3.4 Circulation and Traffic

ENVIRONMENTAL SETTING

PHYSICAL SETTING

Regional and Local Road Network

The Planning Area is a 375-acre rectangular area in northeast Antioch that is bounded on the north generally by Oakley Road, on the east by State Route 160 (SR 160), on the south by State Route 4 (SR 4), and on the west by Hillcrest Avenue. A larger study area has been defined to evaluate circulation impacts. Figure 3.4-1 shows the area context.

Major roads in the study area include SR 4 and SR 160 which are state highways as well as Hillcrest Avenue and East 18th Street. Local roads serving the site include Oakley Road, Phillips Lane, Willow Avenue, and Viera Avenue. Each of these roadways is described below.

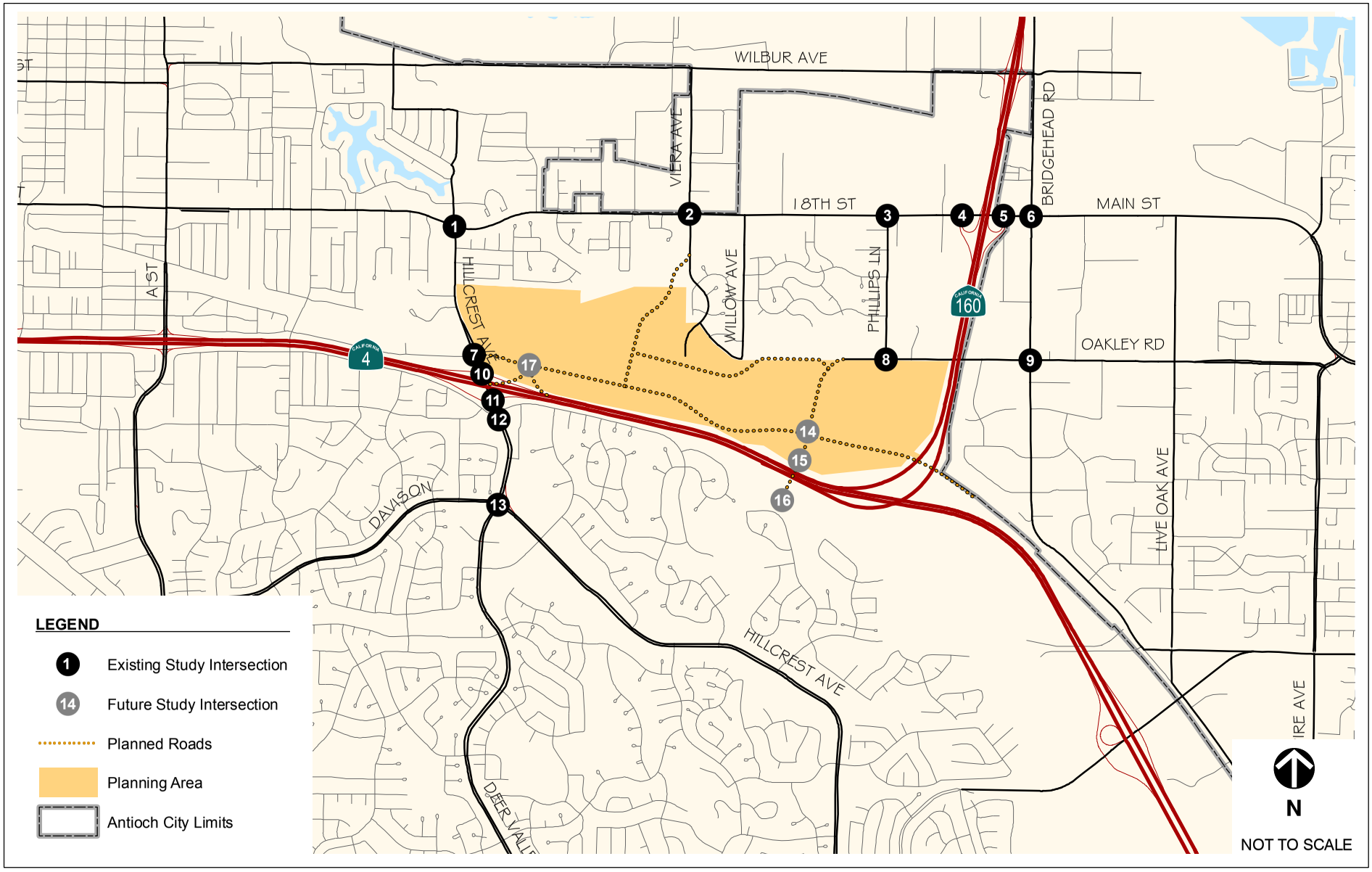
SR 160 is a north-south highway that extends through the study area, east of the Planning Area. This roadway serves as a major route connecting Antioch and Oakley to the Antioch Bridge and Sacramento County to the north, and to the SR 4 freeway to the west and east. SR 160 typically has two lanes in each direction, narrowing to one lane per direction north of the Antioch Bridge toll plaza. SR 160 has a local interchange at East 18th Street just north and east of the Planning Area and it is designated as a Route of Regional Significance through the study area by the *Draft 2008 East County Action Plan*.

SR 4 is an east-west highway that extends through the study area, south of the Planning Area. The road serves as a major route beginning in Hercules at Interstate 80 and continuing east through Antioch and eventually to Stockton and San Joaquin County. Through the study area, SR 4 is a four lane highway with a local interchange at Hillcrest Avenue. SR 4 is a designated Route of Regional Significance through the study area.

Hillcrest Avenue is a two- to six-lane, north-south roadway located west of the Planning Area. The road provides direct access to SR 4 via signalized intersections at the Hillcrest Avenue interchange. South of SR 4 the corridor is mostly commercial while north of SR 4 the corridor transitions to residential uses. Hillcrest Avenue is designated as a Route of Regional Significance through the study area.

East 18th Street is an east-west two- to four-lane roadway in Antioch and is located north of SR 4. It runs parallel to the SR 4 corridor. Direct access to SR 160 is via signalized intersections adjacent to the boundary between Antioch and Oakley. East of the interchange within the City of Oakley the street name changes to Main Street. This corridor is designated a Route of Regional Significance in the *2008 East County Action Plan*.

Oakley Road is a two-lane east-west roadway that connects Oakley to Antioch via a two-lane bridge over SR 160. Oakley Road begins at Viera Avenue in Antioch, extending over SR 160 and through the City of Oakley to Empire Avenue. There is limited development along Oakley Road within the study area.



Hillcrest Station Area Specifc Plan

Figure 3.4-1: Area Context & Study Intersections

Source: Fehr & Peer, 2008.

Phillips Lane is a two-lane north-south roadway that connects Oakley Road to East 18th Street. There is limited development along the corridor, although it does provide access to local residential streets.

Willow Avenue is a two-lane north-south roadway that connects Oakley Road to East 18th Street. There is residential development along the corridor with driveway access directly to Willow Avenue.

Viera Avenue is a two-lane north-south roadway that extends from the study area, south of Oakley Road, north to Wilbur Avenue. It intersects East 18th Street at a signalized intersection. There is residential development along the corridor with driveway access directly to Viera Avenue.

Traffic conditions on streets in Antioch are affected more by the operations at the intersections than by the capacities of the local streets because traffic control devices (signals and stop signs) control the capacity of the street segments. Traffic conditions on the freeway are affected by a combination of factors including the traffic densities and the number and type of merging, diverging, and weaving maneuvers. Intersection and freeway operations are measured using a grading system called level of service (LOS) ranging from LOS A, indicating free flow traffic conditions with little or no delay experienced by motorists, to LOS F, which describes congested conditions where traffic flows exceed design capacity, resulting in long queues and delays.

Level of Service Methodologies

Study intersection operations were evaluated using level of service calculations. The analysis method outlined in *Technical Procedures Update* prepared by the Contra Costa Transportation Authority (CCTA) (July, 2006), known as CCTALOS, was utilized. To augment this analysis, the Transportation Research Board's 2000 *Highway Capacity Manual* (HCM) method and Synchro software were also used.

Freeway operations were evaluated using the Delay Index method prescribed in *Technical Procedures Update* prepared by the Contra Costa Transportation Authority (CCTA) (July, 2006). The FREQ software was used to calculate freeway speeds.

Signalized Intersections

At each signalized study intersection, traffic conditions were evaluated using the CCTALOS and HCM methods. The CCTALOS planning-level analysis uses various intersection characteristics (i.e., traffic volumes, lane geometry, and signal phasing) to estimate the volume-to-capacity (v/c) ratio of an intersection. By contrast, the HCM operations analysis uses those and other intersection characteristics (i.e., traffic volumes, lane geometry, signal timing, and pedestrian activity) to estimate the average delay (measured in seconds per vehicle) experienced by motorists traveling through an intersection. Table 3.4-1 summarizes the relationship between the v/c ratio, delay, and LOS for signalized intersections. It is typical that both methods be applied so that both the intersection capacity and the average delay can be reported and evaluated.

Table 3.4-1 Signalized Intersection LOS Criteria

LOS	*CCTALOS*	*HCM*	*Description*
	Sum of Critical V/C Ratio	*Average Control Delay per Vehicle (seconds)*	
A	< 0.60	≤ 10.0	This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	0.61 - 0.70	10.1 to 20.0	This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.
C	0.71 - 0.80	20.1 to 35.0	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.
D	0.81 - 0.90	35.1 to 55.0	At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	0.91 - 1.00	55.1 to 80.0	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. The individual cycle failures are frequent occurrences.
F	> 1.00	> 80.0	This level, considered unacceptable, occurs when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may also be contributing factors to high delay levels.

Source: Technical Procedures, Contra Costa Transportation Authority, 2006.
Highway Capacity Manual, Transportation Research Board, 2000.

Unsignalized Intersections

For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, Chapter 17 of the Transportation Research Board's 2000 HCM method was used. With this method, the LOS ranking is related to the total average delay for each intersection movement, including those not controlled by a stop sign. Total delay is defined as the amount of time required for a driver to stop at the back of the queue, move to the first-in-queue position, and depart from the queue into the intersection. Table 3.4-2 summarizes the relationship between delay and LOS for unsignalized intersections. Typically, the delay and LOS for the worst-movement from the side-street is also reported for side-street stop-controlled intersections. Synchro software was used to calculate HCM-based LOS for unsignalized intersections.

Table 3.4-2 Unsignalized Intersection LOS Criteria

Level of Service	*Description*	*Average Control Delay Per Vehicle (Seconds)*
A	Little or no delays	< 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Source: Highway Capacity Manual, Transportation Research Board, 2000.

Freeway Delay Index

Traffic conditions on the freeway were evaluated using the Delay Index method. The Delay Index is defined as the ratio of the peak hour congested travel time to free-flow travel time. For example, a Delay Index of 2.0 means that it takes twice as long to travel a particular corridor during the peak commute hour than during non-commute hours when traffic moves at free-flow speeds. The FREQ software was used to determine the corridor travel speeds, which were then used to calculate the Delay Index.

Existing Vehicle Traffic Conditions - Intersections

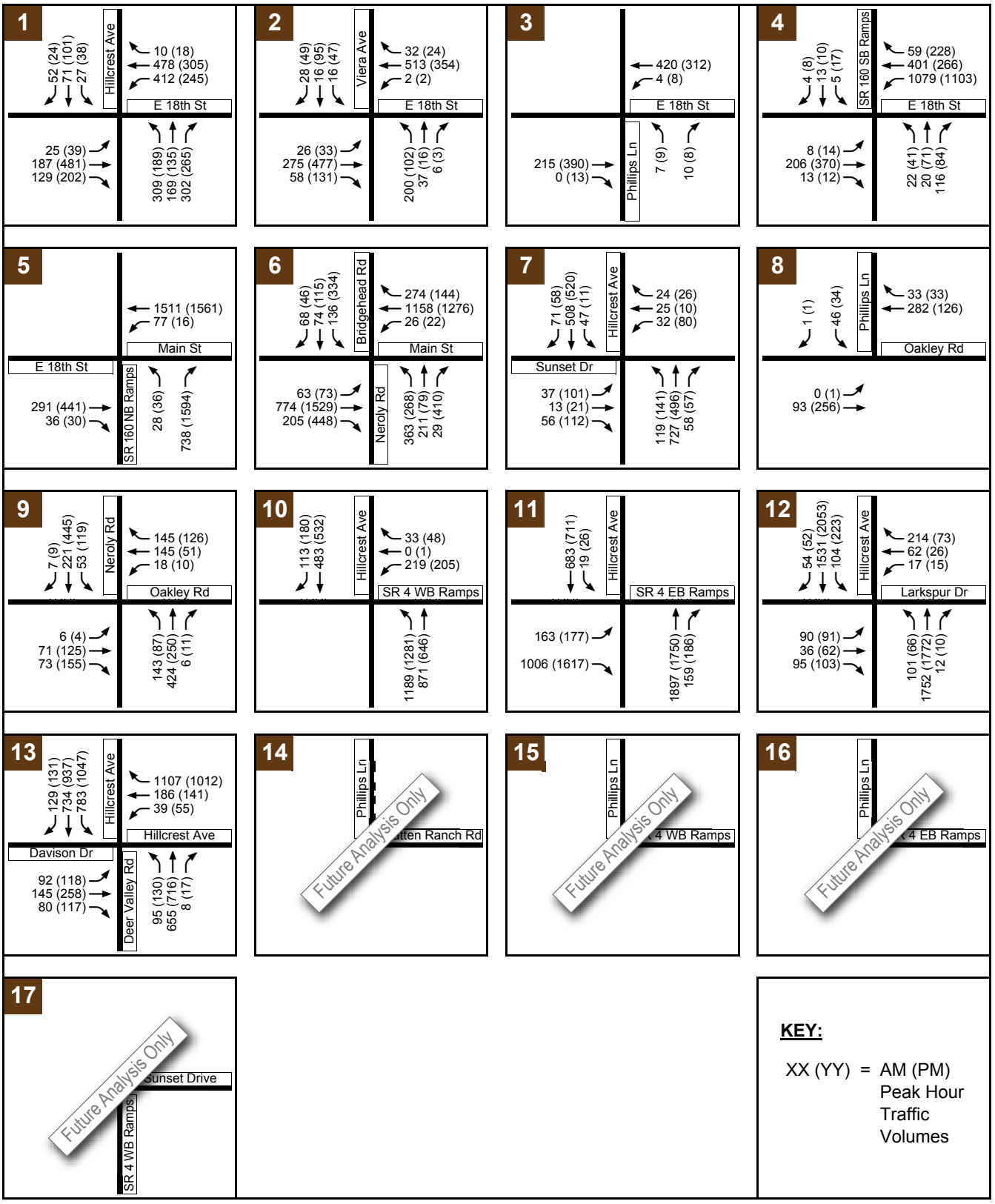
The study intersections are listed below and geographically shown on Figure 3.4-1. The existing (2007) weekday intersection traffic counts for the AM and PM peak hours are shown on Figure 3.4-2.

1. Hillcrest Avenue at East 18th Street
2. Viera Avenue at East 18th Street
3. Phillips Lane at East 18th Street
4. SR 160 Southbound Ramps at East 18th Street
5. SR 160 Northbound Ramps at East 18th Street
6. Bridgehead Road / Neroly Road at Main Street
7. Hillcrest Avenue at Sunset Drive
8. Phillips Lane at Oakley Road
9. Neroly Road at Oakley Road
10. Hillcrest Avenue at SR 4 Westbound Ramps
11. Hillcrest Avenue at SR 4 Eastbound Ramps
12. Hillcrest Avenue at East Tregallas Road and Larkspur Drive
13. Hillcrest Avenue at Deer Valley Road and Davidson Drive

The AM and PM peak hours were derived from peak period intersection counts collected during the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM). The data was collected during typical weekdays (Tuesday through Thursday) in September/October 2007 while schools were in session. The count data indicates that the AM peak hour occurs from 7:30 AM to 8:30 AM and the PM peak hour occurs from 4:30 PM to 5:30 PM. The existing AM and PM peak-hour intersection results using both CCTALOS and HCM are summarized in Table 3.4-3. The HCM LOS results are also shown on Figure 3.4-3.

All signalized study intersections operate at acceptable levels of service based on the CCTALOS and HCM methods and LOS standards, with the exception of the SR 160 Northbound Ramps at East 18th street (#5), Bridgehead Road/ Neroly Road intersection with Main Street (#6), and Hillcrest Avenue at SR 4 Eastbound Ramps (#11) which operate at LOS E in the weekday PM peak hour.

