3.14 - Transportation

3.14.1 - Introduction

This section describes existing conditions related to transportation in the project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to transportation that could result from implementation of the proposed project. Information in this section is based on the project-specific Transportation Impact Assessment prepared by Fehr & Peers (included as Appendix K). The following comments were received during the Environmental Impact Report (EIR) scoping period related to transportation:

• California Department of Transportation (Caltrans), District 4 (Travel Demand Analysis, Multimodal Planning, Vehicle Trip Reduction)

3.14.2 - Existing Conditions

The following discusses the existing roadways that provide access to the project site and vicinity.

Roadway System

The project site is bound by medium density single-family homes to the north, Deer Valley Road and the Kaiser Permanente Antioch Medical Center to the east, undeveloped land to the south, and Empire Mine Road, Black Diamond Mine Preserve and undeveloped land to the west. Antioch is in eastern Contra Costa County, adjacent to the cities of Oakley and Brentwood, located east and southeast, respectively. Land uses surrounding the project site are residential, medical, or undeveloped.

Regional access to the site is provided by State Route 4 (SR-4), Lone Tree Way, Deer Valley Road and, once extended, Sand Creek Road. Dallas Ranch Road and Deer Valley Road provide local access. The following discusses the roadways that would provide access to the site and are most likely to experience direct traffic impacts, if any, from the proposed project.

State Route 4

SR-4 is an east-west freeway that extends from Hercules in the west to Stockton and beyond in the east. In the project area, SR-4 has a northwest/southeast orientation between State Route 160 (SR-160) and Walnut Boulevard in east Contra Costa County. The facility is an eight-lane freeway in the west to SR-160, a six-lane freeway from SR-160 to Laurel Road and a four-lane freeway from Laurel Road to Sand Creek Road. Between Sand Creek Road and Walnut Boulevard, the facility is a two-lane highway with at-grade intersections at Balfour Road and Marsh Creek Road. Each intersection is signalized and operated by Caltrans. SR-4 is a designated Route of Regional Significance by the Contra Costa County Transportation Agency (CCTA). Routes of regional significance are roadways that connect two or more subareas of Contra Costa County, cross county boundaries, carry significant through traffic, and/or provide access to a regional highway or transit facility.

Lone Tree Way

Lone Tree Way is an east-west roadway located north of the project site. The roadway provides three travel lanes in both directions to the east of Hillcrest Avenue. The roadway is also three lanes in each

direction to the west of Hillcrest Avenue until Blue Rock Drive, where the roadway narrows, becoming two lanes in each direction at James Donlon Boulevard. The posted speed limit is 45 miles per hour (mph). No on-street parking is permitted. Lone Tree Way is a designated Route of Regional Significance.

Sand Creek Road

Sand Creek Road is a four-lane, east-west roadway that extends east from SR-4 through Brentwood. The posted speed limit is 45 mph. No on-street parking is permitted on Sand Creek Road. Class II bicycle lanes and sidewalks are provided along most of the roadway through Brentwood. Sand Creek Road from Brentwood Boulevard to its current terminus at SR-4 is a Route of Regional Significance. Sand Creek Road is planned to be extended westward to Deer Valley Road, and through the project site, connecting with Dallas Ranch Road, as shown in Section 2, Project Description, Exhibit 2-9. Once constructed, the future extension of Sand Creek Road would also be a designated Route of Regional Significance.

Deer Valley Road

Deer Valley Road is a north-south roadway connecting Brentwood to Antioch. From south of Balfour Road to the project vicinity, it is two-lane rural road with adjacent areas mostly undeveloped and agricultural. Along this rural section, there are no bicycle or pedestrian facilities and no paved shoulders. Around Sand Creek Road, Deer Valley Road starts to widen to provide two travel lanes in each direction, sidewalks adjacent to developed parcels, and Class II bicycle lanes. As part of the proposed project, Deer Valley Road would be improved along the project frontage to its ultimate standard, which includes two travel lanes in each direction, bicycle lanes, and sidewalks. Deer Valley has a posted speed limit of 45 mph. Deer Valley Road is a designated Route of Regional Significance.

Dallas Ranch Road

Dallas Ranch Road is a four-lane north-south roadway that would connect to the proposed Sand Creek Road extension, providing a new access route to Deer Valley Road and SR-4. Two travel lanes are provided in each direction with bicycle lanes and sidewalks. No direct residential access is provided from Dallas Ranch Road. The posted speed limit on Dallas Ranch Road is 45 mph although it is temporarily posted 25 mph approaching the southerly terminus.

