FEHR PEERS

TECHNICAL MEMORANDUM

Date: September 6, 2017

To: Leah Greenblat and John Nemeth, WCCTAC

From: Francisco Martin and Julie Morgan, Fehr & Peers

Subject: West County STMP Update: Review of Existing Conditions

OK17-0177

The West Contra Costa Subregional Transportation Mitigation Program (STMP) is a development impact fee program that generates funds for regional and subregional transportation improvement projects. The STMP was first adopted in 1997, and an updated nexus study was prepared in 2006. The current effort is to update the program by completing a new nexus study.

Understanding existing transportation conditions is an important element of a nexus study. The purpose of an impact fee is to alleviate future impacts caused by new development; per the requirements of the Mitigation Fee Act, it is not appropriate to use impact fees to correct existing deficiencies, so the nexus study should identify the location of such deficiencies. The fee can be used to fund improvements at those locations, as long as the nexus study evaluates the portion of the improvement that addresses the existing deficiency and excludes that portion from the fee calculations. This Existing Conditions summary was based on a review of recent studies that contain information pertaining to the current operations along Routes of Regional Significance, existing transit services, and existing pedestrian and bicycle infrastructure.

DATA SOURCES

Fehr & Peers reviewed recent planning and environmental clearance documents addressing West County's existing and future transportation needs. Documents reviewed include:

- *2015 Update of the Contra Costa Congestion Management Program* (CCTA, December 2015)
- *2017 Countywide Comprehensive Transportation Plan Public Review Draft* (CCTA, May 2017)

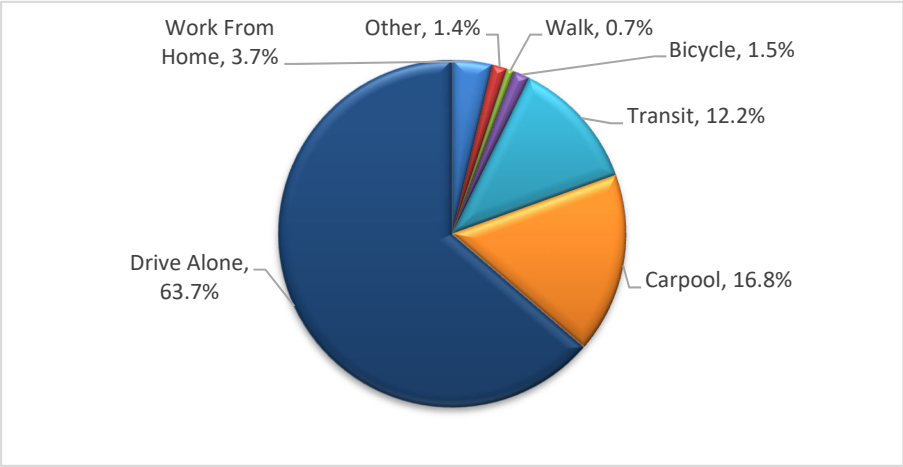
- *2014 Comprehensive Transportation Project List* (CCTA, March 2015)
- *West County Action Plan for Routes of Regional Significance* (CCTA, January 2014)
- *West Contra Costa High-Capacity Transit Study* (WCCTAC, May 2017)
- *West Contra Costa Transit Enhancement Strategic Plan* (WCCTAC, October 2011)
- *2009 Contra Costa Countywide Bicycle and Pedestrian Plan* (CCTA, October 2009), as well as available documents from the ongoing plan update
- Various planning and environmental documents completed in the past several years and available on agency websites, including the following:
    - *San Pablo Avenue Complete Streets Study* (Contra Costa County Public Works, April 2017)
    - *Final Report for the San Pablo Avenue Complete Streets Study* (Cities of Richmond and San Pablo, September 2013)
    - *Final Environmental Impact Report San Pablo Avenue Specific Plan* (City of El Cerrito, August 2014)
    - *Bay Walk Mixed-Use Project Final Initial Study and Mitigated Negative Declaration* (City of Richmond, July 2015)
    - *Draft Environmental Impact Report Bottoms Property Residential Project* (City of Richmond, March 2014)
    - *Draft CEQA Initial Study/Mitigated Negative Declaration Goodrick Avenue Bay Trail Gap Closure Project* (City of Richmond, January 2017)
    - *CVS/Pharmacy & Wireless Communication Facility Relocation Initial Study* (City of Pinole, October 2015)
    - *Pinole Gateway Shopping Center Initial Study* (City of Pinole, January 2015)
    - *Richmond Central Project Initial Study Checklist Public Review Draft* (City of Richmond, April 2014)
    - *Draft Hercules Safeway Project Transportation Impact Assessment* (City of Hercules, July 2017)
    - *Final Sycamore Crossing Transportation Assessment* (City of Hercules, November 2014)
    - *Administrative Draft West County Health Center – Transportation Impact Analysis* (Contra Costa County, April 2017)
    - *Administrative Draft San Pablo City Hall Site Reuse Project Transportation Impact Assessment* (City of San Pablo, June 2017)

The documents listed above provide the basis for the summary of Existing Conditions presented here.

WEST COUNTY MODE SHARE

For informational purposes, Fehr & Peers reviewed American Community Survey data collected by the United States Census Bureau to understand existing commute patterns in West Contra Costa County. **Figure 1** provides a breakdown of the mode split for commute trips from survey respondents in West County. About two-thirds of commuters drive alone, while 17 percent carpool. About 12 percent of commute trips are made via transit, which is higher than the countywide transit mode share of nine percent. Although only 1.5 percent of West County residents commute via bicycling, that is more than double the countywide average. Walking was the lowest observed commute mode in West County, with a 0.7 percent mode share.