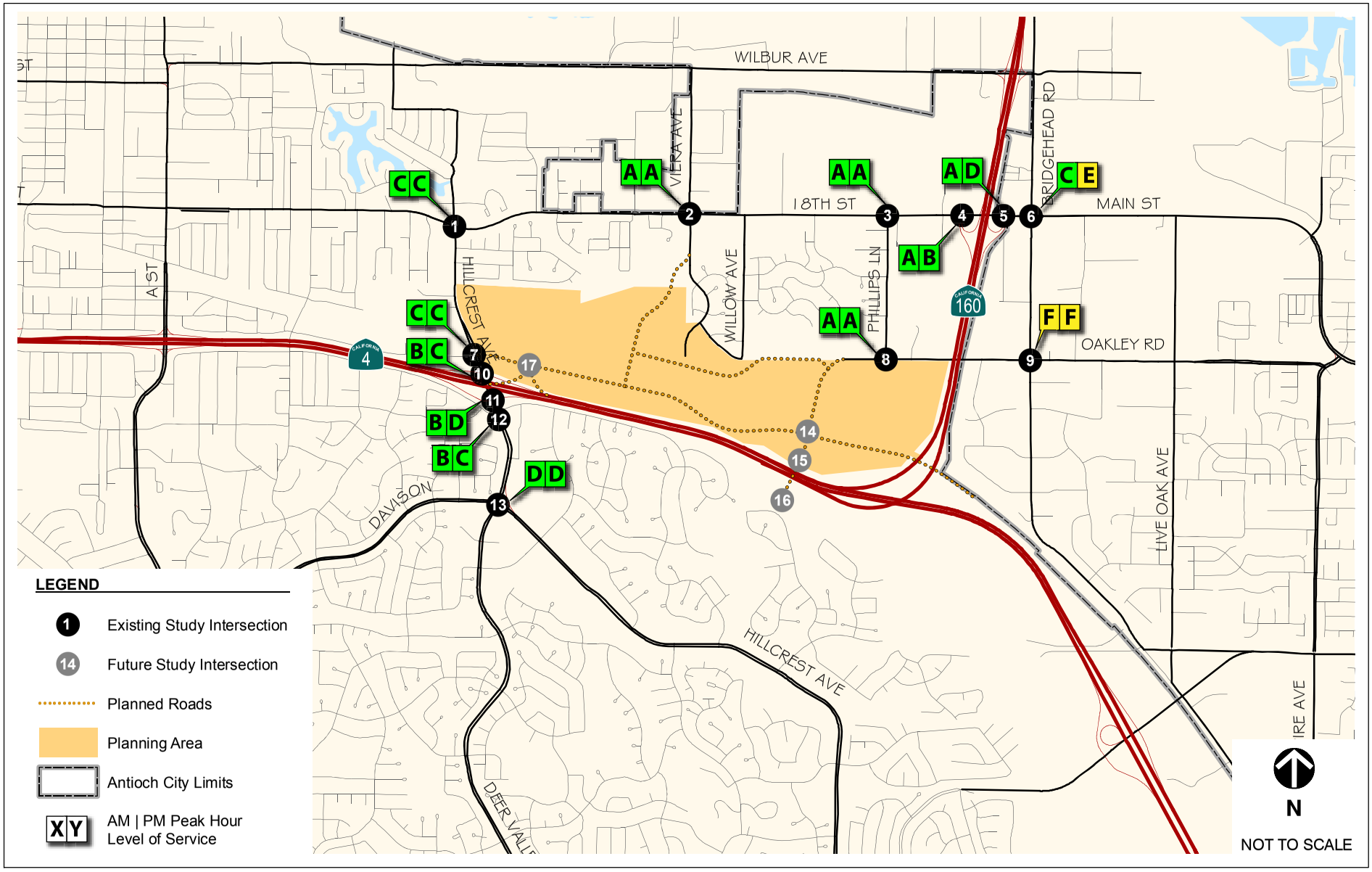
Most unsignalized intersections operate at an acceptable level of service during both the AM and PM peak hours, with the exception of the Neroly Road / Oakley Road intersection (#13) which operates at LOS F during the AM and PM peak hours. This intersection is an all-way stop-controlled intersection that the City of Oakley intends to signalize. The unacceptable service level is caused by heavy traffic volumes on Neroly Road.



Hillcrest Station Area Specifc Plan

Figure 3.4-2: Existing (2007) Peak Hour Traffic Volumes

Source: Fehr & Peer, 2008.



Hillcrest Station Area Specifc Plan

Figure 3.4-3: Existing Intersection Levels of Service

Source: Fehr & Peer, 2008.

The CCTALOS method can produce different results than the HCM method. The primary reason that the methods produce different results is that the CCTALOS method analyzes each intersection independently as an isolated intersection and calculates level of service based on the theoretical capacity of each movement at the intersection. Level of service in the HCM method is based on the delay experienced by each vehicle. The HCM method calculates delay based on physical characteristics of the intersection including signal timing and phasing at the intersection.

Table 3.4-3 Existing (2007) Intersection Operations Weekday AM and PM Peak Hour

Intersection	*Control /1/*	*Peak Hour*	*CCTALOS*		*HCM*	
			V/C /2/	*LOS*	*Delay /3/*	*LOS*
1. Hillcrest Avenue at East 18th Street	Signal	AM PM	0.576 0.531	A A	29 29	C C
2. Viera Avenue at East 18th Street	Signal	AM PM	0.310 0.296	A A	13 7	A A
3. Phillips Lane at East 18th Street	SSSC	AM PM	-- --	-- --	1 1	A A
4. SR 160 Southbound Ramps at East 18th Street	Signal	AM PM	0.491 0.564	A B	11 15	A B
5. SR 160 Northbound Ramps at East 18th Street	Signal	AM PM	0.651 **0.958**	B **E**	13 40	A D
6. Bridgehead Road/Neroly Road at Main Street	Signal	AM PM	0.602 **0.925**	B **E**	30 **64**	C **E**
7. Hillcrest Avenue at Sunset Drive	Signal	AM PM	0.338 0.390	A A	23 30	C C
8. Phillips Lane at Oakley Road	SSSC	AM PM	-- --	-- --	1 1	A A
9. Neroly Road at Oakley Road	AWSC	AM PM	-- --	-- --	**53** **53**	**F** **F**
10. Hillcrest Avenue at SR 4 Westbound Ramps	Signal	AM PM	0.681 0.736	B C	19 22	B C
11. Hillcrest Avenue at SR 4 Eastbound Ramps	Signal	AM PM	0.731 **0.907**	C **E**	18 37	B D
12. Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue	Signal	AM PM	0.562 0.604	A B	19 21	B C
13. Hillcrest Avenue at Deer Valley Road/Davidson Drive	Signal	AM PM	0.743 0.788	C C	41 52	D D

Bold indicates intersection operating at deficient level of service, based on LOS standards described in the following section on Regulatory Setting and shown on Table 3.4-6.

/1/ Intersection Control: Signal = Signalized intersection; SSSC = Side-street stop-controlled intersection; and AWSC = All-way stop-controlled intersection.

/2/ Volume-to-capacity ratio (V/C) determined for all signalized intersections using the CCTALOS methodology. Unsignalized intersections are not evaluated with this method.

/3/ Average intersection delay is calculated for all signalized and unsignalized intersections using the HCM methods. For side-street stop-controlled intersections, average intersection delay (in seconds per vehicle) is presented and the delay for worst approach is shown in parentheses.

Source: Fehr & Peers, 2008.

Existing Vehicle Traffic Operations - Freeway

Weekday peak period traffic counts were conducted on SR 4 at the Hillcrest Avenue over-crossing and at study area ramps during a typical weekday (Tuesday through Thursday) in October 2007. No major incidents were reported on SR 4 or SR 160 during the data collection period. The mainline counts collected in October 2007 were lower than weekday peak period volumes on SR 4 and SR 160 obtained from the 2006 traffic volume data provided by Caltrans at the SR 160 count station located north of Wilbur Avenue. Therefore, the 2006 traffic volume data provided by Caltrans was used for this study. Table 3.4-4 summarizes the existing AM and PM peak hour freeway traffic volumes.

Table 3.4-4 Existing (2006) Freeway Traffic Volumes

Freeway Segment	*Eastbound AM Peak Hour*	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
SR 4, West of Hillcrest Avenue	2,040	2,390	3,720	2,880
SR 4, East of Hillcrest Avenue	1,050	1,340	2,140	1,670
SR 4 (Bypass, west of SR 160)	Data Unavailable - Opened summer 2008			
SR 160, South of E. 18th St	1,050	1,340	2,140	1,670

Source: Fehr & Peers, 2008.

Truck traffic on SR 4 and SR 160 was obtained from the 2005 Annual Average Daily Truck Traffic on the California State Highway System prepared by Caltrans. These counts indicate that heavy vehicles make up about five percent of the total traffic on SR 4 and SR 160.

The existing AM and PM peak-hour speed and Delay Index is summarized in Table 3.4-5. SR 4 and SR 160 in the study area currently satisfy the Traffic Service Objective set by the *East County Action Plan* (CCTA 2000), which specifies that the Delay Index on the freeway should be no greater than 2.5.

Table 3.4-5 Existing Freeway Operations

Measure of Effectiveness /1/	*Eastbound AM Peak Hour*	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
Average Travel Speed (mph)	70	46	68	70
Delay Index /2/	1.0	1.52	1.02	1.0

/1/ Study section of SR 4/SR 160 extends from A Street (east side ramps) to Wilbur Avenue (south side ramps).

/2/ Delay Index is calculated as the free-flow speed (assumed to be 70 mph) divided by the average travel speed. The Traffic Service Objective set by the *East County Action Plan* (CCTA 2000) specifies that the Delay Index on the freeway should be no greater than 2.5.

Source: Fehr & Peers, 2008.

Existing Vehicle Miles Traveled (VMT)

Vehicle miles traveled (VMT) refers to the number of vehicle miles traveled during a given period of time for a given population. One vehicle traveling one mile constitutes one vehicle mile, regardless of its size or the number of passengers. VMT is a common measure of roadway use. The VMT per capita is the total VMT generated by the given population divided by the population. It is a measure of the vehicle miles each person travels on average. Per capita VMT data correlate with various economic and lifestyle factors such as auto ownership, workforce diversity, teen driving, and land use patterns. For this study, population refers to population plus employment.

The Contra Costa Transportation Authority (CCTA) Decennial Countywide Travel Demand Model was used to derive citywide VMT characteristics for year 2007. The land use inputs to the model for year 2007 included 33,822 dwelling units (104,150 population) and 22,178 jobs in Antioch. In total, this land use generated 2,583,803 VMT, or 20.5 VMT per capita i.e., population plus employment.

Existing Transit Operations and Facilities

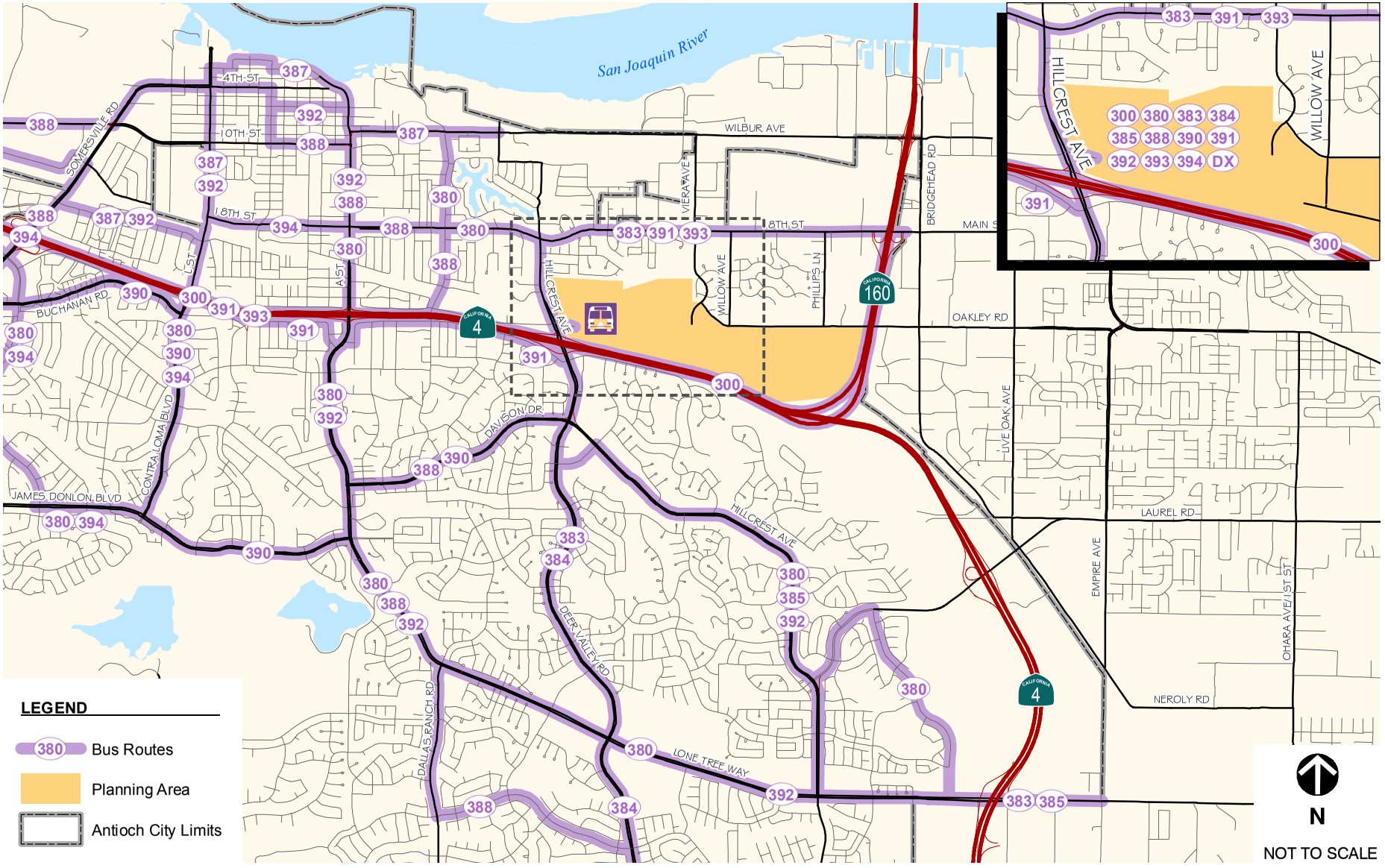
Transit is an important part of Antioch's transportation planning efforts. Expansion of bus service and extension of rail transit into the community will assist in easing the burden on SR 4 during peak commute hours. Bus and rail transit service will also improve access to Antioch's employment generating areas, and provide mobility to transit-dependent populations (e.g., youth and senior citizens). (Antioch General Plan pg. 7-15)

There are several bus transit routes that serve the Hillcrest Park & Ride lot. Figure 3.4-4 shows the existing transit routes operated by Tri Delta Transit that access the lot. These include Routes 300, 383, 384, 385, 386, 390, 392, 393 (weekend), and 394 (weekend). These routes operate with 15 to 60 minute headways throughout the day. Tri Delta Transit also operates the Delta Express which stops at the lot. Transfers to County Connection's Route 930C, which services Pittsburg, Concord, Walnut Creek and the Walnut Creek BART station are possible at the Hillcrest Park & Ride lot.

During peak times about nine westbound or eastbound Tri Delta Transit buses serve the Hillcrest Park & Ride lot and the Pittsburg/Bay Point BART station. Between six and seven buses serve the Sutter Delta Medical Center in Antioch during the same periods.

Tri Delta Transit's Route 300 provides express bus service between Brentwood and the Pittsburg/Bay Point BART Station. This all-day express service makes two stops in Brentwood, two in Oakley, one in Antioch at the Hillcrest Park & Ride lot, and one at the Pittsburg/Bay Point BART Station. The bus operates from 3:15 AM to approximately 10:00 PM on 15- to 30-minute headways.

