Chesapeake Drive / Galveston Drive (*unsignalized*)
18. Chesapeake Drive / Saginaw Drive (*unsignalized*)
19. Cardinal Way / Saginaw Drive (*unsignalized)*
20. Bayfront Expressway / Marsh Road
21. Bayfront Expressway / Willow Road

In addition to the 21 study intersections, this section describes project impacts to freeway mainline segments of US 101, I-280, and SR 84 (Dumbarton Bridge). US 101 freeway ramps providing access to the project site are also described.

INSERT FIGURE IV.D-1 – PROJECT SITE LOCATION

The operations of the key intersections, freeway segments, and freeway ramps were analyzed during the morning (AM) and evening (PM) peak hours under the following analysis scenarios:

Scenario 1: *Existing Conditions* – Existing volumes obtained from counts, representing peak one-hour traffic conditions during the morning and evening commute periods.

Scenario 2: *Background Conditions* – Existing peak-hour volumes plus traffic from approved, but not yet constructed or occupied, developments in the area

Scenario 3: *Project Conditions* – Background peak-hour traffic volumes plus traffic estimated for buildout of the proposed project.

Scenario 4: *Background with Blomquist Extension Conditions* – Redistributed background volumes to account for completion of the Blomquist Street extension over Redwood Creek. The "with Blomquist extension" analysis is presented for informational purposes to illustrate conditions with the bridge, which is included in the City's Traffic Impact Fee Program.

Scenario 5: *Project with Blomquist Extension Conditions* – Background with Blomquist extension volumes plus traffic estimated for buildout of the proposed project.

Scenario 6: *Cumulative (Year 2020) No Project Conditions* – Existing volumes plus a growth factor plus traffic from approved and pending developments in the area.

Scenario 7: *Cumulative (Year 2020) Plus Project Conditions* – Traffic volumes for Cumulative No Project Conditions plus traffic estimated for buildout of the proposed project.

Potential project impacts to pedestrian and bicycle facilities and transit facilities are also addressed in this section, as are on-site circulation and parking issues.

SETTING

ROADWAY NETWORK

Regional Roadways

US 101 is a major north-south regional freeway serving the west coast.[1] In the extended project vicinity, the freeway extends northward from Redwood City through San Francisco, Marin, and Sonoma counties, and south of Redwood City, US 101 extends through San Jose and beyond. Near the project site, US 101 is generally an eight-lane freeway. South of Whipple Avenue and into Santa Clara County, one lane in each direction is restricted to high occupancy vehicles (carpools, van pools, buses) and motorcycles during commute hours. Access to the project site from US 101 is accommodated via an interchange at Woodside Road (Seaport Boulevard).

[1] Although US 101 is oriented in a northwest-southeast direction in Redwood City, the freeway is considered to be a north-south regional route for the purposes of this EIR. For the purposes of this analysis, other roadways that are essentially parallel to US 101 are assumed to be oriented in a north-south direction, and roadways essentially perpendicular to US 101 are assumed to be oriented in an east-west direction.

I-280 is a major north-south regional route serving Redwood City. The route begins in San Francisco and extends south through Palo Alto to San Jose, primarily as an eight-lane facility. Access to the project site from I-280 is provided via interchanges with Edgewood Road (via Alameda de las Pulgas), Farm Hill Boulevard (which becomes Jefferson Avenue), and Woodside Road. HOV lanes exist from Palo Alto to just south of State Route 17 in San Jose.

Woodside Road (SR 84) is an east-west arterial roadway and a designated state highway (State Route 84). The route has four to six lanes between I-280 and US 101. Between I-280 and SR 1, Woodside Road becomes a two-lane rural highway. East of US 101, Woodside Road becomes Seaport Boulevard (see below). The Woodside Road – Seaport Boulevard / US 101 interchange is a major access point for Redwood City because Woodside Road is the only major east-west high-capacity roadway through the city. A grade-separated interchange is provided at El Camino Real (SR 82).

El Camino Real (SR 82) is a north-south, four-lane, intraregional arterial roadway and is a designated state highway (State Route 82). The route begins in Santa Clara County and extends north, through Redwood City, to San Francisco. In Redwood City, El Camino Real includes a grade-separated interchange with Woodside Road and is one of the primary commercial corridors in Redwood City.

Local Roadways

Seaport Boulevard is a four-lane east-west roadway. Seaport Boulevard begins at US 101 (west of US 101, it is designated as Woodside Road) and extends eastward toward the bay. Seaport Boulevard provides access for the project site with the regional network via its interchange with US 101. There is a railroad spur that parallels Seaport Boulevard that provides heavy rail access to industrial land uses along Seaport Boulevard.

Veterans Boulevard is a north-south arterial roadway extending south from Whipple Avenue to Woodside Road. The route is a six-lane divided arterial except between Chestnut Street and Woodside Road where it narrows to two lanes. The northern and southern termini of Veterans Boulevard are a southbound off-ramp from, and a southbound on-ramp to, US 101, respectively.

Whipple Avenue is an east-west roadway extending from Alameda de las Pulgas to US 101. Between US 101 and El Camino Real, Whipple Avenue is a four-lane facility. West of El Camino Real, Whipple Avenue narrows to two lanes west to Alameda de las Pulgas. East of US 101, the route turns to the south and becomes East Bayshore Road, a two-lane collector roadway.

Jefferson Avenue is an east-west, four-lane arterial roadway beginning at Veterans Boulevard and extending west to Farm Hill Road. At Farm Hill Road, Jefferson Avenue turns to the north. Farm Hill Road continues west and provides access via an interchange with I-280. Jefferson Avenue is grade-separated at the Caltrain railroad crossing adjacent to downtown Redwood City.

East Bayshore Road is a north-south, two-lane collector roadway that parallels US 101. The route begins at Whipple Avenue and extends south to Bair Island Road (where it terminates at Redwood Creek). South of Woodside Road, another street is designated as East Bayshore Road and extends through Menlo Park and East Palo Alto on the east side of US 101.

Blomquist Street is a two-lane collector roadway providing access to industrial land uses. It begins just south of Redwood Creek and extends south to Woodside Road, where it connects with the southern portion of East Bayshore Road. Blomquist Street has been identified to be extended northward, over Redwood Creek, to the East Bayshore Road / Bair Island Road intersection (as described in more detail later in this section).

Maple Street is an east-west, two-lane local roadway beginning at El Camino Real and extending eastward over US 101. Maple Street terminates east of its intersection with Blomquist Street.

EXISTING TRANSIT SERVICE

Existing bus service in San Mateo County is provided by the San Mateo County Transit District (SamTrans). Commuter rail (Caltrain) service is provided by the Peninsula Corridor Joint Powers Board (JPB) between San Francisco and San Jose, with extended service to Morgan Hill and Gilroy during commute periods.

Currently, no direct SamTrans service is provided to the project site, though SamTrans Route 270 operates near the project site. Route 270 is a local bus route operating between the Redwood City Caltrain station and Marsh Road via El Camino Real, Jefferson Avenue, Veterans Boulevard, Maple Street, Blomquist Street, East Bayshore Road, Haven Avenue, Marsh Road, Bay Road, and Broadway. Route 270 also has limited service on Seaport Boulevard to the Seaport Plaza development area, operating during commute periods only (6:30 to 8:30 AM and 4:30 to 6:30 PM) with one-hour headways. Travel time between the Caltrain station and Seaport Plaza is approximately 12 minutes.

Caltrain service is provided at the Redwood City Caltrain Station, located in downtown Redwood City approximately 1½ miles west of the project site. Caltrain operates weekdays from 5:00 AM until 12:00 Midnight on 15- to 40-minute headways. On Saturdays, Caltrain operates from 7:00 AM until 1:30 AM on one-hour headways. Sunday operations are from 8:00 AM until 11:45 PM at one- to two-hour headways.

The following two local, privately-operated employer shuttles currently provide service to and from the Redwood City Caltrain Station:

Pacific Shores Employer Shuttle is operated by the Pacific Shores development, with routes along Maple Street, Blomquist Street, and Seaport Boulevard, to provide transit access to and from Pacific Shores on Seaport Boulevard. The shuttle operates during commute periods only (7:00 to 10:30 AM and 4:00 to 8:00 PM) on 30- to 60-minute headways. The shuttle stops at various locations on Seaport Boulevard, primarily in the Pacific Shores development area.

Seaport Employer Shuttle is operated by the Seaport Plaza development, with routes along Middlefield Road, Woodside Road, and Seaport Boulevard, to provide direct transit access to and from Seaport Plaza. The shuttle operates during commute periods only (7:45 to 9:30 AM and 5:00 to 7:00 PM) on 30- to 45-minute headways. The shuttle stops at various locations within the Seaport Plaza development area.

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

Bicycle facilities include bike paths, bike lanes, and bike routes. Bike paths (Class I) are paved trails that are separated from the roadways. Bike lanes (Class II) are separate lanes on roadways designated for use by bicycles by striping, pavement legends, and signs. Bike routes (Class III) are roadways that are designated for bicycle use with signs, but with autos and bicycles sharing the road width. Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals. The existing multi-use (pedestrian and bicycle) paths are presented on Figure IV.D-2.

Bicycle facilities near the project site include a multi-use path on the south side of Seaport Boulevard extending between East Bayshore Road and the Pacific Shores development to the east. There are also Class II bicycle lanes on Cardinal Way near the project site, and on Blomquist Street (with access to a pedestrian and bicycle bridge over Redwood Creek connecting Blomquist Street and Bair Island Road; there is currently no paved connection between the north end of this bridge and Bair Island Road). Bicycle and pedestrian facilities are planned to be incorporated into the planned Blomquist Street Extension over Redwood Creek.

There is an existing multi-use path beginning at Seaport Boulevard, to the west of Seaport Plaza, that extends north along the waterfront. At Redwood Creek, the path turns eastward, along the waterfront, and terminates at the project site.

Sidewalks are provided on Chesapeake Drive, Saginaw Drive, and Cardinal Way near the project site. Although no sidewalks are provided on Seaport Boulevard, the multi-use path noted above is a viable pedestrian facility providing access between US 101 and the project site. There are no sidewalks or paths under the US 101 overcrossing to allow access to Veterans Boulevard and downtown Redwood City. Both pedestrians and bicyclists would use Blomquist Street and the shoulders on the Maple Street overcrossing to access downtown Redwood City from the project site.

The San Francisco Bay Trail consists of a planned pedestrian and bicycle trail and path system that will ultimately be approximately 400 miles long, encircling the Bay, and will include crossings on all of the toll bridges. The system has been planned and is being implemented by the Association of Bay Area Governments (ABAG). At this time, approximately 210 miles of the trail have been completed. Near the project site, the existing trail terminates to the north in Redwood Shores near Mariner Park and begins again in the San Francisco Bay National Wildlife Refuge in Menlo Park. The proposed alignment of the ABAG-planned extension of the Bay Trail through Redwood City begins to the north, at the terminus of the existing Bay Trail segment in Redwood Shores near Mariner Park, passes around San Carlos Airport, along the levee adjacent to US 101, skirts the edge of the Bair Island National Wildlife Refuge, over Redwood Creek via

INSERT FIGURE IV.D-2 – EXISTING BICYCLE/PEDESTRIAN FACILITIES

the proposed Blomquist Street extension bridge, along Blomquist Street, connects to the existing pedestrian and bicycle trail paralleling Seaport Boulevard, and continues along East Bayshore Road to connect with the existing Bay Trail segment in the San Francisco Bay National Wildlife Refuge in Menlo Park.

ROADWAY SYSTEM ASSESSMENT METHODOLOGIES

Existing Lane Configurations

A field visit to the study area was conducted to obtain an inventory of existing control devices (traffic signals or stop signs), intersection lane configurations, and existing traffic signal characteristics (i.e., number of phases and timing) at study intersections. The existing lane configurations and traffic control devices are depicted on Figures IV.D-3a and IV.D-3b.

Existing Traffic Volumes

Peak traffic congestion conditions in Redwood City and its vicinity typically occur during the morning and evening commute periods between 7:00 and 9:00 AM and 4:00 and 6:00 PM, respectively. To ascertain existing roadway operational conditions, intersection operations have been evaluated using the highest one-hour volume counted during each of these periods. New traffic counts were conducted to supplement recent count data obtained from the 2001 San Mateo County Congestion Management Program Monitoring Report and from the traffic analysis conducted for the Marina Shores EIR. Figures IV.D-4a and IV.D-4b present the existing AM and PM peak-hour turning movement volumes at the study intersections. The raw count data are on-file and available for review at the Redwood City Community Development Department.

Some land uses along Seaport Boulevard are industrial in nature, especially along the north side of the street and on Blomquist Street. These land uses tend to generate more heavy vehicle traffic along Seaport Boulevard than is present on most other roadways within the City. Therefore, the number of heavy vehicles using Seaport Boulevard during the AM and PM peak hours was counted so that proper adjustments could be made in the level of service calculations to account for large truck traffic.

Intersection Analysis Methodology

Level of service (LOS) is a qualitative grading system to depict traffic flow conditions. The LOS grading system considers such traffic flow factors as speed, travel time, delay, and freedom to maneuver. Six levels of operation or "grades" are typically used, ranging from LOS A, representing the best operating conditions, to LOS F, representing the worst operating conditions. LOS E represents "at capacity" operations. When demand exceeds capacity, stop-and-go conditions typically result and operations are designated as LOS F. The City of Redwood City has defined the limit of acceptable operations as LOS D. In urban areas, Caltrans accepts LOS D as the minimum acceptable operating level on state highways.

INSERT FIGURE IV.D-3A – LANE CONFIGURATIONS

INSERT FIGURE IV.D-3B – LANE CONFIGURATIONS

INSERT FIGURE IV.D-4A – PEAK HOUR VOLUMES

INSERT FIGURE IV.D-4B – PEAK HOUR VOLUMES

The appropriate level of service calculation methodology for intersections is dependent on the type of intersection control device, i.e., whether the intersection is controlled by traffic signals, stop signs, or roundabouts.

Signalized Intersections

Analysis of operations at all signalized study intersections was conducted using the methodology described in Chapter 16 of the *2000 Highway Capacity Manual* (HCM) (TRB, 2000). This methodology determines the LOS rating based on the average "control delay" experienced at the intersection in seconds per vehicle, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration. The correlation between operations, average control delay, and LOS rating are summarized in Table IV.D-1.

The average delay for the signalized study intersections (with the exception of the Broadway / Woodside Road intersection) was calculated using the TRAFFIX level of service analysis software package. The Broadway / Woodside Road intersection has five approach legs and four departure legs, and the TRAFFIX software package cannot analyze intersections with more than four approaches. Therefore, this intersection was analyzed using the Synchro 5.0 software package. The Synchro software package correlates LOS designations (ratings) to the average control delay and is consistent with the methodology presented in the 2000 HCM.

Unsignalized Intersections

Unsignalized (all-way stop controlled and side street stop-controlled) study intersections were analyzed using the methodology contained in Chapter 17 of the 2000 HCM. Similar to signalized intersections, LOS ratings are based on the average "control delay" expressed in seconds per vehicle. However, at two-way or side street stop-controlled intersections, the control delay is calculated for each critical movement, not for the intersection as a whole. For intersection approaches with a single lane, the control delay is computed as the average of all movements in that lane. At all-way stop-controlled intersections, the LOS rating is based on the average control delay experienced on all approaches. Table IV.D-1 summarizes the relationship between delay and LOS for unsignalized intersections.

The planned extension of Blomquist Street over Redwood Creek will extend northward to the existing East Bayshore Road / Bair Island Road intersection. Preliminary design includes the possible use of a roundabout (i.e., traffic circle) at this intersection to control traffic and provide a distinctive design feature in the Bair Island Road area. The TRAFFIX software package cannot analyze roundabouts, and therefore, this intersection was analyzed under certain future scenarios using the aaSIDRA 2.0 software package, which computes the control delay for each approach and the entire intersection based on traffic volumes, geometrics of the roundabout, and calculated spacing between vehicles (i.e., headways). The aaSIDRA software package correlates LOS to the average control delay and is consistent with the methodology presented in the 2000 HCM.

Level of service calculation sheets for the study intersections are on-file and available for review at the Redwood City Community Development Department.

TABLE IV.D-1
DEFINITIONS FOR INTERSECTION LEVEL OF SERVICE

Unsignalized Intersections			Signalized Intersections	
Description	**Average Total Vehicle Delay (Seconds)**	**Level of Service**	**Average Control Vehicle Delay (Seconds)**	**Description**
No delay for stop-controlled approaches.	≤10.0	A	≤10.0	Free Flow or Insignificant Delays: Operations with very low delay, when signal progression is extremely favorable and most vehicles arrive during the green light phase. Most vehicles do not stop at all.
Operations with minor delay.	>10.0 and ≤15.0	B	>10.0 and ≤20.0	Stable Operation or Minimal Delays: Generally occurs with good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average delay. An occasional approach phase is fully utilized.
Operations with moderate delays.	>15.0 and ≤25.0	C	>20.0 and ≤35.0	Stable Operation or Acceptable Delays: Higher delays resulting from fair signal progression and/or longer cycle lengths. Drivers begin having to wait through more than one red light. Number of vehicles stopping is significant. Most drivers feel somewhat restricted.
Operations with increasingly unacceptable delays.	>25.0 and ≤35.0	D	>35.0 and ≤55.0	Approaching Unstable or Tolerable Delays: Influence of congestion becomes more noticeable. Longer delays result from unfavorable signal progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop. Drivers may have to wait through more than one red light. Queues may develop, but dissipate rapidly, without excessive delays.
Operations with high delays, and long queues.	>35.0 and ≤50.0	E	>55.0 and ≤80.0	Unstable Operation or Significant Delays: Considered to be the limit of acceptable delay. High delays indicate poor signal progression, long cycle lengths and high volume to capacity ratios. Individual cycle failures are frequent occurrences. Vehicles may wait through several signal cycles. Long queues form upstream from intersection.
Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.	>50.0	F	>80.0	Forced Flow or Excessive Delays: Occurs with oversaturation when flows exceed the intersection capacity. Represents jammed conditions. Many cycle failures. Queues may block upstream intersections.

SOURCE: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, updated 2000.

Freeway Ramp Merging and Diverging Analysis

To assess freeway ramp operations, ramp merging and diverging operations were analyzed using the 2000 Highway Capacity Software (HCS) package. The software is designed to be consistent with the freeway ramp merging and diverging evaluation methodology contained in Chapters 24 and 25 of the 2000 HCM. This methodology correlates the LOS ratings to projected (computed) vehicle densities (passenger cars per mile per lane). Table IV.D-2 summarizes the methodology relationship between vehicular density and LOS for freeway ramps. The freeway ramp LOS calculation sheets are on-file and available for review at the Redwood City Community Development Department.

TABLE IV.D-2
LEVEL OF SERVICE CRITERIA FOR RAMP JUNCTION AREAS

Level of Service	Density (pc/mile/lane)[a]
A	$\leq$ 10.0
B	10.1 to 20.0
C	20.1 to 28.0
D	28.1 to 35.0
E	$\geq$ 35.1
F	[b]

[a] pc/mile/lane = passenger car equivalents per mile per lane.
[b] Demand flows exceed capacity limit.

SOURCE: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, updated 2000

Freeway Ramp Weaving Analysis

The weaving analysis on freeway auxiliary lanes was conducted using the nomograph for design and operation of weaving sections presented in the *Highway Design Manual* (Caltrans, 1996). The nomograph correlates the total weaving volume and the length of the weaving section to a level of service (LOS A through LOS F). The nomograph is on-file and available for review at the Redwood City Community Development Department.

Freeway Segment Analysis

Existing level of service ratings for segments of the US 101, I-280, and SR 84 (Dumbarton Bridge) were obtained from C/CAG's 2001 San Mateo CMP Monitoring Report. To evaluate project impacts on these freeway segments, a capacity analysis was conducted. For the purpose of this EIR, each study freeway segment is considered to operate unacceptably if the existing or projected volume of vehicles using the segment exceeds the segment's design capacity.

In conducting this analysis, mixed-flow freeway lanes were analyzed separately from high occupancy vehicle (HOV) lanes. To be consistent with methodologies presented in the San Mateo CMP Monitoring Report, the following design capacities were used: 2,300 vehicles per lane per hour (vplph) for mixed-flow lanes on US 101 and I-280; 1,800 vplph for HOV lanes on US 101; and 1,100 vplph for segments of SR 84. Although SR 84 is not a freeway near Redwood City (it operates more like an expressway), it was included in the capacity analysis to be consistent with the San Mateo County CMP. Because SR 84 is an expressway, its capacity is less than assumed capacities on US 101 and I-280.

EXISTING TRAFFIC CONDITIONS

Existing Intersection Levels of Service

Existing lane configurations and peak-hour turning movement volumes were used to calculate existing levels of service for 20 of the 21 study intersections during the AM and PM peak hours (the East Bayshore Road / Blomquist Street intersection was only analyzed under scenarios that include the Blomquist Street extension over Redwood Creek, see page IV.D-69).[2] The results of the existing intersection LOS analyses are presented in Table IV.D-3.