FIGURE 1 – WEST COUNTY COMMUTE MODE SHARE (2013)



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates, 2013.

ROUTES OF REGIONAL SIGNIFICANCE

Each of the four Regional Transportation Planning Committees (RTPCs) in Contra Costa County, including WCCTAC, work cooperatively to establish overall goals and set performance measures for designated Routes of Regional Significance. Routes of Regional Significance are roadways that connect two or more subareas of Contra Costa, cross County boundaries, carry significant through

traffic, and/or provide access to a regional highway or transit facility. The regional function of these routes coincides with the regional purpose of the STMP. The Routes of Regional Significance in West County are shown on **Figure 2**, and are described as follows:

1. **Appian Way** – From San Pablo Avenue to San Pablo Dam Road.
2. **Carlson Boulevard** – From 23rd Street to San Pablo Avenue.
3. **Central Avenue** – From San Pablo Avenue to I-580.
4. **Cummings Skyway** – From San Pablo Avenue to SR 4.
5. **Interstate 80** – From the Alameda County line to the Solano County line. I-80 is the primary inter-regional commute corridor through West County, and has major regional significance to the Bay Area.
6. **Interstate 580** – From I-80 to the Marin County line. I-580 carries inter-regional traffic between the East Bay and the North Bay.
7. **Richmond Parkway** – From I-80 to I-580 (including Castro Street and Garrard Boulevard segments). Richmond Parkway is an important connector for traffic traveling between I-80 and I-580.
8. **San Pablo Avenue** – From the Alameda County line to I-80/Pomona Street in Crockett. San Pablo Avenue is the most important corridor for inter-city travel in West County: it is the primary transit spine of the region, it travels through all of the West County cities (in many cases, functioning as "Main Street"), and it is the primary reliever route to I-80 during periods of severe freeway congestion.
9. **San Pablo Dam Road** – From San Pablo Avenue to the boundary with the Lamorinda region. San Pablo Dam Road is an important intra-County route, connecting travelers from I-80 in West County to SR 24 in Orinda, and it also serves as the primary commercial corridor for the unincorporated community of El Sobrante.
10. **State Route 4** – From I-80 to Cummings Skyway. SR 4 carries intra-County traffic between West County, Central County and East County.
11. **23rd Street** – From San Pablo Avenue to I-580.