Project Facilities and Traffic Counts

Weekday AM (7:00 a.m. to 9:00 a.m.) and PM (4:00 p.m. to 6:00 p.m.) peak period intersection turning movement counts were collected at the project intersections listed below, including separate counts of pedestrians, bicyclists and heavy vehicles. Traffic counts at the italicized intersections were first collected in 2017 and then again in May and August 2019 with area schools in normal session. At the italicized intersections, previously collected counts from 2017 and the recent 2019 counts were compared. Around the Hillcrest Avenue interchange, traffic volumes changed dramatically due to the opening of the Bay Area Rapid Transit (BART) station in 2018. However, at intersections away from the freeway, traffic volumes decreased slightly between 2017 and 2019. At non-italicized intersections, 2017 data remains reflective of current conditions based on spot counts collected at other locations. The 2017 data was, however, increased by 2 percent to reflect that some traffic changes may have occurred. In August 2019, 72-hour counts (Tuesday through Thursday) were collected on the three roadway segments while area schools were in normal session.

- 1. Lone Tree Way/A Street/SR-4 Westbound Ramps
- 2. Lone Tree Way/A Street/SR-4 Eastbound Ramps
- 3. Hillcrest Avenue/Sunset Drive/Slatten Ranch Road
- 4. Slatten Ranch Road/SR-4 Westbound Ramps
- 5. Hillcrest Avenue/SR-4 Eastbound Ramps
- 6. Lone Tree Way/Davison Drive
- 7. Deer Valley Road/Hillcrest Avenue/Davison Drive
- 8. Lone Tree Way/James Donlon Boulevard
- 9. Lone Tree Way/Dallas Ranch Road
- 10. Lone Tree Way/Deer Valley Road
- 11. Lone Tree Way/Hillcrest Avenue
- 12. Lone Tree Way/SR-4 Eastbound Ramps
- 13. Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way
- 14. Prewett Ranch Drive/Dallas Ranch Road
- 15. Prewett Ranch Drive/Deer Valley Road
- 16. Deer Valley Road/Wellness Way/Street A
- 17. Sand Creek Road/Deer Valley Road
- 18. Sand Creek Road/Hillcrest Avenue (future intersection)
- 19. Sand Creek Road/Heidorn Ranch Road (future intersection)
- 20. Sand Creek Road/SR-4 Eastbound Ramps
- 21. Sand Creek Road/SR-4 Westbound Ramps
- 22. Balfour Road/Deer Valley Road
- 23. Balfour Road/SR-4 Eastbound Ramps
- 24. Balfour Road/SR-4 Westbound Ramps
- 25. Prewett Ranch Drive/Hillcrest Avenue

Peak-hour intersection vehicle volumes are summarized on Exhibit 3.14-1 along with existing lane configurations and traffic controls. Bicycle and pedestrian counts are presented on Exhibit 3.14-2, which shows existing bicycle and pedestrian activity at the project intersection as being generally low.

Level of Service

The operations of roadway facilities are described with the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (free-flow conditions) to LOS F (over capacity conditions). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated LOS F.

Signalized Intersections

Traffic conditions at signalized intersections were evaluated using methods developed by the Transportation Research Board (TRB), as documented in the Highway Capacity Manual 6th Edition (2016 HCM) for vehicles using the analysis software Synchro 10.0. The Highway Capacity Manual (HCM) method calculates control delay at an intersection based on inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak-hour factors. Control delay is defined as the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The relationship between LOS and control delay is summarized in Table 3.14-1.

Level of Service	Description	Delay in Seconds
A	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.	< 10.0
В	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0
С	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.	> 20.0 to 35.0
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.	> 35.0 to 55.0
E	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. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0
F	This level is considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0
Source: Fehr	& Peers 2019.	1

Table 3.14-1: Signalized Intersection Level of Service Criteria

Unsignalized Intersections

For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, the HCM 6th Edition method for unsignalized intersections was used. With this method, operations are defined by the average control delay per vehicle (measured in seconds). The control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in queue. Table 3.14-2 summarizes the relationship between LOS and delay for unsignalized intersections. At side-street stop-controlled intersections, the delay is calculated for each stop-controlled movement, the left turn movement from the major street, as well as the intersection average. The intersection average delay and highest movement/approach delay are reported for side-street stop-controlled intersections.