The results of the intersection analysis indicate that, under existing conditions, the Broadway / Woodside Road intersection is operating at an unacceptable LOS F during the AM and PM peak hours. The Bayfront Expressway / Willow Road intersection is operating at an unacceptable LOS F during the PM peak hour, but an acceptable LOS C during the AM peak hour. All other study intersections are currently operating at an acceptable level (LOS D or better) during both the AM and PM peak hours.

Field Observations

Observations at the El Camino Real / Whipple Avenue intersection [#1] indicate that the degree of traffic delay is affected by Caltrain crossings. When the traffic signal is not being preempted by Caltrain, the intersection operates at acceptable levels. However, when Caltrain preempts the signal, delays to southbound left turns, northbound right turns, and the eastbound and westbound approaches increase. Observations indicated that train preemptions typically last about one signal cycle per train, and currently eight trains preempt the signal during the AM peak hour (i.e., 21 percent of the cycles). During the PM peak hour, Caltrain preempts 27 percent of the cycles. Although longer delays were observed at the intersection during Caltrain crossings, the intersection was observed to operate at acceptable levels over the course of both peak hours.

[2] It should be noted that adjustments were made to the "green time" allocated to certain movements at the El Camino Real / Whipple Avenue intersection to account for additional delays due to Caltrain crossings.

TABLE IV.D-3
EXISTING INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	Intersection Control	Delay[a]	LOS
1. El Camino Real / Whipple Avenue [b]	AM		33.1	C
	PM	Signal	42.8	D
2. Winslow St – Industrial Way / Whipple Ave	AM		29.2	C
	PM	Signal	37.7	D
3. Veterans Boulevard / Whipple Avenue	AM		35.8	D
	PM	Signal	35.6	D
4. US 101 NB Off-Ramp / Whipple Avenue	AM		7.8	A
	PM	Signal	11.1	B
5. East Bayshore Rd / Bair Island Rd	*Analyzed with the Blomquist Extension only.*			
6. El Camino Real / Jefferson Avenue	AM		42.5	D
	PM	Signal	45.3	D
7. Veterans Boulevard / Jefferson Avenue	AM		15.1	B
	PM	Signal	26.4	C
8. Veterans Boulevard / Maple Street	AM		21.3	C
	PM	Signal	29.8	C
9. Blomquist Street / Maple Street	AM	Side-Street	10.6	B
	PM	Stop-Control	10.7	B
10. Alameda de las Pulgas / Woodside Road	AM		35.6	D
	PM	Signal	35.5	D
11. Middlefield Road / Woodside Road	AM		36.8	D
	PM	Signal	46.4	D
12. Bay Road / Woodside Road	AM		22.8	C
	PM	Signal	29.0	C
13. Broadway / Woodside Road [c]	AM		> 180	F
	PM	Signal	> 180	F
14. Veterans Boulevard / Woodside Road	AM		21.1	C
	PM	Signal	40.1	D
15. Blomquist Street / Seaport Boulevard	AM		29.5	C
	PM	Signal	31.0	C
16. Chesapeake Drive / Seaport Boulevard	AM		10.8	B
	PM	Signal	17.2	B
17. Chesapeake Drive / Galveston Drive	AM	Side-Street	8.9	A
	PM	Stop-Control	11.1	B
18. Chesapeake Drive / Saginaw Drive	AM	Side-Street	8.8	A
	PM	Stop-Control	9.3	A
19. Cardinal Way / Saginaw Drive	AM	Side-Street	9.7	A
	PM	Stop-Control	9.8	A
20. Bayfront Expressway / Marsh Road	AM		29.1	C
	PM	Signal	26.2	C
21. Bayfront Expressway / Willow Road	AM		25.4	C
	PM	Signal	105.1	F

[a] For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
[b] Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
[c] This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

Observations at the Broadway / Woodside Road intersection [#13] indicated that the amount of "green time" allocated to the Broadway approaches is insufficient to serve the demand. Vehicles on both Broadway approaches were observed waiting up to three signal cycles to get through the intersection. The results of the LOS analysis are consistent with these field observations.

Existing Freeway Ramp Operations

Existing freeway ramp volumes, freeway mainline volumes, free-flow speeds, merging/diverging lengths, and proximity to upstream/downstream merges/diverges were used as inputs to calculate existing levels of service at the five study freeway ramps. The results of the ramp merging and diverging analysis are presented in Table IV.D-4.

The results of the freeway ramp merging and diverging analysis indicate that:

- The southbound US 101 off-ramp to Veterans Boulevard (Whipple Avenue) is operating at LOS E during the AM and PM peak hours.
- The southbound US 101 off-ramp to Seaport Boulevard and the southbound US 101 on-ramp from Veterans Boulevard (Woodside Road) are operating at LOS F during the AM peak hour and LOS E during the PM peak hour.
- The other two study ramps (northbound US 101 at Seaport Boulevard) are currently operating at LOS C or LOS D during the peak hours.

Existing Freeway Segment Operations

Conditions along freeway segments in San Mateo County are periodically reported by C/CAG as part of its Congestion Management Program (CMP). Recent freeway operating levels were obtained from C/CAG's *2001 San Mateo County CMP Monitoring Report* (Fehr & Peers Associates, 2002). The operating service levels of US 101 and I-280 presented in the CMP Monitoring Report are based on travel time surveys, with the corresponding LOS rating correlated to speed. The LOS ratings for segments of SR 84 are based on traffic volume, with the corresponding LOS rating correlated to traffic density (passenger cars per mile per lane). The current status of freeway operating conditions are presented in Table IV.D-5.

During the AM peak hour, mixed-flow lanes on northbound US 101 between Whipple Avenue and the Santa Clara County line are operating at LOS F; southbound mixed-flow segments of US 101 are operating at LOS F, and the southbound HOV lanes are operating at LOS E; and westbound segments of SR 84 are operating at LOS F. All other study freeway segments are operating at LOS D or better during the AM peak hour.

During the PM peak hour, northbound and southbound segments of US 101 between SR 92 and Whipple Avenue are currently operating at LOS F as are both eastbound segments of SR 84. All other study freeway segments are operating at LOS D or better during the PM peak hour.

TABLE IV.D-4
EXISTING MERGING AND DIVERGING RAMP LEVELS OF SERVICE (LOS)

Freeway Ramp	Peak Hour	Density[a]	LOS
Southbound US 101 Off-Ramp onto Veterans Boulevard (Whipple Avenue)	AM	39.3	E
	PM	37.0	E
Southbound US 101 Off-Ramp onto Seaport Boulevard	AM	40.9	F
	PM	39.1	E
Southbound US 101 On-Ramp from Veterans Boulevard (Woodside Road)	AM	39.3	F
	PM	37.3	E
Northbound US 101 Off-Ramp onto Seaport Boulevard	AM	29.4	D
	PM	23.5	C
Northbound US 101 On-Ramp from Seaport Boulevard	AM	26.3	C
	PM	30.9	D

[a] Density is presented in passenger cars per mile per lane (pc/mi/ln).

SOURCE: Fehr and Peers Associates, 2003

BACKGROUND CONDITIONS

This section discusses the operations of the key intersections and roadway segments under Background Conditions, which consists of existing traffic volumes plus traffic from approved, but not yet constructed or occupied, developments in the area. Planned and fully-funded changes to the roadway system that are expected to be completed in the near future are also included in this scenario. Background Conditions form the basis against which impacts of the proposed project are identified.

ANTICIPATED ROADWAY IMPROVEMENTS

Roadway improvements that are approved, fully-funded, and expected to be completed prior to completion of the proposed project include the following:

- a planned improvement to the southbound approach to the Blomquist Street – East Bayshore Road / Seaport Boulevard intersection [#15]. The intersection modification will include the addition of a dedicated right-turn lane and conversion of the existing shared through/right-turn lane to a dedicated through lane. This improvement was identified as a mitigation measure for the Pacific Shores office development. This improvement is expected to be completed by the end of 2003.

TABLE IV.D-5
EXISTING FREEWAY SEGMENT LEVELS OF SERVICE (LOS)[a]

Segment	Peak Hour	Direction	LOS
US 101: SR 92 to Whipple Avenue	AM	Northbound	B
		Southbound	F
	PM	Northbound	F
		Southbound	F
US 101: Whipple Avenue to Santa Clara Co. Line (*Mixed-Flow Lanes*)	AM	Northbound	F
		Southbound	F
	PM	Northbound	B
		Southbound	D
US 101: Whipple Avenue to Santa Clara Co. Line (*HOV Lanes*)	AM	Northbound	B
		Southbound	E
	PM	Northbound	D
		Southbound	B
I-280: SR 92 to SR 84 (Woodside Road)	AM	Northbound	B
		Southbound	D
	PM	Northbound	D
		Southbound	B
I-280: SR 84 (Woodside Rd) to Santa Clara Co. Line	AM	Northbound	B
		Southbound	B
	PM	Northbound	D
		Southbound	B
SR 84 (Bayfront Expressway): Willow Road to University Avenue	AM	Eastbound	A
		Westbound	F
	PM	Eastbound	F
		Westbound	A
SR 84 (Bayfront Expressway): University Avenue to Alameda County Line	AM	Eastbound	A
		Westbound	F
	PM	Eastbound	F
		Westbound	A

[a] LOS obtained from the *2001 San Mateo County CMP Monitoring Report.*

SOURCE: Fehr and Peers Associates, 2003

- a planned addition of auxiliary lanes to US 101 through Redwood City between Ralston Avenue and Marsh Road. The addition of auxiliary lanes will affect the US 101 / Whipple Avenue and US 101 / Woodside Road (Seaport Boulevard) interchanges. Construction of this improvement began spring 2003, and is expected to be completed by summer 2004.

- a project, recently completed (July 2003), to widen Bayfront Expressway from four lanes to six lanes between Marsh Road and the Dumbarton Bridge. This improvement affects intersection lane configurations at the Bayfront Expressway / Marsh Road [#20] and Bayfront Expressway / Willow Road [#21] study intersections.

Widening of Woodside Road from four to six through lanes in the project study area had been under consideration. However, due to design constraints required by Caltrans that are considered undesirable by the City of Redwood City, it is unlikely that this roadway improvement will occur.[3] As an alternative to widening Woodside Road, the City has begun a study to investigate possible design enhancements at the Woodside Road / Broadway intersection, the main traffic constraint on Woodside Road. For the purposes of this EIR, analysis of traffic operations (and of potential project impacts) assumes "no widening". In order to provide additional information to the decision makers, however, traffic operating conditions at the three study intersections within the "widened portion of Woodside Road" (i.e., Woodside Road / Middlefield Road [#11], Woodside Road / Bay Road [#12], and Woodside Road / Broadway [#13]) are also described under a "with widening" scenario.

The City has also developed plans for the extension of Blomquist Street north over Redwood Creek. The extension would link Blomquist Street to East Bayshore Road at its intersection with Bair Island Road and is included in the Citywide Traffic Impact Fee (TIF) Program. Because this particular planned roadway improvement is not yet fully funded, it has not been included as part of this background analysis.

A study is currently underway to recommend improvements to the US 101 / Woodside Road – Seaport Boulevard interchange. No definitive project has yet been identified, and no timeline for construction of these improvements has been established.

Background roadway improvements that will affect study intersections are depicted on Figure IV.D-5.

BACKGROUND TRAFFIC ESTIMATES

Traffic volumes for Background Conditions were estimated by adding traffic from approved, but not yet constructed or occupied, developments to the existing volumes obtained from traffic counts. The list of approved projects included in this analysis is presented in Table IV.A-1 of the Land Use and Planning section. The trip generation estimates for those projects, and the resulting projected traffic volumes at the study intersections are in Appendix E. The projected traffic volumes under Background Conditions are illustrated on Figure IV.D-6.

[3] In the eastbound direction, the western limit of the widening was to begin approximately at the eastbound on-ramp onto Woodside Road from Hazel Avenue (near El Camino Real) and to end just east of Spring Street (just west of Bay Road). In the westbound direction, the eastern limit of widening was to begin at Broadway and to end approximately at the westbound on-ramp from Redwood Avenue (near El Camino Real). This improvement had been expected to be completed by 2007.

INSERT FIGURE IV.D-5 – BACKGROUND LANE CONFIGURATION IMPROVEMENTS

INSERT FIGURE IV.D-6A – BACKGROUND INTERSECTION VOLUMES

INSERT FIGURE IV.D-6B – BACKGROUND INTERSECTION VOLUMES

BACKGROUND INTERSECTION OPERATIONS

Levels of service were calculated at the study intersections under Background Conditions (see Table IV.D-6). The results of the intersection level of service analysis indicate that the Broadway / Woodside Road intersection [#13] will continue to operate at an unacceptable LOS F during the AM and PM peak hours under this scenario. Operations at the Bayfront Expressway / Willow Road intersection [#21] will improve during the PM peak hour (from LOS F to LOS E) due to the widening of Bayfront Expressway. All other study intersections are expected to operate at acceptable levels (LOS D or better) during the AM and PM peak hours under Background Conditions.

With Woodside Road Widening Scenario

As described above, to provide additional information to the decision makers, traffic operating conditions at Middlefield Road / Woodside Road [#11], Bay Road / Woodside Road [#12], and Broadway / Woodside Road [#13] were assessed under a "with widening" scenario for Background Conditions in addition to the now-likely "no widening" scenario. The results indicate that, if Woodside Road were widened to three lanes in each direction, peak-hour traffic operations at these study intersections would be similar to those if Woodside Road was not widened. That is, the levels of service would be the same, but with somewhat lower average delay per vehicle. It is noted that the Woodside Road / Broadway intersection would continue to operate at an unacceptable LOS F during the AM and PM peak hours with substantial delays (>180 seconds of average control delay) with a widened Woodside Road.

BACKGROUND FREEWAY RAMP ANALYSIS

The addition of auxiliary lanes to US 101 will affect the merging and diverging analysis conducted under existing conditions. The auxiliary lanes will provide a continuous lane between the on- and off-ramps between the US 101 interchanges with Ralston Avenue and Marsh Road. As a result, vehicles will be required to make at least one lane change to enter and exit the freeway, which is defined as weaving.

As described earlier in the transportation section, Caltrans uses a nomograph, presented in its *Highway Design Manual* (Figure 504.7A), to correlate the weaving volume and length of weaving section to a level of service rating. The nomograph indicates that the length of the weaving segments around the Woodside Road (Seaport Boulevard) and Whipple Avenue interchanges are "out of realm of weaving", which means that the weaving segments are "sufficiently long" and provide more than an adequate amount of space for drivers to find a gap and enter or exit the freeway. Thus, no further analysis is needed. The nomograph is on-file and available for review at the Redwood City Community Development Department.

To verify that the freeway ramps would have sufficient capacity to serve expected demand, a volume-to-capacity analysis was conducted for each of the study ramps. For the purpose of this analysis, capacities presented in Chapter 25 of the *2000 Highway Capacity Manual* were used based on the free-flow speed of the study ramps and the number of lanes. The results are presented in Table IV.D-7.

TABLE IV.D-6
BACKGROUND INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	Intersection Control	Delay[a]	LOS
1. El Camino Real / Whipple Avenue [b]	AM		33.9	C
	PM	Signal	47.4	D
2. Winslow St – Industrial Way / Whipple Ave	AM		29.2	C
	PM	Signal	38.0	D
3. Veterans Boulevard / Whipple Avenue	AM		36.3	D
	PM	Signal	36.7	D
4. US 101 NB Off-Ramp / Whipple Avenue	AM		7.9	A
	PM	Signal	11.2	B
5. East Bayshore Rd / Bair Island Rd	*Analyzed with the Blomquist Extension only.*			
6. El Camino Real / Jefferson Avenue	AM		41.1	D
	PM	Signal	47.8	D
7. Veterans Boulevard / Jefferson Avenue	AM		15.7	B
	PM	Signal	28.3	C
8. Veterans Boulevard / Maple Street	AM		22.9	C
	PM	Signal	31.0	C
9. Blomquist Street / Maple Street	AM	Side-Street	11.3	B
	PM	Stop-Control	12.1	B
10. Alameda de las Pulgas / Woodside Road	AM		37.9	D
	PM	Signal	37.2	D
11. Middlefield Road / Woodside Road	AM		37.7	D
	PM	Signal	50.1	D
12. Bay Road / Woodside Road	AM		22.1	C
	PM	Signal	29.8	C
13. Broadway / Woodside Road [c]	AM		> 180	F
	PM	Signal	> 180	F
14. Veterans Boulevard / Woodside Road	AM		21.5	C
	PM	Signal	41.7	D
15. Blomquist Street / Seaport Boulevard	AM		39.3	C
	PM	Signal	31.1	C
16. Chesapeake Drive / Seaport Boulevard	AM		11.8	B
	PM	Signal	17.7	B
17. Chesapeake Drive / Galveston Drive	AM	Side-Street	8.9	A
	PM	Stop-Control	11.1	B
18. Chesapeake Drive / Saginaw Drive	AM	Side-Street	8.8	A
	PM	Stop-Control	9.3	A
19. Cardinal Way / Saginaw Drive	AM	Side-Street	9.7	A
	PM	Stop-Control	9.8	A
20. Bayfront Expressway / Marsh Road	AM		25.0	C
	PM	Signal	29.2	C
21. Bayfront Expressway / Willow Road	AM		20.9	C
	PM	Signal	72.6	E

[a] For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
[b] Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
[c] This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

TABLE IV.D-7
BACKGROUND FREEWAY RAMP CAPACITY ANALYSIS

US 101 Freeway Ramp	Capacity[a]	AM Peak Hour Volume[b]	AM Peak Hour V/C Ratio[c]	PM Peak Hour Volume[b]	PM Peak Hour V/C Ratio[c]
Southbound Off-Ramp onto Veterans Boulevard (Whipple Avenue)	3,800	1,747	0.46	1,455	0.38
Southbound Off-Ramp onto Seaport Boulevard	1,900	392	0.21	211	0.11
Southbound On-Ramp from Veterans Boulevard (Woodside Road)	2,000	1,007	0.50	1,052	0.53
Northbound Off-Ramp onto Seaport Boulevard	2,000	411	0.21	113	0.06
Northbound On-Ramp from Seaport Boulevard	2,000	360	0.18	488	0.24

[a] Based on capacities in the Caltrans *Highway Design Manual* and the posted travel speed on the ramp.
[b] Volumes obtained from existing count data provided by Caltrans, plus trips from approved projects in the area.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

The results of the background freeway ramp capacity analysis indicate that all of the study ramps are expected to have volume-to-capacity (V/C) ratios less than 1.00 (i.e., the demand does not exceed capacity).

BACKGROUND FREEWAY SEGMENT CAPACITY ANALYSIS

Segments of US 101 and SR 84 were reviewed under Background Conditions to assess the freeways' capacity after the US 101 auxiliary lane project and the SR 84 (Bayfront Expressway) widening have been completed. South of Whipple Avenue in the study area, US 101 is to have one high occupancy vehicle (HOV) lane, three mixed-flow lanes, and one auxiliary lane in each direction. North of Whipple Avenue, US 101 is to have four mixed-flow lanes and one auxiliary lane (i.e., no HOV lanes) in each direction. SR 84 is to be widened from four lanes to six lanes.

It should be noted that existing freeway segment operations shown in Table IV.D-5, page IV.D-20, are based on speed and travel time surveys from the San Mateo County CMP. Because speed cannot be projected under future conditions, a capacity analysis was prepared to serve as a baseline for identifying potential project impacts to the freeway system.

A capacity of 2,300 vehicles per lane per hour (vplph) was used for the analysis of mixed-flow lane segments of US 101 and I-280. The HOV lanes were assumed to have a capacity of 1,800 vplph. To estimate the number of vehicles using the HOV lanes, the existing percentage of HOVs on US 101 was obtained from the Measures of Effectiveness report presented in the *US 101 Auxiliary Lane Project Study* (Fehr & Peers Associates, 2000). To remain consistent with methodologies presented in the San Mateo CMP Monitoring Report, capacities of 1,100 vplph were used for segments of SR 84.

Vehicles in the mixed-flow lanes wishing to exit the freeway via the auxiliary lane will occupy capacity in the mixed-flow lanes of US 101 for a portion of each study segment. Additionally, vehicles entering the freeway from the auxiliary lanes will occupy capacity in the mixed-flow lanes of US 101 for only a portion of each study segment. For the mixed-flow lane capacity analysis, it was assumed that half of the total vehicles using the auxiliary lane would use capacity on the mainline section of US 101. The results of the freeway segment capacity analysis are summarized in Table IV.D-8.

The results of the freeway capacity analysis indicate that southbound segments of US 101, Whipple Avenue to Marsh Road, will have v/c ratios of 1.12 to 1.13 (i.e., demand will exceed capacity) during the AM peak hour. Southbound US 101, Whipple Avenue to Woodside Road, will have a v/c ratio of 1.12 during the PM peak hour, but Woodside to Marsh will have a v/c ratio less than 1.00. The peak direction of travel on SR 84 (westbound in the AM peak hour and eastbound in the PM peak hour) will have v/c ratios greater than 1.00. All other study segments will have v/c ratios less than 1.00.