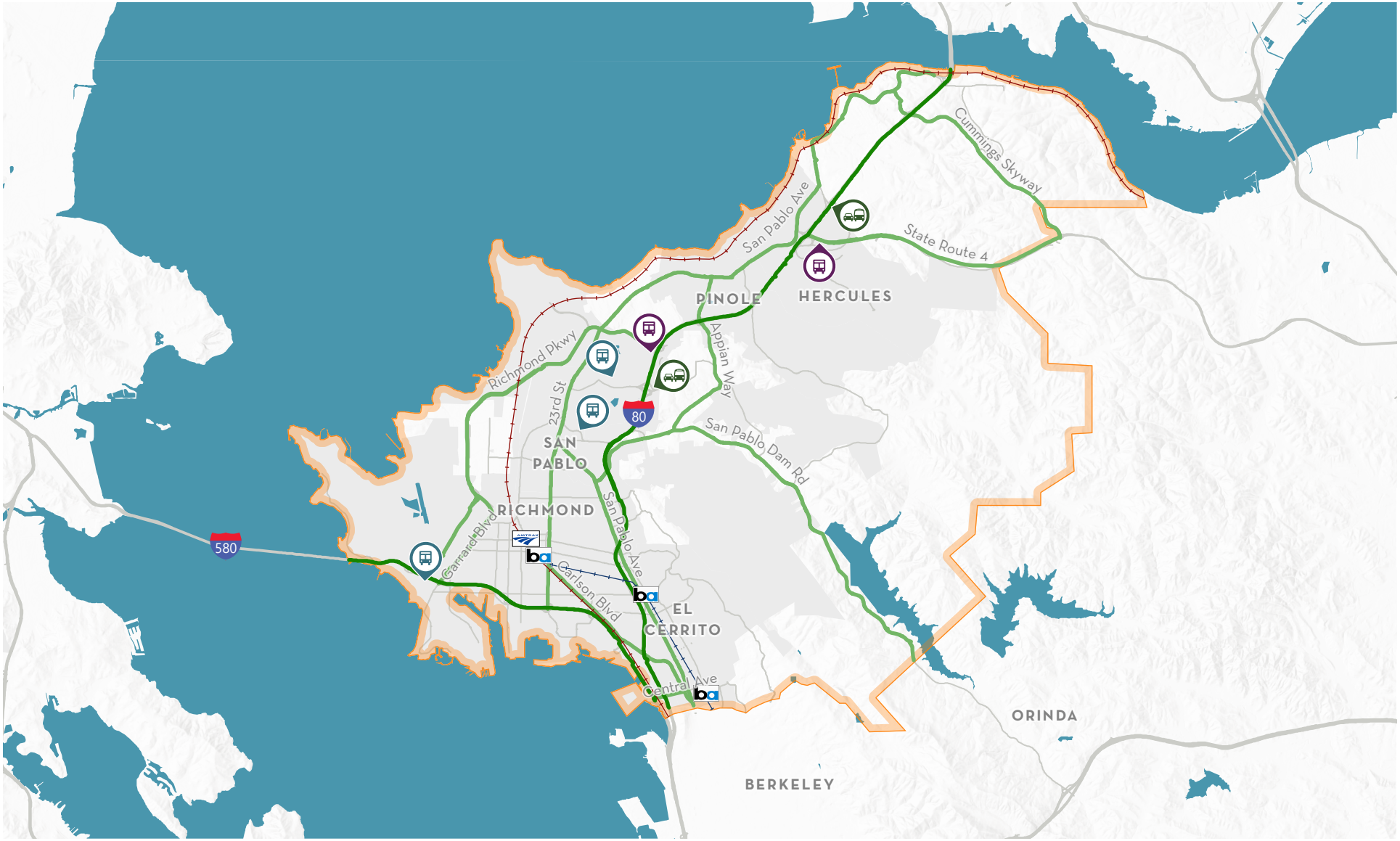


Figure 2

Existing Regional Transportation Facilities

CONGESTION MANAGEMENT PROGRAM

CCTA is responsible for preparing and adopting a Congestion Management Program (CMP) and updating it regularly; the CMP was last updated in 2015. The CMP defines traffic level-of-service (LOS) standards that apply to designated CMP routes that include Routes of Regional Significance. CCTA must monitor whether these LOS standards are being met on the designated CMP network. The purpose of the CMP is to monitor performance of the CMP network, identify deficiencies and needs of the network, and ultimately develop a capital improvement program (CIP) that maintains or improves the multimodal performance of the network.

Existing Intersection Operations

The CMP evaluates traffic operations using procedures outlined in the Transportation Research Board's 2010 Highway Capacity Manual (HCM). LOS is a measure of traffic operating conditions, which varies from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing over-saturated conditions where traffic flows exceed design capacity resulting in long queues and delays). These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving.

CCTA monitors CMP network performance via a series of CMP Monitoring Intersections. **Table A-1** in **Appendix A** lists all 25 CMP Monitoring Intersections in West County, including their respective LOS Standard and existing peak hour LOS results. As shown in Table A-1, all of the CMP Monitoring Intersections currently achieve the relevant LOS standard. In some cases, the standard is set at LOS F; drivers using intersections that operate at LOS F will experience significant delays, but the CMP defines that level of delay as being acceptable for certain locations.

Table A-1 also includes a few non-CMP Monitoring Intersections that were identified as operating at deficient levels in one or more of the planning and environmental documents we reviewed for this study (the list of documents reviewed is on pages 1-2 of this memo). For example, the *West County Action Plan for Routes of Regional Significance* defines a set of multimodal transportation service objectives (MTSOs) for all of the regional routes. The most recent Action Plan, prepared in 2014, presents the results of a monitoring program that analyzed the then-current MTSOs, based on data collected in 2013. As presented in that report, there were three intersections along Routes of Regional Significance that did not achieve the prescribed MTSO: these were three intersections along the Richmond Parkway corridor, at Hensley Street (via Castro Street), Pittsburg Avenue, and Parr Boulevard, where the peak hour Level of Service was lower than the relevant standard.

Additionally, in the *Richmond Central Project Initial Study Checklist Public Review Draft*, the Central Avenue/Westbound I-80 Ramps/Jacuzzi Street/San Joaquin Street intersection was identified to exceed the relevant LOS standard under existing conditions.

Existing Freeway Operations

The CMP monitors 14 freeway segments within West County, using freeway LOS procedures outlined in the 2010 HCM. The monitored freeway segments are listed in **Table A-2** in Appendix A, along with their relevant LOS standard and the monitoring results. None of the freeway segments monitored were found to exceed the relevant standard. The following freeway segments have standards set at LOS F:

- Eastbound I-80 between the Carquinez Bridge and SR 4
- Eastbound and Westbound I-80 between SR 4 and the Alameda County Line
- Eastbound and Westbound SR 4 between I-80 and Cummings Skyway

The LOS F standard indicates that these freeway segments already experience significant levels of congestion, but the CMP defines that as being acceptable for those locations. All other freeway segments in West County have a LOS E standard.

EXISTING TRANSIT FACILITIES

Approximately 12 percent of West County residents commute via transit according to the 2013 American Community Survey results. A variety of bus and passenger rail services operate within West County; the primary transit service operators include the Alameda-Contra Costa Transit District (AC Transit), Western Contra Costa Transit Authority (WestCAT), Bay Area Rapid Transit (BART) and Amtrak/Capitol Corridor. A few other transit operators, such as Fairfield-Suisun Transit, Golden Gate Transit, Solano County Transit (SolTrans) and VINE also operate regional bus routes, typically providing service from other counties to one of the West County BART stations. The *West Contra Costa High-Capacity Transit Study* (WCCTAC, May 2017) provides a comprehensive summary of existing transit services in West County. A brief summary of primary transit operators and key transit facilities are described below.

BUS TRANSIT SERVICE

AC Transit

The Alameda-Contra Costa Transit District (AC Transit) is the primary bus service provider in 13 cities and adjacent unincorporated areas in western Alameda and Contra Costa counties, with Transbay service (including six routes in West County) to destinations in San Francisco, San Mateo, and Santa Clara Counties. Major West County transfer centers used by AC Transit buses include the three BART stations and the Richmond Parkway Transit Center. In addition, AC Transit hubs are located at Contra Costa College, Hilltop Mall (including a park-n-ride lot), and the Tewksbury Turnaround located at the Tewksbury Avenue/Castro Street intersection in Point Richmond. As defined in the High Capacity Transit Study, "transit centers" typically provide off-street parking and access to multiple transit routes that may be operated by multiple transit agencies; "transit hubs" provide similar facilities but without off-street parking. All three BART stations and the Richmond Amtrak station in West County are also considered transit centers.