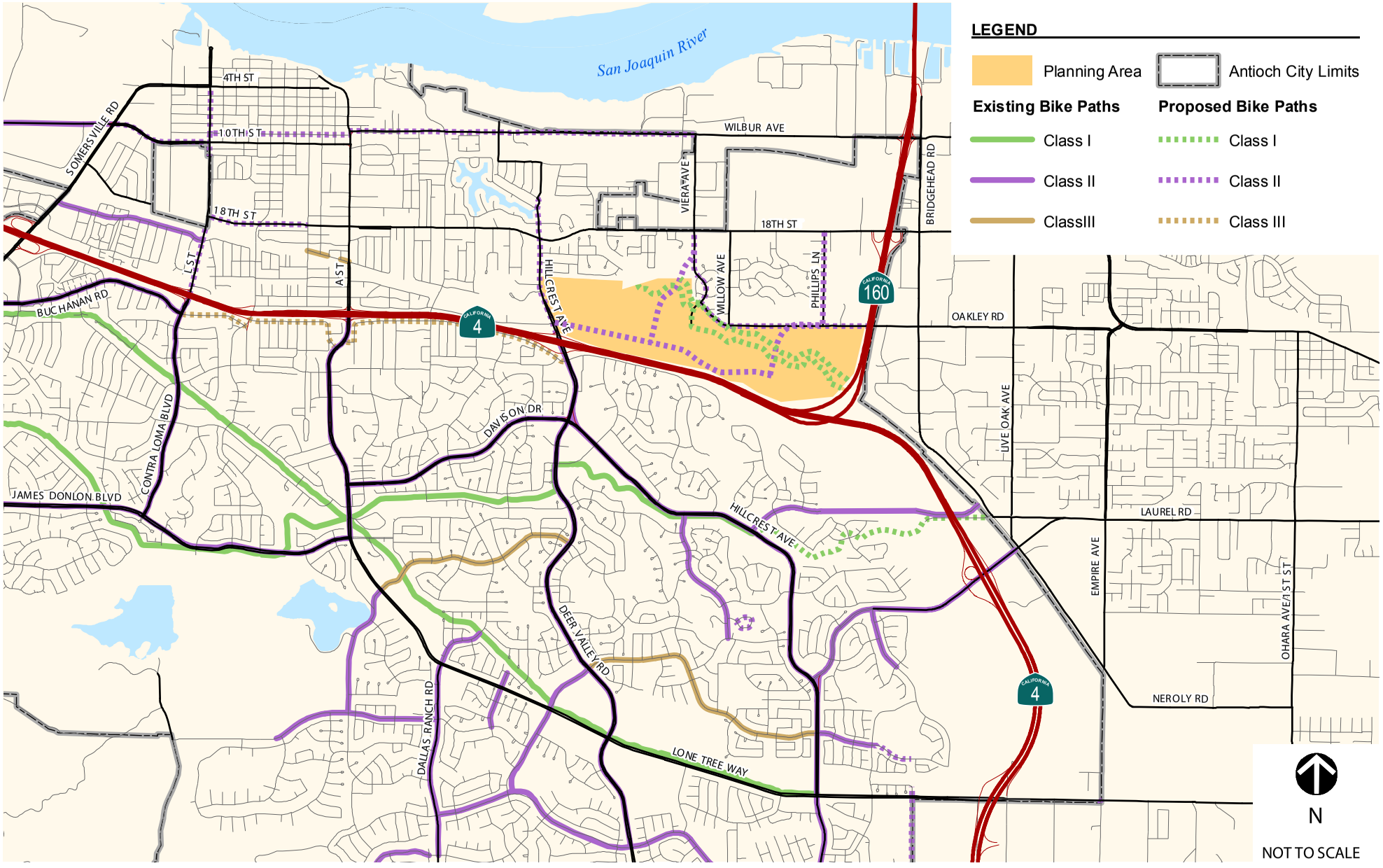
Delta Express, the express commuter bus run by Tri-Delta Transit, serves Martinez from the Hillcrest Park & Ride lot with one bus in the morning and one in the evening. Another express route connects the lot with the Dublin/Pleasanton BART station, where passengers can connect with a free shuttle to the Bishop Ranch Business Park. Two bus runs each commute period are made for this route. The third route is between the lot and the Lawrence Livermore National Lab. It too has two morning and two evening runs during the week.



Hillcrest Station Area Specifc Plan

Figure 3.4-4: Existing (2007) Transit Routes in Antioch

Source: Fehr & Peer, 2008.



Hillcrest Station Area Specifc Plan

Figure 3.4-5: Existing and Planned Bike Routes in Antioch

Source: Fehr & Peer, 2008.

Existing Bicycle and Pedestrian Facilities

The City of Antioch prioritizes the maintenance of a safe, convenient, and continuous network of pedestrian sidewalks, pathways, and bicycle facilities to facilitate bicycling and walking as alternatives to driving private automobiles. (General Plan pg. 7-14)

Existing and proposed bikeway facilities in Antioch are distributed throughout the city. The City uses the following standard bike lane classification system: Class I facilities are bike paths that exclude motor vehicle access; Class II facilities are designated bike lanes that provide a space in the road for bicycle travel; and Class III facilities are bicycle routes that provide signage to alert bicyclists and motorists that a bicycle route exists.

Currently, limited bicycle and pedestrian facilities exist within the study area. Hillcrest Avenue, south of East 18th Street, is designated for Class II bike facilities. No other roads in the Planning Area have designated bike facilities. Pedestrian access is available throughout the developed areas of Antioch, including sidewalks, wheelchair ramps, and crosswalks. Many outlying areas are still rural in character, and do not have sidewalks. There are no continuous pedestrian facilities within the Planning Area since the area is generally undeveloped.

Pedestrian and bicycle facilities will be provided in accordance with the General Plan as future development proceeds. The City of Oakley General Plan (adopted in December 2002), the City of Antioch General Plan (November 2003), City of Oakley Parks, Recreation and Trails Master Plan (March 2003), and East County Bikeway Plan (currently being updated) propose that several new facilities be constructed in the future. Figure 3.4-5 shows the existing and future bike facilities in the city, as planned in the 2003 General Plan.

Existing Freight Rail

The Union Pacific Mococo Line traverses the Planning Area. At this time, the rail line is generally inactive. There are currently at-grade crossings of this rail line at Hillcrest Avenue, west of the Planning Area, and at Willow Avenue within the Planning Area. There are no grade-separated rail crossings in northeast Antioch. So, any train activity on this line would prohibit north/south vehicle flow.

The General Plan identifies the need for an additional rail crossing via Phillips Lane extension south from Oakley Road to Slatten Ranch Road. Because California Public Utilities Commission (CPUC) guidelines generally prohibit the creation of new at-grade rail crossings, providing this crossing will necessitate construction of a new over- or under-pass. A similar condition exists should Viera Avenue be extended south to Slatten Ranch Road.

The General Plan recognizes that traffic congestion at local at-grade rail crossings will increase due to increased rail and automobile traffic. As a result, the General Plan policies require the City to work with the railroads to construct grade separations along the tracks through Antioch including at Hillcrest Avenue.

REGULATORY SETTING

State

Caltrans does not have regulations regarding traffic LOS on state highway facilities. They do have guidelines for traffic operations on State Highway facilities. Caltrans recommends a target LOS at the threshold between LOS C and LOS D. If the location under existing conditions operates worse than the appropriate target LOS, then the existing LOS should be maintained.

Regional

One of the key components in the Contra Costa Transportation Authority's Growth Management Program is the requirement that local jurisdictions engage in cooperative, multi-jurisdictional planning. One of the key components of this cooperative planning is the preparation of Action Plans for Routes of Regional Significance. The Action Plans are intended to reduce cumulative regional traffic impacts from forecasted development. As part of the Action Plan, each Regional Transportation Planning Committee identifies a system of Regional Routes, that is, those freeways and arterials that provide the main connections among Contra Costa's communities and to the surrounding region.

The *East County Action Plan* (CCTA, 2000) establishes Traffic Service Objectives (TSO) for routes of regional significance in eastern Contra Costa County. An update to the East County Action Plan is currently in draft form but has not yet been adopted; the TSOs proposed in that draft are the same as those in the adopted 2000 East County Action Plan for the facilities studied in this report. The TSO used to measure freeway operations is the peak hour Delay Index. Delay Index is defined as the ratio of the peak hour congested travel time to free-flow travel time on each freeway segment. For example, a Delay Index of 2.0 means that it takes twice as long to travel a particular segment during the peak commute hour than during non-commute hours when traffic moves at free-flow speeds. Objectives for SR 4 and SR 160 include a Delay Index of 2.5.

The Action Plan establishes a TSO for signalized intersections on Routes of Regional Significance. LOS of Mid-D with a volume-to-capacity ratio of 0.85 is considered the threshold.

Local

The Growth Management Element of the City's General Plan sets level of service standards for roadways in the City of Antioch consistent with requirements of Measure C, along with policies to ensure that these standards are maintained. Standards are defined for "Routes of Regional Significance" and for "Basic Routes."

"Routes of Regional Significance" include state highways and other major roadways that carry a significant amount of through traffic and link Antioch to neighboring jurisdictions. These routes are subject to implementation of the Action Plans, a set of programs and policies that are developed with other jurisdictions in the County to address traffic impacts along these regional routes. SR 4, SR 160, Hillcrest Avenue, and East 18th Street are designated as routes of regional significance. Discretionary projects that impact routes of regional significance shall comply with the requirements of the adopted Action Plans.

"Basic Routes" include all local roads that are not otherwise designated as routes of regional significance. Roads providing access the Planning Area that are considered "Basic Routes" include Neroly Road, Oakley Road, Willow Avenue, and Viera Avenue.

Table 3.4-6 identifies the intersection standards for the study locations using the City's General Plan standards and the standards from the East County Action Plan (CCTA, 2000). Consistent with City General Plan policies, the adopted standards from the East County Action Plan (CCTA, 2000) will be used in this study to assess CEQA-level impacts.

Table 3.4-6 Intersection Traffic Standards

Study Intersection	*Antioch General Plan Standards*	*East County Action Plan Standards /1/*
Signalized intersections along Hillcrest Avenue at: Deer Valley Road / Davidson Drive (#1) East Tregallas Road / Larkspur Drive (#2) SR 4 Eastbound Ramps (#3) SR 4 Westbound Ramps (#4) Sunset Drive (#5)	LOS D Avg. Delay = 55 sec. V/C = 0.90	Mid-LOS D Avg. Delay = 45 sec. V/C = 0.85
Signalized intersections on Basic Routes in Antioch, within 1,000 feet of a freeway interchange: SR 160 Southbound Ramps at East 18th Street (#9) SR 160 Northbound Ramps at East 18th Street (#10)	Mid-LOS E Avg. Delay = 67 sec. V/C = 0.94	Mid-LOS D Avg. Delay = 45 sec. V/C = 0.85
Signalized intersections on Basic Routes in Antioch, further than 1,000 feet of a freeway interchange: Hillcrest Avenue at East 18th Street (#6) Viera Avenue at East 18th Street (#7)	High-LOS D Avg. Delay = 50 sec. V/C = 0.85-0.89	Mid-LOS D Avg. Delay = 45 sec. V/C = 0.85
Unsignalized intersections on Basic Routes in Antioch, further than 1,000 feet of a freeway interchange: Phillips Lane at East 18th Street (#8) Phillips Lane at Oakley Road (#12)	High-LOS D **/2/** Avg. Delay = 32 sec	Mid-LOS D **/2/** Avg. Delay = 30 sec
Signalized intersections along Main Street: Bridgehead Road / Neroly Road at Main Street (#11)	LOS D Avg. Delay = 55 sec. V/C = 0.90	Mid-LOS D Avg. Delay = 45 sec. V/C = 0.85
Unsignalized intersections on Basic Routes in Oakley: Oakley Road/Neroly Road (#13)	LOS D **/2/** Avg. Delay = 35 sec.	Mid-LOS D **/2/** Avg. Delay = 30 sec

/1/ East County Action Plan for Routes of Regional Significance (TRANSPLAN, 2000). These standards will be used to assess CEQA-level impacts.

/2/ Unsignalized intersections are not explicitly addressed. This threshold is extrapolated from the signalized standards.

Source: Fehr & Peers, 2008

IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

Based on the adopted standards in the East County Action Plan and consistent with City General Plan policies, a significant traffic impact would occur if the addition of project-related traffic would result in:

- operations of a signalized study intersection to decline from an acceptable level to an unacceptable level (service levels are defined in Table 3.4-6 for each study intersection); or,
- deterioration in already unacceptable operations at a signalized intersection by a change in average delay of more than 5 seconds; or,
- operations of an unsignalized study intersection to decline from an acceptable to an unacceptable level (as defined in Table 3.4-6), and the need for installation of a traffic signal, based on the Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour Signal Warrant (Warrant 3); or,
- operations of a freeway segment to exceed the established Delay Index standard of 2.5; or,
- deterioration in a freeway segment that already exceeds the established Delay Index standard by increasing the freeway volume by more than 3 percent.

A significant traffic impact would also occur if the project would result in:

- substantially increased hazards or congestion due to a design feature (e.g., sharp curves) or incompatible uses (e.g., farm equipment); or,
- inadequate emergency access; or,
- conflicts with adopted alternative transportation policies, plans, or programs.

SUMMARY OF IMPACTS

Intersection Operations

With the Circulation Plan and policies contained in the Hillcrest Station Area Specific Plan, all street intersections will meet the adopted Level of Service (LOS) standards with two exceptions. Traffic at two intersections cannot be mitigated to less than significant levels:

- In 2035, the Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue intersection would operate at LOS F during the AM and PM peak hours. There will be insufficient capacity during the AM peak hour to accommodate northbound travel on Hillcrest Avenue through the Larkspur Avenue signalized intersection. This congestion will remain isolated to Hillcrest Avenue, south of the Larkspur Avenue intersection.
- In 2035, Hillcrest Avenue at SR 4 Eastbound Ramp intersection would operate at LOS F during the PM peak hour. The PM peak hour traffic congestion will be isolated to the right turning traffic from the Eastbound SR 4 Off-Ramp onto Hillcrest Avenue (southbound). This congestion occurs because there is less than 200 feet separating the off-ramp intersection with the adjacent Larkspur Avenue intersection.

Freeway Operations

Freeway segments with a Delay Index greater than 2.5 are considered to operate below acceptable thresholds per the *East County Action* Plan (CCTA, 2000). All freeway study segments currently (2006) operate with an acceptable Delay Index. In 2035, all freeway study segments will operate with an acceptable Delay Index under the assumption that the Phillips Lane interchange is constructed.

However, since the Phillips Lane interchange is not currently approved or funded, its construction cannot be guaranteed, and therefore a significant and unavoidable freeway impact has been identified. Analysis indicates that the Hillcrest Interchange of SR 4 will experience severe congestion by 2035 if the Phillips Lane Interchange is not constructed. Even without any development in the Hillcrest Station Area, freeway traffic will experience delay indexes of up to 3.3, traveling at 21 miles per hour average speed. The addition of development in the Hillcrest Station Area would exacerbate this congestion even further.

Qualitative analysis and preliminary traffic model runs were conducted to determine when freeway operations will begin to exceed the adopted Delay Index standard, assuming that Phillips Lane Interchange is not built, and there is a phased gradual development of the Hillcrest Station Area plus an eBART station. The analysis indicates that under that scenario the Freeway Delay Index will begin to be exceeded by the year 2020. This is projected to occur even with the installation of the Hillcrest Interchange Improvements planned by CCTA, and the extension of Slatten Ranch Road to Laurel Road. Without those planned improvements that reduce traffic at the Hillcrest Interchange, freeway operations would begin to operate below the acceptable Delay Index sometime between 2015 and 2020, primarily due to traffic accessing the eBART station via the SR 4 freeway.

Vehicle Miles Traveled

Implementation of the proposed Specific Plan will have a beneficial effect on Antioch-generated VMT. The plan would support a mixed-use environment near eBART and Tri Delta Transit bus service. Because of this proximity, employees and residents will have more opportunity to use transit. In addition, the Planning Area will contain a mix of commercial retail and services which will reduce the number of trips residents and employees need to make by personal vehicle. Trip-chaining, increased opportunities for walking and bicycling, and access to transit all help to reduce daily VMT per capita. As a result, the plan would generate about 7 percent less VMT per capita than the citywide average in year 2035.

Transit

Implementation of the proposed Specific Plan will have a beneficial impact on local transit use. The large, mixed-use environment adjacent to the eBART station would encourage regional transit use via the BART system, and local transit use via Tri-Delta Transit, which currently operates nine bus routes and express bus service to the Planning Area.

Parking

Implementation of the proposed Specific Plan will provide additional parking in the Specific Plan area to serve the land uses proposed. Parking supplies are proposed to meet the local zoning code requirements, with some reductions allowed for shared parking and for projects within walking distance of the eBART station.

Pedestrian and Bicycle Circulation and Access

Implementation of the proposed Specific Plan will have a beneficial impact on pedestrian and bicycle circulation and access. The large, mixed-use environment proposed in the Specific Plan would encourage bicycle and pedestrian access by placing complementary uses (housing, shopping, professional offices, transit facilities) within walking or bicycling distance of each other, and by providing a relatively fine-grained system of local streets and access ways. In addition, it has been shown that higher-density residential and commercial uses generate proportionally higher rates of pedestrian and bicycling activity than typical low-density suburban development patterns, and proximity to a major regional transit stop also encourages more cycling and walking. This is a beneficial effect of the proposed project.

Freight Rail

Full implementation of the proposed Specific Plan requires a new grade separation at Hillcrest Avenue and the Union Pacific Railroad, to accommodate increased train operations projected by Union Pacific Railroad. Without a grade separation, there will be significant impacts on Hillcrest Avenue and SR 4. Because the extent of increased train traffic is not known with certainty, and since the grade separation is not an identified or funded project in the Regional Transportation Plan, this impact is classified as significant and unavoidable. The impacts on the Hillcrest Interchange and SR 4 can be partially off-set by constructing the new Phillips Lane Interchange with a grade separation at Phillips Lane and the Union Pacific Railroad. This would provide an alternative north/south connection between SR 4 and northeast Antioch when freight trains travel through the area.

Emergency Access

Implementation of the proposed Specific Plan will have a beneficial impact on emergency access. By including extensions of roadways that currently terminate and providing a relatively fine-grained system of local streets and access ways, the proposed plan will allow more opportunities and route choices for emergency service providers. The new Phillips Lane Interchange proposed in the plan would provide more regional route choice for emergency service providers in the event of an evacuation or other major emergency. This is a beneficial effect of the proposed project.

Consistency with Adopted Plans

The proposed Specific Plan is generally consistent with adopted regional plans. Amendments to the Antioch General Plan are part of this project, and thus there are no inconsistencies with the Antioch General Plan.