REGULATORY CONTEXT

This section discusses agencies with jurisdiction over transportation facilities and services in Redwood City. Plans and policies governing the proposed project are also discussed.

AGENCIES WITH JURISDICTION IN REDWOOD CITY

The City of Redwood City has jurisdiction over all City streets and City-operated traffic signals. Several regional and state agencies have jurisdiction over regional transportation system planning and funding. The City/County Association of Governments of San Mateo County (C/CAG), which is the state-authorized Congestion Management Agency in San Mateo County, and the Metropolitan Transportation Commission, which is the state-authorized regional transportation planning agency for the nine-county Bay Region, oversee and coordinate funding for intra-regional transportation improvement programs. The State of California Department of Transportation has jurisdiction over Redwood City-serving freeways (US 101 and I-280), freeway ramps, and designated state routes (SR 82 – El Camino Real and SR 84 – Woodside Road).

Transit service providers such as Caltrain, SamTrans, and the Water Transportation Authority (agency responsible for providing ferry service) have jurisdiction over their respective services. These various jurisdictional agencies and their pertinent specific responsibilities and funding abilities are more specifically described below.

TABLE IV.D-8
BACKGROUND FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	AM Peak Hour Volume[b]	AM Peak Hour V/C Ratio[c]	PM Peak Hour Volume[b]	PM Peak Hour V/C Ratio[c]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	8,640	0.94	7,772	0.84
Southbound – Whipple Avenue to Woodside Road	Mixed HOV	6,900 1,800	7,779 1,056	1.13 0.59	7,746 1,080	1.12 0.60
Southbound – Woodside Road to Marsh Road	Mixed HOV	6,900 1,800	7,720 1,136	1.12 0.63	6,388 939	0.93 0.52
Northbound – Marsh Road to Woodside Road	Mixed HOV	6,900 1,800	5,187 889	0.75 0.49	4,001 639	0.58 0.36
Northbound – Woodside Road to Whipple Road	Mixed HOV	6,900 1,800	5,597 1,110	0.81 0.62	4,333 1,018	0.63 0.57
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	7,008	0.76	6,274	0.68
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	7,737	0.84	4,327	0.47
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	8,169	0.89	4,220	0.46
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	8,273	0.90	4,881	0.53
Southbound – Woodside Road to County Line	Mixed Flow	9,200	5,392	0.59	3,973	0.43
Northbound – County Line to Woodside Road	Mixed Flow	9,200	3,074	0.33	5,660	0.62
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	4,259	0.46	7,779	0.85
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	3,877	0.42	7,277	0.79
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	4,354	0.47	7,480	0.81
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	650	0.20	3,570	1.08
Eastbound – University Road to County Line	Mixed Flow	3,300	1,600	0.48	4,892	1.48
Westbound – County Line to University Road	Mixed Flow	3,300	4,703	1.43	1,481	0.45
Westbound – University Road to Willow Road	Mixed Flow	3,300	3,354	1.02	1,288	0.39

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans, plus trips from approved projects in the area.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

City of Redwood City

The City of Redwood City is responsible for planning, constructing, and maintaining local public transportation facilities, including all City streets, City-operated traffic signals, sidewalks, and bicycle facilities. These local services are funded primarily by gas-tax revenue and developer fees.

City/County Association of Governments of San Mateo County (C/CAG)

C/CAG is the state-designated regional Congestion Management Agency (CMA) that sets state and federal funding priorities for improvements affecting its San Mateo County Congestion Management Program (CMP) designated regional roadway system. C/CAG-designated CMP roadway system components in Redwood City include SR 82/El Camino Real, SR 84/Woodside Road, US 101, and I-280. C/CAG-designated CMP intersections in Redwood City include El Camino Real / Whipple Avenue, Bayfront Expressway / Marsh Road (borders Redwood City), and Woodside Road / Middlefield Road.

C/CAG has adopted mitigation guidelines to reduce the number of net new vehicle trips generated by new developments. These guidelines apply to all developments that generate 100 or more net new peak-hour trips on the CMP network and that are subject to CEQA review. These guidelines ensure that developers and/or tenants implement improvements and programs designed to help reduce the demand for all new peak-hour trips (including the first 100 trips) projected to be generated by the development. (Aspects of the C/CAG guidelines specific to the proposed project are discussed later in this section.)

Metropolitan Transportation Commission (MTC)

The state-designated regional transportation planning agency for the nine-county San Francisco Bay Area is the Metropolitan Transportation Commission (MTC). MTC is the clearinghouse for state and federal transportation improvement funds. Each county CMA, including C/CAG, is required to forward a capital improvement project list to MTC. MTC reviews the lists submitted by all nine counties and submits a regional priority list to the California Transportation Commission and/or the Federal Highway Administration for selection of projects to receive funding. Funded projects are included in the Regional Transportation Plan.

California Department of Transportation (Caltrans)

Caltrans has authority over the state highway system, including mainline facilities, interchanges, and arterial state routes. Caltrans approves the planning and design of improvements for all state-controlled facilities. State-controlled facilities in Redwood City include US 101 and its interchanges at Whipple Avenue and Woodside Road, SR 82/El Camino Real, SR 84/Woodside Road, including the El Camino Real / Woodside Road interchange.

PLANS AND POLICIES

City and regional plans and policies in place that affect transportation in Redwood City and are relevant to consideration of the environmental impacts of the proposed project are described below.

Redwood City Strategic General Plan

The Redwood City Strategic General Plan Circulation Element (adopted in 1990, revised in 1993) contains the following relevant objectives and policies:

- Allow for the safe and convenient movement and access of motor vehicles in Redwood City, but not at the expense of the environment or the overall quality of life in Redwood City or to the detriment of alternative transportation modes. (Motor Vehicle Transportation Objective 1, page 7-7)

- Local road projects that are not part of the State Highway System shall not be included in the Circulation Element if one or more of the following impacts are likely to result:

  – Increases road capacity, thereby encouraging increased through automobile traffic;

  – Requires a substantial acquisition of land;

  – Results in a substantial loss of housing and/or business;

  – Encroaches into environmentally sensitive areas, such as open space and wetlands, resulting in a substantial loss of these areas;

  – Routes increased traffic through residential neighborhoods; or

  – Is extremely costly in terms of benefits achieved. (Motor Vehicle Transportation Objective 2, page 7-7)

- Participate in formulating and supporting the goals and policies of the Congestion Management Plan for San Mateo County by cooperating with adjacent jurisdictions so as to more effectively deal with traffic congestion and traffic impacts. (Motor Vehicle Transportation Policy MV-2, page 7-7)

- Create conditions to allow for better utilization of the existing public transportation system that will increase public transportation use and the subsequent improvement of the public transportation infrastructure and expansion of service. (Public Transportation Objective 1, page 7-13)

- Establish site planning and architectural standards for new building projects that would incorporate transit access and orientation. Such standards would apply to both public and private building projects located along existing bus routes to enhance pedestrian access and convenient public transit access. (Public Transportation Policy PT-4, page 7-14)

- Make walking and bicycling a realistic and more widespread transportation alternative in Redwood City by establishing a series of policies to create an urban environment that will make walking and bicycling safe, efficient, and convenient. (Non-Motorized Transportation Objective, page 7-26)

- Designate areas for mixed use and higher density residential development to create pedestrian-oriented environments. This policy shall complement the policies in the Public Transportation section as they pertain to land use. (Non-Motorized Transportation Policy NM-1, page 7-26)

- Minimum standards for sidewalk widths shall be maintained. Loss of sidewalk surface due to encroachment and/or the installation of poles, street furniture, and/or other utility hardware shall be avoided. If any sidewalk surface is lost to these or other uses, additional sidewalk surface shall be provided that is equal to or more than the amount of sidewalk surface lost. (Non-Motorized Transportation Policy NM-3, page 7-26)

- Provide and maintain continuity to the existing bikeway system within Redwood City by eliminating missing segments in the system. Bikeway continuity shall also be provided, whenever possible, through such means as eliminating parking on one or both sides of the street and/or through street modification. If these measures are not feasible, the posting of appropriate signs and pavement markings shall be required. (Non-Motorized Transportation Policy NM-8, page 7-27)

- All new traffic signal installations and existing traffic signal modifications shall include installation of bicycle-sensitive signal detector loops. (Non-Motorized Transportation Policy NM-11, page 7-27)

Railroad Grade Separations

The City's General Plan also discusses potential future railroad grade separations as a means to reduce traffic delays and conflicts between Caltrain and automobiles. The General Plan discusses possible locations for railroad grade separations that include Jefferson Avenue, which has already been constructed, and Whipple Avenue. Construction of a grade separation at Whipple Avenue is not expected in the near future (Redwood City Community Development Department, November 2002).

Roadway Improvements

The General Plan also identifies the following projected roadway improvement needs:

- the Blomquist Street Extension, which would extend Blomquist Street from its current terminus at Maple Street northward, over Redwood Creek, to the East Bayshore Road / Bair Island Road intersection; this improvement is approximately 50-percent funded.

- the extension of Skyway Road at San Carlos Airport south from its current terminus at Pulgas Creek to Whipple Avenue, to provide a parallel alternative to US 101 and provide a direct non-freeway connection between Redwood Shores and the rest of Redwood City. No funding has been identified for this improvement and the planned extension alignment would encroach onto wetlands, which will result in substantial mitigation needs. Construction of this project is not anticipated in the foreseeable future; and

- the extension of the Bayfront Expressway from its current terminus at Marsh Road in Menlo Park northward to Seaport Boulevard, in a realigned four-lane configuration that would replace the existing segment of East Bayshore Road. City leadership is currently opposed to this extension, based on plans reviewed to date, which suggest that adverse local impacts of the extension outweigh the minor benefits for Redwood City.

The General Plan also discusses the possibility of constructing an elevated viaduct for Woodside Road between El Camino Real and US 101. This recommendation was, in part, due to increased traffic expected on Woodside Road due to the above-cited Bayfront Expressway project. Due to the environmental constraints associated with that project, the possible widening of Woodside Road between El Camino Real and US 101 (see Background Conditions), the cost of an elevated viaduct, and the expected increase in traffic on local streets within Redwood City, this project will not occur in the foreseeable future.

The addition of on- and off-ramps on the existing Maple Street overcrossing of US 101 has also been recommended in the General Plan. This improvement would create an additional interchange on US 101 in Redwood City; however, the General Plan also notes that there is currently not enough spacing between the existing interchanges at Whipple Avenue and Woodside Road to meet Caltrans design standards, and as a result, recognizes that this new interchange could only be built concurrently with the complete reconstruction of the US 101 / Woodside Road interchange. This project is not expected to occur in the near future.

Redwood City Traffic Impact Mitigation Fee Study

The Redwood City Traffic Impact Mitigation Fee Study was prepared and adopted to establish a source of funding for future transportation system capital improvements in Redwood City. The funding needs identified in the study are discussed below.

Identified Intersection Improvement Needs:

• El Camino Real / Whipple Avenue	Addition of a receiving lane for the westbound right-turn creating a “free” right turn movement
• Veterans Boulevard / Whipple Avenue	Addition of an eastbound right turn lane
• Veterans Boulevard / Middlefield Road	Installation of a traffic signal
• El Camino Real / Beech St – Lincoln Ave	Close center median
• Bay Road / Fifth Street	Installation of a traffic signal
• Various locations near schools	Install lighted pedestrian crossings

Identified Travel Corridor and Areawide Improvements:

- Woodside Road (SR 84) has been identified for widening to six lanes from El Camino Real to US 101 to improve traffic flow through the corridor. A Caltrans-prepared Project Study Report and Environmental Document were approved for this project in 1999. Completion of the widening had been anticipated within the next five years. However, due to design constraints required by Caltrans, this roadway widening is unlikely to occur. The Mitigation Fee Study has also identified a need for the widening of Woodside Road to six lanes from El Camino Real to Valota Road.

- East Bayshore Road (south of Whipple Avenue) has been identified for widening to three lanes (one lane in each direction and a center two-way left-turn lane) due to existing long delays during peak periods, especially when movies start/end at the Century 12 cinema complex. There is an approved project that will relocate the Redwood City cinema complex to downtown Redwood City, a measure that may ease peak travel demands on East Bayshore Road and Whipple Avenue. Depending on this and other future and proposed land uses in the Bair Island Road area, East Bayshore Road may not need widening in the future.

- The Blomquist Street Extension, from Maple Street, over Redwood Creek, to the East Bayshore Road/Bair Island Road intersection has been identified in the Mitigation Fee Study as necessary to provide additional and emergency access to the Bair Island Road area.

- Veterans Boulevard has been identified as needing widening to four lanes from Chestnut Street to Woodside Road. This will provide additional queuing capacity at the Woodside Road / Veterans Boulevard intersection.

- Neighborhood traffic management programs have also been identified as needed, including installation of traffic calming/improvement projects in local neighborhoods to alleviate cut-through traffic and speeding.

Identified Alternative Modes / Transit Potential Projects:

- A bicycle connection is identified as a potential project between Veterans Boulevard and Seaport Boulevard using the right-of-way of the existing railroad spur. However, the fee study also indicates that this connection is infeasible while the railroad spur is active. It should be noted that alternative use of this spur was analyzed in the Redwood City Bayfront Area Study (see below). The study also provided additional information regarding alternative use of this spur during commute periods (the spur is currently only operative at night) and its feasibility.

- A City-based shuttle system is identified as a potential project.

- A full-time city transportation demand management (TDM) coordinator is identified as a potential way to encourage alternative transportation modes. The coordinator would have the responsibility to develop TDM traffic reduction plans, assist employers in establishing and operating employee trip reduction plans, and coordinate with regional agencies and traffic relief organizations.

- Miscellaneous transit, pedestrian, and bicycle projects are also identified as potential improvements, such as bus shelters, benches, pedestrian amenities, Americans with Disability Act-compliant curb ramps, closing sidewalk and bike lane gaps, park and ride lots, and transit center improvements.

- The City currently funds the Redwood Shores Taxi Shuttle to/from the Caltrain Station from the traffic fees.

City Parking Policies and Requirements

The City of Redwood City Zoning Ordinance requires off-street parking to be provided at the following rates:

> Office: One space per 300 square feet. Ten percent of parking facilities must be designated for carpools and vanpools.
>
> Industrial or Manufacturing Plants: One space for every two employees on the maximum working shift, but in no case less than one space per 600 square feet of floor area.
>
> Warehouse: One space for every two employees on the maximum working shift, plus one space per 1,000 square feet of floor area.

Redwood City Bayfront Area Study Formulation Program

Land use/urban design and transportation planning studies are currently being conducted by the City for the Bayfront Area, which is the area east of US 101 generally bounded by Whipple Avenue and Seaport Boulevard. The planning area includes the Bair Island Road Area, the area along Blomquist Street (including the proposed Blomquist Extension), the Port, the Pacific Shores Area, and the Seaport Center area (including the project site).

The purpose of this planning study is to develop land use and circulation alternatives for the Bayfront Area for consideration by the City Council. The transportation component of the study includes a "fatal flaw" analysis of the existing roadway system estimating the maximum buildout of the area with the existing roadway system capacities. The transportation component will also examine the feasibility of enhancing and establishing alternative modes of travel in the Bayfront Area. Some of the alternative mode options currently being explored include use of the existing railroad right-of-way under US 101 that parallels Seaport Boulevard as a transit corridor during peak commute periods, creation of ferry service terminals, increased bus and shuttle service, water taxi service, improved pedestrian and bicycle service to the area, and the possibility of additional pedestrian and bicycle bridges over Redwood Creek within the area.

C/CAG Guidelines for the Implementation of the Land Use Component of the 1999 Congestion Management Program

C/CAG, the San Mateo County CMA, has adopted guidelines for the land use component of its Congestion Management Program (CMP) in order to reduce the regional traffic impacts of substantive new developments. The guidelines apply to all projects that generate 100 or more net new peak-hour trips on the CMP network and that are subject to CEQA review. Projects in the county that meet this criterion are required to:

1. Determine if a combination of acceptable options/measures is possible that will reduce the demand for all new peak-hour trips that the project is anticipated to generate on the CMP roadway network (including the first 100 trips). Options and measures that could be implemented include:

- Build adequate roadway and/or transit improvements so that the added peak-hour trips will have no measurable impact on the CMP roadway network.

- The developer may also contribute a one-time only payment of $20,000 per peak-hour trip (including the first 100 trips) to a special fund for the implementation of appropriate transportation demand management (TDM) system measures at the development.

- Implement a TDM program that has the capacity to fully reduce the demand for new peak-period trips. C/CAG has provided a list of TDM measures and their associated "trip credit" to assist in the development of a TDM program. The list of C/CAG-approved TDM measures in presented later in this section (page IV.D-57).

- Negotiate with C/CAG staff for other acceptable ways to mitigate trips for specific developments on a case-by-case basis.

- The portion of traffic impact mitigation fees collected by Redwood City as part of its Traffic Impact Fee Mitigation Program that are used to mitigate project impacts on the CMP roadway network will count as a credit toward the project's per-trip mitigation requirements under the CMP.

2. If the combination of options/measures can fully reduce the number of trips on the CMP roadway network, the information must be included as part of the environmental documents that are circulated and adopted by the local jurisdiction.

3. If the combination of options/measures cannot fully reduce the number of trips on the CMP roadway network, C/CAG staff should be contacted for review and approval as early in the process as possible so that the agreed upon plan can be included in the environmental documents placed in circulation.

4. If an agreement is not reached with C/CAG staff on the mitigation plan, an immediate review by the C/CAG Board will be scheduled so that the local jurisdiction project approval process will not be delayed.

ABAG's San Francisco Bay Trail

As described previously under Existing Conditions, some existing segments of the ABAG-planned Bay Trail have been constructed north and south of the project area, and preliminary alignments to close the local Bay Trail gap have been identified. The existing trail alignment along Seaport Boulevard will remain unchanged.

Caltrain

Caltrain is expected to expand its current service along the southern peninsula (Kolozsvari, 2002). The "baby bullet" program includes the construction of additional passing tracks to the existing Caltrain line, along the existing alignment, to allow express service trains to pass local service trains between San Francisco and San Jose. It will also include station modifications as necessary. The program will include the purchase of five additional train sets to establish express service through the corridor.

Water Transit Authority

The Water Transit Authority has completed a plan to increase water transit throughout the San Francisco Bay. The plan identifies a new ferry terminal to be located in the City of Redwood City, likely located at the terminus of Seaport Boulevard adjacent to the Pacific Shores Development. Although the Water Transit Authority has circulated its EIR for expanding service in the bay area (including the expanded service to Redwood City), funding has yet to be obtained for the expanded service.

IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

According to State CEQA Guidelines, a project typically results in a significant impact if it causes an increase in traffic that is substantial and adverse in relation to the traffic load and capacity of the existing street system. This standard of significance relates to automobile traffic only and does not address the potential effects of other travel modes including transit, bicycle, and pedestrian facilities. In order to evaluate a broad range of travel characteristics, the following standards of significance apply to the transportation impacts discussed in this EIR. These standards are consistent with the most recent transportation/circulation sections prepared for other EIRs in Redwood City.

Intersection Impacts

Based on Redwood City standards, traffic impacts at intersections are considered to be significant if the addition of project traffic causes:

- operations (level of service) at a signalized intersection to deteriorate from an acceptable level (LOS D or better) under Background Conditions to an unacceptable level (LOS E or F);

- degradation of operations at a signalized intersection already operating at an unacceptable level (LOS E or F) under Background Conditions by increasing the average control delay by five or more seconds;

- operations on the critical movements at an unsignalized intersection to deteriorate from an acceptable level (LOS D or better) under Background Conditions to an unacceptable level (LOS E or F) *and* causes the traffic volumes at the intersection to satisfy the Caltrans Peak-Hour Volume warrant for traffic signal installation; or,

- the average control delay on the critical movements at an unsignalized intersection already operating at an unacceptable level (LOS E or F) to increase by five or more seconds *and* causes the traffic volumes at the intersection to satisfy the Caltrans Peak-Hour Volume warrant for traffic signal installation.

Freeway Ramp Capacity Impacts

The proposed project is considered to result in a freeway ramp capacity impact if its implementation:

- causes the volume-to-capacity ratio (V/C) of the freeway ramp to exceed 1.00; or,
- increased the amount of traffic on a freeway ramp already exceeding its capacity by adding more than one percent of the ramp's capacity to that ramp.

Freeway Segment Capacity Impacts

For the purposes of this EIR, traffic impacts on the surrounding freeway segments are defined to occur if the addition of project traffic causes:

- the volume on the freeway segment to exceed its capacity; or,
- increases the amount of traffic on a freeway segment already exceeding its capacity by adding more than one percent of the freeway segment's capacity to that segment.