AC Transit routes 72, 72M and 72R have the highest bus ridership in West County, with average daily ridership in 2014 for all three routes combined of about 15,000 passengers. The average daily ridership in 2014 for all AC Transit routes that operate in West County was about 25,500 passengers[1].

WestCAT

WestCAT provides local bus services to the northern areas of West County, including Crockett, Hercules, Pinole, and El Sobrante. WestCAT operates eight local routes, four regional express routes, and one transbay route. The average daily WestCAT ridership was about 5,000 passengers in 2014[1]. Major West County transfer centers used by WestCAT buses include the El Cerrito del Norte BART Station, Richmond Parkway Transit Center, and Hercules Transit Center.

PASSENGER RAIL TRANSIT SERVICE

BART

BART provides regional rail transit service to Contra Costa, Alameda, San Francisco and San Mateo counties. There are three BART stations in West County: El Cerrito Plaza, El Cerrito del Norte, and

[1] *West Contra Costa High-Capacity Transit Study* (WCCTAC, May 2017).

Richmond. Two BART lines operate in West County: Fremont-Richmond and Richmond-Daly City/Millbrae. Trains have a typical headway of 15 minutes on weekdays and 20 minutes on Saturdays and Sundays.

The 2016 average weekday BART ridership is summarized in **Table 3** for all three stations. On average, about 37,000 BART trips occurred each weekday in West County in 2016; the El Cerrito del Norte station has the highest usage. The El Cerrito del Norte station platform operates near capacity during the morning and evening peak commute periods and the existing station capacity may not adequately accommodate future forecasted growth in BART ridership.

TABLE 3
BART 2016 AVERAGE WEEKDAY RIDERSHIP

	El Cerrito Plaza	El Cerrito del Norte	Richmond	West County Total
Entry	5,055	8,771	4,511	*18,337*
Exit	5,134	9,162	4,356	*18,652*
Total	*10,189*	*17,933*	*8,867*	**36,989**

Source: BART, 2016, www.bart.gov/about/reports/ridership.

Amtrak

Amtrak provides inter-city rail service throughout California and the country. The Richmond Amtrak station, located adjacent to the Richmond BART Station, is the only Amtrak station in West County. Amtrak operates two long-distance routes through West County, the Coast Starlight (Los Angeles to Seattle) and the California Zephyr (Emeryville to Chicago), but neither of these routes stop in West County. Amtrak also operates the following state-supported routes that stop at the Richmond station:

- **Capital Corridor Route** – this route extends 169 rail miles between San Jose and Auburn. The Capitol Corridor Joint Powers Authority (CCJPA) contracts with Amtrak to operate 15 daily round trips. The Capitol Corridor is Amtrak's third-busiest corridor; the Richmond station had 53,877 annual boardings and 57,014 annual alightings in fiscal year 2013-14[1].

- **San Joaquin Route** – this route extends 316 rail miles between Oakland and Bakersfield. The San Joaquin Joint Powers Authority (SJJPA) contracts with Amtrak to operate four daily round trips. San Joaquin Route ridership data for the Richmond station was not readily available.

FREIGHT RAIL SERVICES

Two rail corridors operate between Richmond and Martinez: the Union Pacific Railroad (UPRR) Martinez Subdivision and the Burlington Northern Santa Fe (BNSF) Stockton Subdivision. Amtrak trains, including the Capitol Corridor and San Joaquin Routes, currently operate on the UPRR Martinez Subdivision. The UPRR Martinez Subdivision extends between Oakland and Roseville, and provides freight service to the Ports of Oakland and Richmond. The BNSF Stockton Subdivision extends between Richmond and Fresno, and is currently only used for freight services, including service to the Port of Richmond. Freight rail improvements are not part of the STMP; however, improvements to rail crossings that benefit regional vehicle, transit, bicycle and/or pedestrian travel may be eligible for STMP funding.

TRANSIT MARKET ASSESSMENT

A transit market assessment was completed as part of the *West Contra Costa High-Capacity Transit Study* (WCCTAC, May 2017) to identify the most competitive transit markets in West County. The evaluation included an origin-destination (O-D) analysis using the CCTA countywide travel demand model and cell phone data, in addition to a Transit Suitability Index (TSI) analysis to assess the competitiveness of transit for the major travel markets that affect the I-80 corridor. Some of the key findings were:

- About 72 percent of total daily person trips stay within West County.
- The top three destinations for travel from West County are Albany/Berkeley/Emeryville, San Francisco, and Alameda/Oakland. Northern Alameda County and San Francisco accounted for 62 percent of all trips that begin in West County and end outside of West County.
- The top three origins for travel to West County are Albany/Berkeley/Emeryville, Solano County, and Alameda/Oakland. About 42 percent of trips to West County originated from northern Alameda County.

The TSI analysis conducted as part of the transit study indicated that the cities of El Cerrito, Richmond, and San Pablo have the greatest current potential for transit ridership growth; the

potential for transit is expected to increase in Pinole and Hercules as anticipated growth occurs. For travel within West County, the transit market assessment indicated a need to increase service for trips originating in central and northwest areas of West County (e.g., San Pablo, Pinole, Hercules) to destinations in the western areas, such as El Cerrito, Richmond, and San Pablo. A need was also identified for better transit service between West County and northern Alameda County. The I-80, San Pablo Avenue, and 23rd Street corridors have the greatest potential for future transit investments in West County.