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-1 Existing Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls and Daily Roadway Segment Volumes

 $36230007 \bullet 12/2019 \mid 3.14\text{-}1_existing_PHITV_lane_config_traffic_controls.cdr$

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT THIS PAGE INTENTIONALLY LEFT BLANK



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-2 Existing Peak Hour Pedestrian and Bicycle Volumes

36230007 • 12/2019 | 3.14-2_existing_PH_ped_bicycle_vol.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT THIS PAGE INTENTIONALLY LEFT BLANK

Level of Service	Description	Delay in Seconds			
A	Little or no delays	≤ 10.0			
В	Short traffic delays	> 10.0 to 15.0			
С	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 where intersection capacity exceeded	> 50.0			
Source: Fehr & Peers 2019.					

Table 3.14-2: Unsignalized Intersection Level of Service Criteria

Existing Intersection Operations

Existing intersection lane configurations, signal timings, and peak-hour turning movement volumes were used to calculate the LOS for the project intersections during each peak-hour, using the Synchro 9.0 software program, as presented in Table 3.14-3. Observed peak-hour factors were used at all intersections for the existing analysis.¹ Pedestrian and bicycle activity was also factored into the analysis.

As shown, signalized project intersections generally operate within the LOS standards set by the City of Antioch and Contra Costa County, except for Intersection 5, the Hillcrest Avenue/SR-4 Eastbound Ramp intersection, which operates at an overall LOS F during the PM peak-hour. Poor operations are primarily due to the close proximity of the adjacent intersection (Hillcrest Avenue at Tregallas Road/Larkspur Drive), poor vehicle progression between closely spaced intersections that do not make efficient use of green time, and lane utilization imbalances for the eastbound right-turn movement from the off-ramp as well as the northbound through movement.

	Intersection	Control ¹	Peak-hour	Delay ²	LOS
1.	Lone Tree Way/A Street/SR-4 Westbound Ramps	Signal	AM PM	13 9	B A
2.	Lone Tree Way/A Street/SR-4 Eastbound Ramps	Signal	AM PM	15 15	B B
3.	Hillcrest Avenue/Sunset Drive/Slatten Ranch Road	Signal	AM PM	18 17	B B
4.	Slatten Ranch Road/SR-4 Westbound Ramps	Signal	AM PM	8 8	A A
5.	Hillcrest Avenue/SR-4 Eastbound Ramps	Signal	AM PM	32 90	C F

Table 3.14-3: Existing Conditions Peak-hour Intersection Level of Service Summary

¹ The peak-hour factor is the relationship between the peak 15-minute flow rate and the full hourly volume: PHF = Hourly volume/(4 x (volume during the peak 15 minutes of flow)). The analysis level of served is based on peak rates of flow occurring within the peak hour because substantial short term fluctuations typically occurring during an hour.

Table 3.14-3 (cont.): Existing Conditions Peak-hour Intersection Level of Service Summary

	Intersection	Control ¹	Peak-hour	Delay ²	LOS
6.	Lone Tree Way/Davison Drive	Signal	AM PM	16 15	B B
7.	Deer Valley Road/Hillcrest Avenue/Davison Drive	Signal	AM PM	24 28	C C
8.	Lone Tree Way/James Donlon Boulevard	Signal	AM PM	20 17	B B
9.	Lone Tree Way/Dallas Ranch Road	Signal	AM PM	30 16	C B
10.	Lone Tree Way/Deer Valley Road	Signal	AM PM	32 23	C C
11.	Lone Tree Way/Hillcrest Avenue	Signal	AM PM	18 21	B C
12.	Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	18 32	B C
13.	Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way	Signal	AM PM	9 12	A B
14.	Prewett Ranch Drive/Dallas Ranch Road	Signal	AM PM	18 14	B B
15.	Prewett Ranch Drive/Deer Valley Road	Signal	AM PM	27 14	C B
16.	Deer Valley Road/Wellness Way/Street A	Signal	AM PM	7 5	A A
17.	Sand Creek Road/Deer Valley Road	Signal	AM PM	9 7	A A
18.	Sand Creek Road/Hillcrest Avenue (future intersection)	Signal	AM PM	_	_ _
19.	Sand Creek Road/Heidorn Ranch Road (future intersection)	Signal	AM PM	—	_ _
20.	Sand Creek Road/SR-4 Eastbound Ramps	Signal	AM PM	4 4	A A
21.	Sand Creek Road/SR-4 Westbound Ramps	Signal	AM PM	5 6	A A
22.	Balfour Road/Deer Valley Road	SSSC	AM PM	14 (23) 10 (14)	B (C) B (B)
23.	Balfour Road/SR-4 Eastbound Ramps	Signal	AM PM	33 30	C C
24.	Balfour Road/SR-4 Westbound Ramps	Signal	AM PM	25 23	A A

Intersection	Control ¹	Peak-hour	Delay ²	LOS
25. Prewett Ranch Drive/Hillcrest Avenue	Signal	AM PM	19 16	B B
Notes: ¹ Signal = signalized intersection; SSSC = side-street stop-cont ² Average intersection delay is calculated for all signalized inter Source: Fehr & Peers 2017.	rol ersections using	g the HCM met	hod for vehicle	s.