Transit, Bicycle, and Pedestrian Impacts

For the purposes of this EIR, the proposed project is considered to result in a significant transit, bicycle, and/or pedestrian impact if its implementation:

- conflicts with existing, planned, or possible future transit, bicycle and/or pedestrian facility and service;
- causes transit, bicycle, or pedestrian facilities to be frequently blocked by cars or other potential safety obstruction hazards;
- causes vehicles to cross pedestrian or bicycle facilities on a regular basis at driveway entrances lacking adequate sight distance or warning systems; or,
- encourages pedestrians to cross roads in undesignated areas.

PROJECT IMPACTS

Traffic projections for the proposed project were estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In the first step, the amount of traffic added to the surrounding roadway system is estimated. In the second step, the directions the trips use to approach and depart the site are estimated. In the third step, the trips are assigned to specific street segments and intersection turning movements. The results of this process are described in the following sections.

Trip Generation

From a traffic perspective, the proposed project includes two components that could generate new vehicle trips to the area: (1) development of the proposed 541,000 s.f.-facility, and (2) increased use of the Marine Science Institute (MSI) due to their new facilities that will be developed as part

of the proposed project. The trip generation estimates are presented in Table IV.D-9 and are described in greater detail below.

TABLE IV.D-9
PROJECT TRIP GENERATION ESTIMATE

Land Use	Size	Weekday		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	In	Out	Total	Rate	In	Out	Total
Laboratories	541,000 gsf	7.43[a]	4,022	0.53[b]	232	54	286	0.99[b]	102	435	537
Proposed TDM Reductions [c]		3%	-120	7%	-16	-4	-20	7%	-7	-30	-37
Project Subtotal after TDM			*3,902*		*216*	*50*	*266*		*95*	*405*	*500*
Marine Science Institute [d]		n/a	88	n/a	11	0	11	n/a	11	0	11
Project Total			**3,990**		**227**	**50**	**277**		**106**	**405**	**511**

[a] The daily trip generation rate was derived by comparing the measured PM peak-hour trip rate at Abbott Laboratories facilities in the Bay Area to the PM peak-hour trip rate for Research & Development (R&D) land uses in the Institute of Transportation Engineers (ITE) *Trip Generation*, 6th Edition (1997), and applying the ratio of measured trips to ITE-derived trips to the ITE daily trip generation rate for R&D facilities.

[b] AM and PM peak-hour trip generation rates were derived on the basis of surveys conducted at Abbott Laboratories facilities in the Bay Area.

[c] Transportation Demand Management (TDM) reductions were estimated by Nelson\Nygaard Associates and are based on the TDM measures originally proposed by the project sponsor. See Table IV.D-14, page IV.D-57, for the project's revised proposed TDM plan (no further reductions were applied to reflect the revised TDM plan, which ensures a conservative analysis of impacts).

[d] New trips generated by three new classes that would be held at the new Marine Science Institute facility. Trips were estimated based on information provided about expected use of the facility, including class sizes, the proportion of students that would arrive via bus and automobile, and average vehicle occupancies.

SOURCE: Fehr and Peers Associates, 2003

Abbott Laboratories Trip Generation

Trip generation surveys were conducted at the following three Bay Area Abbott Laboratories facilities in July 2001:

- The 80,000-s.f. Perclose facility located at 400 Saginaw Drive in Redwood City
- The 232,000-s.f. Abbott Laboratories facility located at 755 Jarvis Drive in Morgan Hill
- The 333,000-s.f. Abbott Laboratories facility located at 5440 Patrick Henry Drive in Santa Clara

The trip generation surveys were conducted from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. The surveys indicated that the Abbott Laboratories facilities generate approximately 0.53 AM peak-hour vehicle trips and 0.99 PM peak-hour vehicle trips per 1,000 square feet of floor area, using a weighted average. Based on these rates, the proposed project would generate about 286 AM peak-hour vehicle trips (232 inbound / 54 outbound) and 537 PM peak-hour vehicle trips (102 inbound / 435 outbound).

To estimate the number of daily vehicle trips generated by the proposed Abbott Laboratories facility, the surveyed PM peak-hour trip generation rate was divided by the PM peak-hour trip generation rate for Research & Development (R & D) land uses as presented in *Trip Generation* (ITE, 1997). That ratio was then applied to the ITE R & D daily trip generation rate to estimate a daily trip generation rate for the proposed Abbott Laboratories facility, i.e., about 4,022 daily vehicle trips.

The proposed project would include a transportation demand management (TDM) plan to reduce the number of new vehicle trips on area roadways. The proposed TDM plan, presented in full below (see page IV.D-57), would include the following: bicycle lockers and racks, showers and changing rooms, shuttle service, subsidized transit tickets, preferential parking, TDM coordinator, video conferencing centers, on-site amenities (ATM, exercise facilities, cafeteria), shared parking, and a pre-tax transportation account.

The proposed TDM plan has yet to be approved by C/CAG or the City of Redwood City. However, subject to that approval, the proposed plan is expected to reduce the number of trips generated by the proposed project on the basis of review to date. The original TDM plan was reviewed by Nelson\Nygaard Consulting Associates, a firm specializing in TDM research and applications, to estimate trip reduction associated with the proposed plan elements, and the expectation is that the proposed TDM measures would reduce the project's peak-period commute trips by about seven to ten percent, depending on the frequency of their shuttle to/from Caltrain, the amount of their transit subsidy, and nature of employee jobs (i.e., do the employees have stable work hours such that carpooling can work, etc.).[4] The preliminary review also indicates that the TDM plan would reduce non-peak trips by approximately two percent. For the purposes of this EIR, and to provide a conservative estimate, a seven percent reduction was applied for peak-hour trips and a three percent reduction was applied to the daily trip generation estimates.[5] Based on these assumed trip-reduction percentages, the proposed project would generate about 3,902 net new daily trips, 266 net new AM peak-hour trips (216 inbound / 50 outbound), and 500 net new PM peak-hour trips (95 inbound / 405 outbound).

Nelson\Nygaard also reviewed draft sections of the Bayfront Area Study, C/CAG requirements, and Abbott Lab's proposed TDM plan. Based on that review, additional TDM strategies, consistent with the Bayfront Area Study, are recommended to be implemented by the proposed project to enhance the effectiveness of the TDM plan. Among the recommended enhancements are the following (the full Nelson\Nygaard memorandum is presented in Appendix C of this EIR):

- Establish the number, location, design, and other parameters for bicycle lockers and racks, based on the San Mateo County Bike Plan Guidelines

- Provide showers and changing rooms in each building

[4] The project sponsor's proposed TDM plan presented herein contains more programs than the TDM plan reviewed by Nelson\Nygaard. However, no further reductions were applied to reflect the revised TDM plan, which ensures a conservative analysis of impacts.

[5] A two-percent reduction for non-peak period trips and a seven-percent reduction for peak period trips yields a three-percent reduction over an entire day.

- For shuttle service to the Caltrain Station, Abbott will need to lease/purchase its own shuttle vehicle(s), to serve shift-oriented schedules of Abbott employees, and potentially increase its fleet over time in response to growth in employee demand

- Subsidize transit passes at a level no less than the cost of a monthly Caltrain pass, and explore idea of a pre-buy transit pass program with SamTrans

- Work with the Peninsula Traffic Congestion Relief Alliance and RIDES for Bay Area Commuters to promote ridesharing, and provide financial subsidies as incentives

- Enhance effectiveness of preferential parking for carpoolers through other parking management measures, such as charging more for solo drivers to park

- Establish a position of full-time TDM coordinator who will be responsible for the TDM programs and for liaison activities with the City

- Implement additional measures from the Bayfront Study, such as an employer-provided fleet vehicle, and a TDM Marketing and Information program

Marine Sciences Institute Trip Generation

The proposed project includes development of a new, two-story, 10,000 sq.-ft. replacement facility for the Marine Sciences Institute (MSI). Currently, MSI occupies several small, portable buildings on the project site that would be removed as part of the project. After completion of the proposed project, MSI is expecting to increase their services, to include an additional ship class in the early evening (6:00 to 8:00 p.m.), with 40 to 60 students and three additional shore programs (one in the morning) with 50 to 60 students.

To estimate trip generation for the increased MSI use, several assumptions were made, namely that 1/3 of the students would arrive via bus, and 2/3 of the students would arrive via carpools; the carpools were assumed to have a vehicle occupancy of four students per car. The additional morning shore class is expected to generate inbound trips during the AM peak hour. Based on the assumed vehicle types and occupancies, it was estimated that the 60-student (maximum) class would generate 11 new inbound trips during the AM peak hour. Similarly, the evening ship program would generate 11 new inbound trips during the PM peak hour. The MSI would generate about 88 new vehicle trips per day, based on a total of four new classes each generating 22 new vehicle trips.

Trip Distribution

The distribution of project trips on the local roadway network was estimated based on existing travel patterns in the area and the relative locations of complementary land uses. Employee home zip code information for the existing Perclose (Redwood City) and Sun-Microsystems (Menlo Park) facilities were also reviewed to help formulate the trip distribution estimates.

In general, 38 percent of project-generated traffic would travel to and from the north via US 101, I-280, El Camino Real, Industrial Road, and Bair Island Road; 10 percent to/from the east via the Dumbarton Bridge and Seaport Boulevard; 37 percent to/from the south via US 101, I-280,

Middlefield Road, and El Camino Real; 7 percent to/from downtown Redwood City; and 8 percent to/from areas west of El Camino Real. The project trip distribution is presented on Figure IV.D-7.

Trip Assignment

Trips generated by the proposed project were assigned to the roadway system based on the trip distribution pattern described above. The resulting trip assignments during the AM and PM peak hours are presented on Figure IV.D-8. Project trips were added to background traffic volumes to estimate intersection volumes under Project Conditions, as shown on Figure IV.D-9.

Project Intersection Operations

Level of service calculations were conducted to evaluate intersection operations under Project Conditions. Table IV.D-10 presents the projected levels of service and the change in delay compared to Background Conditions at each study intersection.

Impact D.1: The proposed project would increase vehicle delays at area intersections. (Significant)

As shown in Table IV.D-10, traffic added by the project would increase delays at the Woodside Road / Broadway intersection [#13] within an already unacceptable LOS F during the AM and PM peak hours. The project-generated increase in delay during the AM peak hour would exceed the five-second threshold of significance established for this analysis, and the project impact would be significant; contributing to the significance of the impact is that the increased delays also would increase the response time for emergency vehicles. The project-generated increase in delay during the PM peak hour would be less than five seconds, and the project impact would be less than significant. Delays at the Bayfront Expressway / Willow Road intersection [#21] would increase and would continue to operate at an unacceptable LOS E during the PM peak hour due to the project; however, the increase would be less than five seconds, and the effect would be less than significant. All other study intersections are expected to operate at an acceptable level (LOS D or better) during the AM and PM peak hours with the proposed project in place.

Mitigation Measure D.1a: The project sponsor and the City of Redwood City shall work with Caltrans to modify the traffic signal phasing at the intersection of Woodside Road / Broadway to provide an overlap phase during which northbound right turns would be made (with a green arrow) simultaneously with each of the signal phases for left turns from westbound Woodside Road and from the southbound US 101 off-ramp (U-turns from westbound Woodside Road and southbound US 101 off-ramp would be prohibited). As part of this measure, emergency vehicle signal pre-emption would be added to the traffic signal control. The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR)

The significant impact is expected to occur at 95 percent buildout of the proposed project. It should be noted that the City is currently investigating modifications to improve operations at the intersection. These modifications include minor geometric reconfigurations and possible turn

INSERT FIGURE IV.D-7 – PROJECT TRIP DISTRIBUTION

INSERT FIGURE IV.D-8A – PROJECT TRIP ASSIGNMENT

INSERT FIGURE IV.D-8B – PROJECT TRIP ASSIGNMENT

INSERT FIGURE IV.D9A – PROJECT CONDITIONS VOLUMES

INSERT FIGURE IV.D-9B – PROJECT CONDITIONS VOLUMES

TABLE IV.D-10
BACKGROUND AND PROJECT INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	Background		Project Conditions		
		Delay[a]	LOS	Delay[a]	LOS	Change to Delay
1. El Camino Real / Whipple Avenue [b]	AM	33.9	C	34.0	C	+0.1
	PM	47.4	D	48.0	D	+0.6
2. Winslow St – Industrial Way / Whipple Ave	AM	29.2	C	29.2	C	+0.0
	PM	38.0	D	38.0	D	+0.0
3. Veterans Blvd / Whipple Avenue	AM	36.3	D	36.6	D	+0.3
	PM	36.7	D	37.0	D	+0.3
4. US 101 Northbound Off-Ramp / Whipple Avenue	AM	7.9	A	7.9	A	0.0
	PM	11.2	B	11.2	B	0.0
5. East Bayshore Rd / Bair Island Rd	*Analyzed with the Blomquist Street Extension only.*					
6. El Camino Real / Jefferson Avenue	AM	41.1	D	41.3	D	+0.2
	PM	47.8	D	48.2	D	+0.4
7. Veterans Blvd / Jefferson Avenue	AM	15.7	B	16.2	B	+0.5
	PM	28.3	C	28.8	C	+0.5
8. Veterans Boulevard / Maple Street	AM	22.9	C	23.2	C	+0.3
	PM	31.0	C	31.7	C	+0.7
9. Blomquist Street / Maple Street (*unsignalized*)	AM	11.3	B	11.6	B	+0.3
	PM	12.1	B	13.5	B	+1.4
10. Alameda de las Pulgas / Woodside Rd	AM	37.9	D	38.2	D	+0.3
	PM	37.2	D	37.9	D	+0.7
11. Middlefield Road / Woodside Road	AM	37.7	D	38.1	D	+0.4
	PM	50.1	D	52.7	D	+2.6
12. Bay Road / Woodside Road	AM	22.1	C	22.1	C	0.0
	PM	29.8	C	30.3	C	+0.5
13. Broadway / Woodside Road [c]	AM	> 180	F	**> 180**	**F**	**+5.1**
	PM	> 180	F	> 180	F	+1.9
14. Veterans Blvd / Woodside Road	AM	21.5	C	22.0	C	+0.5
	PM	41.7	D	43.6	D	+1.9
15. Blomquist Street / Seaport Blvd	AM	39.3	C	51.8	D	+12.5
	PM	31.1	C	41.5	D	+10.4
16. Chesapeake Drive / Seaport Blvd	AM	11.8	B	14.0	B	+2.2
	PM	17.7	B	33.2	C	+15.5
17. Chesapeake Drive / Galveston Drive (*unsignalized*)	AM	8.9	A	9.3	A	+0.4
	PM	11.1	B	17.6	B	+6.5
18. Chesapeake Drive / Saginaw Drive (*unsignalized*)	AM	8.8	A	9.2	A	+0.4
	PM	9.3	A	13.3	B	+4.0
19. Cardinal Way / Saginaw Drive (*unsignalized*)	AM	9.7	A	10.4	B	+0.7
	PM	9.8	A	15.8	C	+6.0
20. Bayfront Expressway / Marsh Road	AM	25.0	C	25.2	C	+0.2
	PM	29.2	C	29.7	C	+0.5
21. Bayfront Expressway / Willow Road	AM	20.9	C	20.9	C	0.0
	PM	72.6	E	75.0	E	+2.4

[a] For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
[b] Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
[c] This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

restrictions. It should also be noted that this intersection is included and is being analyzed in the US 101 / Woodside Road interchange improvement study being conducted by CCS Planning and Engineering.

Implementation of Mitigation Measure D.1a would decrease the project-generated increase in delay during the AM peak hour to less than five seconds and would improve response time for emergency vehicles, thereby reducing the project impact to a less-than-significant level. However, because of constraints of available right-of-way, it is unlikely that any combination of turning restrictions and geometric enhancements would be able to improve traffic operating conditions at the Woodside Road / Broadway intersection [#13] to acceptable levels of service without eliminating one of the five approaches to the intersection and reconfiguring the interchange.

Therefore, to further reduce project impacts, the following mitigation measure is recommended.

Mitigation Measure D.1b: The project sponsor would implement more aggressive measures as part of the proposed Transportation Demand Management (TDM) program. The project sponsor would be fully responsible for this measure. (Identified by this EIR)

It is recommended that the project sponsor work with the City of Redwood City and with C/CAG when implementing their proposed TDM program (see page IV.D-57) to increase the success rate of the TDM measures.

The proposed project also refers to a possible onsite childcare facility. Although a childcare facility would not decrease the number of peak-hour trips generated by the proposed project, it would alter trip characteristics for Abbott Laboratories employees, and would reduce daily (area-wide) travel.

With Woodside Road Widening Scenario

Similar to Background Conditions, to provide additional information to the decision makers, traffic operating conditions at Middlefield Road / Woodside Road [#11], Bay Road / Woodside Road [#12], and Broadway / Woodside Road [#13] were assessed under a "with widening" scenario for Project Conditions in addition to the now-likely "no widening" scenario. The results indicate that, if Woodside Road were widened to three lanes in each direction, peak-hour traffic operations at these study intersections under Project Conditions would be similar to those if Woodside Road was not widened. That is, the levels of service would be the same, but with somewhat lower average delay per vehicle. The Woodside Road / Broadway intersection would continue to operate at an unacceptable LOS F during the AM and PM peak hours, and the project impact would be the same as under the "no widening" scenario (i.e., significant in the AM peak hour and less than significant in the PM peak).

Significance after Mitigation: This project impact would be significant and unavoidable because it is not certain that Mitigation Measure D.1a could be implemented (i.e., because the City of Redwood City, as Lead Agency, could not implement the improvement without Caltrans'

approval). However, in the event that Mitigation Measure D.1a could be implemented, the impact would be less than significant.

Impact D.2: The proposed project would increase the traffic volume (left turns and through) on the westbound approach to the Veterans Boulevard / Woodside Road intersection [#14], which would increase backups into the westbound through lane, creating potentially unsafe conditions. (Significant)

Although the Veterans Boulevard / Woodside Road intersection [#14] would operate at acceptable levels during the PM peak hour under Project Conditions, the westbound left turns would total about 450 vehicles during this time period (with the project contributing 95 of those vehicles). According to Caltrans' *Highway Design Manual*, dual left-turn lanes should be considered when the volume exceeds 300 vehicles per hour. Thus, a more-detailed evaluation of vehicle queuing was performed to determine if a second left-turn lane would be warranted. The queuing analysis is on-file and available for review at the Redwood City Community Development Department.

The queuing analysis indicates that the maximum expected westbound left-turn queue at the intersection would be 18 vehicles (about 450 feet). The existing left-turn pocket is approximately 240 feet in length and has storage capacity for approximately 10 vehicles, meaning that left-turning vehicles would occupy the through lane, impeding traffic flow. This would create a potential safety impact at the intersection as drivers of westbound vehicles approaching the intersection have limited sight distance due to existing landscaping and the horizontal curvature of Seaport Boulevard at this location. The project's contribution to the potential safety hazard is considered to be a significant impact.

Mitigation Measure D.2: The project sponsor and the City of Redwood City shall work with Caltrans to lengthen the westbound left-turn pocket and install advance warning signs at the Veterans Boulevard / Woodside Road intersection [#14]. The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR)

It is recommended that the westbound left-turn lane at the Veterans Boulevard / Woodside Road intersection be extended by 210 feet (to 450 feet) to provide adequate storage capacity for the maximum expected queue. Extension of the left-turn lane would require modification to the existing median next to the support structure for the US 101 overcrossing. Additionally, advance signage would warn drivers that they are approaching a signalized intersection and to be aware of possibly stopped vehicles. Because the above-described existing landscaping that impedes drivers' sight distance is within Caltrans right-of-way, the City of Redwood City would need to request that Caltrans perform routine maintenance to ensure that over-growth does not impair driver visibility.

It should be noted that any modification to the westbound left-turn lane at the Veterans Boulevard / Woodside Road intersection would require Caltrans approval. Caltrans is currently preparing a study to identify modifications to the Woodside Road / US 101 interchange, and modifications to this interchange could, if constructed, affect the ability to lengthen the westbound left-turn lane at the Veterans Boulevard / Woodside Road intersection.

Significance after Mitigation: This project impact would be significant and unavoidable because it is not certain that Mitigation Measure D.2 could be implemented (i.e., because the City of Redwood City, as Lead Agency, could not implement the improvement without Caltrans' approval). However, in the event that Mitigation Measure D.2 could be implemented, the impact would be less than significant.

Project Freeway Ramp Capacity Analysis

To verify that the study freeway ramps would have sufficient capacity to serve expected demand under Project Conditions, a volume-to-capacity analysis was conducted for each of the study ramps. For the purpose of this analysis, capacities presented in Chapter 25 of the *2000 Highway Capacity Manual* were used based on the recommended speeds on the study ramps.

Impact D.3: The proposed project would increase the traffic volume-to-capacity ratios on area freeway ramps. (Less than Significant)

As shown in Table IV.D-11, all of the study ramps would have adequate capacity (i.e., v/c ratios less than 1.00) under Project Conditions during the AM and PM peak hours. The project effect would be less than significant.

Mitigation: None required.