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

CCTA adopted the first Contra Costa Countywide Bicycle and Pedestrian Plan (CBPP) in 2003. CCTA prepared an Update to the 2003 CBPP in 2009 and is currently underway with another CBPP update. The upcoming 2018 CBPP Update for Contra Costa County will serve as an implementation mechanism for the Action Plans for Routes of Regional Significance, identify a low stress bicycling backbone network, and support Countywide efforts with policy, program, and design guidance and technical assistance. This update process will build upon existing local efforts and identify ways that local agencies can work together to bridge gaps in the regional network.

PEDESTRIAN FACILITIES

West Contra Costa County's diverse natural landscape both accommodates and presents obstacles to walking. On one hand, West County enjoys several trail segments along the coast and pedestrian facilities in urbanized areas, such as the Ohlone Greenway along the BART tracks. On the other, the East Bay hills and lack of pedestrian infrastructure (e.g. sidewalk gaps) can present challenges for walking in various areas of West County. Pedestrian facilities include sidewalks, off-street pathways, crosswalks (midblock and at intersections), curb ramps, median refuges, and pedestrian signals. Sidewalks, crosswalks, curb ramps and pedestrian signals are generally provided in the urban areas of West County, including the areas surrounding each of the three BART stations. Pedestrian facilities can be limited in suburban and rural areas of West County.

All transit users are pedestrians at some point in their trip and improving pedestrian access to BART stations, transit centers and major bus stops can encourage use of transit instead of driving. Capital improvements that enhance pedestrian access to transit facilities will be considered in the nexus

study update in an effort to increase transit mode share and reduce vehicle congestion along the Routes of Regional Significance.

BICYCLE FACILITIES

The California Department of Transportation (Caltrans) classifies four primary bicycle facility types in the *Highway Design Manual* (Chapter 1000: Bikeway Planning and Design). Each bikeway class is intended to provide bicyclists with enhanced riding conditions. Bikeways offer various levels of separation from traffic based on traffic volume and speed, among other factors. The four bikeway types in California and appropriate contexts for each are shown on **Figure 3** and detailed below.

- **Class I Bikeway (Bike Path)** – Bike paths provide a completely separate right-of-way and are designated for the exclusive use of people riding bicycles and walking with minimal cross-flow traffic. Such paths can be well-situated along creeks, canals, and rail lines. Class I Bikeways can also offer opportunities not provided by the road system by serving as both recreational areas and/or desirable commuter routes.
- **Class II Bikeway (Bike Lane)** – Bike lanes provide designated street space for bicyclists, typically adjacent to the outer vehicle travel lanes. Bike lanes include special lane markings, pavement legends, and signage. Bike lanes may be enhanced with painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (such as driveways or intersections). At a minimum, buffer striping should be provided between the bicycle lane and the vehicle travel lanes.
- **Class III Bikeway (Bike Route)** Bike routes provide enhanced mixed-traffic conditions for bicyclists through signage, striping, and/or traffic calming treatments, and provide continuity to a bikeway network. Bike routes are typically designated along gaps between bike trails or bike lanes, or along low-volume, low-speed streets. Bicycle boulevards provide further enhancements to bike routes to encourage slow speeds and discourage non-local vehicle traffic via traffic diverters, chicanes, traffic circles, and/or speed tables. Bicycle boulevards can also feature special wayfinding signage to nearby destinations or other bikeways.
- **Class IV Bikeway (Separated Bikeway)** Separated Bikeways, also referred to as cycle tracks or protected bikeways, are bikeways for the exclusive use of bicycles which are physically separated from vehicle traffic. Separated Bikeways were recently adopted by Caltrans in 2015. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers such as curbs, planters, and delineators, or on-street parking.