Table 3.14-3 (cont.): Existing Conditions Peak-hour Intersection Level of Service Summary

The unsignalized intersection of Deer Valley Road at Balfour Road currently operates at an acceptable level; however, previous data collection efforts and analyses noted deficient operations for this intersection. Completion of the Balfour Road interchange and associated SR-4 widening between Sand Creek Road and Balfour Road may have resulted in travel pattern shifts, with more vehicles traveling on SR-4, versus Deer Valley and other parallel roadways. To assess the need for signalization of stop-controlled intersections, the Manual of Uniform Traffic Control (MUTCD) presents nine signal warrants. The Peak-hour Volume Warrant and the Peak-hour Delay Warrant was used in this analysis as a supplemental analysis tool to assess operations at the unsignalized intersections.² The Deer Valley Road at Balfour Road intersection does not meet peak-hour signal warrants during the AM peak-hour.

Existing Queuing

Vehicle queues were also calculated by Synchro 10.0. In the existing condition, average left-turn vehicle queues are contained within the available storage with the 95th percentile vehicle queue for some movements potentially extending beyond the available storage, including:

- Lone Tree Way/A Street/SR-4 Westbound Ramps (northbound left movement, AM peak-hour)
- Hillcrest Avenue/Sunset Drive/Slatten Ranch Road (northbound left movement, AM peak-hour)
- Lone Tree Way/Davison Drive (westbound left, AM peak-hour, and northbound left, PM peakhour)
- Hillcrest Avenue/Davison Drive/Deer Valley Road (eastbound left, AM peak-hour; northbound left, PM peak-hour)
- Lone Tree Way/James Donlon Boulevard/Ridgerock Drive (eastbound left and southbound left AM and PM peak-hours)

² Unsignalized intersection warrant analysis is intended to examine the general correlation between existing conditions and the need to install new traffic signals. Existing peak-hour volumes are compared against a subset of the standard traffic signal warrants recommended in the MUTCD and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely on the warrants because the installation of signals can lead to certain types of collisions. The responsible State or local agency should undertake regular monitoring of actual traffic conditions and accident data and conduct a timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

- Lone Tree Way/Dallas Ranch Road/Eagle Ridge Drive (eastbound left-turn and northbound left-turn, AM peak-hour and PM peak-hour)
- Lone Tree Way/Deer Valley Road (northbound left-turn, AM peak-hour)
- Lone Tree Way/SR-4 Eastbound Ramps (southbound left and through, AM and PM peak-hour)
- Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way (northbound left-turn, AM and PM peakhour)
- Prewett Ranch Drive/Dallas Ranch Road (southbound left, AM peak-hour)
- Prewett Ranch Drive/Deer Valley Road (westbound left, AM peak-hour)
- Balfour Road/SR-4 Eastbound Ramps (northbound left-turn, AM peak-hour, eastbound through AM and PM peak-hour)

Daily Roadway Segment Operation

Sand Creek Road would be constructed in phases as adjacent development occurs. In the near-term when Sand Creek Road is extended from SR-4 to Hillcrest Avenue, and Hillcrest Avenue is extended to Sand Creek Road, some additional through vehicle traffic could be added to Prewett Ranch Drive until Sand Creek Road is extended to Deer Valley Road, and ultimately Dallas Ranch Road. This additional traffic could result in traffic volumes on Prewett Ranch Drive exceeding desired levels, especially in the vicinity of Diablo Vista Elementary School and houses fronting Prewett Ranch Drive. To address the issue, automatic machine traffic counts along Prewett Ranch Drive were conducted over a 72-hour period (Tuesday through Thursday) on clear days in August 2019 with area schools in session. The average daily traffic volumes on these roadways are summarized below in Table 3.14-4. Prewett Ranch Drive carries approximately 7,510 vehicles per day east of Deer Valley Road. In the vicinity of the school, traffic volumes are approximately 3,970, which is higher than the desired amount for a residential collector roadway that has front-on housing. The peak-hour of travel along the Prewett Ranch Drive corridor tends to align with school bell times.

	Segment	Daily Traffic	Project Traffic	Daily Fluctuation				
1.	Prewett Ranch Drive, east of Deer Valley Road	7,510	520	± 1.2 percent				
2.	Prewett Ranch Drive at Diablo Vista Elementary School	4,050	520	± 1.8 percent				
3.	Prewett Ranch Drive, west of Hillcrest Avenue	3,970	520	± 2.9 percent				
So	Source: Fehr & Peers 2019.							