Project Freeway Mainline Capacity Analysis

Segments of US 101, I-280, and SR 84 were evaluated during the AM and PM peak hours under Project Conditions to identify any potentially significant project-related traffic increases on the study freeway segments. After the planned addition of auxiliary lanes to US 101, there will be three mixed-flow lanes, one high occupancy vehicle (HOV) lane, and one auxiliary lane in each direction south of Whipple Avenue. North of Whipple Avenue, US 101 will have four mixed-flow lanes and one auxiliary lane in each direction. I-280 has four mixed-flow lanes in each direction. SR 84 (Bayfront Expressway) now has three lanes in each direction between the Dumbarton Bridge and Marsh Road after the recent completion of its planned widening (see page IV.D-21).

TABLE IV.D-11
PROJECT FREEWAY RAMP CAPACITY ANALYSIS

US 101 Freeway Ramp	Capacity[a]	AM Peak Hour			PM Peak Hour		
		Project Trips	Volume[b]	V/C Ratio[c]	Project Trips	Volume[b]	V/C Ratio[c]
Southbound Off-Ramp onto Veterans Blvd (Whipple Avenue)	3,800	5	1,752	0.46	2	1,457	0.38
Southbound Off-Ramp onto Seaport Blvd	1,900	43	435	0.23	20	231	0.12
Southbound On-Ramp from Veterans Blvd (Woodside Road)	2,000	12	1,019	0.51	95	1,147	0.57
Northbound Off-Ramp onto Seaport Blvd	2,000	53	464	0.23	25	138	0.07
Northbound On-Ramp from Seaport Blvd	2,000	10	370	0.19	81	569	0.28

[a] Based on capacities in the Caltrans *Highway Design Manual* and the posted travel speed on the ramp.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

The same per-lane capacities as described above were used. The auxiliary lanes were not included in this analysis. However, vehicles entering the freeway segments via the auxiliary lane will merge into and occupy capacity in the mixed-flow lanes for a portion of the freeway segment under study. Likewise, vehicles wishing to exit the freeway segment, that were occupying capacity in the mixed-flow lanes, will merge into the auxiliary lanes and occupy capacity in that lane for only a portion of the freeway segment. Therefore, it was assumed that half of all vehicles that would use the auxiliary lane in each freeway segment (both entering and exiting the freeway mainline) were included in the capacity analysis for the mixed-flow lanes. The number of vehicles using the HOV lanes was derived from the "Measures of Effectiveness" projections included in the *US 101 Auxiliary Lane Project Study* (Fehr and Peers, 2000).

Impact D.4: The proposed project would increase the traffic volume-to-capacity ratios on area freeways. (Significant)

As shown in Table IV.D-12, during the AM peak hour, the southbound mixed-flow lanes on US 101 from Whipple Avenue to Marsh Road would have v/c ratios of 1.12 to 1.13 under Project Conditions. The two westbound study segments of SR 84 also would have v/c ratios greater than 1.00. The proposed project would add traffic volumes that are less than one percent of each of these segments' capacity. All other study segments are expected to have V/C ratios less than 1.00. Therefore, during the AM peak hour, the proposed project would have a less-than-significant effect on the study freeway segments.

As shown in Table IV.D-13, during the PM peak hour, the two eastbound study segments of SR 84 would have v/c ratios greater than 1.00, and the proposed project would add traffic volumes that are more than one percent of each of these segments' capacity. The *2001 San Mateo CMP Monitoring Report* determined that these two freeway segments currently operate at LOS F. Based on the freeway capacity significance criteria described above, this effect would represent a significant project impact to both study freeway segments.

The southbound mixed-flow lanes on US 101 from Whipple Avenue to Woodside Road would have a v/c ratio of 1.13 under Project Conditions, but the proposed project would add traffic volumes that are less than one percent of each of these segments' capacity. All other study segments would have v/c ratios less than 1.00.

Mitigation Measure D.4: The project sponsor would implement Mitigation Measure D.1 (a more aggressive Transportation Demand Management program). The project sponsor would be fully responsible for this measure. (Identified by this EIR)

Full mitigation of this impact would require the addition of another eastbound through lane to both freeway segments. However, freeway widening is generally considered to be beyond the scope of a single development project and is therefore considered infeasible.

To minimize the significant effects of project traffic to these freeway segments, the proposed project should expand its TDM program. Additional TDM measures are described above under Mitigation Measure D.1. Although an increased TDM program would reduce the number of trips on the study freeway segments, project trips would likely not be eliminated. The project's TDM plan would need to achieve a 20 percent reduction in PM peak-hour vehicle trips to reduce the project's contribution to the freeway segments to less than the one percent significance threshold. Because of uncertainty as to the actual success rate for TDM programs, however, the level of vehicle trip reduction needed to reduce the impact to SR 84 cannot be ensured, and the impact would be significant and unavoidable.

Significance after Mitigation: Significant Unavoidable.

TABLE IV.D-12
AM PEAK-HOUR PROJECT FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	Project Trips	Volume[b]	V/C Ratio[c]	Project Percent[d]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	45	8,685	0.94	0.49
Southbound – Whipple Avenue to Woodside Road	Mixed	6,900	38	7,817	1.13	0.55
	HOV	1,800	5	1,061	0.59	0.28
Southbound – Woodside Road to Marsh Road	Mixed	6,900	11	7,731	1.12	0.16
	HOV	1,800	1	1,137	0.63	0.06
Northbound – Marsh Road to Woodside Road	Mixed	6,900	45	5,232	0.75	0.65
	HOV	1,800	8	897	0.49	0.44
Northbound – Woodside Road to Whipple Road	Mixed	6,900	8	5,605	0.81	0.12
	HOV	1,800	2	1,112	0.62	0.11
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	10	7,018	0.76	0.12
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	18	7,755	0.84	0.20
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	3	8,172	0.89	0.03
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	2	8,275	0.90	0.02
Southbound – Woodside Road to County Line	Mixed Flow	9,200	5	5,397	0.59	0.05
Northbound – County Line to Woodside Road	Mixed Flow	9,200	20	3,094	0.33	0.22
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	7	4,266	0.46	0.08
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	13	3,890	0.42	0.14
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	4	4,358	0.47	0.04
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	5	655	0.20	0.15
Eastbound – University Road to County Line	Mixed Flow	3,300	5	1,605	0.48	0.15
Westbound – County Line to University Road	Mixed Flow	3,300	20	4,723	1.43	0.61
Westbound – University Road to Willow Road	Mixed Flow	3,300	20	3,374	1.02	0.61

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.
[d] Project Percent = number of project trips on the segment divided by the freeway segment's capacity. Number presented as percentages.

SOURCE: Fehr and Peers Associates, 2003

TABLE IV.D-13
PM PEAK-HOUR PROJECT FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	Project Trips	Volume[b]	V/C Ratio[c]	Project Percent[d]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	21	7,793	0.85	0.23
Southbound – Whipple Avenue to Woodside Road	Mixed HOV	6,900 1,800	18 2	7,764 1,082	1.13 0.60	0.26 0.11
Southbound – Woodside Road to Marsh Road	Mixed HOV	6,900 1,800	84 11	6,472 950	0.94 0.53	1.22 0.61
Northbound – Marsh Road to Woodside Road	Mixed HOV	6,900 1,800	20 5	4,021 644	0.58 0.36	0.29 0.28
Northbound – Woodside Road to Whipple Road	Mixed HOV	6,900 1,800	66 15	4,399 1,033	0.64 0.57	0.96 0.83
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	81	6,355	0.69	0.88
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	8	4,335	0.47	0.09
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	23	4,243	0.46	0.25
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	13	4,894	0.53	0.14
Southbound – Woodside Road to County Line	Mixed Flow	9,200	36	4,009	0.44	0.39
Northbound – County Line to Woodside Road	Mixed Flow	9,200	10	5,630	0.61	0.11
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	3	7,782	0.85	0.03
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	6	7,283	0.79	0.07
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	32	7,512	0.82	0.35
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	36	3,606	**1.09**	**1.09**
Eastbound – University Road to County Line	Mixed Flow	3,300	36	4,928	**1.49**	**1.09**
Westbound – County Line to University Road	Mixed Flow	3,300	10	1,491	0.45	0.30
Westbound – University Road to Willow Road	Mixed Flow	3,300	10	1,298	0.39	0.30

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.
[d] Project Percent = number of project trips on the segment divided by the freeway segment's capacity. Number presented as percentages.

SOURCE: Fehr and Peers Associates, 2003

C/CAG Analysis Requirements

The proposed project would generate 277 AM peak-hour trips and 511 PM peak-hour trips. Because the proposed project would generate more than 100 net new peak-hour trips and the proposed project is subject to CEQA review, the proposed project must meet the requirements presented in the C/CAG *Guidelines for the Implementation of the Land Use Component of the 1999 Congestion Management Program.* The project sponsor proposes to expand its TDM plan so that it has the capacity to fully reduce all net new project peak-hour trips on the CMP roadway network. The TDM plan, which must be approved by both the City of Redwood City and C/CAG prior to the certification of this EIR is presented in Table IV.D-14 (formatted consistent with C/CAG's format), with the equivalent number of trips that would be credited as reduced. It should be noted that the estimate of project-generated vehicle trips was based on the TDM measures originally proposed by the project sponsor, and no further reductions were applied to reflect the revised TDM plan, thus ensuring a conservative analysis of impacts.

It should be noted that the Bayfront Area Study includes a transportation section that identifies TDM measures that should be implemented in that area. It is recommended that the TDM measures implemented by the project sponsor be consistent with those identified in the Bayfront Area Study, and should also be consistent with measures identified by Nelson\Nygaard and Fehr and Peers Associates in their respective memoranda presented in Appendix C.

Project Impacts on Transit, Pedestrian, and Bicycle Facilities

Impact D.5: The proposed project would increase traffic volumes on area roadways, which could affect transit, pedestrian and bicycle operations. (Less than Significant)

Currently, during commute hours, SamTrans operates Route 270 to the Seaport Plaza area near the project site. Additionally, there are some private employee shuttles operating from the Caltrain station to the Seaport Plaza and Pacific Shores areas. It should be noted that the TDM plan proposed as part of the project includes participation in these shuttle programs.

The Abbott Laboratories facility would have full access control. It is recommended that, to promote use of Caltrain and the shuttle system, the shuttle have access to the Abbott Laboratories facility, and that the shuttle stop be located in proximity to the buildings. Providing "door-to-door" service would increase the potential for employees to ride the shuttle, as it would not require riders to brave the elements in inclement weather.

The Water Transit Authority (WTA) has identified Redwood City as a possible ferry terminal in the future. The probable location of the ferry terminal in Redwood City would be at the end of Seaport Boulevard, near the Pacific Shores development. Although funding for this terminal has not been identified and a possible opening date for the terminal has not been established, it is recommended that the project sponsor provide shuttle service between the terminal and the project site after ferry service to Redwood City has been implemented.

TABLE IV.D-14
ABBOTT LABORATORIES PROPOSED
TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation Demand Management Measure	Number of Trips Credited	Rationale	Project-Proposed Measure	Trip Reduction Achieved
Bicycle lockers and racks	One peak-hour trip will be credited for every 3 new bike lockers and racks installed and maintained.	Experience has shown that bicycle commuters will average using this mode one-third of the time, especially during warmer summer months.	30 bicycle lockers and racks	10
Showers and changing rooms	Two peak-hour trips will be credited for each new combination shower and changing room installed.	Two bicyclists can sequentially use one shower/changing room during the peak commuter time	4 showers and changing rooms	8
Operation of a dedicated shuttle service during the peak period to a rail station or an urban residential area	One peak-hour trip will be credited for each peak-hour round trip seat on the shuttle. Increases to two trips if a Guaranteed Ride Home Program is also in place. Five additional trips will be credited if the shuttle stops at a child care facility enroute to/from the worksite.	Yields a one-to-one ratio (one seat in a shuttle equals one auto trip reduced); utilization increases when a guaranteed ride home program is also made available.	One 10-passenger van twice during the peak hour to Redwood City Caltrain and to Union City BART with guaranteed ride home	80
Charging employees for parking	One peak-hour trip will be credited for each parking spot charged out at $20 per month for one year.	Yields a one-to-one ratio (one parking spot charged out equals one auto trip reduced).	N/A	0
Subsidizing transit tickets for employees	One peak-hour trip will be credited for each transit pass that is subsidized at least $20 per month for one year. One additional trip will be credited if the subsidy is increased to $75 for parents using transit to take a child to childcare enroute to work.	Yields a one-to-one ratio (one transit pass equals one auto trip reduced).	100 employee transit passes	100
Subsidizing pedestrian/bicyclists who commute to work	One peak-hour trip will be credited for each employee that is subsidized at least $20 per month for one year.	Yields a one-to-one ratio (one pedestrian/bicyclist equals one auto trip reduced.	N/A	0
Creation of preferential parking for carpoolers	Two peak-hour trips will be credited for each parking spot reserved	Yields a two-to-one ratio (one reserved parking spot equals a minimum of two auto trips reduced).	20 reserved carpool spaces	40
Creation of preferential parking for vanpoolers	Seven peak-hour trips will be credited for each parking spot reserved	Yields a seven-to-one ratio (one reserved parking spot equals a minimum of seven auto trips reduced).	5 reserved vanpool spaces	35

(*Continued*)

TABLE IV.D-14 (Continued)
ABBOTT LABORATORIES PROPOSED
TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation Demand Management Measure	Number of Trips Credited	Rationale	Project-Proposed Measure	Trip Reduction Achieved
Implementation of a vanpool program	Seven peak-hour trips will be credited for each vanpool arranged by a specific program operated at the site of the development. Increases to ten trips if a Guaranteed Ride Home Program is also in place.	The average van capacity is seven people.	5 vanpools with guaranteed ride home.	50
Operation of a commute assistance center, offering onsite, one stop shopping for transit and commute alternatives information, preferably staffed with a live person to assist building tenants with trip planning	One peak-hour trip will be credited for each feature added to the information center; and an additional one peak-hour trip will be credited for each hour the center is staffed with a live person, up to 20 trips per each 200 tenants. Possible features may include: • Transit information brochure rack • Computer kiosk connected to Internet • Telephone (with commute and transit information numbers) • Desk and chairs (for personalized trip planning) • On-site transit ticket sales • Implementation of flexible work hour schedules that allow transit riders to be 15-30 minutes late or early (due to problems with transit or vanpool) • Quarterly educational programs to support commute alternatives	This is based on staff's best estimate. Short of there being major disincentives to driving, having an onsite TDM program offering commute assistance is fundamental to an effective TDM program.	5 features	5
Implementation of a parking cash out program	One peak-hour trip will be credited for each parking spot where the employee is offered a cash payment in return for not using parking at the employment site.	Yields a one-to-one ratio (one cashed out parking spot equals one auto trip reduced).	105 parking spaces	105
Installation of highband width Internet connections in employees' homes to facilitate home telecommuting.	One peak-hour trip will be credited for each connection installed.	Yields a one-to-one ratio.	N/A	0

(*Continued*)

TABLE IV.D-14 (Continued)
ABBOTT LABORATORIES PROPOSED
TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation Demand Management Measure	Number of Trips Credited	Rationale	Project-Proposed Measure	Trip Reduction Achieved
Installation of video conferencing centers that are available for use by the tenants of the facility.	Twenty peak-hour trips will be credited for a center installed at the facility.	Assumes that there will be one teleconference per day that includes twenty people.	1 video conference center	20
Implementation of a compressed workweek program.	One peak-hour trip will be credited for every 5 employees that are offered the opportunity to work four compressed days per week.	The workweek will be compressed into 4 days; therefore the individual will not be commuting on the 5th day.	200 employees	40
Provision of assistance to employees so they can live close to work	If an employer develops and offers a program to help employees find acceptable residences within five miles of the employment site, a credit of one trip will be given for each slot in the program.	This assumes that a five-mile trip will generally not involve travel on the freeways.	N/A	0
Conduct a local-based hiring program by registering with and using the Alliance Job Link Program	One peak-hour trip will be credited for every 2 job listings posted with this program.	This is based on staff's best estimate.	N/A	0
Implementation of a program that gives preference to hiring local residents at the new development site	One peak-hour trip will be credited for each employment opportunity reserved for employees recruited and hired from within five miles of the employment site.	This assumes that a five-mile trip will generally not involve travel on the freeways.	N/A	0
Provision of on-site amenities / accommodations that encourage people to stay on site during the workday, making it easier for workers to leave their automobiles at home.	One peak-hour trip will be credited for each feature added to the job site. Possible features may include: • banking • grocery shopping • clothes cleaning • exercise facilities • child care center	This is based on staff's best estimate	ATM; Exercise Facility; Cafeteria	3
Provide use of motor pool vehicles to employees who use alternate commute methods so they can have access to vehicles during breaks for personal use.	One peak-hour trip will be credited for each vehicle provided. One peak-hour trip will be credited for every 4 bicycles provided.	This is based on staff's best estimate	N/A	0

(*Continued*)

TABLE IV.D-14 (Continued)
ABBOTT LABORATORIES PROPOSED
TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation Demand Management Measure	Number of Trips Credited	Rationale	Project-Proposed Measure	Trip Reduction Achieved
Provision of child care services as a part of the development	One trip will be credited for every two child care slots at the job site. This amount increases to one trip for each slot if the child care service accepts multiple age groups (infants = 0-2 yrs, preschool = 3-4 yrs, school-age = 5 to 13 yrs).		20 children in each of two age groups	20
Developer/property owner may join an employer group to expand available child care within 5 miles of the job site or may provide this service independently	One trip will be credited for each new child care center slot created either directly by an employer group, by the developer/property owner, or by an outside provider if an agreement has been developed with the developer/property owner that makes the child care accessible to the workers at the development.		N/A	0
Join the Alliance's Guaranteed Ride Home program.	One peak-hour trip will be credited for every 2 slots purchased in the program.	Experience shows that when a Guaranteed Ride Home Program is added to a TDM program, average ridership increases by about 50%.	N/A	0
Combine any ten of these elements and receive an additional credit for five peak-hour trips.	Five peak-hour trips will be credited.	Experience has shown that offering multiple and complementary TDM components can magnify the impact of the overall program	10 amenities	5
Work with the Alliance to develop/ implement a Transportation Action Plan	Five peak-hour trips will be credited.	This is based on staff's best estimate	Will work with Alliance	5
The developer can provide a cash legacy after the development is complete and designate an entity to implement one or more of the previous measures before day one of occupancy.	Peak-hour trip reduction credits will accrue as if the developer was directly implementing the items.	Credits accrue depending on what the funds are used for.	N/A	0
Participate in / create / sponsor a Transportation Management Association	Five peak-hour trips will be credited.	Generally acceptable TDM practices (based on research of TDM practices around the nation and reported on the Internet).	N/A	0

(*Continued*)

TABLE IV.D-14 (Continued)
ABBOTT LABORATORIES PROPOSED
TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation Demand Management Measure	Number of Trips Credited	Rationale	Project-Proposed Measure	Trip Reduction Achieved
Coordinate TDM programs with existing developments/employers	Five peak-hour trips will be credited.	This is based on staff's best estimate	N/A	0
For employers with multiple job sites, institute a proximate commuting program that allows employees at one location to transfer/trade with employees in another location that is closer to their home.	One peak-hour trip will be credited for each opportunity created.	Yields a one-to-one ratio.	N/A	0
Pay for parking at park and ride lots or transit stations.	One peak-hour trip will be credited for each spot purchased.	Yields a one-to-one ratio.	N/A	0
Install and maintain alternative transportation kiosks	Five trips will be credited for each kiosk.	This is based on staff's best estimate	3 kiosks	15
			TOTAL CREDIT	541

SOURCES: Fehr and Peers Associates, Nelson\Nygaard, and Korve Engineering, 2003.

Currently, there is a pedestrian and bicycle path paralleling Seaport Boulevard that would provide access to the proposed project. However, there are no pedestrian nor bicycle facilities on Woodside Road providing access to downtown Redwood City. Pedestrians and bicycles are encouraged to use the bicycle lane on Blomquist Street and the shoulders on the Maple Street overcrossing to access downtown Redwood City from the project site. Cardinal Way currently includes bicycle lanes.

Pedestrian access to the project site would be accommodated via existing pedestrian facilities on streets within the Seaport Plaza development area. Pedestrian access would be provided along the project site's waterfront, which would be available to the general public. The proposed project is not expected to have an adverse effect on pedestrian or bicycle facilities.

Mitigation: None required.

Parking

Impact D.6: The proposed project would generate parking demand that would have to be accommodated by the onsite parking supply. (Less than Significant)

As part of Phase 1 of the proposed project, when 200,000-sq. ft. of facilities would be constructed, 660 parking spaces would be provided in two surface parking lots. During Phase 2, when an additional 176,000-s.f. of facilities would be constructed, an additional 581 parking spaces would be provided. These spaces would be provided in a parking structure that would be constructed on one of the surface parking lots. Phase 3 of the proposed project would include 545 additional parking spaces, for a total of 1,786 on-site parking spaces at project buildout.