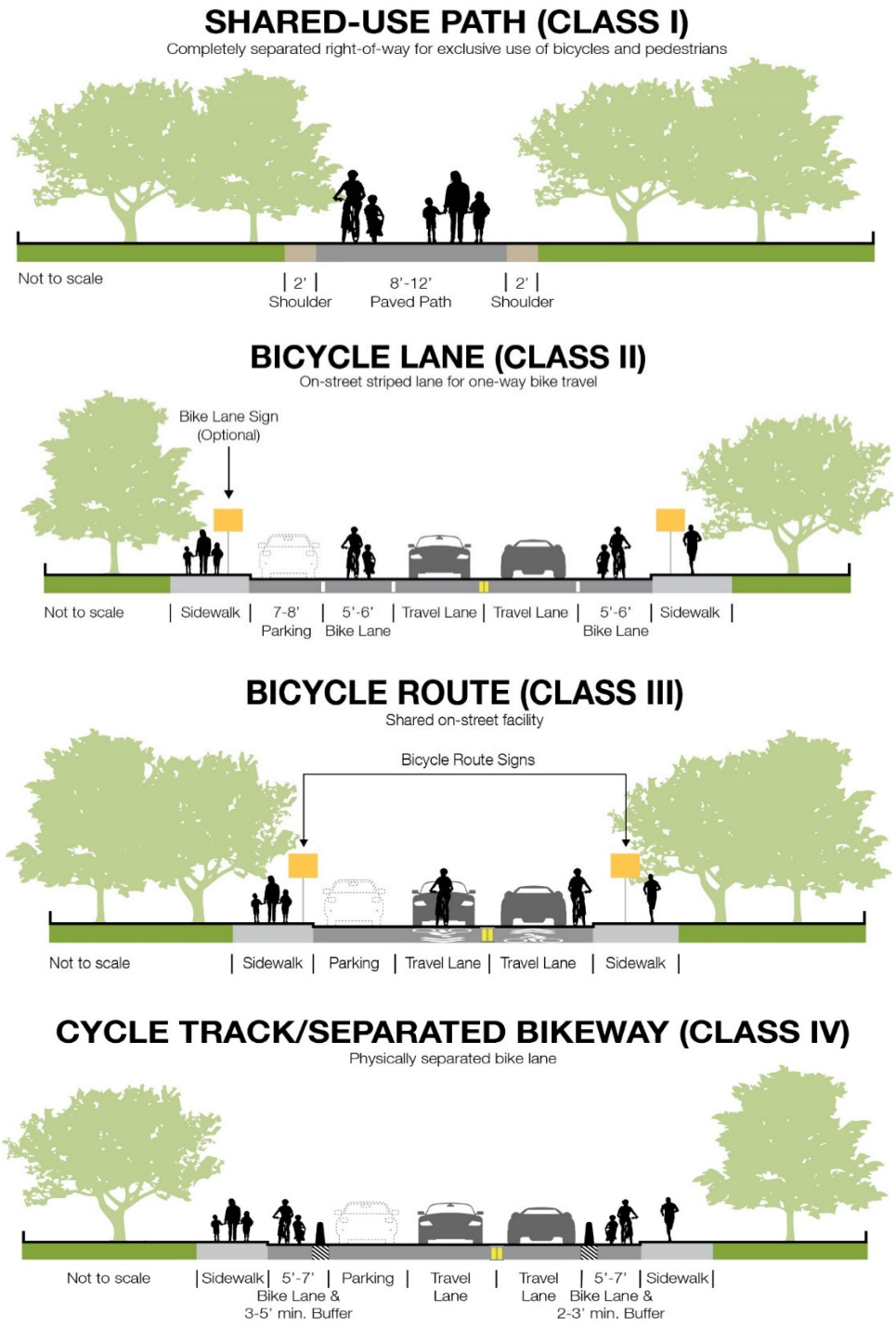


FIGURE 3 – BIKEWAY TYPES

The upcoming 2018 CBPP Update will include an updated bicycle network map for Contra Costa County; the preliminary West County bicycle network map is shown on **Figure 4**, the final map will be available by end of 2017.

Bicycling as a means of transportation is disconnected in West County. As shown on Figure 4, there are several network gaps that hinder bicycle access and circulation in West County. Recent bicycle transportation planning and research has focused on bicycle comfort to help understand bicycle facilities' potential for bicycle ridership and mode shift. The development of low-stress bicycle networks that eliminate high-stress barriers is critical to broadening the appeal of bicycling in West County. One strategy for expanding low-stress bikeways is to develop a continuous and connected "Backbone Network" in West County. Backbone networks are citywide or region-wide bicycle facilities with low-stress ratings and seek to address barriers to access associated with the high-stress arterial and collector roadways. Depending on roadway characteristics, low-stress facilities can range from Class III bicycle routes on low auto volume and low speed residential streets with traffic calming, to off-street Class I trails and on-street Class IV separated bikeways. In addition, ensuring that intersection treatments are low-stress and comfortable is another critical component of low-stress backbone networks. Capital improvements that provide low-stress bicycling facilities along routes that connect to major regional destinations and transit facilities will be considered in the nexus study update in an effort to increase bicycle mode share and reduce vehicle congestion along the Routes of Regional Significance.