Hazardous Design Features

Implementation of the proposed Specific Plan will not have an effect on hazardous design features, and therefore this topic is not evaluated in the EIR. The transportation system proposed with the plan would be designed to meet applicable local, regional, and state standards and would be reviewed by the City for consistency with those standards prior to granting design approval.

METHODOLOGY AND ASSUMPTIONS

A detailed description of the traffic forecasting process is described in the memorandum *Model Validation and Year 2007 and 2035 Forecasts* (Fehr & Peers, 2008). The content of the memorandum is summarized in the following paragraphs.

Considering the major changes in the regional roadway network and the amount of regional growth expected in the future, the Contra Costa Transportation Authority (CCTA) Decennial Countywide Travel Demand Model was selected as the most appropriate tool to forecast 2035 AM and PM peak hour intersection volumes. The Decennial Countywide Travel Demand Model (Countywide Model) as produced by CCTA is available in scenarios that represent years 2000, 2010, 2020, and 2030. Thus, scenarios for years 2007 and 2035 were developed for this analysis.

The year 2035 model scenario was developed to represent traffic conditions at station area buildout and to reflect ABAG's *Projections 2007* land use forecasts which extend out to 2035.

Traffic Model Calibration and Validation Methodology

The Countywide Model was modified to develop a year 2007 scenario to better reflect current conditions in the area and to establish the baseline conditions for future analysis. The area for calibration was defined to include the cities of Antioch, Brentwood, and Oakley, to reflect the potential regional effects of the SR 4 Bypass.

As required by CCTA's Technical Procedures, a sub-area model validation exercise was conducted using validation targets specified by CCTA. The 2007 AM and PM peak hour volumes produced by the model were compared with traffic counts collected in the area in 2006 and 2007. Preliminary model validation results were used to guide further adjustments to the model input parameters, such as roadway types and speeds, to better reflect actual conditions.

The model revisions substantially increased the number of count locations that meet the validation targets, although both the original and the revised 2007 AM peak hour models leave two of the six CCTA peak hour validation criteria not satisfied. These two criteria are the tests related to arterial roadways. However, the revisions bring the model significantly closer to passing both criteria. The model revisions applied to the 2007 PM peak hour model result in substantial improvements in the number of count locations meeting the validation targets, and in fact the revised model satisfies all of the CCTA peak hour validation criteria.

Traffic Modeling Methodology

The 2007 CCTA Model and 2035 CCTA Model (both developed as part of the calibration and validation process) were used to develop peak hour demand traffic forecasts. The following four-step process was used to determine Year 2035 AM and PM peak hour turning movement forecasts for the intersections including ramp forecasts:

- **Step 1** - The 2007 CCTA Model was executed to determine the base year model peak hour demand volumes for the intersections.
- **Step 2** - The 2035 CCTA Model was executed to determine the "raw" (i.e., unadjusted) peak hour demand forecasts for the intersections.

- **Step 3** – The raw peak hour demand forecasts were adjusted using the "furness" method presented in the *CCTA Technical Procedures Update* (July 19, 2006). This method is an iterative factoring process that considers model-projected growth and existing turning movements. The furness process corrects for base year model deviation, addressing locations where the model over/under estimates volumes.
- **Step 4** – As recommended in the *Technical Procedures* the forecasted volumes developed in Step 3 were reviewed for reasonableness. At locations where volumes did not appear reasonable (i.e. future year volumes lower than existing counts) adjustments were made to ensure that the forecasted volume was at least equal to the existing count and that volumes were balanced between adjacent intersections.

Project Land Use Inputs, Generation Rates, and Trip Assignment

Project trip generation refers to the process for estimating the amount of vehicular traffic a project would add to the surrounding roadway system. Estimates of the total amount of traffic entering and exiting the project area are calculated for an average weekday. Separate estimates are created for the peak one-hour periods during the morning and evening commute periods when traffic volumes on the surrounding streets are highest.

For projects that contain a mixture of uses, such as retail and office, it is reasonable to expect that some trips would occur internal to the site. Internal trips are defined as those which begin and end within the Planning Area and do not add any new trips to the external roadway network.

For retail uses, such as contained within the proposed project, driveway traffic comprises: (1) new traffic generated by the project, (2) traffic that would otherwise already be on the adjacent roadways but the driver decides to stop at the site (e.g., to purchase an item on their way home from work), and (3) traffic on other nearby roadways, but the driver decides to take a short detour to stop at the site. The trips in Item 2 are referred to as "pass-by" trips and the trips in Item 3 are referred to as "diverted-link" trips.

Trip generation estimates for the project were developed by using trip generation rates contained in the Institute of Transportation Engineers (ITE), *Trip Generation*, (7th Edition). Information contained in Chapter 7 of the *ITE Trip Generation Handbook*, June 2004, was used to estimate internal trips. The internal trip percentages reflect development-scale by application of the trip rate equations rather than the average trip rate values in the internalization spreadsheets. Because of the Planning Area's relationship to the surrounding road system, "pass-by" and "diverted-link" trips were not considered in the trip generation estimates. The transit reduction was calculated from empirical data from research completed in *Travel Characteristics of Transit-Oriented Development in California* (Lund / Cervero / Wilson 2004).

Table 3.4-7 presents the key project characteristics including: development size, base trip generation, internal capture percentages, transit reductions, and the resulting net vehicle trips that were assigned to the surrounding road system. As shown, the project includes 1.2 million square feet of office space, 2,500 residential units, 1 million square feet of retail uses, and 325 hotel rooms. It is also assumed that this project scenario includes construction of the new Phillips Lane interchange at SR 4.

Table 3.4-7 Development and Land Use Inputs for the Project

Office (ksf)	1200			
Residential (dwelling units)	2500			
Retail (ksf)	1000			
Hotel (rooms)	325			
Peak Hour Analyzed	AM		PM	
Trip Generation Rate (Office)	1.55		1.49	
Trip Generation Rate (Residential)	0.51		0.62	
Trip Generation Rate (Retail)	1.03		3.75	
Trip Generation Rate (Hotel)	0.56		0.59	
Raw Trip Generation Rate (Office)	1860		1788	
Raw Trip Generation Rate (Residential)	1275		1550	
Raw Trip Generation Rate (Retail)	1030		3750	
Raw Trip Generation Rate (Hotel)	196		207	
Internal Capture %	24%		29%	
Transit Reduction percent for HBW Trips	19%		17%	
Transit Reduction percent for Other Trips	6%		5%	
Net Trips (Office)	1118		1142	
Net Trips (Residential)	1004		992	
Net Trips (Retail)	527		2357	
Net Trips (Hotel)	175		194	
Net Trips In / Net Trips Out (Office)	984	134	194	947
Net Trips In / Net Trips Out (Residential)	201	803	347	645
Net Trips In / Net Trips Out (Retail)	322	206	1131	1225
Net Trips In / Net Trips Out (Hotel)	107	68	103	91
Note: The proposed Specific Plan assumes the Phillips Lane interchange in place.				

Source: Fehr & Peers, 2008

The project vehicle trips were distributed to the road system based on the CCTA Decennial Travel Demand Model. A different distribution was derived for the residential, office, and retail/hotel land uses. The model was then used to assign the vehicle trips to the surrounding road system. The assigned project trips were summed with the Year 2035 traffic forecasts to derive forecasts with the project.

Cumulative Land Use Inputs for Traffic Model

To represent year 2035 conditions, projected growth levels were extrapolated based on the ABAG *Projections 2007* figures on residential and employment levels for years 2020 and 2030. The land use forecasts were then scaled to ensure consistency with citywide 2035 land use totals from ABAG *P07*. Future growth in the Planning Area is based on the anticipated buildout of the proposed Specific Plan land uses. Growth outside the Planning Area has been reduced to maintain an overall consistency with the ABAG *P07* Projections for the east Contra Costa County area, including Antioch, Brentwood, and Oakley.

Tables 3.4-8 and Table 3.4-9 compare the number of households and jobs in the original CCTA countywide model (after the spring 2007 update) with the model scenarios as updated for this analysis.

Table 3.4-8 Comparison of Number of Households

Scenario	*Antioch*	*Brentwood*	*Oakley*	*Total*
2000 (CCTA Model) /1/	29,588	8,221	7,657	45,466
2007 (Project Model) /2/	33,822	15,568	10,070	59,460
2030 (CCTA Model) /1/	42,917	24,954	12,822	80,693
2035 (Project Model) /2/	43,720	31,180	14,780	89,680

/1/ Land use data as used in the CCTA Decennial Countywide Travel Demand Model and based on ABAG Projections 2005, updated in 2006-7 in cooperation with Antioch, Brentwood, Oakley, and other city staffs throughout Contra Costa County.

/2/ Land use derived from ABAG Projections 2007 by Fehr & Peers in cooperation with Antioch, Brentwood, and Oakley staff.

Source: Fehr & Peers, 2008.

Table 3.4-9 Comparison of Number of Jobs

Scenario	*Antioch*	*Brentwood*	*Oakley*	*Total*
2000 (CCTA Model) /1/	17,340	7,353	3,081	27,773
2007 (Project Model) /2/	22,178	8,074	3,672	33,924
2030 (CCTA Model) /1/	42,385	19,420	12,380	74,185
2035 (Project Model) /2/	42,110	19,580	10,610	72,300

/1/ Land use data as used in the CCTA Decennial Countywide Travel Demand Model and based on ABAG *Projections 2005*.

/2/ Land use derived from ABAG *Projections 2007* by Fehr & Peers in cooperation with Antioch, Brentwood, and Oakley Staff.

Source: Fehr & Peers, 2008.

Proposed Future Roadway Network

There are transportation improvement projects in East Contra Costa County that are intended to address existing and future traffic congestion. Those applicable to the Hillcrest Station Area are described below and were assumed to be completed by 2035. Planned roadway improvements are shown on Figure 3.4-6, and the Planning Area roadways are also shown on Figure 3.4-7.

Regional Improvements outside Planning Area

SR 4 Widening Project. The Contra Costa Transportation Authority (CCTA) in cooperation with the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) are working to widen SR 4, upgrade its interchanges and affected local roadways from about 0.8 mile west of Loveridge Road to approximately 0.7 mile east of Hillcrest Avenue. The project will reduce existing traffic congestion, improve traffic operations, encourage high-occupancy vehicle (HOV) use, and accommodate travel demand anticipated through the year 2030.

SR 4 will be widened to eight lanes (three mixed flow lanes and one HOV lane in each direction) through the Hillcrest Avenue interchange where it will become a six-lane freeway (three mixed flow lanes in each direction). These lanes will ultimately connect to the six-lane SR 4 Bypass which was open to traffic in early 2008.

Interchange and affected local roadways will also be upgraded as part of the SR 4 Widening Project. Upgraded facilities will occur at the Loveridge Road, Somersville Road, Lone Tree Way/A Street, and Hillcrest Avenue interchanges. In addition, the G Street interchange will be removed and a new full access interchange will be provided at Contra Loma. The widened SR 4 corridor through the Hillcrest Avenue interchange will be widened to accommodate BART within the median.

Hillcrest Avenue Interchange Improvements. The Hillcrest Avenue interchange adjacent to the Planning Area is planned to be modified including: widening the eastbound SR 4 off-ramp to two lanes at the gore point, widening the overpass to allow for additional through and left turn lanes, adding a northbound to westbound loop on-ramp, constructing a westbound SR 4 hook ramp to Slatten Ranch Road. These improvements are consistent with those identified in the State Route 4 (East) Widening Project.

SR 4 Bypass Project. The State Route 4 Bypass Project (Bypass) is a roadway project being constructed cooperatively between Contra Costa County and the Cities of Antioch, Brentwood, Pittsburg, and Oakley. The Bypass is intended to ease traffic congestion in Antioch, Brentwood and Oakley; to provide access to the growing areas of southeast Antioch and western Brentwood; and, to provide more efficient connections throughout East Contra Costa County.

The Bypass will be constructed in three segments by 2020. Segment 1 extends from just east of the SR 4/Hillcrest Avenue Interchange to Lone Tree Way in the City of Antioch consists of a 6-lane freeway between existing SR 4 and the Laurel Road Interchange and a 4-lane freeway from Laurel Road to Lone Tree Way. This portion of the Bypass opened in March 2008. Segment 1 of the Bypass has been designed to accommodate the freeway-to-freeway connectors between SR 160 and SR 4, east of the SR 4/SR 160 interchange. Phase 1 of Segment 2 was constructed in 2002 as a 2-lane Expressway from Lone Tree Way to Balfour Road. Future phases will convert Segment 2 to a full freeway with interchanges at Sand Creek Road and Balfour Road. Segment 3 extends from Balfour Road south to Marsh Creek Road as a 2-lane Expressway, then along Marsh Creek Road (East-West Connector) as a 2-lane conventional highway, connecting to existing SR 4 (Byron Highway).

It is expected that Caltrans will relinquish the existing highway through Antioch and Brentwood and accept the Bypass as the new State Route 4 sometime in 2010.

Local Road Improvements outside the Planning Area

Roadway improvements are identified on the General Plan Circulation Map that could affect traffic flow in the vicinity of the project location.

East 18th Street Widening. This project is currently under construction and will widen East 18th Street to provide a continuous four-lane roadway with a median from SR 160 to Viera Avenue. This project is a gap closure project so that the corridor will be a continuous four-lane facility through the study area. This project is fully funded.

Wild Horse Road Extension. This project would extend the two-lane Wild Horse Road from its current terminus (east of Hillcrest Avenue) to Slatten Ranch Road. The Wild Horse Road extension would be constructed as part of planned residential development along the corridor. Because the planned development has been assumed in this analysis, the road extension is also

assumed. If the development does not occur, then the road would not be needed and would not be constructed.

Laurel Road Extension. This project would extend Laurel Road between its current terminus in Antioch and Hillcrest Avenue. The Laurel Road extension would be constructed as part of planned development along the corridor. Because the planned development has been assumed in this analysis, the road extension is also assumed. If the development does not occur, then the road would not be needed and would not be constructed.

Road Improvements Proposed as Part of Specific Plan

Phillips Lane Interchange. The Phillips Lane interchange is identified in the *2008 Contra Costa Countywide Transportation Plan*. The interchange project is not funded at this time. In addition, there are policy considerations that are currently being evaluated as part of a city-sponsored study effort. Specifically, the interchange spacing between the Phillips Lane Interchange and the SR 160 connector would require a mandatory design exception per Index 501.3 of Caltrans *Highway Design Manual*. For purposes of the traffic analysis in this EIR, the interchange is assumed to be in place. However, the project may not be feasible, because Caltrans will need to approve the design and accept the mandatory design exception, and funding needs to be identified. Therefore the EIR also contains qualitative analysis of traffic impacts in the event that the Phillips Lane Interchange is not constructed. Furthermore, the Specific Plan contains policies that limit the amount and extent of development in the Hillcrest Station Area if the Phillips Lane Interchange is not constructed.

Oakley Road Extension. This project would include a two-lane roadway extending from Oakley Road at Viera Avenue to the west, terminating at the PG&E facilities. While it is shown on the General Plan circulation map as extending all the way to Hillcrest Avenue, this is not feasible due to the location of the PG&E facilities and the proximity to existing intersections.

Slatten Ranch Road Extension. This project would continue Slatten Ranch Road north from Laurel Road as a two lane roadway to Phillips Lane, and then as a four-lane roadway from Phillips Lane to Hillcrest Avenue. The extension would intersect Hillcrest Avenue opposite the existing Sunset Drive signalized intersection. New SR 4 westbound ramps would be constructed at Slatten Ranch Road.

Phillips Lane Extension. This project would include a two- to four-lane roadway with a median from East 18th Street to the Slatten Ranch Road Extension. This project would also include a grade separation at the railroad tracks, and possibly a new interchange with SR 4.

Viera Avenue Extension. This project would include a two-lane roadway from East 18th Street to the Slatten Ranch Road Extension. A central third lane would be included between the PG&E easement and Slatten Ranch Road; the central lane would function as a turn lane near intersections, and would be a landscaped median in other segments. This project includes constructing a left-turn lane from northbound Viera Avenue to westbound East 18th Street. It would include a bypass around the existing residential neighborhood and a grade separation at the railroad tracks.

Hillcrest Avenue and East 18th Street Intersection. This project includes providing protected left-turn traffic signal phasing, constructing a second left-turn lane from northbound Hillcrest

Avenue to westbound East 18th Street, and a right-turn lane from eastbound East 18th Street to southbound Hillcrest Avenue.

Neroly Road and Oakley Road Intersection. This project includes the City of Oakley installing a traffic signal, constructing left-turn lane and a shared through/right-turn lane at each intersection approach. This project is not currently identified in the Oakley General Plan or Capital Improvement Program.

Hillcrest Avenue Railroad Grade Separation. This project shown on the circulation map would separate the railroad from Hillcrest Avenue by constructing a rail over-crossing at Hillcrest Avenue. Funding for the grade separation project has not been identified, and so it is not assumed in the analysis.