Table 3.14-4: Existing Average Daily Traffic

Existing Public Transit Service and Facilities

The Eastern Contra Costa Transit Authority (Tri Delta Transit) provides transit service in eastern Contra Costa County, serving the communities of Brentwood, Antioch, Oakley, Concord, Discovery Bay, Bay Point, and Pittsburg. Fifteen routes operate on weekdays, with five routes operating on weekends. Routes 379, 388, and 392 operate in the vicinity of the project site, stopping at the Kaiser Permanente Antioch Medical Center on Deer Valley Road, opposite from the project site. Route 388 also has stops on Dallas Ranch Road and Prewett Ranch Road.

Routes 388 and 392 provide access to the Antioch BART Station and Pittsburg BART Station, with Route 388 providing weekday service on 30-to 60 minute headways and Route 392 providing weekend service on 60-minute headways. These routes also connect to Kaiser Permanente Antioch Medical Center, Sutter Delta Medical Center, Downtown Antioch, Pittsburg Center BART, the Pittsburg Civic Center, and numerous schools.

Route 379 provides weekday school service with one morning bus from the Antioch BART Station to Kaiser Permanente Antioch Medical Center.

In addition to the regular transit service to the proposed project site, dial-a-ride, door-to-door service within Eastern Contra Costa County is provided by Tri Delta Transit for disabled people of all ages and senior citizens. A new micro-transit pilot program was launched in June 2019 to provide ondemand rideshare service within specific boundaries connecting riders to key destinations, include the Antioch BART Station and key shopping destinations. The service area boundaries are SR-4, Long Tree Way, and Deer Valley Road. Rides cost \$2. If successful, the program could be expanded.

BART provides fixed rail transit to Eastern Contra Costa County. The terminus station is located in Antioch at Hillcrest Avenue, approximately 4 miles from the project site, with timed transfers from traditional BART transit to diesel BART trains at the Pittsburg/Bay Point BART Station. Weekday service is provided on approximately 15-minute headways and weekend service is provided on approximately 20-minute headways. The Antioch Line connects to key regional employment centers, including Concord, Pleasant Hill, Walnut Creek, Oakland, and San Francisco. Transfers to other lines can be made in Oakland.

Bicycle Facilities

Bicycle facilities include the following:

- **Bike Paths (Class I):** Paved trails that are separated from roadways. These trails are also shared with pedestrians.
- Bike Lanes (Class II): Lanes on roadways designated for use by bicycles through striping, pavement legends, and signs.
- Bike Routes (Class III): Roadways designated for bicycle use by signs only; may or may not include additional pavement width for cyclists.
- Separated Bikeway (Class IV): 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 adopted by Caltrans in 2015. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers, or on-street parking.

In the immediate project vicinity, portions of Deer Valley Road and Dallas Ranch Road provide Class II bicycle facilities with separate lanes designated for bicycle travel. Lone Tree Way has a striped shoulder that can be used by bicyclists along some roadway sections, but it is a not a designated bicycle lane. The Class I Mokelumne Trail³ is located north of the project site. The Mokelumne Trail ultimately connects to the Pittsburg/Bay Point BART Station. There are numerous existing Class I trails in the existing Dallas Ranch and Prewett Ranch neighborhoods, connecting residential neighborhoods to parks and schools.

Pedestrian Facilities

Pedestrian facilities in the vicinity of the proposed project include sidewalks, crosswalks, pedestrian signals, and multi-use trails. Improved roadways in the project area generally provide sidewalks on both sides of the street. No sidewalks or other infrastructure currently exist on-site. At the signalized intersection of Deer Valley Road and Sand Creek Road, crosswalks and pedestrian push-button actuated signals are provided.

3.14.3 - Regulatory Framework

Federal

No federal plans, policies, regulations, or laws related to transportation and traffic are applicable to the proposed project.

California Department of Transportation

Caltrans builds, operates, and maintains the State highway system, including the interstate highway system. Caltrans's mission is to improve mobility Statewide. The department operates under strategic goals to provide a safe transportation system, optimize throughput and ensure reliable travel times, improve the delivery of State highway projects, provide transportation choices, and improve and enhance the State's investments and resources. Caltrans controls the planning of the State highway system and accessibility to the system. Caltrans establishes LOS goals for highways and works with local and regional agencies to assess impacts and develop funding sources for improvements to the State highway system. Caltrans requires encroachment permits from agencies or new development before any construction work may be undertaken within the State's right-of-way. For projects that would impact traffic flow and levels of services on State highways, Caltrans would review measures to mitigate the traffic impacts.