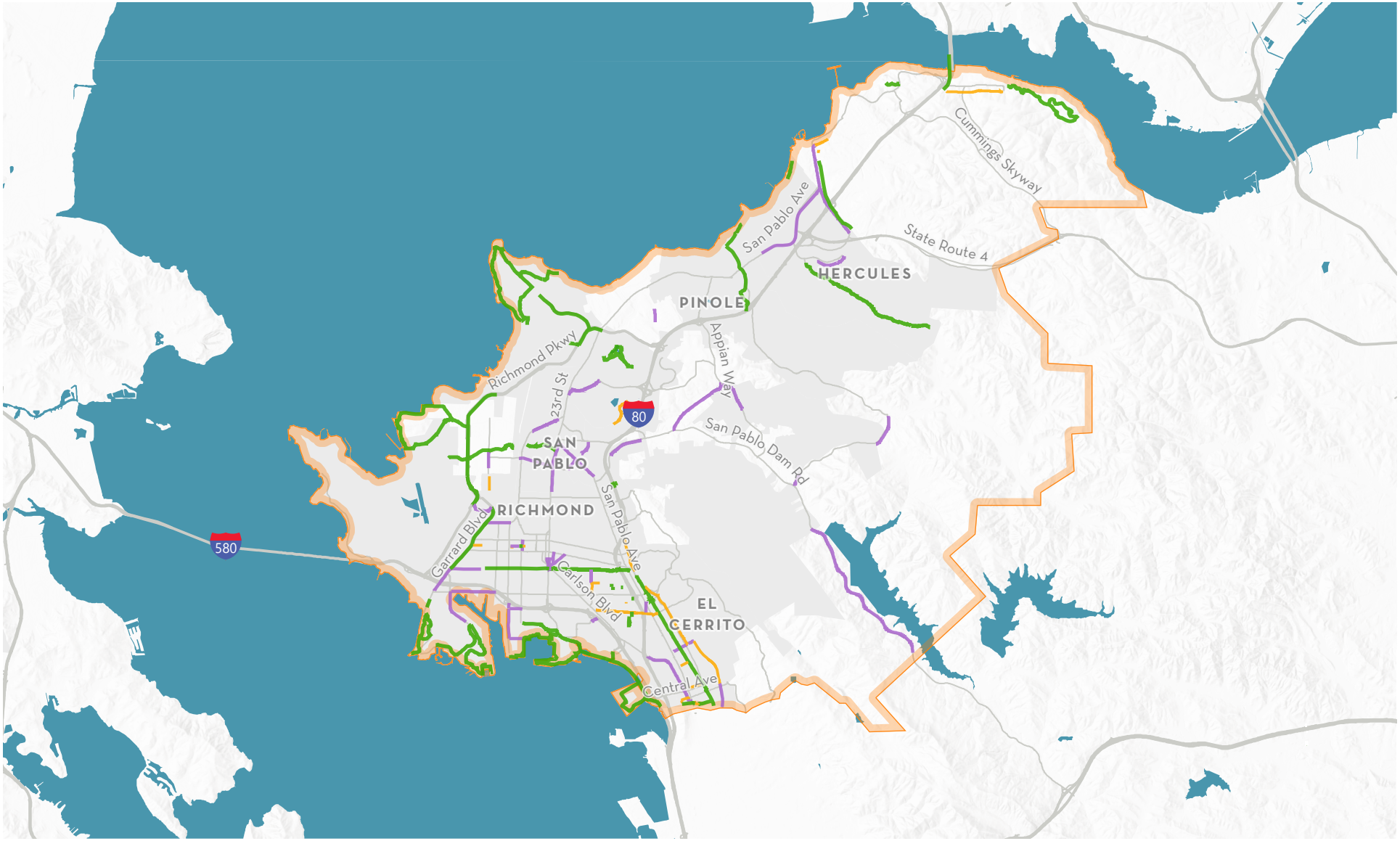


Figure 4

Existing West County Bicycle Network (Preliminary)

Source: Upcoming 2018 Contra Costa Countywide Bicycle and Pedestrian Plan (Map is Preliminary)

SUMMARY OF EXISTING DEFICIENCIES

Based on the documents reviewed for this study, the following intersections along Routes of Regional Significance are considered to have existing deficiencies:

- Castro Street/Hensley Street (City of Richmond)
- Richmond Parkway/Pittsburg Avenue (City of Richmond)
- Richmond Parkway/Parr Boulevard (City of Richmond)
- Central Avenue/Jacuzzi Street/San Joaquin Street/Westbound I-80 Ramps (City of Richmond)

If any of the capital improvement projects included in the STMP address these intersections, the STMP will account for these deficiencies by calculating the proportion of the improvement cost that is attributable to correcting the deficiency and removing that proportion from the fee calculations.

The STMP may include capital improvements that address transit, bicycle, and/or pedestrian facilities. In lieu of identifying specific locations of existing deficiencies in those networks, the STMP will establish a nexus for transit, bicycle, or pedestrian projects based on the proportional growth anticipated in West County.

NEXT STEPS

To guide the STMP update process, this memo provides a summary of Existing Conditions for West County based on a review of available studies. The information provides the basis for identifying existing deficiencies, which will be accounted for in the future STMP fee calculations. The information in this memo will be presented at the September 14th TAC meeting.

Please contact Francisco Martin or Julie Morgan if you have any questions or comments.

Attachments

Appendix A – Existing Conditions Intersection and Freeway Traffic Operations Summary

Appendix A

Existing Conditions Intersection and Freeway Traffic Operations Summary

FEHR PEERS

TABLE A-1
EXISTING INTERSECTION LEVEL OF SERVICE

ID	Facility	Cross Street	Jurisdiction	Intersection Type	Peak hour	Delay	LOS	LOS Standard	Source
1	San Pablo Avenue	John Muir Parkway	Hercules	Signal	AM PM	43.9 53.4	D D	E	CMP 2015[1]
2	San Pablo Avenue	Pinole Valley Road	Pinole	Signal	AM PM	6 12.4	A B	E	CMP 2015[1]
3	San Pablo Avenue	Appian Way	Pinole	Signal	AM PM	25.1 28.6	C C	E	CMP 2015[1]
4	San Pablo Avenue	Hilltop Drive	Richmond	Signal	AM PM	46 62	D E	E	CMP 2015[1]
5	San Pablo Avenue	Rumrill Boulevard	San Pablo	Signal	AM PM	31.6 57.9	C E	F	CMP 2015[1]
6	San Pablo Avenue	El Portal Drive	San Pablo	Signal	AM PM	39.6 37.1	D D	E	CMP 2015[1]
7	San Pablo Avenue	Road 20	San Pablo	Signal	AM PM	66.5 40.8	E D	E	CMP 2015[1]
8	San Pablo Avenue	San Pablo Dam Road	San Pablo	Signal	AM PM	29.1 36.2	C D	E	CMP 2015[1]
9	San Pablo Avenue	McBryde Avenue	Richmond	Signal	AM PM	25.6 34.7	C C	E	CMP 2015[1]
10	San Pablo Avenue/ Barrett Avenue	WB I–80 Ramps	Richmond	Signal	AM PM	30.8 28.5	C C	E	CMP 2015[1]
11	San Pablo Avenue	EB I–80 Ramps/ Roosevelt Ave	Richmond	Signal	AM PM	17.4 22.4	B C	E	CMP 2015[1]
12	San Pablo Avenue	Barrett Avenue	Richmond	Signal	AM PM	61.5 56.4	E E	F	CMP 2015[1]
13	San Pablo Avenue	Cutting Boulevard	El Cerrito	Signal	AM PM	31 40	C D	E	CMP 2015[1]
14	San Pablo Avenue	Central Avenue	El Cerrito	Signal	AM PM	35.4 45.4	D D	E	CMP 2015[1]
15	San Pablo Dam Road	WB I–80 Ramps	San Pablo	Signal	AM PM	26.4 51.1	C D	F	CMP 2015[1]
16	San Pablo Dam Road	EB I-80 Ramps/ Amador St	San Pablo	Signal	AM PM	59.4 59.1	E E	F	CMP 2015[1]
17	San Pablo Dam Road	El Portal Drive	Richmond, County	Signal	AM PM	33.7 40.8	C D	E	CMP 2015[1]