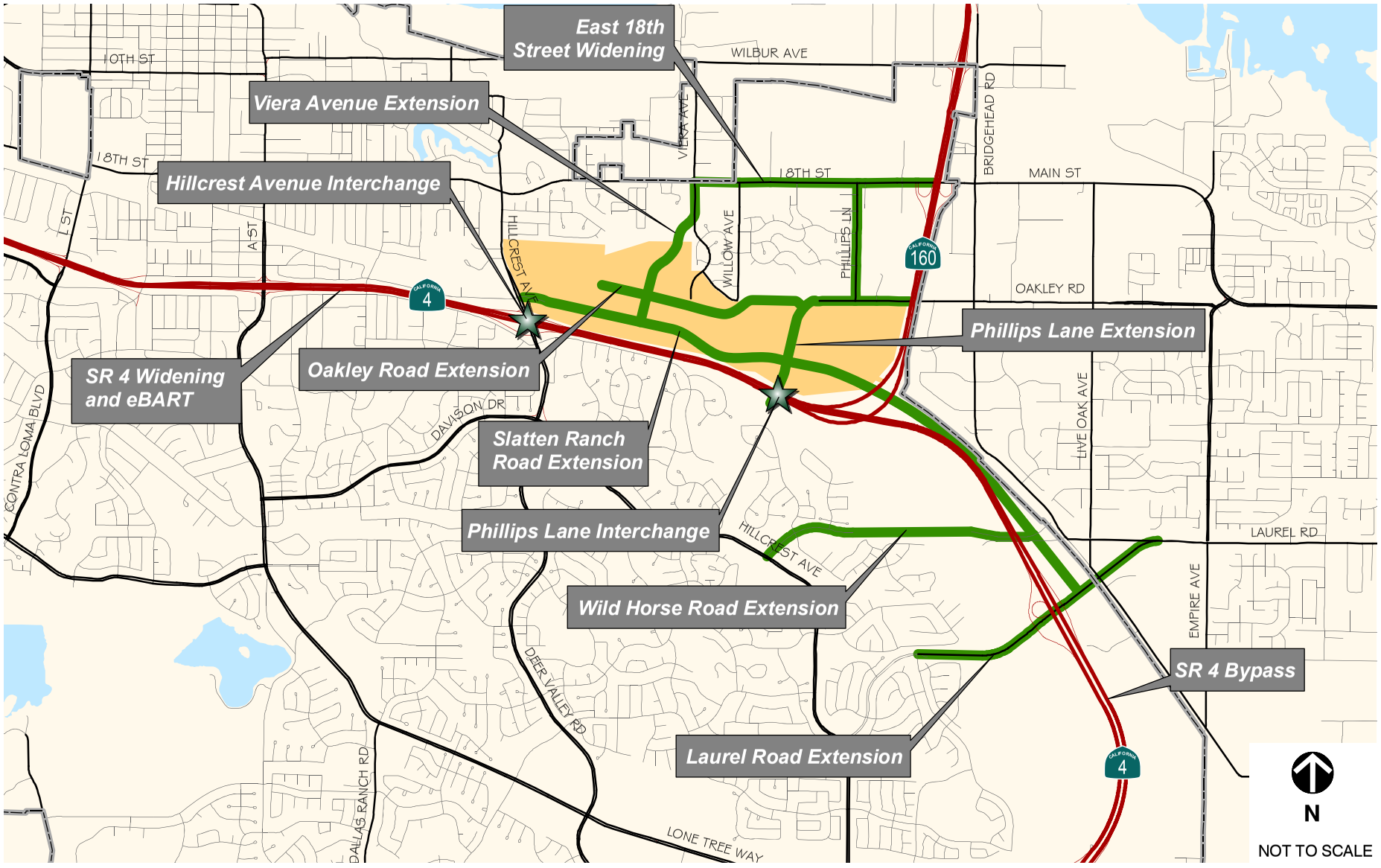
Planned Transit Improvements

This EIR assumes that the eBART Phase 1 Proposed Project, consisting of Diesel Multiple Unit technology running from a transfer station located just east of the Pittsburg/Bay Point BART platform and extending down the median of SR 4 will be constructed and operational by 2015 as planned by BART. One eBART station would be located in Pittsburg at Railroad Avenue and the terminus station for Phase 1 would be near Hillcrest Avenue in Antioch. The terminus station will be located in the SR 4 median either 1,275 feet (Median Station) or 2,175 feet (East Median Station) from the Hillcrest Avenue/SR 4 Interchange. A potential second station is planned adjacent to the railroad right-of-way near the Phillips Lane and Slatten Ranch Road intersection.

In addition, Tri Delta Transit is expected to continue offering service from a new transit center near the eBART station in the median.

Proposed Pedestrian and Bicycle Circulation and Access Improvements

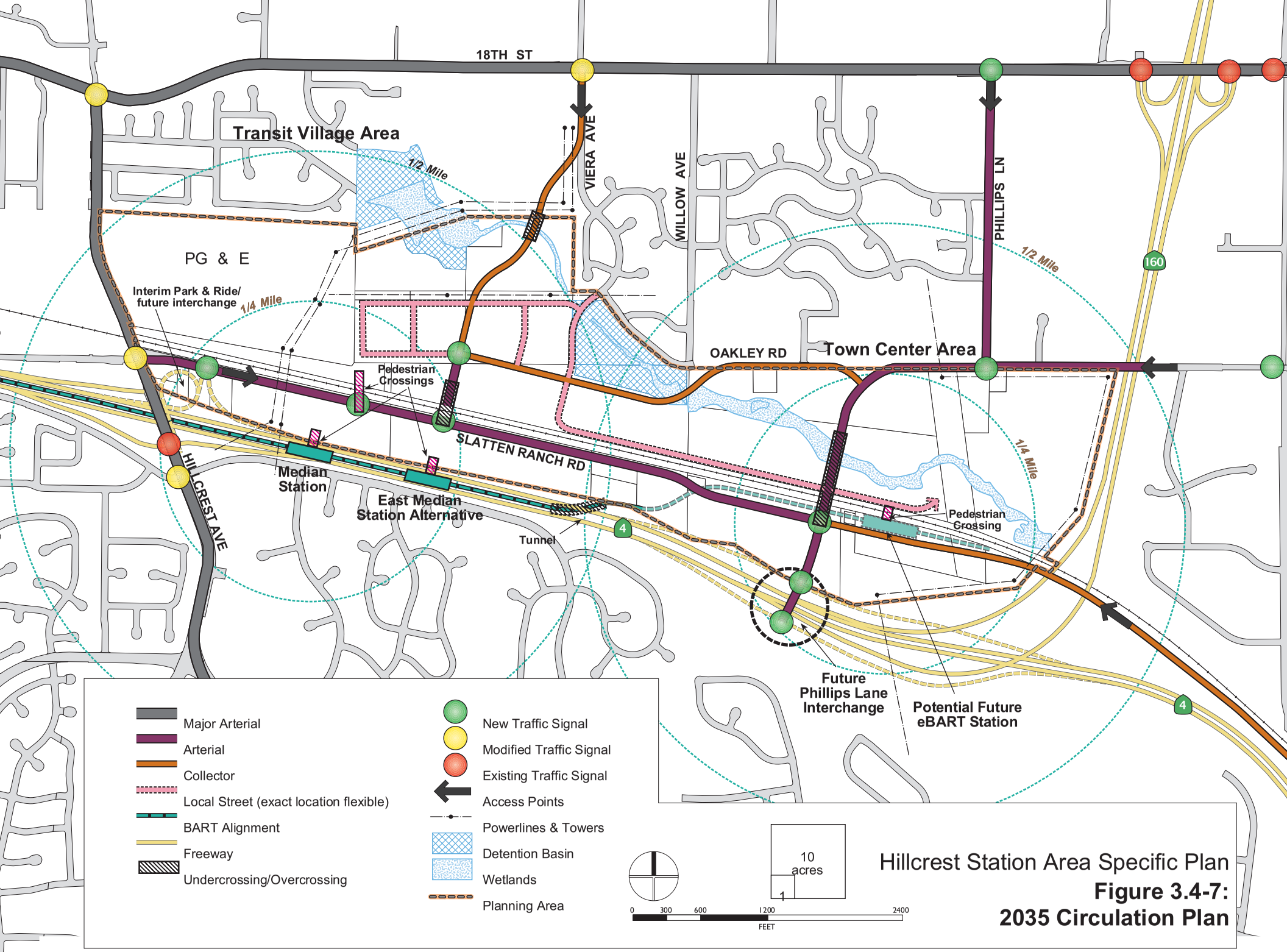
This EIR assumes that in addition to the bicycle routes planned in the General Plan, the improvements indicated on Figure 3.4-8 will also be constructed.



Hillcrest Station Area Specifc Plan

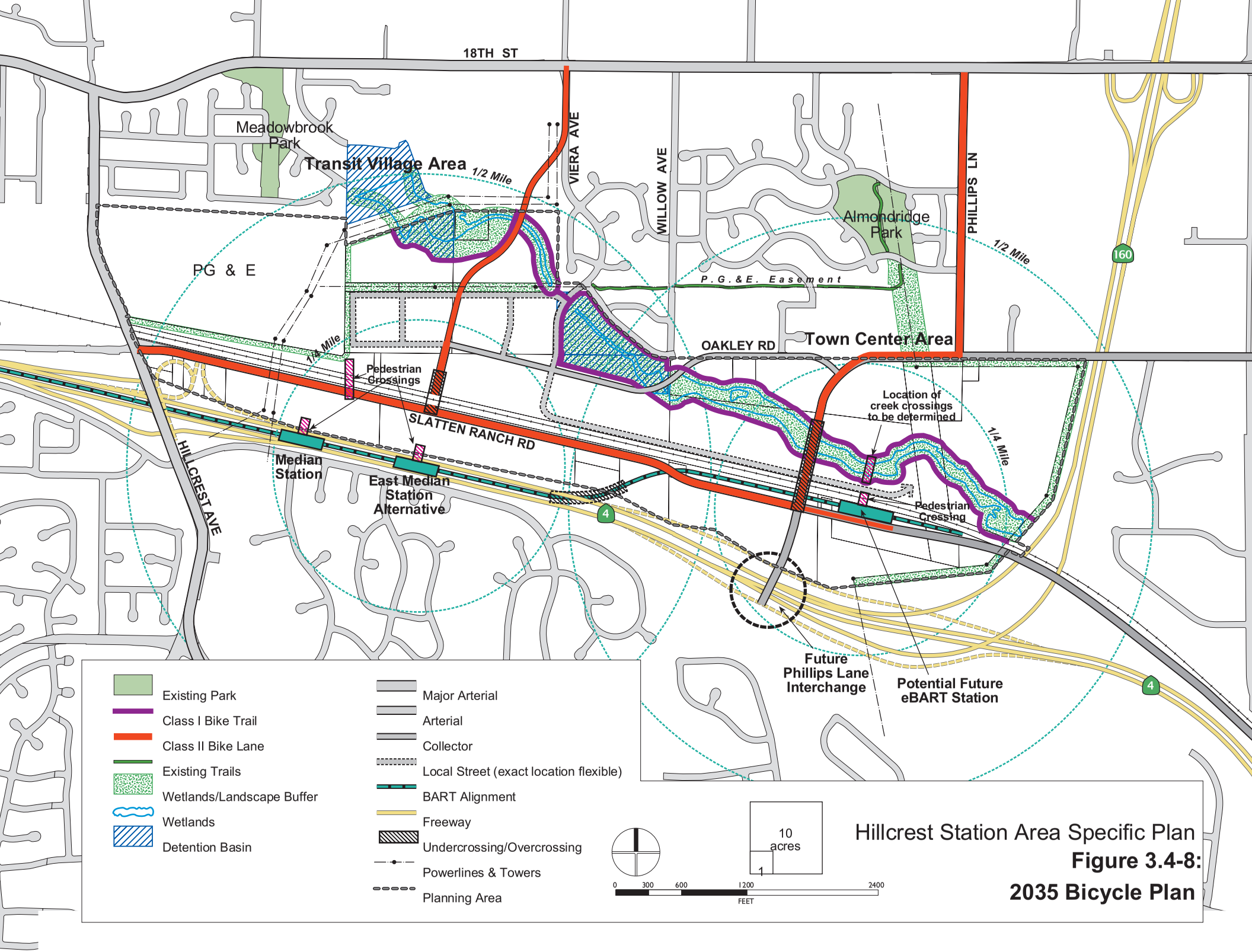
Figure 3.4-6: Regional, City, and Planning Area Roadway Improvements

Source: Fehr & Peer, 2008.



Hillcrest Station Area Specific Plan

Figure 3.4-7:
2035 Circulation Plan



Hillcrest Station Area Specific Plan

Figure 3.4-8:

2035 Bicycle Plan

Freight Rail

Union Pacific has announced plans to increase the number of trains on the Mococo Line running through the Planning Area to as many as 10-15 trains per day initially and as many as 25-40 trains per day in the long term. As part of the worst case scenario, this EIR assumes that there will be 40 trains per 24-hour period in 2035. This traffic analysis also assumes that a grade separation at Hillcrest Avenue and the Union Pacific Mococo Railroad is implemented in a timely manner, i.e. before train traffic causes a back-up on the SR 4 mainline due to stopping traffic at the Hillcrest Avenue Interchange. However the grade separation project is not included in the Contra Costa County Regional Transportation Plan, and is not designed or funded. Therefore qualitative analysis also describes how circulation would be impacted if the rail line traffic increases as proposed by Union Pacific and the grade separation is not constructed.

IMPACTS AND MITIGATION MEASURES

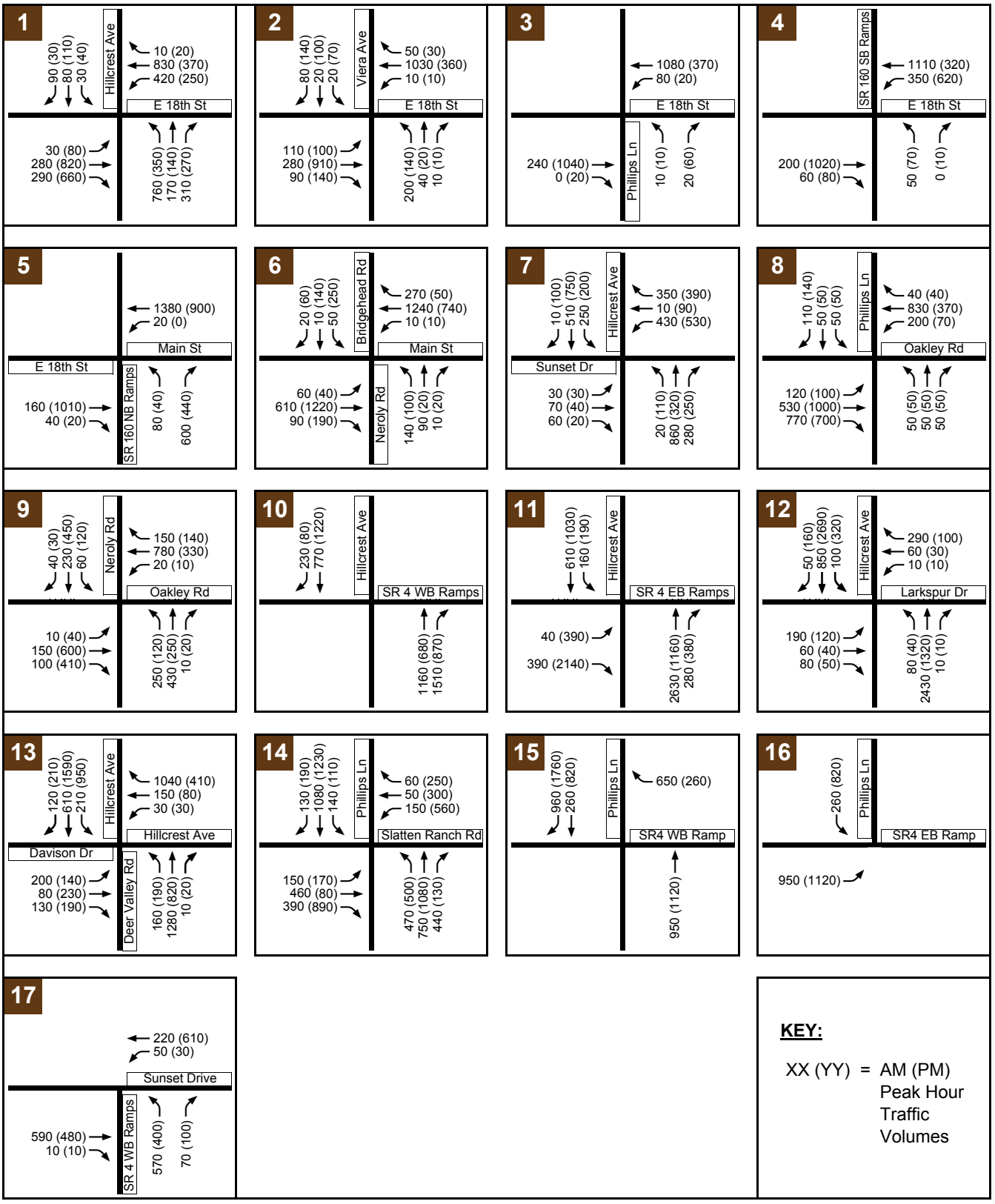
3.4-1 ***Increased motor vehicle traffic would result in unacceptable level of service (LOS) at study intersections. (Significant and Unavoidable)***

The proposed Specific Plan intersection traffic forecasts are presented in Figure 3.4-9. Tables 3.4-10, 3.4-11, and 3.4-12 contain the results of the traffic analysis for the buildout of the proposed Specific Plan in 2035. The first table shows traffic operations results based on the HCM Methodology. The second table shows traffic operations results made with the CCTA Methodology. The third table illustrates the percent of vehicles served in 2035 as compared to existing conditions. Figure 3.4-10 shows the LOS results from the HCM analysis graphically.