Planning Code Requirements. The City of Redwood City requires one parking space for every 300 sq. ft. of floor area for office space and at least ten percent of those parking spaces shall be designated and marked for carpool and/or vanpool parking only; carpool/vanpool spaces are to be located with the best access to the workplace. For industrial and manufacturing space, the City requires one space for every two employees on the maximum working shift, but in no case fewer than one space per 600 sq. ft. of floor area. For warehousing, the City requires one space for every two employees on the maximum working shift plus one space per 1,000 sq. ft. of floor area. Based on the City's parking requirements, the proposed project would be required to provide 644 spaces under Phase 1; 1,231 spaces under Phase 2; and 1,781 spaces at project completion.

Parking Demand. Project-generated parking demand was estimated using generation rates published by the Institute of Transportation Engineers (ITE, 1987), as following:

Office: 2.27 spaces per 1,000 sq. ft. based on buildout of the site.

Manufacturing: 0.60 spaces per employee.

Warehouse: 0.95 spaces per employee.

Phase 1 of the proposed project would include 145,000 sq. ft. of R & D, administration, and amenities (all assumed to generate parking demand consistent with general office), 35,000 sq. ft. of manufacturing (approximately 270 employees), and 20,000 sq. ft. of warehouse (about 12 employees). Using the above-cited ITE rates, the estimated parking demand generated by the project would be about 503 spaces during Phase 1. Applying an industry-standard 1.10 multiplier to the projected demand, to account for parking inefficiency, and circulation/turnover effects, the "effective demand" during Phase 1 would be about 553 spaces.

Phase 2 of the proposed project would include an additional 176,077 sq. ft. of R & D (assumed to generate parking demand consistent with general office), which would generate demand for 400 additional parking spaces. Parking demand for Phase 1 plus Phase 2 would be about 903 parking spaces. Applying the above-cited 1.10 multiplier, the "effective demand" during Phase 2 would be about 993 parking spaces.

Phase 3 of the proposed project would include an additional 165,000 sq. ft. of R & D (assumed to generate parking demand consistent with general office), which would generate demand for about 375 parking spaces. Therefore, at buildout, the proposed project would generate a total demand for about 1,278 parking spaces. Applying the 1.10 multiplier, the "effective demand" during Phase 3 would be about 1,406 parking spaces.

The proposed parking supply, City Code requirements, estimated parking demand, and recommended parking supply are summarized in Table IV.D-15. As shown, for each phase of the proposed project, the onsite parking supply would satisfy the Zoning Code requirement for off-street parking, and would fully accommodate the estimated parking demand, and the project's impact would be less-than-significant.

TABLE IV.D-15
SUMMARY OF PARKING SUPPLY, CODE REQUIREMENT AND DEMAND (BY PHASE)

Project Phase	Proposed Onsite Supply[a]	City Code Requirement	Estimated Parking Demand	Recommended Parking Supply[b]
Phase 1	660	644	503	553
Phase 2	581	587	400	440
Phases 1 & 2	*1,241*	*1,231*	*903*	*993*
Phase 3	545	550	375	413
Total Project	***1,786***	***1,781***	***1,278***	***1,406***

[a] Proposed supply is based on information provided by the project sponsor (per project site plan dated September 24, 2002).
[b] Recommended parking supply is based on parking demand rates and equations published by the Institute of Transportation Engineers (ITE), increased by 10 percent to account for parking inefficiencies and circulation/turnover considerations.

SOURCE: Fehr and Peers Associates, 2003

It should be noted that the proposed project includes 1,786 parking spaces for an estimated 1,531 employees. City Code requires 1,781 parking spaces for the same project buildout specification. Both of these seem excessive given absenteeism due to the project sponsor's proposed occupancy, in addition to vacation, sickness, or off-site work/meetings (generally assumed to be 5 to 10 percent of employees on a given day), plus the project's work shifts. The recommended supply, based on published ITE data and a 1.10 efficiency multiplier, provides a more realistic estimated need for about 1,406 spaces for the projected number of employees.

Additionally, the most effective way to promote alternative modes of travel and TDM programs is to limit parking facilities and charge employees to park. Therefore, although City code requires parking spaces as noted above, there could be greater benefits by reducing the supply of parking spaces on the site during each development phase and providing frequent and convenient shuttle service, convenient and protected bicycle parking, and other alternative mode enhancements. Conversely, if too few parking spaces were provided, the parking demand generated by Abbott Laboratories would spill over into the Port/MSI or adjacent Seaport Plaza parking facilities. This could cause a parking deficiency for these areas as their capacity would be occupied by vehicles generated by Abbott Laboratories. Parking deficiencies could result in vehicles being parked illegally on the street resulting in potential safety hazards. Without an areawide reduction in parking supply and corresponding enhancements in areawide shuttle service and alternative mode facilities, a parking reduction at only the Abbott Laboratories site would not necessarily be an effective trip reduction tool. Redevelopment of adjacent parcels would have to be held to the same reduced parking standards to be truly effective.

It is recommended that demand for the project's onsite parking spaces be monitored after completion of Phase 1. The monitoring survey, paid for by the project sponsor and administered in a manner approved by the City of Redwood City, would determine how the actual parking demand compares to the demand estimated herein, and would allow an adjustment to the proposed parking supply for Phases 2 and 3. For example, if the monitored parking demand were similar to, or lower than, the demand estimated for this EIR, then the number of parking spaces proposed for Phase 2 could be reduced (or the Phase 3 expansion of the parking garage could be eliminated).[6] In the event fewer parking spaces were needed, a landscape reserve could be maintained that could be converted to additional parking if Abbott's employee density were to increase, or if a new tenant were to occupy the site with a higher employee density.

Mitigation: None required.

Site Access and On-Site Circulation

The project site plan, dated January 21, 2003, was reviewed for the site access and on-site circulation analysis. The site plan is presented on Figure IV.D-10.

Vehicular access to the Abbott Laboratories facility would be accommodated via three driveways. The main driveway, located at the "bend" in Cardinal Way, would form the third leg of the intersection. The main entrance would include two inbound lanes north of the intersection and would provide queuing for approximately twelve vehicles assuming controlled access by either a gate or guard is maintained. The second driveway would provide access to parking facilities and

[6] Note that, as shown in Table IV.D-15, the estimated surplus of parking spaces for the total project is more than the estimated parking demand for Phase 3 of the project. That is, the proposed supply (1,786 spaces) is 380 spaces higher than the recommended supply (1,406 spaces), which is higher than the 375-space estimated demand for Phase 3.

INSERT **FIGURE IV.D-10** – SITE PLAN

is located approximately 200 feet south of the terminus of Cardinal Way. The second driveway shows queuing space for six to eight vehicles. The third driveway is a service driveway and would be located just south of the terminus of Cardinal Way. All access points to Abbott Laboratories would be secured. All driveways would be full access driveways (i.e., serve inbound and outbound driveways without any turn restrictions). Depending on the service rate of vehicles getting through security, the queuing capacity of the second driveway may need to be increased so as to not adversely affect through traffic on Cardinal Way.

Emergency access to the project site would be accommodated via two project driveways on Cardinal Way and at the terminus of Chesapeake Drive. Emergency access to the Seaport area (Seaport Boulevard) including the project site would be accommodated via either Blomquist Street (via the Maple Street overcrossing) or Seaport Boulevard / Woodside Road (via the US 101 undercrossing), and East Bayshore Road. Emergency vehicles can negotiate all turning movements required to access the project site. It is recommended that the final site plan be reviewed by the local fire department to ensure that adequate internal circulation is provided.

The main egress from the Abbott Laboratories Facility would be provided via a two-lane egress driveway. Based on the existing lane configuration on Cardinal Way, with one lane in each direction, it is recommended that this egress be redesigned with only one lane to prevent unnecessary merging and driver confusion.

MSI would share site access and parking with the Port of Redwood City. Access to both of these facilities would be provided via the north leg of the Chesapeake Drive / Saginaw Drive intersection. It is recommended that, because access to the MSI would be through the Port facility, speeds be monitored and pedestrian enhancements be installed if warranted.

Pedestrian access to the project site would be accommodated via existing pedestrian facilities on Cardinal Way. The site plan also shows a sidewalk around the entire project site, providing access to the waterfront and includes gated pedestrian entries into the Abbott Laboratories facility.

Abbott Laboratories' on-site vehicular circulation, at buildout, includes circulation within the parking structure, within the on-site parking spaces, and around the central plaza which would provide direct access to all on-site buildings. All circulation aisles would be approximately 25 feet wide and there would be no "dead-end" aisles. Parking spaces would be 8½ feet wide and 18 feet deep.

The Port and MSI parking area would have one-way circulation aisles providing access to angled parking spaces. The driveway would separate the parking area from the port. As discussed above, it is recommended that speeds along this driveway be monitored and that traffic calming devices, such as speed humps or raised crosswalks, be installed if warranted.

The site plan indicates that, at buildout, sidewalks would provide pedestrian access between all Abbott Laboratories buildings. It is recommended that the following project improvement measures be implemented by the project sponsor:

(1) speed humps, raised crosswalks, or other traffic-slowing measures provided where pedestrians cross the vehicular circulation aisles around the quad; and

(2) a sidewalk created along the northern edge of the Port/MSI parking lot to provide direct pedestrian access from the parking area to the MSI.

Impact D.7: Project construction could result in temporary circulation and safety impacts in the project vicinity. (Potentially Significant)

During the projected 44-month project construction period, temporary and intermittent transportation impacts would result from truck movements to and from the project site during demolition, excavation and construction activities.[7] Estimated construction durations for the project would be as shown in Table IV.D-16.

TABLE IV.D-16
CONSTRUCTION PERIOD ESTIMATES

Project Phase	Duration	Average Daily Heavy Vehicles	Average Daily Light Trucks	Average Daily Autos	Employees
Phase 1	16 months	8	13	13	30
Phase 2	14 months	10	16	12	30
Phase 3	14 months	6	8	8	22

SOURCE: Fehr and Peers Associates, 2003, based on information provided by the project sponsor

The impact of construction-related traffic would be a temporary and intermittent lessening of the capacities of project area streets because of the slower movements and larger turning radii of construction trucks compared to passenger vehicles. Given the proximity of US 101 freeway ramps to the project site, use of local roadways by haul trucks would be limited to the direct route between the site and the freeway. Truck traffic from 7:00 to 9:00 a.m. or from 4:00 to 6:00 p.m. would coincide with peak-period traffic, and could worsen service levels. Trucks are expected to be staged in a manner consistent with construction management/staging strategies established in conjunction with the project sponsor, construction contractor, and the Redwood City Engineering and Construction Division. Feasible traffic management and mitigation measures would be instituted to reduce traffic congestion during construction of this project and other nearby projects.

[7] Abbott proposes to construct the project in three phases, over a timeframe of approximately ten years, but actual construction time is estimated to be 44 months during those ten years.

As described above, construction-related effects are temporary in nature, and there would be no long-term impacts. To ensure that short-term impacts generated by project construction would be lessened to the maximum extent feasible, however, measures are identified below to mitigate the potentially significant short-term impacts.

Mitigation Measure D.7: Prior to construction activity, the project sponsor shall submit a construction management plan for review and approval by Redwood City's Engineering and Construction Division.

This plan shall include, but is not limited to, the following items:

- **Identification of routes and hours (in a Haul Route Plan) for the movements of construction vehicles that would minimize the impacts on vehicular traffic circulation and safety in the area.**
- **Staging of the movements of construction materials and equipment so as not to hinder the general flow of traffic in the immediate vicinity of the project site.**
- **Identification of areas required for encroachment within the public right-of-way.**
- **Accommodation of on-site placement of construction equipment and construction vehicles.**
- **Posting of signs at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and a day and evening contact number for the City of Redwood City.**
- **Designation of an on-site complaint and enforcement manager to respond to and track complaints.**
- **Provision of adequate notification procedures for any road closures.**

Significance after Mitigation: Less than Significant.

BLOMQUIST STREET EXTENSION INTERSECTION ANALYSIS

The Redwood City Traffic Impact Fee Mitigation Program has identified the need to extend Blomquist Street northward over Redwood Creek to East Bayshore Road (at the East Bayshore Road/Bair Island Road intersection). The proposed extension is approximately 50 percent funded at this time. The purpose of this section is to identify project impacts if the Blomquist Street extension were completed in the near future. This analysis is intended to provide additional information to the decision makers.

"With Blomquist Extension" Roadway Configuration

Preliminary plans have been developed for the proposed extension of Blomquist Street over Redwood Creek. Indications are that the extension will include one lane in each direction, with bicycle lanes and pedestrian facilities. (The pedestrian and bicycle facilities will ultimately close the gap in the Bay Trail that is discontinuous in this section of Redwood City.) At the northern end of the extension, the Blomquist Street / Bair Island Road / East Bayshore Road intersection [#5] will be controlled with a one-lane roundabout. For the purposes of this analysis, it is assumed that the Blomquist Street / Maple Street intersection [#9] will be stop-sign-controlled on the eastbound and westbound approaches only. Furthermore, it was assumed that the intersection approaches would be configured as follows:

- Northbound Approach – one shared left/through/right-turn lane.
- Southbound Approach – one dedicated right-turn lane and a shared through/left-turn lane.
- Eastbound Approach – one dedicated left-turn lane and a shared through/right-turn lane.
- Westbound Approach – one dedicated left-turn lane and a shared through/right-turn lane.

Emergency access to the project site would be similar to that described on page IV.D-66, but with the Blomquist Extension, emergency access to the Seaport area (Seaport Boulevard) including the project site via Blomquist Street would be expanded to include the extension to the US 101 / Whipple Avenue interchange.

"With Blomquist Extension" Roadway Volumes

The Blomquist Street extension will extend a roadway paralleling US 101 from it current terminus at Seaport Boulevard north to Whipple Avenue. The ability for trips generated on the east side of US 101 to access multiple interchanges or bypass freeway congestion will improve, and the overall circulation in the area will be enhanced. Therefore, background volumes were redistributed to local intersections to account for vehicles bypassing congestion on US 101 by using the Blomquist Street extension. Redistribution estimates developed for the *Blomquist Street Extension/Bair Island Road Intersection Analysis* (Fehr & Peers Associates, 2001) were used to help redistribute the background volumes for this analysis.

"With Blomquist Extension" Intersection Analysis

The redistributed background volumes and assumed lane configurations were used as inputs, and project traffic was reassigned to the roadway system to account for the Blomquist Street extension and was added to the Background with Blomquist intersection volumes. A level of service analysis was conducted at the study intersections under "with Blomquist" conditions (see Table IV.D-17).

TABLE IV.D-17
"WITH BLOMQUIST EXTENSION" INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	Background		Project Conditions		
		Delay[a]	LOS	Delay[a]	LOS	Change to Delay
1. El Camino Real / Whipple Avenue [b]	AM	33.9	C	34.1	C	+0.2
	PM	47.4	D	48.9	D	+1.5
2. Winslow St – Industrial Way / Whipple Ave	AM	29.2	C	29.2	C	+0.0
	PM	38.0	D	38.0	D	+0.0
3. Veterans Blvd / Whipple Avenue	AM	36.0	D	36.1	D	+0.1
	PM	39.4	D	39.8	D	+0.4
4. US 101 Northbound Off-Ramp / Whipple Avenue	AM	7.9	A	8.1	A	+0.2
	PM	12.8	B	12.9	B	+0.1
5. East Bayshore Rd / Bair Island Rd (*roundabout*)	AM	6.0	A	6.4	A	+0.4
	PM	6.5	A	6.1	A	-0.4
6. El Camino Real / Jefferson Avenue	AM	41.1	D	41.3	D	+0.2
	PM	47.8	D	48.1	D	+0.3
7. Veterans Blvd / Jefferson Avenue	AM	16.1	B	16.5	B	+0.4
	PM	28.1	C	28.5	C	+0.4
8. Veterans Boulevard / Maple Street	AM	23.9	C	24.2	C	+0.3
	PM	38.4	D	38.9	D	+0.5
9. Blomquist Street / Maple Street (*unsignalized*)	AM	23.7	C	28.1	D	+4.4
	PM	109.7	F	**>180**	**F**	>5.0
10. Alameda de las Pulgas / Woodside Rd	AM	37.9	D	38.2	D	+0.3
	PM	37.2	D	37.8	D	+0.6
11. Middlefield Road / Woodside Road	AM	37.5	D	37.8	D	+0.3
	PM	49.0	D	51.0	D	+2.0
12. Bay Road / Woodside Road	AM	22.2	C	22.2	C	0.0
	PM	29.9	C	30.3	C	+0.4
13. Broadway / Woodside Road [c]	AM	> 180	F	> 180	F	+4.8
	PM	> 180	F	> 180	F	-0.3
14. Veterans Blvd / Woodside Road	AM	17.3	B	18.1	B	+0.8
	PM	36.2	D	37.7	D	+1.5
15. Blomquist Street / Seaport Blvd	AM	33.4	C	35.2	D	+1.8
	PM	37.3	D	52.7	D	+15.4
16. Chesapeake Drive / Seaport Blvd	AM	11.8	B	14.0	B	+2.2
	PM	17.7	B	33.2	C	+15.5
17. Chesapeake Drive / Galveston Drive (*unsignalized*)	AM	8.9	A	9.3	A	+0.4
	PM	11.1	B	17.6	B	+6.5
18. Chesapeake Drive / Saginaw Drive (*unsignalized*)	AM	8.8	A	9.2	A	+0.4
	PM	9.3	A	13.3	B	+4.0
19. Cardinal Way / Saginaw Drive (*unsignalized*)	AM	9.7	A	10.4	B	+0.7
	PM	9.8	A	15.8	C	+6.0
20. Bayfront Expressway / Marsh Road	AM	25.0	C	25.2	C	+0.2
	PM	29.2	C	29.7	C	+0.5
21. Bayfront Expressway / Willow Road	AM	20.9	C	20.9	C	0.0
	PM	72.6	E	75.0	E	+2.4

[a] For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
[b] Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
[c] This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

Impact D.8: The proposed project would increase vehicle delays at area intersections under "With Blomquist" conditions. (Significant)

Under Background with Blomquist Conditions, the side-street movements at the unsignalized Blomquist Street / Maple Street intersection [#9] would operate at an unacceptable LOS F. The addition of project-generated traffic would exacerbate operations at the intersection by increasing the average control delay by more than 5.0 seconds. The intersection would meet the Caltrans Peak Hour Volume Warrant for signal installation, and based on the significance criteria established for this analysis, this would constitute a significant impact.

Under Existing, Background, and Project Conditions, the Woodside Road / Broadway intersection [#13] would operate at an unacceptable LOS F during the AM peak hour. The extension of Blomquist Street would slightly decrease volumes at this intersection under Background with Blomquist and Project with Blomquist conditions. The proposed project, with the Blomquist Street extension, would increase delay at the intersection by less than the five-second threshold of significance (a less-than-significant impact).

The Bayfront Expressway / Willow Road intersection [#21] would operate at an unacceptable LOS E during the PM peak hour, as it would without the extension. As would be the case without the Blomquist extension, delays would increase within an unacceptable LOS E during the PM peak hour due to the project, but the increase would be less than five seconds, and the effect would be less than significant. All other study intersections would operate at acceptable levels (LOS D or better) during the AM and PM peak hours under Background with Blomquist and Project with Blomquist Conditions.

Mitigation Measure D.8a: The project sponsor would work with the City of Redwood City to modify traffic control at the Blomquist Street / Maple Street intersection [#9] in one of three alternative ways. The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR and in the *Marina Shores EIR*)

- **Install a traffic signal (with emergency vehicle signal pre-emption), or**
- **Reconstruct the intersection as a roundabout, or**
- **Install stop signs on all intersection approaches.**

Installation of a traffic signal at the intersection would improve conditions to an acceptable LOS B during the AM and PM peak hours under Project with Blomquist Conditions, and emergency vehicle signal pre-emption would improve response time for emergency vehicles. If the intersection was controlled by a roundabout with design characteristics similar to the roundabout proposed for the East Bayshore Road / Bair Island Road intersection, the intersection would operate at an acceptable LOS B or better under Project with Blomquist Conditions during the AM and PM peak hours. Under all-way stop control, the intersection would operate at an acceptable LOS C during the AM and PM peak hours under Project with Blomquist Conditions if the intersection were further modified to widen the northbound approach to provide one dedicated left-turn lane and a shared through/right-turn lane, and to restripe the southbound approach to

provide a dedicated left-turn lane and a shared through/right-turn lane (so that the northbound and southbound left-turn approaches offset correctly).

With Woodside Road Widening Scenario

Similar to Background and Project Conditions, to provide additional information to the decision makers, traffic operating conditions at Middlefield Road / Woodside Road [#11], Bay Road / Woodside Road [#12], and Broadway / Woodside Road [#13] were assessed under a "with widening" scenario for "With Blomquist Extension" project conditions in addition to the now-likely "no widening" scenario. The results indicate that, if Woodside Road were widened to three lanes in each direction, peak-hour traffic operations at these study intersections would be similar to those if Woodside Road was not widened. That is, the levels of service would be the same, but with somewhat lower average delay per vehicle. The Woodside Road / Broadway intersection would continue to operate at an unacceptable LOS F during the AM and PM peak hours, and the project impact would be the same as under the "no widening" scenario (i.e., less than significant in both the AM and PM peak hours).