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State Highway facilities; however, Caltrans recognizes that achieving LOS C/LOS D may not always be feasible.

For the Caltrans highway facilities being studied, the operational standards and significance criteria are established by the CCTA acting as the designated congestion management agency (CMA) representing the jurisdictions of Contra Costa County. As the acting CMA, the CCTA establishes the traffic LOS standards for all State highway facilities in Contra Costa County, which supersede the general Caltrans operational standard for all State highways in the project area.

³ The Mokelume Trail follows East Bay Municipal Utility District's Mokelumne aqueduct within Antioch and Pittsburg.

Senate Bill 743

In November 2017, the Governor's Office of Planning and Research (OPR) released a technical advisory containing recommendations regarding the assessment of vehicle miles traveled (VMT), proposed thresholds of significance, and potential mitigation measures for lead agencies to use while implementing the required changes contained in Senate Bill 743 (SB 743). Also in November 2017, the OPR released the proposed text for California Environmental Quality Act (CEQA) Guidelines Section 15064.3, "Determining the Significance of Transportation Impacts," which summarized the criteria for analyzing transportation impacts for land use projects and transportation projects and directs lead agencies to "choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure." The OPR recommends that for most instances a per service population threshold should be adopted and that a 15 percent reduction below that of existing development would be a reasonable threshold.

As noted in the OPR Guidelines, agencies are directed to choose metrics that are appropriate for their jurisdiction to evaluate the potential impacts of a project in terms of VMT. The City of Antioch has/has not established specific local VMT thresholds and industry-wide standards are still in the advisory stage. The latest direction from the OPR also lists new exemptions for certain projects with revised screening thresholds (e.g., 100 trips/day, map based, or near transit stations

Mandatory implementation of the VMT metric and application of Section 15064.3 has been delayed to July 1, 2020. Additionally, per CEQA Guidelines Section 15007(c) the revised Guidelines will apply to a CEQA document only if the revised Guidelines are in effect when the document is sent out for public review. As such, a VMT analysis is not required under CEQA at this time; however, a brief VMT analysis is provided herein for informational purposes only.

Regional

Contra Costa Transportation Authority

CCTA is the Congestion Management Agency for Contra Costa County. CCTA implements the East County Action Plan for Routes of Regional Significance, which sets forth performance objectives for Routes of Regional Significance. SR-4, Balfour Road, Deer Valley Road, Hillcrest Avenue, Lone Tree Way, and Sand Creek Road/Dallas Ranch Road are Routes of Regional Significance within the Study Area.

The East County Action Plan for Routes of Regional Significance establishes a Multimodal Transportation Service Objective for SR-4:

- Delay Index of less than 2.5 (<2.5)
- High Occupancy Vehicle (HOV) usage greater than 600 vehicles per lane per peak-hour in peak direction (>600 vehicles/lane/peak-hour)

Local

The City of Antioch

General Plan

The City of Antioch General Plan sets for the following goals, objectives, and policies relevant to transportation:

Goals

- To provide for a sustained high quality of life, it is the goal of the Circulation Element to achieve and maintain a balanced, safe, problem-free transportation system that:
 - Improves present traffic flows and provides easy and convenient access to all areas of the community;
 - Is safe for all modes of motorized and non-motorized transportation;
 - Reduces dependence on single occupant automobile travel by providing a high level of pedestrian, bicycle, and public transit travel opportunities; and
 - Preserves a sense of comfort and wellbeing throughout the community by reducing the intrusiveness of commercial, business park, and industrial traffic, rail traffic, and regional traffic on neighborhood streets and residents' quality of life.
- **Objective 7.3.1:** Provide adequate roadway capacity to meet the roadway performance standards set forth in the Growth Management Element.
- **Policy 7.3.2a:** Facilitate meeting the roadway performance standards set forth in the Growth Management Element and improving traffic flow on arterial roadways.
 - Work with the UP and BNSF railroads to construct grade separations along the tracks at Somersville Road, Hillcrest Avenue, "A" Street, the proposed Viera Road extension, and the proposed Phillips Lane extension.
 - Promote the design of roadways to optimize safe traffic flow within established roadway configurations by minimizing driveways and intersections, uncontrolled access to adjacent parcels, on-street parking, and frequent stops to the extent consistent with the character of adjacent land uses.
 - Provide adequate capacity at intersections to accommodate future traffic volumes by installing intersection traffic improvements and traffic control devices, as needed, as development occurs.
 - Facilitate the synchronization of traffic signals.
 - Where needed, provide acceleration and deceleration lanes for commercial access drives.
 - Provide for reciprocal access and parking agreements between adjacent land uses, thereby facilitating off-street vehicular movement between adjacent commercial and other nonresidential uses.
 - Encourage regional goods movement to remain on area freeways and other appropriate routes.
- **Policy 7.3.2b:** Design and reconfigure collector and local roadways to improve circulation within and connections to residential and commercial areas.
 - Implement appropriate measures to mitigate speeding and other traffic impacts in residential areas.
 - Implement roadway patterns that limit through traffic on local residential streets.