As shown in the tables, buildout from regional growth and the land uses envisioned with the proposed Specific Plan would result in significant impacts at the following study intersections:

- Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue intersection would operate at LOS F during the AM and PM peak hours.
- Hillcrest Avenue at SR 4 Eastbound Ramp intersection would operate at LOS F during the PM peak hour.

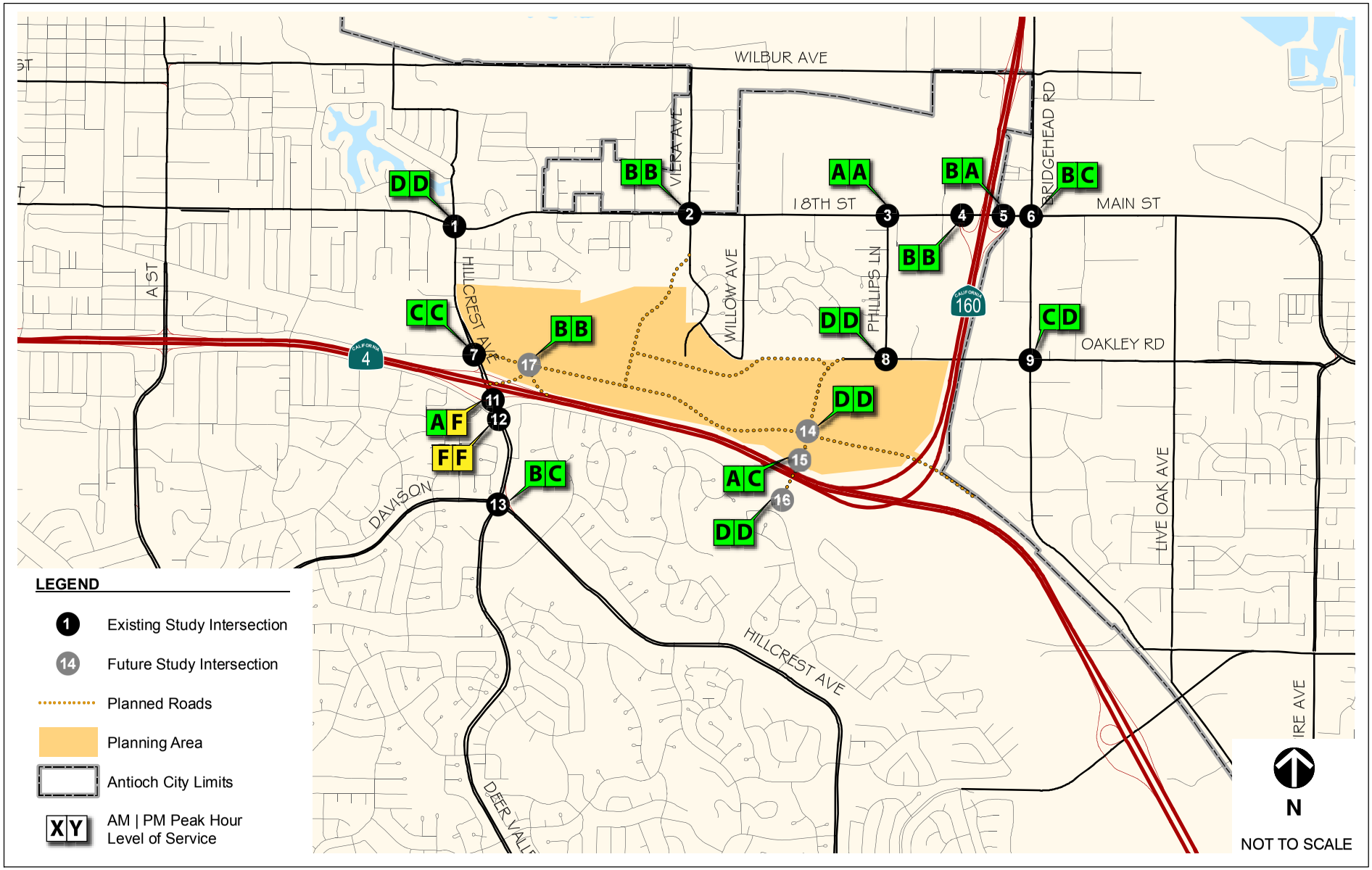
These findings are based on the HCM method rather than the CCTA method. The HCM method used in this study at the Hillcrest Avenue interchange recognizes the influence of closely spaced intersections on the vehicle capacity. The vehicle queues (which extend through adjacent intersections) and signal coordination parameters preclude use of volume-to-capacity traffic analysis tools, such as the CCTA method, as they cannot adequately identify intersection delay, level of service (LOS), and queue lengths. Analysis packages such as the CCTA method are not sensitive to detailed intersection design features such as turn-pocket lengths, atypical intersection geometrics, and closely-spaced intersections (e.g. the effects of the adjacent intersection through the Hillcrest Avenue interchange). For these reasons, we concur with the 2000 *Highway Capacity Manual* and recommend the use of the HCM methods through micro-simulation to analyze intersection operations. Specifically, we used the SimTraffic microsimulation platform to assess the 2035 conditions at the Hillcrest interchange because it is capable of producing results that have a higher degree of precision than the CCTA method. In addition, it is commonly used for similar situations in Antioch and the rest of Contra Costa County, and it is often used by Caltrans to evaluate ramp termini intersections.



Hillcrest Station Area Specifc Plan

Figure 3.4-9: 2035 Intersection Traffice Volume Forecasts

Source: Fehr & Peer, 2008.



Hillcrest Station Area Specifc Plan

Figure 3.4-10: 2035 Intersection Level of Service Results

Source: Fehr & Peer, 2008.

Table 3.4-10 Intersection Operations Weekday AM and PM Peak Hour – HCM Methodologies

Assumptions: This table assumes implementation of all plan policies to mitigate intersection operations, including Phillips Lane Interchange, and grade separation at Hillcrest Ave and railroad.

Intersection	*Control*	*Peak Hour*	*Specific Plan Buildout 2035*	
			Delay /1/	*LOS*
1. Hillcrest Avenue at East 18th Street	Signal	AM PM	41 36	D D
2. Viera Avenue at East 18th Street	Signal	AM PM	16 13	B B
3. Phillips Lane at East 18th Street	Signal	AM PM	6 6	A A
4. SR 160 Southbound Ramps at East 18th Street	Signal	AM PM	15 16	B B
5. SR 160 Northbound Ramps at East 18th Street	Signal	AM PM	11 10	B A
6. Bridgehead Road/Neroly Road at Main Street	Signal	AM PM	14 27	B C
7. Hillcrest Avenue at Sunset Drive	Signal	AM PM	26 33	C C
8. Phillips Lane at Oakley Road	Signal	AM PM	44 36	D D
9. Neroly Road at Oakley Road	Signal	AM PM	46 34	D C
10. Hillcrest Avenue at SR 4 Westbound Ramps	No Control	AM PM	This intersection is replaced with a northbound to westbound loop ramp to SR 4 as part of the planned Hillcrest Interchange Improvement Project.	
11. Hillcrest Avenue at SR 4 Eastbound Ramps	Signal	AM PM	9 **#**	A **F**
12. Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue	Signal	AM PM	**>100** **#**	**F** **F**
13. Hillcrest Avenue at Deer Valley Road/Davidson Drive	Signal	AM PM	19 25	B C
14. Phillips Lane at Slatten Ranch Road	Signal	AM PM	47 55	D D
15. Phillips Lane at SR 4 Westbound Ramps	Signal	AM PM	8 11	A C
16. Phillips Lane at SR 4 Eastbound Ramps	Signal	AM PM	44 41	D D
17. SR 4 Westbound Ramps at Slatten Ranch Road	Signal	AM PM	12 12	B B

Bold indicates intersection operating at deficient level of service.

indicates that delay is not meaningful because not all the vehicles are able to traverse the intersection during the PM peak hour.

/1/ Delay is measured in seconds and represents average intersection control delay using the HCM methods.

Source: Fehr & Peers, 2008.

Table 3.4-11: Intersection Operations Weekday AM and PM Peak Hour – CCTA Methodology

Assumptions: This table assumes implementation of all plan policies to mitigate intersection operations, including Phillips Lane Interchange, and grade separation at Hillcrest Ave and railroad.

Intersection	*Control*	*Peak Hour*	*Specific Plan Buildout 2035*	
			V/C	*LOS*
1. Hillcrest Avenue at East 18th Street	Signal	AM PM	0.861 0.806	D D
2. Viera Avenue at East 18th Street	Signal	AM PM	0.539 0.508	A A
3. Phillips Lane at East 18th Street	Signal	AM PM	0.317 0.344	A A
4. SR 160 Southbound Ramps at East 18th Street	Signal	AM PM	0.352 0.559	A A
5. SR 160 Northbound Ramps at East 18th Street	Signal	AM PM	0.453 0.336	A A
6. Bridgehead Road/Neroly Road at Main Street	Signal	AM PM	0.410 0.566	A A
7. Hillcrest Avenue at Sunset Drive	Signal	AM PM	0.574 0.579	A A
8. Phillips Lane at Oakley Road	Signal	AM PM	0.727 0.794	C C
9. Neroly Road at Oakley Road	Signal	AM PM	0.791 0.730	C C
10. Hillcrest Avenue at SR 4 Westbound Ramps	No Control	AM PM	This intersection is replaced with a northbound to westbound loop ramp to SR 4 as part of the planned Hillcrest Interchange Improvement Project.	
11. Hillcrest Avenue at SR 4 Eastbound Ramps	Signal	AM PM	0.561 0.761	A C
12. Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue	Signal	AM PM	0.820 0.683	D B
13. Hillcrest Avenue at Deer Valley Road/Davidson Drive	Signal	AM PM	0.816 0.681	D B
14. Phillips Lane at Slatten Ranch Road	Signal	AM PM	0.852 0.926	D E
15. Phillips Lane at SR 4 Westbound Ramps	Signal	AM PM	0.484 0.409	A A
16. Phillips Lane at SR 4 Eastbound Ramps	Signal	AM PM	0.343 0.562	A A
17. SR 4 Westbound Ramps at Slatten Ranch Road	Signal	AM PM	0.370 0.483	A A

Bold indicates intersection operating at deficient level of service.

-- indicates that CCTA methodology does not analyze stop-controlled intersections.

Source: Fehr & Peers, 2008.

Table 3.4-12 Intersection Operations Weekday AM and PM Peak Hour – Percent Vehicles Served

Assumptions: This table assumes implementation of all plan policies to mitigate intersection operations, including Phillips Lane Interchange, and grade separation at Hillcrest Ave and railroad.

	Existing		*Specific Plan Buildout 2035*	
Intersection	*AM*	*PM*	*AM*	*PM*
7. Hillcrest Avenue at Sunset Drive	101%	98%	96%	97%
11. Hillcrest Avenue at SR 4 Eastbound Ramps	97%	91%	92%	87%
12. Hillcrest Avenue at East Tregallas Drive/Larkspur Avenue	97%	92%	92%	88%
17. SR 4 Westbound Ramps at Slatten Ranch Road	n/a	n/a	97%	99%

Percent vehicle served is calculated by dividing the actual number of vehicles able to traverse the intersection by the total number of vehicles forecast to traverse the intersection. Intersections with values less than 95percent are considered to be operating at deficient levels. The SimTraffic component of the Synchro software was used to determine vehicles served.

Source: Fehr & Peers, 2008.

It should also be noted that, if the Union Pacific Railroad moves forward with its stated intention of resuming regular train operations on the Mococo Line and if the rail crossing at Hillcrest Avenue remains an at-grade crossing, then substantially more congestion and vehicle queuing would be expected at the two intersections above and throughout the Hillcrest Avenue interchange area during times of train crossings. There remains a great deal of uncertainty about when train traffic might resume and how many trains per day would be operated, as well as whether the existing tracks, which have not been maintained for many years, would be upgraded to allow higher speeds through the area. This is not an impact of the proposed Specific Plan project. It is anticipated that the resumption of rail operations would be the subject of negotiations between the UP and the City of Antioch. The Specific Plan proposal to extend Phillips Lane (with grade separation at the Union Pacific Railroad) and construct an interchange at SR 4 would provide alternative north/south travel between SR 4 and northeast Antioch; thereby, shifting some traffic away from the Hillcrest Avenue rail crossing.

Specific Plan Policies that Reduce Impact

The following proposed policies could help reduce this impact, but the impact would remain significant at some locations unless mitigated at the study intersections:

Street Network

C-1 Create a connected street network of arterials and collectors that connects with existing local and regional roadways, and provides circulation throughout the Station Area.

C-2 Create a connected network of local streets appropriate for a mixed use, pedestrian-oriented environment that extends throughout the Hillcrest Station Area. The network should establish:

- Blocks that are two to four acres in size to facilitate direct and easy pedestrian access between different land uses and destinations; and,

- Maximum block lengths of approximately 450 feet, or 600 feet where a mid-block pedestrian connection is provided (measured on the longest side of the block).

C-4 Require land dedication and street improvements to be built consistent with street designs described in Chapter 4, Urban Design, for all arterials, collectors, and local streets in the Hillcrest Station Area.

C-5 Limit potential traffic and parking impacts from new development on existing neighborhoods by:

- Re-routing existing collector alignments outside existing neighborhoods, where feasible;
- Providing direct access to the arterial and regional road network from any new streets; and,
- Installing traffic calming measures where necessary.

C-6 Minimize cul-de-sacs to the maximum extent possible. Where cul-de-sacs are necessary due to barriers such as freeways and detention basins:

- Provide at least one pedestrian and bicycle path at the circular end in order to connect to other streets and trails, to allow emergency vehicle access when warranted and to minimize response times for emergency access; and,
- Consider designing cul-de-sacs with a planted cul-de-sac island to limit the amount of pavement and increase stormwater management opportunities.

Station Area Street Improvements

C-8 All applications for master plans, subdivisions, and development projects shall indicate how streets are connected to existing local and regional roadways, and how a connected network of streets is created throughout the Hillcrest Station Area.

C-9 Arterials and collectors should be located as shown in Figure 3-4 Circulation Plan; however, locations may be modified based on additional engineering or environmental analysis, or a completed master plan that shows how all parcels will be adequately served. Streets shall be located consistent with the following criteria:

- Arterials are to be generally located along property lines.
- Collector alignments may vary to accommodate site conditions and development proposals, provided that the streets align and join directly with existing and/or future collector streets on adjoining properties.

C-10 Construct a four-lane east-west road, Slatten Ranch Road, south of the Union Pacific Railroad from Hillcrest Avenue to SR 160 to serve the eBART Station and development between SR 4 and the Union Pacific right-of-way. Design this road consistent with the following criteria:

- Connect Sunset Drive west of Hillcrest Avenue with the Station Area;
- Accommodate easy and direct access for buses in and out of the eBART station; and

- Ensure that BART service can be extended to the east in or adjacent to the Union Pacific railroad right-of-way. Design of this corridor will need to be coordinated with Caltrans, Union Pacific Railroad, and BART.

C-11 The City shall address traffic congestion at the Hillcrest Avenue and East 18th Street intersection. Starting in 2015, the City shall monitor the turning movements at this intersection with annual traffic counts.

- When the average delay per vehicle is exceeds 45 seconds (or the current CCTA level of service standard), the City engineer shall initiate a comprehensive engineering study to define feasible mitigations and the project's fair share of the cost of improvements.
- When the average delay per vehicle is 55 seconds (or the Level of Service reaches E), proceed with design and construction of the improvements defined in the engineering study.

C-12 Extend and re-align Viera Avenue between East 18th Street and Slatten Ranch Road. Design this road consistent with the following criteria:

- Realign Viera Avenue so that Station Area traffic does not impact existing neighborhoods, as generally shown in Figure 3-4.
- Add a left turn lane from northbound Viera Avenue to westbound East 18th Street.
- Work with PG&E to design the alignment so that Viera Avenue minimizes impacts to the PG&E electrical transmission and natural gas rights-of-way.
- Construct an overcrossing at East Antioch Creek that minimizes impacts to the creek, detention basins, and recreational areas.
- Construct an overcrossing or undercrossing at the railroad tracks that serves vehicles, pedestrians, and bicycles. Design the crossing to maximize developable land. The design of this crossing should also be coordinated with the design of the railroad grade separation at Hillcrest Avenue.