Significance after Mitigation: Less than Significant.

CUMULATIVE CONDITIONS ANALYSIS

Cumulative (2020) No Project Conditions

Cumulative No Project Conditions correspond to expected year 2020 traffic conditions without the proposed project.

Cumulative No Project Transportation Improvements

Several transportation improvements are assumed to be in place under Cumulative No Project Conditions. These improvements are described below:

- The extension of Blomquist Street, over Redwood Creek, to the East Bayshore Road / Bair Island Road intersection is assumed to be in place under Cumulative No Project Conditions. Intersection lane configurations and traffic control devices assumed under the above-described Background with Blomquist Conditions were used in the Cumulative No Project analysis.

- Veterans Boulevard is expected to be widened to four lanes, two in each direction, between Woodside Road and Chestnut Street.

- Increased Caltrain service including use of the "Baby Bullet". The expected increase in Caltrain frequency over existing use is that 12 and 10 trains will affect operations at the Whipple Avenue / El Camino Real intersection [#1] during the AM and PM peak hours, respectively, in year 2020 (Kolozsvari, 2002). Further adjustments were made to the "green time" allocated to certain movements at the intersection to account for additional Caltrain movements through Redwood City.

The Water Transit Authority has identified Redwood City as a location to extend ferry service to in the future. The proposed ferry terminal would be located at the end of Seaport Boulevard near the Pacific Shores office development. At this time, funding for ferry service to Redwood City has not been secured. This analysis does not include traffic generated by a ferry terminal on Seaport Boulevard due to the lack of secure funding.

Cumulative No Project Roadway Volumes

To estimate local and regional growth at the study intersections, peak-period traffic volumes from the C/CAG countywide travel demand forecasting model were obtained for the model's base year (2000) and future (2020) scenarios. An annual growth factor of one percent was developed by comparing the base year to the future year forecasts at the study intersections. The annual growth factor was then applied to Existing Condition volumes that were redistributed to account for the Blomquist Street extension.

Trips from approved and pending (reasonably foreseeable, but not yet approved) projects in the vicinity of the project site were then added to the redistributed and factored existing volumes to estimate volumes under Cumulative No Project Conditions. The list of approved and pending projects, their associated trip generation estimates, and their trip assignments are on-file and available for review at the Redwood City Community Development Department. Some of the pending projects included in this analysis include the proposed Marina Shores development, Kaiser Hospital Master Plan development, the Redwood City Downtown Area Plan and Housing Element possible development, and development of the Syufy property. The Cumulative No Project volumes are presented on Figure IV.D-11.

Cumulative No Project Intersection Analysis

Level of service calculations were conducted using the Cumulative No Project intersection volumes and assumed lane configurations (see Table IV.D-18). The results of the analysis indicate that ten of the study intersections, listed below, will operate at an unacceptable service level (LOS E or F) during one or both of the peak hours.

1. El Camino Real / Whipple Avenue (AM and PM)
3. Veterans Boulevard / Whipple Avenue (AM and PM)
6. El Camino Real / Jefferson Avenue (AM and PM)
9. Blomquist Street / Maple Avenue (AM and PM)
10. Alameda de las Pulgas / Woodside Road (AM and PM)
11. Middlefield Road / Woodside Road (AM and PM)
13. Broadway / Woodside Road (AM and PM)
14. Veterans Boulevard / Woodside Road (PM only)
15. Blomquist Street / Seaport Boulevard (AM only)
21. Bayfront Expressway / Willow Road (PM only)

INSERT **FIGURE IV.D-11A** – CUMULATIVE NO PROJECT VOLUMES

INSERT **FIGURE IV.D-11B** – CUMULATIVE NO PROJECT VOLUMES

TABLE IV.D-18
CUMULATIVE (2020) NO PROJECT INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	Intersection Control	Delay[a]	LOS
1. El Camino Real / Whipple Avenue [b]	AM		72.6	E
	PM	Signal	112.7	F
2. Winslow St – Industrial Way / Whipple Ave	AM		36.7	D
	PM	Signal	46.9	D
3. Veterans Boulevard / Whipple Avenue	AM		76.1	E
	PM	Signal	66.1	E
4. US 101 NB Off-Ramp / Whipple Avenue	AM		13.5	B
	PM	Signal	46.6	D
5. East Bayshore Rd / Bair Island Rd	AM		10.2	B
	PM	Roundabout	38.4	D
6. El Camino Real / Jefferson Avenue	AM		61.4	E
	PM	Signal	83.6	F
7. Veterans Boulevard / Jefferson Avenue	AM		20.7	C
	PM	Signal	31.6	C
8. Veterans Boulevard / Maple Street	AM		26.4	C
	PM	Signal	35.6	D
9. Blomquist Street / Maple Street	AM	Side-Street	>180	F
	PM	Stop-Control	>180	F
10. Alameda de las Pulgas / Woodside Road	AM		90.1	F
	PM	Signal	67.6	E
11. Middlefield Road / Woodside Road	AM		79.2	E
	PM	Signal	117.7	F
12. Bay Road / Woodside Road	AM		25.6	C
	PM	Signal	53.7	D
13. Broadway / Woodside Road [c]	AM		> 180	F
	PM	Signal	> 180	F
14. Veterans Boulevard / Woodside Road	AM		40.4	D
	PM	Signal	70.9	E
15. Blomquist Street / Seaport Boulevard	AM		80.3	F
	PM	Signal	54.4	D
16. Chesapeake Drive / Seaport Boulevard	AM		13.3	B
	PM	Signal	22.0	C
17. Chesapeake Drive / Galveston Drive	AM	Side-Street	9.0	A
	PM	Stop-Control	12.1	B
18. Chesapeake Drive / Saginaw Drive	AM	Side-Street	8.9	A
	PM	Stop-Control	9.6	A
19. Cardinal Way / Saginaw Drive	AM	Side-Street	10.0	B
	PM	Stop-Control	10.1	B
20. Bayfront Expressway / Marsh Road	AM		31.1	C
	PM	Signal	36.6	D
21. Bayfront Expressway / Willow Road	AM		25.3	C
	PM	Signal	148.5	F

a For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
b Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
c This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

With Woodside Road Widening Scenario

Similar to the previously-described analysis scenarios, to provide additional information to the decision makers, traffic operating conditions at Middlefield Road / Woodside Road [#11], Bay Road / Woodside Road [#12], and Broadway / Woodside Road [#13] were assessed under a "with widening" scenario for Cumulative No Project Conditions in addition to the now-likely "no widening" scenario. The results indicate that, if Woodside Road were widened to three lanes in each direction, Middlefield Road / Woodside Road would operate one service level better than if Woodside Road was not widened (i.e., at an acceptable LOS D during the AM peak hour, and an unacceptable level during the PM peak hour only). Traffic operations at Bay Road / Woodside Road would be similar to those without the widening (i.e., acceptable during both peak hours) if Woodside Road was not widened, although the PM peak-hour conditions would be one service level better with the widening. The Woodside Road / Broadway intersection would continue to operate at an unacceptable LOS F during the AM and PM peak hours with substantial delays (>180 seconds of average control delay) even with a widened Woodside Road.

Cumulative No Project Freeway Ramp Capacity Analysis

Operations of the study freeway ramps were reviewed by conducting a volume-to-capacity analysis under Cumulative No Project Conditions. To estimate volumes on the freeway ramps under this scenario, a growth rate of 0.5 percent per year (until year 2020) was applied to the existing volumes (obtained from Caltrans counts). As was done for the cumulative intersection analysis, trips from approved and pending projects in the vicinity of the project site were added to the factored existing volumes to estimate volumes under Cumulative No Project Conditions. The results of the freeway ramp capacity analysis are presented in Table IV.D-19.

The results of the freeway ramp capacity analysis indicate that all of the study freeway ramps are expected to have sufficient capacity to meet demand (i.e., v/c ratios less than 1.00) under Cumulative No Project Conditions during the AM and PM peak hours.

Cumulative No Project Freeway Mainline Capacity Analysis

Operations of the study freeway mainline segments were reviewed by conducting a volume-to-capacity analysis under Cumulative No Project Conditions. To estimate volumes on the freeway mainline segments under this scenario, a growth rate of 0.5 percent per year was applied to the existing volumes until year 2020 based on information from the C/CAG travel demand forecasting model. As was done for the cumulative intersection and freeway ramp analyses, trips from approved and pending projects in the vicinity of the project site were added to the factored existing volumes to estimate volumes under Cumulative No Project Conditions. The results of the freeway mainline capacity analysis are summarized in Table IV.D-20.

The results of the freeway segment capacity analysis under Cumulative No Project Conditions indicate that the southbound US 101 mixed flow lanes, SR 92 to Marsh Road, are expected to have a v/c ratio greater than 1.00 during the AM peak hour. Southbound US 101 mixed flow volumes, Whipple Avenue to Marsh Road, are expected to exceed capacity during the PM peak

TABLE IV.D-19
CUMULATIVE (2020) NO PROJECT FREEWAY RAMP CAPACITY ANALYSIS

US 101 Freeway Ramp	Capacity[a]	AM Peak Hour Volume[b]	AM Peak Hour V/C Ratio[c]	PM Peak Hour Volume[b]	PM Peak Hour V/C Ratio[c]
Southbound Off-Ramp onto Veterans Boulevard (Whipple Avenue)	3,800	2,190	0.58	1,942	0.51
Southbound Off-Ramp onto Seaport Boulevard	1,900	582	0.31	247	0.13
Southbound On-Ramp from Veterans Boulevard (Woodside Road)	2,000	1,468	0.73	1,367	0.68
Northbound Off-Ramp onto Seaport Boulevard	2,000	742	0.37	171	0.09
Northbound On-Ramp from Seaport Boulevard	2,000	454	0.23	839	0.42

a Based on capacities in the Caltrans *Highway Design Manual* and the posted travel speed on the ramp.
b Volumes obtained from existing count data provided by Caltrans.
c Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

hour as well. Westbound segments of SR 84 are expected to have V/C ratios greater than 1.00 during the AM peak hour. During the PM peak hour, eastbound segments of SR 84 are expected to have v/c ratios greater than 1.00. All other study segments are expected to have v/c ratios less than 1.00, where expected demand does not exceed the freeway segment's capacity.

Cumulative (2020) With Project Conditions

Trips generated by the proposed project were redistributed to account for the Blomquist Street extension. These trips were added to the Cumulative No Project volumes to estimate volumes under Cumulative with Project Conditions (see Figure IV.D-12).

Cumulative With Project Intersection Analysis

Impact D.9: The proposed project would increase vehicle delays at area intersections under cumulative (2020) conditions. (Significant)

As shown in Table IV.D-21, traffic added by the project would increase delays at the following six study intersections enough to have a significant effect on traffic operating conditions; contributing to the significance of the impact is that the increased delays also would increase the response time for emergency vehicles:

TABLE IV.D-20
CUMULATIVE (2020) NO PROJECT FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	AM Peak Hour Volume[b]	AM Peak Hour V/C Ratio[c]	PM Peak Hour Volume[b]	PM Peak Hour V/C Ratio[c]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	9,452	1.03	8,502	0.92
Southbound – Whipple Avenue to Woodside Road	Mixed	6,900	8,510	1.23	8,474	1.23
	HOV	1,800	1,155	0.64	1,181	0.66
Southbound – Woodside Road to Marsh Road	Mixed	6,900	8,445	1.22	6,988	1.01
	HOV	1,800	1,242	0.69	1,027	0.57
Northbound – Marsh Road to Woodside Road	Mixed	6,900	5,647	0.82	4,377	0.63
	HOV	1,800	973	0.54	699	0.39
Northbound – Woodside Road to Whipple Road	Mixed	6,900	6,123	0.89	4,740	0.69
	HOV	1,800	1,214	0.67	1,114	0.62
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	7,666	0.83	6,863	0.75
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	8,464	0.92	4,733	0.51
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	8,934	0.97	4,616	0.50
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	9,050	0.98	5,339	0.58
Southbound – Woodside Road to County Line	Mixed Flow	9,200	5,898	0.64	4,346	0.47
Northbound – County Line to Woodside Road	Mixed Flow	9,200	3,363	0.37	6,192	0.67
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	4,659	0.51	8,510	0.92
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	4,241	0.46	7,961	0.87
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	4,763	0.52	8,183	0.89
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	711	0.22	3,905	1.18
Eastbound – University Road to County Line	Mixed Flow	3,300	1,750	0.53	5,352	1.62
Westbound – County Line to University Road	Mixed Flow	3,300	5,145	1.56	1,620	0.49
Westbound – University Road to Willow Road	Mixed Flow	3,300	3,669	1.11	1,409	0.43

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

INSERT **FIGURE IV.D-12A** – CUMULATIVE WITH PROJECT VOLUMES

INSERT **FIGURE IV.D-12B** – CUMULATIVE WITH PROJECT VOLUMES

TABLE IV.D-21
CUMULATIVE NO PROJECT AND PROJECT INTERSECTION LEVELS OF SERVICE (LOS)

Intersection	Peak Hour	2020 No Project Delay[a]	2020 No Project LOS	2020 Project Conditions Delay[a]	2020 Project Conditions LOS	Change to Delay
1. El Camino Real / Whipple Avenue [b]	AM	72.6	E	73.4	E	+0.8
	PM	112.7	F	115.6	F	+2.9
2. Winslow St – Industrial Way / Whipple Ave	AM	36.7	D	37.0	D	+0.3
	PM	46.9	D	47.4	D	+0.5
3. Veterans Blvd / Whipple Avenue	AM	76.1	E	77.4	E	+1.3
	PM	66.1	E	67.4	E	+1.3
4. US 101 Northbound Off-Ramp / Whipple Avenue	AM	13.5	B	13.7	B	+0.2
	PM	46.6	D	47.4	D	+0.8
5. East Bayshore Rd / Bair Island Rd (*roundabout*)	AM	10.2	B	10.2	B	0.0
	PM	38.4	D	46.9	D	+8.5
6. El Camino Real / Jefferson Avenue	AM	61.4	E	62.1	E	+0.7
	PM	83.6	F	85.4	F	+1.8
7. Veterans Blvd / Jefferson Avenue	AM	20.7	C	21.4	C	+0.7
	PM	31.6	C	32.4	C	+0.8
8. Veterans Boulevard / Maple Street	AM	26.4	C	26.7	C	+0.3
	PM	35.6	D	36.6	D	+1.0
9. Blomquist Street / Maple Street (*unsignalized*)	AM	>180	F	**>180**	**F**	**>5.0**
	PM	>180	F	**>180**	**F**	**>5.0**
10. Alameda de las Pulgas / Woodside Rd	AM	90.1	F	91.4	F	+1.3
	PM	67.6	E	70.9	E	+3.3
11. Middlefield Road / Woodside Road	AM	79.2	E	83.2	F	+4.0
	PM	**117.7**	**F**	**124.8**	**F**	**+7.1**
12. Bay Road / Woodside Road	AM	25.6	C	25.9	C	+0.3
	PM	**53.7**	**D**	**59.8**	**E**	**+6.1**
13. Broadway / Woodside Road [c]	AM	> 180	F	**> 180**	**F**	**+6.2**
	PM	> 180	F	**> 180**	**F**	**+7.0**
14. Veterans Blvd / Woodside Road	AM	40.4	D	43.6	D	+3.2
	PM	70.9	E	**82.4**	**F**	**+11.5**
15. Blomquist Street / Seaport Blvd	AM	80.3	F	**107.6**	**F**	**+27.3**
	PM	54.4	D	**87.0**	**F**	**+32.6**
16. Chesapeake Drive / Seaport Blvd	AM	13.3	B	16.9	B	+3.6
	PM	23.7	C	46.0	D	+22.3
17. Chesapeake Drive / Galveston Drive (*unsignalized*)	AM	9.0	A	9.5	A	+0.5
	PM	12.1	B	21.2	C	+9.1
18. Chesapeake Drive / Saginaw Drive (*unsignalized*)	AM	8.9	A	9.4	A	+0.5
	PM	9.6	A	14.3	B	+4.7
19. Cardinal Way / Saginaw Drive (*unsignalized*)	AM	10.0	B	10.8	B	+0.8
	PM	10.1	B	17.6	C	+7.5
20. Bayfront Expressway / Marsh Road	AM	31.1	C	31.4	C	+0.3
	PM	36.6	D	37.4	D	+0.8
21. Bayfront Expressway / Willow Road	AM	25.3	C	25.4	C	+0.1
	PM	148.5	F	151.7	F	+3.2

[a] For signalized intersections, average control delay for the overall intersection is reported. For side-street stop-controlled intersections, control delay for the worst movement is reported.
[b] Adjustments were made to the signal timings at this intersection to account for Caltrain preemption.
[c] This intersection has five approach lanes, and was analyzed using the Synchro LOS software package.

SOURCE: Fehr and Peers Associates, 2003

Impact D.9a: The proposed project would increase vehicle delays within an already unacceptable level of service by more than five seconds on the side-street movements at the unsignalized intersection of Blomquist Street / Maple Street [#9] during the AM and PM peak hours; in addition, the intersection would meet the Caltrans Peak Hour Volume Warrant for signal installation.

Mitigation Measure D.9a: The project sponsor would work with the City of Redwood City to modify traffic control at the Blomquist Street / Maple Street intersection [#9] in one of two alternative ways. The project sponsor would pay their fair share of the cost of this measure. (Identified by this EIR and in the *Marina Shores EIR*)

- **Install a traffic signal (with emergency vehicle signal pre-emption), or**
- **Reconstruct the intersection as a roundabout**

Installation of a traffic signal at the intersection would improve conditions to an acceptable LOS D or better during the AM and PM peak hours under Cumulative with Project Conditions, and emergency vehicle signal pre-emption would improve response time for emergency vehicles. If the intersection was controlled by a roundabout with design characteristics similar to the roundabout proposed for the East Bayshore Road / Bair Island Road intersection, the intersection would operate at an acceptable LOS B under Cumulative with Project Conditions during the AM and PM peak hours.

Significance after Mitigation: Less than Significant.

Impact D.9b: The proposed project would increase vehicle delays within an already unacceptable level of service by more than five seconds at the signalized intersection of Middlefield Road / Woodside Road [#11] during the PM peak hour.

Mitigation Measure D.9b: In the absence of readily-attainable capacity-enhancing measures to improve traffic conditions at the intersection of Middlefield Road / Woodside Road [#11], the project sponsor would implement Mitigation Measure D.1b (a more aggressive Transportation Demand Management [TDM] program) to reduce the travel demand at this intersection. In addition, the project sponsor and the City of Redwood City shall work with Caltrans to add emergency vehicle signal pre-emption to the traffic signal control at this signalized intersection. The project sponsor would be fully responsible for the enhanced TDM program, and would pay its fair share of the cost of the emergency signal pre-emption. (Identified by this EIR)

For this intersection to operate at an acceptable level during the PM peak hour under Cumulative Plus Project Conditions, the dedicated eastbound and westbound right-turn lanes would need to be converted to a shared through/right-turn lane in each direction and add a receiving lane in each direction (essentially, the lane configurations if Woodside Road was widened to three lanes in each direction, as described on page IV.D-21). In addition, a second eastbound left-turn lane would need to be constructed.

These identified improvements include widening Woodside Road, which the City of Redwood City has identified as undesirable because of Caltrans design requirements. Therefore, to reduce impacts, it is recommended that the project sponsor intensify their TDM program to reduce peak-hour vehicle trips (see Mitigation Measure D.1b). Because of uncertainty as to the actual success rate for the TDM program, the level of vehicle trip reduction needed to reduce the impact at the Middlefield Road / Woodside Road [#11] intersection cannot be assured, and the impact would be significant and unavoidable. Although provision of emergency vehicle signal pre-emption would not improve the general operating conditions at this intersection to an acceptable level of service, it would improve response time for emergency vehicles.

Significance after Mitigation: Significant Unavoidable.

Impact D.9c: The proposed project would degrade the level of service from LOS D to LOS E at the signalized intersection of Bay Road / Woodside Road [#12] during the PM peak hour.

Mitigation Measure D.9c: In the absence of readily-attainable capacity-enhancing measures to improve traffic conditions at the intersection of Bay Road / Woodside Road [#12], the project sponsor would implement Mitigation Measure D.1b (a more aggressive Transportation Demand Management [TDM] program) to reduce the travel demand at this intersection. In addition, the project sponsor and the City of Redwood City shall work with Caltrans to add emergency vehicle signal pre-emption to the traffic signal control at this signalized intersection. The project sponsor would be fully responsible for the enhanced TDM program, and would pay its fair share of the cost of the emergency signal pre-emption. (Identified by this EIR)

For this intersection to operate at an acceptable level during the PM peak hour under Cumulative Plus Project Conditions, the westbound right-turn lane would need to be converted to a shared through/right-turn lane and a receiving lane would be needed to accommodate the additional through traffic (essentially, the lane configurations if Woodside Road was widened).