- **Policy 7.3.2c:** Require the design of new developments to focus through traffic onto arterial streets.
- **Policy 7.3.2d:** Where feasible, design arterial roadways, including routes of regional significance, to provide better service than the minimum standards set forth in Measure C and the Growth Management Element. Thus, where feasible, the City will strive to maintain a "High D" level of service (v/c-0.85-0.89) within regional commercial areas and at intersections within 1,000 feet of a freeway interchange. The City will also strive where feasible to maintain Low-range "D" (v/c = 0.80-0.84) in all other areas of the City, including freeway interchanges.
- **Policy 7.3.2e:** Establish Assessment Districts in areas that will require major roadway infrastructure improvements that will benefit only that area of the City, and thereby facilitate the up-front construction of needed roadways.
- **Policy 7.3.2f:** Design street intersections to ensure the safe passage of through traffic and accommodate anticipated turning movements. Implement intersection improvements consistent with the following lane geometrics, unless traffic analyses indicate the need for additional turn lanes.
- **Policy 7.3.2h:** Require traffic impact studies for all new developments that propose to increase the approved density or intensity of development or are projected to generate 50 peak hour trips or more at any intersection of Circulation Element roadways. The purpose of these studies is to demonstrate that:
 - the existing roadway system, along with roads to be improved by the proposed project, can meet the performance standards set forth in Sections 3.4.1 and 3.4.2 of the Growth Management Element, and
 - required findings of consistency with the provisions of the Growth Management Element can be made.
- **Policy 7.3.2n:** Use raised medians as a method for achieving one or more of the following objectives: access control, separation of opposing traffic flows, left turn storage, aesthetic Improvement, and/or pedestrian refuge.
- **Policy 7.3.2p:** Where a series of traffic signals are provided along a route, facilitate the coordination of traffic signals to optimize traffic progression on a given route. Traffic signalization should emphasize facilitating access from neighborhood areas onto the City's primary roadway network, and should work to discourage through traffic from using local streets.

3.14.4 - Impacts and Mitigation Measures

Significance Criteria

According to the CEQA Guidelines' Appendix G Environmental Checklist, to determine whether transportation and traffic impacts are significant environmental effects, the following questions are analyzed and evaluated. Would the project:

- a) Conflict with a program plan, ordinance or policy of the circulation system, including transit, roadway, bicycle and pedestrian facilities?
- b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

- c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
- d) Result in inadequate emergency access?

In the context of Checklist Question (a), the following thresholds are used:

Roadway System

The proposed project could create a significant impact related to intersection operations if the following criteria is met:

- Would the operations at a project intersection on a Route of Regional Significance decline from high LOS D (an average delay of 55 seconds for signalized intersections) or better to LOS E or F, based on the HCM LOS method, with the addition of proposed project traffic?
- 2. Would the operations at a project intersection not on a Route of Regional Significance decline from the established performance standard for the roadway facility type?
 - a. Low LOS E (an average delay of 65 seconds for signalized intersections) or better to a high LOS E or F, based on the HCM LOS method, with the addition of proposed project traffic for intersections within 1,000 feet of a freeway interchange?
 - b. High LOS D (an average delay of 55 seconds for signalized intersections) or better to a LOS E or F, based on the HCM LOS method, with the addition of proposed project traffic for residential and commercial portions of the Focus Area?
 - c. Mid LOS D (an average delay of 50 seconds for signalized intersections) or better to a high LOS D, LOS E, or LOS F, based on the HCM LOS method, with the addition of proposed project traffic for residential and arterial roadways in non-regional commercial areas?
- 3. Would the proposed project deteriorate already unacceptable operations at a signalized intersection by adding traffic?
- 4. Would the operations of an unsignalized project intersection decline from acceptable to unacceptable with the addition of proposed project traffic, and would the installation of a traffic signal based on the Manual of Uniform Traffic Control Devices (MUTCD) Peak-hour Signal Warrant (Warrant 3), be warranted?
- 5. Would the proposed project result in or worsen unacceptable conditions on the SR-4 mainline, based on delay index calculations?
 - a. The delay index should not exceed 2.5 seconds during the AM or PM peak-hour, meaning that congested travel times should not be more than 2.5 times the uncongested travel times.