C-13 Extend and improve Oakley Road to serve the Hillcrest Station Area. Design this road consistent with the following criteria:

- Minimize impacts to the Oakley Detention Basin;
- Limit traffic and parking from the Station Area within existing neighborhoods;
- Support and encourage pedestrian-oriented land uses between the Oakley Detention Basin and the PG&E substation; and,
- Do not preclude a future connection with Hillcrest Avenue featuring a right-in, right-out intersection, if warranted.

C-15 Extend and improve Phillips Lane south of East 18th Street to Slatten Ranch Road. Design this road consistent with the following criteria:

- Serve the development within the Town Center;
- Minimize impacts to East Antioch Creek and recreational uses;
- Cross over the railroad;

- Intersect with Slatten Ranch Road; and
- Provide access to the Phillips Lane Interchange.

City and Regional Transportation Improvements

C-16 Work with CCTA and Caltrans to implement Hillcrest Avenue Interchange improvements. The final design of the improvements should consider the potential railroad grade separation at Hillcrest Avenue.

C-17 Work with Union Pacific Railroad to provide a grade separation at the intersection of the Mococo Railway right-of-way and Hillcrest Avenue, if it is determined that the rail operator will resume active rail service. Explore all feasible design solutions with the goal to minimize the impacts on existing development and new development in the Hillcrest Station Area.

C-18 Work with Caltrans to approve, design, and construct a full SR 4 interchange at Phillips Lane. Work with federal, state, and local agencies such as the Fee and Finance Authority to secure funding for the Phillips Interchange.

C-19 The City and project sponsors shall work with neighboring cities and regional agencies to construct Slatten Ranch Road from west of SR 160 to Laurel Avenue.

C-20 The City shall ensure that Wild Horse Road is extended and connected to the SR 4 Bypass Frontage Road, "Slatten Ranch Road," to improve local access to parks, schools, and fire stations.

C-21 Work with the City of Oakley to monitor traffic levels and level of service at the Neroly Road and Oakley Road intersection, and support efforts to design and construct needed improvements.

Transportation Demand Management

C-22 Apply a Transportation Demand Management (TDM) program that reduces single-occupant vehicle trips to development exceeding 25,000 square feet of non-residential space. Components of TDM programs could include:

- Contributions to urban design projects, such as:
  - Bicycle parking, both short- and long-term, located in appropriate places; and,
  - Direct routes to transit (station, shuttle, or bus) and other key destinations that are well-lit and designed for pedestrian comfort.
- Employer-based programs, such as:
  - Carpool and vanpool ride-matching services;
  - Designated employer TDM contact;
  - Guaranteed ride home for transit users and car/vanpoolers;
  - Transit subsidies for employees;
  - Flexible work schedules, shortened work weeks, or options to telecommute;
  - Information campaigns using brochures, boards/kiosks, or other communication outlets; and,

  - Employer provided showers and lockers.
- Meeting or exceeding project design standards, such as:
  - Free and preferential parking for carpools, vanpools, low-emission vehicles, and car-share vehicles;
  - Passenger loading zones; and,
  - Bicycle- and pedestrian- friendly site planning and building design.

Road Network Implementation

I-5 Construct the following circulation improvements in conjunction with development of the Freeway Area:

- Slatten Ranch Road from Hillcrest to SR 160
- At least one emergency access route connecting Slatten Ranch Road to Oakley Road

I-7 Construct the following circulation improvements in conjunction with development of the Transit Village Area:

- Viera Avenue (New) from East 18th Street to Oakley Road
- Viera Avenue Connection from Oakley Road to Slatten Ranch Road, with an Overcrossing or Undercrossing of the Railroad Line
- Pedestrian/Bicycle Bridge over the Railroad Line to the eBART Station Entrance (required only if the Median Station is selected instead of East Median)
- Oakley Road from Viera Avenue (New) to Willow Ave.

I-9 Development within the Town Center Area shall not occur until the Phillips Lane Interchange is officially approved by Caltrans and funding sources are identified, or other regional transportation improvements that resolve the projected congestion at the SR 4/Hillcrest Interchange are identified, included in the Contra Costa County Regional Transportation Plan, and funding sources are identified.

I-11 Construct the following circulation improvements in conjunction with development of the Town Center Area north of East Antioch Creek.

- Widen Oakley Road from SR 160 to Willow Avenue
- Redesign the Willow Avenue/Oakley Road Connection
- Phillips Lane from East 18th Street to Oakley Road

I-12 Construct the following circulation improvements in conjunction with development of the Town Center Area south of East Antioch Creek.

- Phillips Lane Connection to Slatten Ranch Road: Overcrossing
- Phillips Lane and SR 4 Interchange
- Phillips Lane from Slatten Ranch Road to SR 4 and Interchange

Mitigation Measures Considered and Determined Infeasible

Following adoption of the policies and goals, impacts would be reduced to less than significant at some study intersections, but significant impacts would remain at the following study intersections: Hillcrest Avenue at Tregallas Drive/Larkspur Avenue and Hillcrest Avenue at SR 4 Eastbound Ramp. While roadway network improvements could reduce traffic impacts at these two intersections, the level of improvement would not be sufficient to bring them into compliance with the adopted standards.

The City has considered additional measures to comply with the LOS criteria at these two intersections. Measures considered include realigning Tregallas Drive and Larkspur Avenue to the south to improve vehicle storage between this intersection and the SR 4 eastbound off-ramp intersection. This change was determined to be infeasible during the planning horizon because it would require the acquiring and demolition of active and viable commercial properties, residential properties, and a church south of the Planning Area.

Other measures considered such as realigning the Hillcrest Avenue corridor and constructing new/modified ramps to/from SR 4 eastbound would have similar right-of-way impacts. In addition, the adopted policies and goals include construction of improvements at two intersections located outside the Planning Area. Policy C-11 addresses intersection capacity improvements at the Hillcrest Avenue/East 18th Street intersection which is located in the City of Antioch. Policy C-21 addresses capacity improvements at the Neroly Road/Oakley Road intersection which is located in the City of Oakley. Without implementing these policies both intersections would operate at unacceptable LOS E or F conditions in 2035 with buildout of the Specific Plan.

3.4-2 ***Increased motor vehicle traffic would result in increased Delay Indices at study freeway segments. (Significant and Unavoidable)***

Freeway Traffic Forecasts with the Phillips Lane Interchange at SR 4

The proposed Specific Plan freeway traffic forecasts are presented in Table 3.4-13 and Table 3.4-14 contain the results of the traffic analysis for the buildout of the proposed Specific Plan in 2035. The tables also illustrate the 2035 conditions as compared to existing conditions.

Traffic induced from the buildout of the land uses envisioned with the proposed Specific Plan would not result in significant impacts on freeway operations, if the Phillips Lane Interchange at SR 4 is constructed in a timely manner. While the traffic forecasts in year 2035 are substantially greater than year 2007 traffic, the additional freeway capacity planned for SR 4 combined with the Phillips Lane Interchange will accommodate the expected growth in traffic. Following adoption of the policies and goals, impacts would be reduced to less than significant at the study freeway segments.

Table 3.4-13 2035 Freeway Traffic Volumes

Assumptions: This table assumes implementation of all plan policies to mitigate intersection operations, including Phillips Lane Interchange, and grade separation at Hillcrest Ave and railroad.

Freeway Segment	*Eastbound AM Peak Hour*	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
SR 4, West of Hillcrest Avenue	3,770	6,450	7,370	5,560
Percent Change from Existing /1/	*85% (2,040)*	*170% (2,390)*	*98% (3,720)*	*93% (2,880)*
SR 4, East of Hillcrest Avenue	3,780	5,290	5,410	5,070
Percent Change from Existing /1/	*260% (1,050)*	*295% (1,340)*	*153% (2,140)*	*204% (1,670)*
SR 4 (Bypass), West of Laurel Rd	2,120	4,960	5,140	2,830
Percent Change from Existing	*Data Unavailable*			
SR 160, South of East 18th St	510	1,180	1,230	620
Percent Change from Existing /1/	*-51% (1,050)*	*-12% (1,340)*	*-43% (2,140)*	*-63% (1,670)*

/1/ Value in parenthesis represents the existing traffic volume.

Source: Fehr & Peers; Dyett & Bhatia, 2008.

Table 3.4-14 2035 Freeway Operations

Assumptions: This table assumes implementation of all plan policies to mitigate intersection operations, including Phillips Lane Interchange, and grade separation at Hillcrest Ave and railroad.

Specific Plan	*Eastbound AM Peak Hour*	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
SR 4 between the A Street and Laurel Road interchanges				
Average Travel Speed (mph)	70	69	64	69
Delay Index /1/	1.00	1.02	1.09	1.01
Percent change from existing Delay Index /2/	0% (1.00)	-33% (1.52)	7% (1.02)	1% (1.00)
SR 160 between the SR 4 and Wilbur Avenue interchanges				
Average Travel Speed (mph)	70	70	70	70
Delay Index /1/	1.00	1.00	1.00	1.00

1. Delay Index is calculated as the free-flow speed (assumed to be 70 mph) divided by the average travel speed. The Traffic Service Objective defined by CCTA is a Delay Index of less than 2.5.

2. Value in parentheses represents the existing Delay Index.

Source: Fehr & Peers, 2008.

Specific Plan Policies that Reduce Impact

The proposed policies listed under Impact 3.4-1 would also help to reduce the impact on freeway operations.

Freeway Traffic Forecasts without Construction of the Phillips Lane Interchange at SR 4, and Without Any New Development in the Hillcrest Station Area

Significant and unavoidable freeway impacts would remain if the Phillips Lane Interchange is not constructed. Without the interchange the forecasted traffic volumes would overwhelm the Hillcrest Avenue Interchange, causing severe congestion extending back onto the mainline SR 4

freeway during the PM peak hours. While the Specific Plan calls for the Phillips Lane Interchange (Policy C-18), its implementation is not certain. Funding has not been identified for the interchange, and its proposed location would require a mandatory design exception from Caltrans related to interchange spacing. Thus, the impact to the freeway system is considered significant and unavoidable.

The City has considered measures to address the severe traffic congestion at the Hillcrest Avenue Interchange beyond those identified in the State Route 4 East Widening Project including additional ramp widening, alternative interchange configurations, and realigning local roads to improve interchange efficiency. These changes would all require the acquiring and demolition of active and viable commercial properties, residential properties, and a church south of the Planning Area. The alternatives were considered infeasible given the substantial impact to the right-of-way.

A sensitivity test was conducted at the Hillcrest Avenue Interchange to determine the approximate future year when the Phillips Lane Interchange would need to be constructed to accommodate the eBART station and additional development outside the Specific Plan Area, consistent with ABAG land use forecasts. This analysis presents the traffic situation that will result without any development in Hillcrest Station Area. The resulting 2035 freeway traffic forecasts are shown in Table 3.4-15.

The traffic model indicates that by 2035 with no specific plan area development except for the implementation of the eBART project with a station near Hillcrest Avenue, traffic at the Hillcrest intersection would cause a back-up on the SR 4 mainline during peak travel times and cause significant increases in the delay indices. Refer to Table 3.4-16 for the traffic analysis results. Therefore, it can be anticipated that any additional development would create worse delays.

The Phillips Lane Interchange, as proposed in the Specific Plan, would provide the additional access and circulation necessary to reduce this impact to less than significant levels. Without the interchange, the freeway system would operate below acceptable standards.

Table 3.4-15 2035 Freeway Traffic Volumes Without Phillips Lane Interchange

Assumptions: – No Station Area Development, and with the eBART station and parking

Freeway Segment	*Eastbound AM Peak Hour*	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
SR 4, West of Hillcrest Avenue	2,990	6,100	6,610	4,160
Percent Change from existing	*47% (2,040)*	*155% (2,390)*	*78% (3,720)*	*44% (2,880)*
SR 4, East of Hillcrest Avenue	2,820	4,670	4,620	3,310
Percent Change from existing	*169% (1,050)*	*249% (1,340)*	*116% (2,140)*	*98% (1,670)*
SR 4 (Bypass), West of Laurel Rd	1,850	4,630	4,650	2,570
Percent Change from existing	*Data Unavailable*			
SR 160, South of East 18th St	1,800	870	1,080	1,850
Percent Change from existing	*71% (1,050)*	*-35% (1,340)*	*-50% (2,140)*	*10% (1,670)*

Source: Fehr & Peers, 2008.

Table 3.4-16 2035 Freeway Operations Without Phillips Lane Interchange

Assumptions: – No Station Area Development, and with the eBART station and parking

	Eastbound AM Peak Hour	*Westbound AM Peak Hour*	*Eastbound PM Peak Hour*	*Westbound PM Peak Hour*
SR 4 between the A Street and Laurel Road interchanges				
Average Travel Speed (mph)	70	70	21	70
Delay Index /1/	1.00	1.00	3.33	1.00
Percent change from existing Delay Index	0% (1.00)	-34% (1.52)	+326% (1.02)	0% (1.00)
SR 160 between the SR 4 and Wilbur Avenue interchanges				
Average Travel Speed (mph)	70	70	70	70
Delay Index /1/	1.00	1.00	1.00	1.00

/1/ Delay Index is calculated as the free-flow speed (assumed to be 70 mph) divided by the average travel speed. The Traffic Service Objective defined by CCTA is a Delay Index of less than 2.5.

Source: Fehr & Peers, 2008.

Freeway Traffic Forecasts With Hillcrest Station Area Development, but Without Construction of the Phillips Lane Interchange at SR 4

Qualitative assessment and preliminary traffic model runs were conducted to determine when freeway operations will begin to exceed the adopted Delay Index standard, assuming that Phillips Lane Interchange is not built, and there is a phased development of the Hillcrest Station Area.

As indicated in the previous section, the Freeway Delay Index is expected to exceed the standard in 2035 with no Phillips Lane Interchange and no station area development except the eBART station and related parking. Traffic model runs were also conducted to determine the level of additional impact that the station area land development would have on the freeway if the Phillips Lane Interchange were not constructed. The model runs indicate that only about 60 percent of the expected peak hour traffic demand through the interchange area could be served in 2035; whereas, about 75 percent of the traffic was served with no station area development. In either case, the freeway system would breakdown.

Year 2020 was the basis of analysis to determine the implications of phased station area development. The transportation system assumptions included completion of the SR 4 Widening Project (including eBART with a Hillcrest Station), SR 4 Bypass Widening Project, Hillcrest Avenue Interchange Project, Slatten Ranch Road extension from Laurel Road to Hillcrest Avenue, and either the Viera Avenue or Phillips Lane extension to Slatten Ranch Road.

To represent year 2020 land use conditions, projected growth levels were obtained from the ABAG *Projections 2007* figures on residential and employment levels for year 2020. The land use forecasts for Antioch were scaled to ensure consistency with citywide 2020 land use totals from ABAG *P07*, assuming phased development in the Hillcrest Station Area. The level of development within the station area included: 650 housing units, 270,000 square feet of office, and 275,000 square feet of retail.

The year 2020 analysis indicates that traffic congestion through the Hillcrest Avenue Interchange will cause substantial vehicle queues that extend back onto the freeway mainline. These

conditions would be exacerbated if the assumed road improvements are not constructed; particularly the Hillcrest Avenue Interchange Improvements, Slatten Ranch Road extension from Laurel Road to Hillcrest Avenue, and either Viera Avenue or Phillips Lane extension to Slatten Ranch Road.

3.4-3 *Implementation of the proposed Specific Plan would generate additional Vehicle Miles Traveled (VMT). (Informational Purposes Only)*

This analysis is provided for informational purposes only. There is no significance criteria related to Vehicle Miles Traveled (VMT). The VMT analysis is the basis for analysis in the chapters regarding Air Quality and Climate Change.

The proposed Specific Plan VMT characteristics in year 2035 are presented in Table 3.4-17. The table also illustrates the 2035 conditions as compared to the citywide average for years 2007 and 2035. The values in Table 3.4-17 were obtained from the traffic forecasting model used in this study. While the Specific Plan would generate more VMT per capita than year 2007 levels, the citywide VMT per capita in year 2035 is expected to be 23.6, which is greater than the proposed plan which would generate 21.9 VMT per capita i.e., population plus employment.

Table 3.4-17 Vehicle Miles Traveled (VMT)

	Dwelling Units	*Population*	*Total Employment*	*VMT (Total)*	*VMT (per Capita /1/)*
Specific Plan	2,500	7,405	6,000	293,472	21.9
2007 City of Antioch	33,822	104,150	22,178	2,583,803	20.5
2035 City of Antioch	43,720	129,631	42,110	4,056,209	23.6

/1/ Vehicle Miles Traveled (VMT) per capita is calculated by dividing the total VMT by the sum of the population plus total employment.

Source: Fehr & Peers, 2008.

3.4-4 *Implementation of the proposed Specific Plan could increase transit demand. (Less than Significant)*

The East County Action Plan Traffic Service Objectives (TSOs) requires that transit ridership be increased by 25 percent between the years 2000 and 2010. Because implementation of the Specific Plan is not expected to begin until after the eBART project is completed in 2015, this TSO is not applicable. However, it can be assumed that increasing transit ridership will continue to be a priority for East County.