These identified improvements include widening Woodside Road, which the City of Redwood City has identified as undesirable because of Caltrans design requirements. Therefore, to reduce impacts, it is recommended that the project sponsor intensify their TDM program to reduce peak-hour vehicle trips (see Mitigation Measure D.1b). Because of uncertainty as to the actual success rate for the TDM program, the level of vehicle trip reduction needed to reduce the impact at the Bay Road / Woodside Road [#12] intersection cannot be assured, and the impact would be significant and unavoidable. Although provision of emergency vehicle signal pre-emption would not improve the general operating conditions at this intersection to an acceptable level of service, it would improve response time for emergency vehicles.

Significance after Mitigation: Significant Unavoidable.

Impact D.9d: The proposed project would increase vehicle delays within an already unacceptable level of service by more than five seconds at the signalized intersection of Broadway / Woodside Road [#13] during the AM and PM peak hours.

Mitigation Measure D.9d: Implement Mitigation Measure D.1a (work with Caltrans to modify the traffic signal phasing to provide an overlap phase during which northbound right turns would be made (with a green arrow) simultaneously with each of the signal phases for left turns from westbound Woodside Road and from the southbound US 101 off-ramp, and add emergency vehicle signal pre-emption to the traffic signal control). The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR)

As described under Mitigation Measure D.1a, page IV.D-42, the City is currently investigating modifications to improve operations at the intersection, including minor geometric reconfigurations and possible turn restrictions. Implementation of Mitigation Measure D.1a would decrease the project-generated increase in delay during the AM and PM peak hours to less than five seconds and would improve response time for emergency vehicles, thereby reducing the project impact to a less-than-significant level. However, because of constraints of available right-of-way, it is unlikely that any combination of turning restrictions and geometric enhancements would be able to improve traffic operating conditions to acceptable levels of service without eliminating one of the five approaches to the intersection and reconfiguring the interchange. Therefore, to further reduce project impacts, implementation of Mitigation Measure D.1b (more aggressive measures as part of the project sponsor's proposed TDM program to reduce the travel demand at this intersection) is recommended.

Significance after Mitigation: This project impact would be significant and unavoidable because it is not certain that Mitigation Measure D.1a could be implemented (i.e., because the City of Redwood City, as Lead Agency, could not implement the improvement without Caltrans' approval). However, in the event that Mitigation Measure D.1a could be implemented, the impact would be less than significant.

Impact D.9e: The proposed project would increase vehicle delays within an already unacceptable level of service by more than five seconds at the signalized intersection of Veterans Boulevard / Woodside Road [#14] during the PM peak hour.

Mitigation Measure D.9e: The project sponsor and the City of Redwood City shall work with Caltrans to modify the Veterans Boulevard / Woodside Road intersection [#14] in one of two alternative ways. The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR, the *Marina Shores EIR*, and the *Kaiser Master Plan EIR*)

- **Add a second southbound through lane on Veterans Boulevard (and add emergency vehicle signal pre-emption to the traffic signal control), or**

- **Add a second westbound left-turn lane on Seaport Boulevard - Woodside Road and modify the traffic signal to provide a westbound overlap right-turn signal phase or a free westbound right-turn movement (and add emergency vehicle signal pre-emption to the traffic signal control).**

Addition of a second southbound through lane on Veterans Boulevard would improve conditions to an acceptable LOS D during the PM peak hour under Cumulative with Project Conditions. It should be noted, however, that a second receiving lane would need to be added to the US 101 on-ramp, and the ramp would need to be widened to accommodate merging with the ramp connection from eastbound Woodside Road. If the ramp is not sufficiently widened, merging congestion could degrade ramp operations, making this mitigation undesirable. Although provision of emergency vehicle signal pre-emption would not improve the general operating conditions at this intersection to an acceptable level of service, it would improve response time for emergency vehicles.

Alternatively, a second westbound left-turn lane on Seaport Boulevard - Woodside Road could be added to the intersection, and the traffic signal modified so that westbound right turns would receive a green arrow simultaneous with southbound left turns, creating an overlap right-turn signal phase. This modification would require that southbound U-turns be prohibited at the intersection. Similar to the above alternative intersection modification, this measure would require the addition of a second receiving lane on the US 101 on-ramp, and in addition, would require modification to the structure supporting US 101. Such modifications to US 101 features could be infeasible. Again similar to the above alternative intersection modifications, while provision of emergency vehicle signal pre-emption would not improve the general operating conditions at this intersection to an acceptable level of service, it would improve response time for emergency vehicles.

Instead of providing an overlap right-turn phase, it may be more desirable to provide a "free" westbound right-turn movement. The dedicated right-turn lane would require a receiving lane on Veterans Boulevard, and the turning movement would not be controlled by the traffic signal at the intersection. This would require widening Veterans Boulevard in the northbound direction by one lane, which is consistent with the City of Redwood City's traffic impact mitigation fee study.

Significance after Mitigation: This project impact would be significant and unavoidable because it is not certain that Mitigation Measure D.9e could be implemented (i.e., because the City of Redwood City, as Lead Agency, could not implement either of the above improvements on state highways without Caltrans' approval).[8] However, in the event that Mitigation Measure D.9e could be implemented, the impact would be less than significant.

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[8] It should also be noted that Caltrans is currently conducting a study to identify improvements for the Woodside Road / US 101 interchange. Although the study is still in the preliminary stages and a preferred design alternative has not been identified, modifications at the interchange could affect operations at this intersection.

Impact D.9f: The proposed project would degrade the level of service from LOS D to LOS F at the signalized intersection of Blomquist Street / Seaport Boulevard [#15] during the PM peak hour, and delays would increase within an already unacceptable level of service by more than five seconds during the AM peak hour.

Mitigation Measure D.9f: The project sponsor would work with the City of Redwood City to modify the lane configuration and the signal phasing at the Blomquist Street / Seaport Boulevard intersection [#15]. The project sponsor would pay its fair share of the cost of this measure. (Identified by this EIR and the *Marina Shores EIR*)

To mitigate project impacts at the Blomquist Street / Seaport Boulevard intersection [#15], the following intersection modifications would be needed:

- Add a second dedicated northbound left-turn lane and restripe the existing shared through/left-turn lane as a dedicated through lane;
- Add a second dedicated southbound left-turn lane;
- Add a dedicated westbound right-turn lane and restripe the shared through/right-turn lane as a dedicated through lane; and
- Change north/south left-turn phasing from split-phase to protected-phase.

With these intersection modifications, the intersection would operate at an acceptable LOS D during the AM and PM peak hours.

It should be noted, however, that the addition of a lane to the southbound approach would require coordination with the railroad company and the Public Utilities Commission (PUC). Additionally, there may be inadequate room to add a westbound right-turn lane due to the railroad tracks. To fit the dedicated right-turn lane, the whole intersection may need to be realigned to the south, which may require modification to the levee currently supporting Seaport Boulevard.

Significance after Mitigation: This project impact would be significant and unavoidable because it is not certain that Mitigation Measure D.9f could be implemented (i.e., because the identified mitigation measure requires coordination with outside agencies, and realigning the intersection to the south may be infeasible). However, in the event that Mitigation Measure D.9f could be implemented, the impact would be less than significant.

There are five other study intersections that would operate at an unacceptable service level (LOS E or F) during one or both of the peak hours under Cumulative Conditions; however, the project-generated increase in vehicle delays would be less than five seconds, and the effect would be less than significant. The ten other study intersections would operate at an acceptable level (LOS D or better) during the AM and PM peak hours under Cumulative Conditions with the proposed project in place.

Other Affected Intersections Under Cumulative Conditions

The results of the level of service analysis indicate that, although the proposed project would have a less-than-significant cumulative impact at some of the study intersections (i.e., the proposed project would add less than five seconds of average control delay to each intersection), these intersections are expected to operate at unacceptable levels under Cumulative Conditions. Although CEQA guidelines do not required mitigation measures for less-than-significant impacts, the following discussion of suggested intersection improvements (to achieve acceptable LOS D or better conditions) is provided for information purposes:

El Camino Real / Whipple Avenue [#1]. This intersection would operate at an unacceptable LOS E or worse during the AM and PM peak hours under cumulative conditions with or without the proposed project. An improvement identified for this intersection in the *Redwood City Traffic Impact Mitigation Fee Study* (TIMFS) included the addition of a "free" westbound right-turn lane (i.e., a right-turn lane where vehicle movements are not controlled by the traffic signal) and associated receiving lane on the north leg of the intersection. However, the level of service analysis at this intersection indicated that, with the TIMFS improvement, the intersection would still not operate at an acceptable level during the AM nor PM peak hour.

If the intersection were grade-separated, then signal timings would not be affected by Caltrain, and the intersection would operate at an acceptable LOS D during the AM and PM peak hours. It should be noted that grade separation of the railroad crossing has been identified as an objective in the *Redwood City Strategic General Plan*, but that, due to the limited distance between the intersection and the railroad tracks, grade separation at this location may not be feasible.

Alternatively, the eastbound approach would need to be widened to include one dedicated right-turn lane, two through lanes, and one dedicated left-turn lane (currently, the approach is configured with one shared through/left-turn lane and one shared through/right-turn lane). The east/west signal phasing would also need to be changed from split phasing (i.e., eastbound and westbound traffic get separate, not concurrent, green lights) to protected left-turn phasing. With these intersection improvements, the intersection would operate at an acceptable LOS D during the AM and PM peak hours. It should be noted, however, that widening of the eastbound approach would require land acquisition because both sides of Whipple Avenue at the intersection are developed, and that may make the widening infeasible.

Veterans Boulevard / Whipple Avenue [#3]. This intersection would operate at an unacceptable LOS E during the AM and PM peak hours under cumulative conditions with or without the proposed project. An improvement for this intersection was identified in the TIMFS which includes the addition of a dedicated eastbound right-turn lane. However, the level of service analysis indicates that, even with this improvement, the intersection would still operate at an unacceptable level during the AM and PM peak hours.

In addition to the TIMFS-identified improvement, a second westbound left-turn lane is also needed. With the combined improvements, the intersection would operate at an acceptable LOS D during the AM and PM peak hours. It should be noted, however, that modification to the

westbound approach might require widening of the Whipple Avenue overpass (over US 101) and would likely require coordination with Caltrans.

El Camino Real / Jefferson Avenue [#6]. This intersection would operate at an unacceptable LOS E or worse during the AM and PM peak hours under cumulative conditions with or without the proposed project. With the addition of a second left-turn lane on the northbound, southbound, and eastbound approaches, the intersection would operate at an acceptable LOS D during the AM and PM peak hours. It should be noted, however, that this improvement is not desired by the City and is considered infeasible due to right-of-way constraints.

Alameda de las Pulgas / Woodside Road [#10]. This intersection would operate at an unacceptable LOS E or worse during the AM and PM peak hours under cumulative conditions with or without the proposed project. For the intersection to operate at an acceptable level, the eastbound and westbound approaches of Woodside Road would need an additional through lane. The eastbound approach to the intersection has a striped shoulder, and the westbound approach has a wide shoulder that provides on-street parking. The existing dedicated right-turn lanes for both approaches, when combined with the existing wide shoulders, would be restriped as a shared through/right-turn lane. With these modifications, the intersection would operate at LOS D during the AM and PM peak hours. It should be noted, however, that the lane additions would eliminate existing on-street parking spaces on Woodside Road for the length of the improvement.

Bayfront Expressway / Willow Road [#21]. This intersection would operate at an unacceptable LOS F during the PM peak hour under cumulative conditions with or without the proposed project. For the intersection to operate at an acceptable LOS D during the PM peak hour, the eastbound right-turn lane would need to be reconfigured as a "free" right-turn movement, with an associated receiving lane on the south leg of the intersection. This improvement would require coordination with Caltrans and the City of Menlo Park, and would likely require additional right-of-way for receiving lanes.

Cumulative with Project Freeway Ramp Capacity Analysis

Operations of the study freeway ramps were reviewed by conducting a volume-to-capacity analysis under Cumulative with Project Conditions. The purpose of this analysis is to verify that the freeway ramps would have adequate capacity to serve expected demand under Cumulative with Project Conditions.

Impact D.10: The proposed project would increase the traffic volume-to-capacity ratios on area freeway ramps. (Less than Significant)

As shown in Table IV.D-22, all of the study ramps would have adequate capacity (i.e., v/c ratios less than 1.00) under Project Conditions during the AM and PM peak hours. The project effect would be less than significant.

TABLE IV.D-22
CUMULATIVE WITH PROJECT FREEWAY RAMP CAPACITY ANALYSIS

US 101 Freeway Ramp	Capacity[a]	AM Peak Hour Project Trips	AM Peak Hour Volume[b]	AM Peak Hour V/C Ratio[c]	PM Peak Hour Project Trips	PM Peak Hour Volume[b]	PM Peak Hour V/C Ratio[c]
Southbound Off-Ramp onto Veterans Blvd (Whipple Avenue)	3,800	14	2,204	0.58	6	1,948	0.51
Southbound Off-Ramp onto Seaport Blvd	1,900	32	614	0.32	15	262	0.14
Southbound On-Ramp from Veterans Blvd (Woodside Road)	2,000	12	1,480	0.74	95	1,462	0.73
Northbound Off-Ramp onto Seaport Blvd	2,000	53	795	0.40	25	196	0.10
Northbound On-Ramp from Seaport Blvd	2,000	8	462	0.23	61	900	0.45

[a] Based on capacities in the Caltrans *Highway Design Manual* and the posted travel speed on the ramp.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

Mitigation: None required.

Cumulative with Project Freeway Mainline Capacity Analysis

Segments of US 101, I-280, and SR 84 were evaluated during the AM and PM peak hours under Cumulative conditions to identify any potentially significant project-related traffic increases on the study freeway segments. Assumptions regarding the relative use of mixed-flow lanes and auxiliary lanes for impact analysis, described on page IV.D-28, were applied here, too.

Impact D.11: The proposed project would increase the traffic volume-to-capacity ratios on area freeways. (Significant)

As shown in Table IV.D-23, during the AM peak hour, the southbound mixed-flow lanes on US 101 from SR 92 to Marsh Road would have v/c ratios of 1.03 to 1.23 under Cumulative Conditions. The two westbound study segments of SR 84 also would have v/c ratios greater than 1.00. The proposed project would add traffic volumes that are less than one percent of each of

TABLE IV.D-23
AM PEAK-HOUR CUMULATIVE FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	Project Trips	Volume[b]	V/C Ratio[c]	Project Percent[d]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	45	9,452	1.03	0.49
Southbound – Whipple Avenue to Woodside Road	Mixed	6,900	28	8,510	1.23	0.41
	HOV	1,800	4	1,155	0.64	0.22
Southbound – Woodside Road to Marsh Road	Mixed	6,900	11	8,445	1.22	0.16
	HOV	1,800	1	1,242	0.69	0.06
Northbound – Marsh Road to Woodside Road	Mixed	6,900	45	5,674	0.82	0.65
	HOV	1,800	8	973	0.54	0.44
Northbound – Woodside Road to Whipple Road	Mixed	6,900	7	3,123	0.89	0.10
	HOV	1,800	1	1,214	0.67	0.06
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	10	7,666	0.83	0.11
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	18	787464	0.92	0.20
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	2	8,934	0.97	0.02
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	2	9,050	0.98	0.02
Southbound – Woodside Road to County Line	Mixed Flow	9,200	5	5,898	0.64	0.05
Northbound – County Line to Woodside Road	Mixed Flow	9,200	20	3,363	0.37	0.22
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	6	4,659	0.51	0.07
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	10	4,241	0.46	0.11
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	4	4,763	0.52	0.04
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	5	711	0.22	0.15
Eastbound – University Road to County Line	Mixed Flow	3,300	5	1,750	0.53	0.15
Westbound – County Line to University Road	Mixed Flow	3,300	20	5,145	1.56	0.61
Westbound – University Road to Willow Road	Mixed Flow	3,300	20	3,669	1.11	0.61

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

these segments' capacity. All other study segments are expected to have V/C ratios less than 1.00. Therefore, during the AM peak hour, the proposed project would have a less-than-significant effect on the study freeway segments.

As shown in Table IV.D-24, during the PM peak hour, the southbound mixed-flow lanes on US 101 from Woodside Road to Marsh Road would have a v/c ratio of 1.02 under Cumulative Conditions. The two eastbound study segments of SR 84 also would have v/c ratios greater than 1.00. The proposed project would add traffic volumes that are more than one percent of each of these segments' capacity. Based on the freeway capacity significance criteria described above, this affect would represent a significant project impact to both study freeway segments.

The southbound mixed-flow lanes on US 101 from Whipple Avenue to Woodside Road would have a v/c ratio of 1.23 under Cumulative Conditions, but the proposed project would add traffic volumes that are less than one percent of each of these segments' capacity. All other study segments would have v/c ratios less than 1.00.

Mitigation Measure D.11: The project sponsor would implement Mitigation Measure D.1 (a more aggressive Transportation Demand Management program). The project sponsor would be fully responsible for this measure. (Identified by this EIR)

Full mitigation of this impact would require the addition of another through lane to these freeway segments. However, freeway widening is generally considered to be beyond the scope of a single development project and is therefore considered infeasible.

To minimize the significant effects of project traffic to these freeway segments, the proposed project should expand their TDM program. Additional TDM measures are described above under Mitigation Measure D.1. Although an increased TDM program would reduce the number of trips on the study freeway segments, project trips would likely not be eliminated. The project's TDM plan would need to achieve an additional 20 percent reduction in PM peak-hour vehicle trips to reduce the project's contribution to the freeway segments to less than the one percent significance

threshold. Because of uncertainty as to the actual success rate for TDM programs, however, the level of vehicle trip reduction needed to reduce the impact to US 101 and SR 84 cannot be ensured, and the impact would be significant and unavoidable.

Significance after Mitigation: Significant Unavoidable.

TABLE IV.D-24
PM PEAK-HOUR CUMULATIVE FREEWAY SEGMENT LEVELS OF SERVICE (LOS)

Segment	Lane Type	Capacity[a]	Project Trips	Volume[b]	V/C Ratio[c]	Project Percent[d]
US 101						
Southbound – SR 92 to Whipple Avenue	Mixed Flow	9,200	21	8,523	0.93	0.23
Southbound – Whipple Avenue to Woodside Road	Mixed	6,900	13	8,487	1.23	0.19
	HOV	1,800	2	1,183	0.66	0.11
Southbound – Woodside Road to Marsh Road	Mixed	6,900	84	7,072	**1.02**	**1.22**
	HOV	1,800	11	1,038	0.58	0.61
Northbound – Marsh Road to Woodside Road	Mixed	6,900	21	4,398	0.64	0.30
	HOV	1,800	4	703	0.39	0.22
Northbound – Woodside Road to Whipple Road	Mixed	6,900	52	4,792	0.69	0.75
	HOV	1,800	9	1,123	0.62	0.50
Northbound – Whipple Road to SR 92	Mixed Flow	9,200	81	6,944	0.75	0.88
I-280						
Southbound – SR 92 to Edgewood Road	Mixed Flow	9,200	8	4,741	0.52	0.09
Southbound – Edgewood Road to Farm Hill Boulevard	Mixed Flow	9,200	18	4,634	0.50	0.20
Southbound – Farm Hill Blvd to Woodside Road	Mixed Flow	9,200	11	5,350	0.58	0.12
Southbound – Woodside Road to County Line	Mixed Flow	9,200	36	4,382	0.47	0.39
Northbound – County Line to Woodside Road	Mixed Flow	9,200	10	6,202	0.67	0.11
Northbound – Woodside Road to Farm Hill Blvd	Mixed Flow	9,200	3	8,513	0.93	0.03
Northbound – Farm Hill Blvd to Edgewood Road	Mixed Flow	9,200	5	7,966	0.87	0.05
Northbound – Edgewood Road to SR 92	Mixed Flow	9,200	32	8,215	0.89	0.35
SR 84 (Bayfront Expressway)						
Eastbound – Willow Road to University Road	Mixed Flow	3,300	36	3,941	**1.19**	**1.09**
Eastbound – University Road to County Line	Mixed Flow	3,300	36	5,388	**1.63**	**1.09**
Westbound – County Line to University Road	Mixed Flow	3,300	10	1,630	0.49	0.30
Westbound – University Road to Willow Road	Mixed Flow	3,300	10	1,419	0.43	0.30

[a] Capacity = 2,300 vehicles per lane per hour for mixed-flow lanes, and 1,800 vplph for HOV lanes, on US 101 and I-280. Capacity = 1,100 vplph on SR 84. See text for description on how traffic in the auxiliary lanes was addressed.
[b] Volumes obtained from existing count data provided by Caltrans.
[c] Volume-to-Capacity Ratio.

SOURCE: Fehr and Peers Associates, 2003

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