TABLE A-1
EXISTING INTERSECTION LEVEL OF SERVICE

ID	Facility	Cross Street	Jurisdiction	Intersection Type	Peak hour	Delay	LOS	LOS Standard	Source
18	San Pablo Dam Road	Appian Way	County	Signal	AM PM	67.1 42.9	E D	E	CMP 2015[1]
19	San Pablo Dam Road	Castro Ranch Road	Richmond, County	Signal	AM PM	25.5 25.6	C C	E	CMP 2015[1]
20	El Portal Drive	Road 20	San Pablo	Signal	AM PM	14.1 16.6	B B	E	CMP 2015[1]
21	El Portal Drive	WB I–80 Ramps	County	Signal	AM PM	26.4 25.6	C C	F	CMP 2015[1]
22	El Portal Drive	EB I–80 Ramps	Richmond, County	Signal	AM PM	441.9 43.3	F D	F	CMP 2015[1]
23	Cutting Boulevard	Canal Boulevard	Richmond	Signal	AM PM	11.5 12.3	B A	E	CMP 2015[1]
24	Cutting Boulevard	Harbour Way	Richmond	Signal	AM PM	38.6 43.8	D D	E	CMP 2015[1]
25	Cutting Boulevard	Carlson Boulevard	Richmond	Signal	AM PM	23.9 23.4	C C	E	CMP 2015[1]
26	Castro Street	Hensley Street	Richmond	Signal	AM PM	-- --	C **E**	D	WCAP 2014[2]
27	Richmond Parkway	Pittsburg Avenue	Richmond	Signal	AM PM	-- --	**F** F	D	WCAP 2014[2]
28	Richmond Parkway	Parr Boulevard	Richmond	Signal	AM PM	-- --	**F** C	D	WCAP 2014[2]
29	Central Avenue	Jacuzzi Street/San Joaquin Street/WB I-80 Ramps	Richmond	Signal	AM PM	**57.7** **56.9**	**E** **E**	D	RCPIS 2014[3]

Notes: **Bold** indicates locations that exceed the LOS standard.

1. Intersection results are based on the *2015 Update of the Contra Costa Congestion Management Program* (CCTA, December 2015).
2. Intersection results are based on the *West County Action Plan for Routes of Regional Significance* (CCTA, January 2014).
3. Intersection results are based on the *Richmond Central Project Initial Study Checklist Public Review Draft* (City of Richmond, April 2014).

Source: Highway Capacity Manual, Chapter 19 (Signalized Intersections), Chapter 20 and 21 (Unsignalized Intersections), Transportation Research Board, 2010.

TABLE A-2
EXISTING FREEWAY LEVEL OF SERVICE

ID	Route	Limits	Direction	Peak hour	Speed	LOS	LOS Standard	Source
F80-1	I-80	Carquinez Bridge to Cummings Skyway	EB	AM PM	63.3 61.6	A A	F	CMP 2015[1]
F80-1	I-80	Carquinez Bridge to Cummings Skyway	WB	AM PM	64.4 65	A A	E	CMP 2015[1]
F80-2	I-80	Cummings Skyway to State Route 4	EB	AM PM	65.4 66.7	A A	F	CMP 2015[1]
F80-2	I-80	Cummings Skyway to State Route 4	WB	AM PM	61.4 67.5	A A	E	CMP 2015[1]
F80-3	I-80	State Route 4 to San Pablo Dam Road	EB	AM PM	63.6 28	A F	F	CMP 2015[1]
F80-3	I-80	State Route 4 to San Pablo Dam Road	WB	AM PM	24.8 63	F A	F	CMP 2015[1]
F80-4	I-80	San Pablo Dam Road to Cutting Blvd.	EB	AM PM	62.6 25	A F	F	CMP 2015[1]
F80-4	I-80	San Pablo Dam Road to Cutting Blvd.	WB	AM PM	25.8 49.9	F D	F	CMP 2015[1]
F80-5	I-80	Cutting Blvd. to Alameda County	EB	AM PM	63.7 23	A F	F	CMP 2015[1]
F80-5	I-80	Cutting Blvd. to Alameda County	WB	AM PM	18.6 64.7	F A	F	CMP 2015[1]
F580-1	I-580	Richmond Bridge to Alameda County Line	EB	AM PM	41.5 58.7	E B	E	CMP 2015[1]
F580-1	I-580	Richmond Bridge to Alameda County Line	WB	AM PM	31.1 62.2	E A	E	CMP 2015[1]
F4-1	SR-4	I-80 to Cummings Skyway	EB	AM PM	57.2 59.5	B B	F	CMP 2015[1]
F4-1	SR-4	I-80 to Cummings Skyway	WB	AM PM	61.6 61.8	A A	F	CMP 2015[1]

Notes:
1. Intersection results are based on the *2015 Update of the Contra Costa Congestion Management Program* (CCTA, December 2015.

Source: Highway Capacity Manual, Chapter 11 (Basic Freeway Segments), Transportation Research Board, 2010.