Buildout of the land uses envisioned with the proposed Specific Plan would result in additional demand for transit. The intensity of land uses in proximity to rail and bus transit should support new transit riders. BART needs to achieve a minimum number of riders to make the eBART service economically feasible. So, they adopted a 5,856 daily ridership threshold for the eBART service. BART has estimated that there will be about 10,100 daily riders by the year 2030 on the eBART corridor, well exceeding the adopted threshold. (*East Contra Costa County BART Extension Draft EIR*, September 2008). About 54 percent of these daily riders will be new transit users. Therefore the Transit Service Objective will be achieved.

As a "terminal" station, the Hillcrest Station is projected to serve 8,200 daily riders, many commuting by car or bus from East Contra Costa County. The transit-oriented development at the station will also generate transit riders. According to BART sources, daily ridership for development within one-half mile of the station can be estimated as 0.6 riders per household and 0.1 riders per job. Based on these assumptions, the land uses designated in the proposed Specific Plan will generate about 1,000 riders during the AM peak hour and the PM peak hour combined, and about 2,065 daily riders, about 25 percent of the daily total expected to use the station. The Specific Plan also contains policies supporting up to 2,600 parking spaces and a bus transit center to be built near the eBART station which will be used by the remaining 75 percent of riders that will either drive or use a bus to access the station.

The increase in transit demand will be served by the eBART line and station that will be constructed by eBART, and the bus service that will connect to the eBART station. Therefore the impact is less than significant.

Specific Plan Policies that Reduce Impact

The following proposed Specific Plan policies would reduce the impact on transit:

LU-3 Create a Transit Village in the western portion of the Hillcrest Station Area north of the Union Pacific Railroad right-of-way, with direct pedestrian, bicycle, bus transit, and automobile connections to the eBART station in the median of SR 4.

LU-24 Locate eBART parking so that it is accessible to passengers arriving by car, bus, bicycle, or on foot.

LU-25 Work with BART to ensure that at least 1,000 parking spaces are provided in close proximity to the eBART Station by 2015, and that 2,600 spaces are provided by 2035.

LU-27 Provide public bus facilities near each eBART station.

C-10 Construct a four-lane east-west road, Slatten Ranch Road, south of the Union Pacific Railroad from Hillcrest Avenue to SR 160 to serve the eBART Station and development between SR 4 and the Union Pacific right-of-way. Design this road consistent with the following criteria:

- Connect Sunset Drive west of Hillcrest Avenue with the Station Area;
- Accommodate easy and direct access for buses in and out of the eBART station; and
- Ensure that BART service can be extended to the east in or adjacent to the Union Pacific railroad right-of-way. Design of this corridor will need to be coordinated with Caltrans, Union Pacific Railroad, and BART.

C-35 The City shall continue working with BART, CCTA, Caltrans, and property owners to study design, funding, and construction options for the Hillcrest eBART station, including but not limited to the East Median Station, which is the City's preferred station location. The design and location of the station should be modified from the current Median Station plan to achieve the following goals:

- Provide a more direct pedestrian and bicycle route from the Transit Village pedestrian center to the eBART station, with a distance of no more than one-quarter mile, and the minimum number of grade changes;

- Provide shorter, more direct vehicular access between the Transit Village Area to the eBART station;
- Maximize developable land, especially properties with freeway visibility, and properties in the Transit Village Area; and
- Provide an attractive view from the eBART station, that includes a direct line of sight to the Transit Village, and screens the view of the PG&E station; and
- Maximize opportunities for shared parking between BART patrons and other land uses.

C-36 Develop a multi-modal transit center at the median eBART station that provides access to eBART, buses, taxies, and shuttles. Design the transit facilities to include:

- Bus transit center and approximately 8-12 bus bays (moved from the Hillcrest Park-and-Ride lot to the eBART Station parking area);
- Kiss-and-ride limited term parking area;
- Disabled parking;
- Shuttle pick up and drop off area; and,
- Safe and attractive pedestrian and bike crossings to the station.

C-37 Work with Tri-Delta Transit to minimize impacts to existing service while serving the Station Area.

C-38 Design arterials and arterial intersections, particularly near pedestrian-oriented streets, to accommodate transit services, including bus stops, pull-outs, and shelters.

Mitigation Measures

No mitigation measure required.

3.4-5 ***Implementation of the proposed Specific Plan would increase demand for parking. (Less than Significant)***

Development within the Specific Plan would be required to provide parking consistent with the zoning code for the City of Antioch, which historically has been sufficient to ensure adequate parking supply for development in Antioch. Policies within the plan do allow for modifying the zoning-required parking supply to recognize the shared parking opportunities within a mixed-use environment as well as opportunities to reduce parking demand due to proximity to transit. Any modifications can only be made when supported by an engineering study of similar developments in similar environments. Studies that recommend parking provisions different than the applicable zoning code must be reviewed and approved by the City.

Parking demand will also occur as a result of external sources to the Specific Plan development. Specifically, the eBART station located within the plan area will generate demand for parking. According to the the project description in the Draft EIR prepared for the eBART project, up to 1,000 parking spaces will be required to serve the demand generated by the eBART station within the plan area at opening day. The demand is then expected to increase to about 2,600 parking spaces in year 2030 if the eBART station within the plan area remains a terminus station.

The opening day eBART parking need (up to 1,000 spaces) can be accommodated within a mixed-use and transit-oriented development such as that envisioned with the Specific Plan. The Specific Plan allows for structured parking to be built in the future in the Freeway Area between SR 4 and the Union Pacific Railroad, which would likely occur on the site of the first phase surface parking lot with 1000 spaces. The Specific Plan would also allow for a second eBART station, which would disperse the 2,600 parking space need across two stations rather than one. In this manner, structured parking to accommodate the full compliment of eBART parking (2,600 spaces) could be distributed in parking lots and parking structures between the two stations.

Specific Plan Policies that Reduce Impact

The following proposed Specific Plan policies would reduce this impact:

LU-25 Work with BART to ensure that at least 1,000 parking spaces are provided in close proximity to the eBART Station by 2015, and that 2,600 spaces are provided by 2035.

C-24 Locate off-street parking behind buildings or in structures, to the maximum extent feasible. Do not locate parking between public streets and building entrances, except on commercial retail sites within the freeway area.

C-25 Maintain flexible parking standards that balance the need for parking with the broader Station Area goals of encouraging transit ridership, ridesharing, and nurturing the area's pedestrian appeal.

C-26 Distribute parking throughout the Station Area to help balance traffic flow on the street grid network.

C-27 Include on-street parking on collector and local streets, following detailed recommendations in Chapter 4, Urban Design.

C-28 Adopt specific parking standards for the Station Area. Consider some or all of the following strategies to prevent oversupply and encourage the use of alternate modes of transportation:

- Allow shared parking between uses with different peak periods of parking demand;
- Reduce minimum off-street parking requirements for multi-family and commercial developments;
- Adopt maximum off-street parking requirements;
- Allow credits for adjacent on-street spaces;
- Allow exemptions for small retail and dining establishments (e.g. less than 2,500 square feet) in pedestrian centers; and,
- Allow tandem parking in residential developments.

C-29 Work with property owners to emphasize shared parking arrangements where appropriate to maximize efficient use of parking resources.

C-30 Incentivize parking structures, rooftop parking, and underground parking, through flexibility in conditions of approval and in negotiations for any City financial participation in the development.

C-31 Require surface parking lots to be designed so that it is feasible to use them for other uses, such as farmers' markets or community events, without reducing the landscaping requirements.

C-32 Identify opportunities for parking pricing strategies. Work with property owners to price parking so as to discourage automobile trips that could be made by other modes.

C-34 Work with BART to identify funding sources for parking at the eBART stations, consistent with the following criteria:

- 1,000 spaces at the time eBART service begins; and,
- 2,600 spaces by 2030, if the Hillcrest Station continues to be the terminus station for the eBART service. These spaces may be developed in phases.

I-2 Prior to final approvals of land subdivisions or development projects in the Transit Village and Freeway Areas, work with BART on a comprehensive eBART parking plan, which defines how eBART parking requirements for 1,000 spaces will be met when the Hillcrest Station opens, and how future eBART parking requirements of 2600 spaces can be met without reducing the available developable land in the Transit Village and Freeway areas.

Mitigation Measures

None required.

3.4-6 ***Implementation of the proposed Specific Plan will increase bicycling and walking. (Less than Significant)***

The proposed Specific Plan would increase pedestrian and bicycle activity as well as vehicle traffic in and around the area. Pedestrian activity would increase commensurate with new roads, buildings, parking, and open space. The Specific Plan policies require the construction of an extensive network of pedestrian and bicycle facilities, including sidewalks, bridges, bicycle routes, and a multi-use trail separate from roads. All railroad crossings will be grade separated. The mixed-use environment over several hundred acres supports bicycling and walking as viable travel choices. Policies in the Specific Plan require facilities to be built in a manner that protects pedestrian and bicycle safety. Therefore the potential impacts on pedestrian and bicycle safety are less than significant.

Specific Plan Policies that Reduce Impact

In addition to the proposed circulation policies listed under Impact 3.1-1, the following Specific Plan policies reduce this impact:

C-2 Create a connected network of local streets appropriate for a mixed use, pedestrian-oriented environment that extends throughout the Hillcrest Station Area. The network should establish:

- Blocks that are two to four acres in size to facilitate direct and easy pedestrian access between different land uses and destinations; and,
- Maximum block lengths of approximately 450 feet, or 600 feet where a mid-block pedestrian connection is provided (measured on the longest side of the block).

C-3 Design streets so that they incorporate medians, landscaping, sidewalks, street trees, travel lanes, bike lanes, and on-street parking, such that they:

- Are consistent with the desired pedestrian-oriented character and safety; and,
- Meet the needs of all users including drivers, pedestrians, persons with disabilities, bicyclists, and transit users.

C-39 Prioritize pedestrian and bicyclist safety at intersections and street crossings with measures such as:

- Contrasting and/or textured paving crosswalks;
- In-ground, blinking crosswalk lights; and,
- Pedestrian refuges and bulb-outs.

C-40 Implement a way-finding signage program for common destinations.

C-41 Require development projects to provide walking and biking routes directly to major destinations such as parks, pedestrian centers, and eBART stations.

C-42 Adopt minimum bicycle parking requirements for residential and commercial projects. Bicycle parking should be designed with the following criteria:

- Short-term parking should be visible from the main entrance of buildings.
- Long-term parking should be provided in secure, well-lighted areas.

C-43 Encourage employers to provide showers and lockers.

C-44 Limit the number of curb cuts allowed on each block face.

C-45 On pedestrian-oriented streets, design streets and sidewalks consistent with the provisions in Chapter 4, Urban Design, including:

- Tree wells or planter strips with trees between the sidewalk and parking;
- On-street parking between sidewalks and travel lanes;
- Pedestrian-scale street lights;
- Limited curb cuts that cross the pedestrian path of travel;
- Outdoor seating for restaurants and cafes;
- Projections into the right of way for awnings, canopies, pedestrian-oriented signs, bay windows, and other elements that enhance the pedestrian realm; and

C-46 Sidewalks should have at least a five-foot wide clear path of travel.

C-47 Provide bike routes throughout the Station Area, as illustrated in Figure 3-5.

- Class 1: Continuous multi-purpose trail along East Antioch Creek and the detention basins
- Class 2: Slatten Ranch Road, Phillips Lane, and Viera Avenue

C-48 Allow bicycle circulation on all local streets, to the extent feasible.

C-49 Design and implement a multi-use trail loop around the wetlands and East Antioch Creek. This loop should include at least two pedestrian crossings across the creek.

C-50 Provide multi-use trails that connect from East Antioch Creek to existing neighborhood parks north of the Station Area.

C-51 Provide at least two pedestrian and bicycle crossings across the railroad, at least one each in the Transit Village and the Town Center. If the Median Station is the selected eBART station location, provide a third pedestrian and bicycle crossing opposite the eBART station entrance, as shown in Figures 3-4 and 3-5.

OS-8 Create a linear public open space at least 25 feet wide around the wetlands and detention basins. Design the open space consistent with the following criteria:

- A multi-use trail 8-12 feet wide is provided around the perimeter of the 50-foot inner wetland buffer area;
- The trail connects to public streets, public parks, and plazas;
- At least two pedestrian and bike paths are available to cross the creek;
- At least one staging area with parking is provided adjacent to the trail in the Transit Village area and one in the Town Center area;
- Recreational facilities, such as seating, picnic tables, tot lots, and exercise areas or par course, are provided adjacent to the trail;
- Viewing platforms may be built to observe the natural areas; and
- If feasible, informational signage is provided so that the riparian habitat can used as an educational destination for local schools.

UD-27 Create pedestrian and bicycle routes from the pedestrian centers of the Transit Village and Town Center to the eBART station(s) that are direct, safe, attractive and well-lit. Minimize the travel time and travel distance, and minimize the number of road crossings and the elevation changes such as tunnels, bridges, and ramps.

UD-28 Incorporate bicycle and pedestrian facilities into the design of the railroad crossing at Viera Avenue and the design of Slatten Ranch Road, to create a comfortable and attractive pedestrian and bicycle route to eBART. If the railroad crossing is an undercrossing, minimize the width of the tunnel and maximize the daylight to the pedestrian/bicycle route.

UD-29 If the East Median station location is selected for the eBART station, create a good quality pedestrian/bicycle connection from the Transit Village pedestrian center to the eBART station entrance.

- Design the Viera Avenue undercrossing/overcrossing to provide a reasonably straight pedestrian/bicycle connection to the eBART station entrance.
- Incorporate a pedestrian path from the eBART station entrance to the Viera Avenue undercrossing (or overcrossing).
- Provide a signalized pedestrian/bicycle crossing at Slatten Ranch Road, or a pedestrian/bicycle bridge.
- The pedestrian and bicycle routes should be generally be consistent with the diagram shown in Figure 4-26: Pedestrian and Bicycle Route to eBART: East Median Station.

- Conduct further studies to optimize the design of the Viera Avenue under-crossing, the Slatten Ranch Road/Viera Avenue intersection, and the pedestrian connections, in order to achieve good quality connections, and at the same time minimize costs and storm drainage pumping facilities.

UD-30 If the Median Station location is selected for the eBART station, create a good quality pedestrian/bicycle connection from the Transit Village pedestrian center to the eBART station entrance.

- Build a pedestrian/bicycle crossing over the railroad line, in a location that is generally in a straight line with the eBART station entrance.
- Incorporate a pedestrian path from the eBART station entrance to the railroad crossing.
- Provide a signalized pedestrian/bicycle crossing at Slatten Ranch Road.
- The pedestrian and bicycle routes should be generally be consistent with the diagram shown in Figure 4-29: Pedestrian and Bicycle Route to eBART: Median Station.

Mitigation Measures

None required.

3.4-7 ***Construction of the Specific Plan elements would have temporary impacts on the environment if the project construction would substantially affect traffic flow, circulation, parking, and pedestrian safety. (Less than Significant)***

Construction activities include those associated with site preparation and building construction.

Site preparation includes all of the activities required to allow construction of the infrastructure and the individual parcels of the project. Major components would involve removal of existing structures, removal of contaminated soil material, deposition of clean fill, and grading. A variety of equipment would be required for site preparation including bulldozers, grading machines, cranes, and dump trucks, which would be responsible for the removal and deposition of cut and fill material on the site.

Infrastructure construction involves the utilities and the roads to support the building construction. Elements of infrastructure construction include laying storm drain and other utilities and grading/paving roads, sidewalks, and landscaping. Building construction involves the assembly of buildings on the site. Major elements of building construction would include driving piles to support the building foundation, constructing the building frame, pouring concrete, and completing the interior of each building.

Given the size of the project site, it is anticipated that the construction workers, vehicles, and equipment would be stored onsite. Therefore, the primary impacts to the circulation system would be related to construction vehicles traveling to and from the site, and the potential disruptions to normal vehicular, transit and bicycle/pedestrian flow on SR 4 and the local roads serving the project area that may result when major elements of the Specific Plan's roadway infrastructure are under construction.

Specific Plan policies require the preparation of Construction Traffic Management Plans by Project Sponsors, and thus this potential impact is less than significant.

Specific Plan Policies that Reduce Impact

The following Specific Plan policies reduce this impact:

C-23 Project sponsors shall develop a Construction Traffic Management Plan for City review and approval. The plan shall include at least the following items and requirements to reduce traffic congestion to the maximum extent feasible during construction:

- A set of comprehensive traffic control measures, including major truck trips and deliveries that avoid peak traffic hours, detour signs if required, lane closure procedures, sidewalk closure procedures, signs, cones for drivers, and designated construction access routes.
- Notification procedures for adjacent property owners and public safety personnel regarding when major deliveries, detours, and lane closures will occur.
- Location of construction staging areas for materials, equipment, and vehicles (must be located on the project site).
- Identification of haul routes for movement of construction vehicles that minimize impacts on vehicular and pedestrian traffic, circulation and safety;
- Temporary construction fences to contain debris and material and to secure the site.
- Provisions for removal of trash generated by project construction activity.
- A process for responding to, and tracking, complaints pertaining to construction activity, including identification of an onsite complaint manager.
- Provisions for monitoring surface streets used for truck routes so that any damage and debris attributable to the trucks can be identified and corrected.

Mitigation Measures

None required.