Transit System

The proposed project would create a significant impact related to transit service if the following criteria is met:

1. The proposed project interferes with existing transit facilities or precludes the construction of planned transit facilities.

Bicycle System

The proposed project would create a significant impact related to the bicycle system if any of the following criteria are met:

- 1. Disrupt existing bicycle facilities; or
- 2. Interfere with planned bicycle facilities; or
- 3. Create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards.

Pedestrian System

The proposed project would create a significant impact related to the pedestrian system if any of the following criteria are met:

- 1. Disrupt existing pedestrian facilities; or
- 2. Interfere with planned pedestrian facilities; or
- 3. Create inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards.

Approach to Analysis

Analysis in this section is based on the Transportation Impact Analysis that is provided in Appendix K. The following is a summary of the analysis methodology.

Trip Generation

Trip generation refers to the process of estimating the amount of vehicular traffic a project would add to the surrounding roadway system. Estimates are created for the daily condition and for the peak 1-hour period during the morning and evening commute when traffic volumes on the adjacent streets are typically the highest. Project trip generation was estimated using rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition), with the resulting estimates presented in Table 3.14-5 assuming that the Village Center is developed with the retail option and in Table 3.14-6 assuming the Village Center is developed with the office option.

		Weekday						
			А	M Peak-ho	ur	PM Peak-hour		
Use	Size	Daily	In	Out	Total	In	Out	Total
Phase 1								
All Ages Single-family Homes ¹	421 dwelling units	3,970	78	234	312	263	154	417
Village Center—Retail ²	54,000 square feet	2,040	32	19	51	99	107	206
Fire Station ³	—	20	1	1	2	1	1	2
Phase 1 Subtotal Total		6,030	111	254	365	363	262	625

Table 3.14-5: Vehicle Trip Generation Estimates—Retail Option

		Weekday						
			AM Peak-hour		ur	Р	M Peak-ho	ur
Use	Size	Daily	In	Out	Total	In	Out	Total
Phase 2	·						-	
All Ages Single-family Homes ¹	201 dwelling units	1,900	37	112	149	125	74	199
Phase 3		·	·			·		
All Ages Single-family Homes ¹	133 dwelling units	1,260	25	73	98	83	49	132
Age Restricted Single- family Homes ⁴	422 dwelling units	1,800	33	68	101	77	50	127
Phase 3 Subtotal		3060	58	141	199	160	99	259
Total Project Trips		10,990	206	507	713	648	435	1,083
Notes: ¹ ITE land use category 2 Daily: (T) = 9.44 (X) AM Peak-hour: T = 0.74 PM Peak-hour: T = 0.99 ² ITE land use category 8 Daily: (T) = 37.75 (X) AM Peak-hour: T = 0.94 PM Peak-hour: T = 3.82 ³ Based on Observations ⁴ ITE land use category 2 Daily: (T) = 4.27 (X) AM Peak-hour: T = 0.24 PM Peak-hour: T = 0.24 PM Peak-hour: T = 0.24	4(X); Enter = 25 pe 4(X); Enter = 25 pe 3(X); Enter = 63 pe 3(Z)—General Com 4(X); Enter = 62 pe 1(X); Enter = 48 pe 1(X); Enter = 48 pe 1(X); Enter = 48 pe 1(X); Enter = 48 pe 1(X); Enter = 33 pe 1(X); Enter = 33 pe	Homes (Adj rcent; Exit = ercent; Exit = mercial (Adj ercent; Exit = rcent; Exit = 70 and 86 in Housing—At ercent; Exit =	Streets, 7-1 75 percent 37 percen Streets, 7- 38 percen 52 percen Contra Cos tached (Ad	9A, 4-6P): t 9A, 4-6P): t t sta County lj Streets, 7 t	-9A, 4-6P):		1	

Table 3.14-5 (cont.): Vehicle Trip Generation Estimates—Retail Option

PM Peak-hour: T = 0.30 (X); Enter = 61 percent; Exit = 39 percent Source: Trip Generation Manual (10th Edition), ITE, 2019; Fehr & Peers June 2019.

Table 3.14-6: Vehicle Trip Generation Estimates—Office Option

		Weekday						
			AM Peak-hour PM Peak-ho		M Peak-ho	ur		
Use	Size	Daily	In	Out	Total	In	Out	Total
Phase 1								
All Ages Single-family Homes ¹	421 dwelling units	3,970	78	234	312	263	154	417
Village Center— Office ²	54,000 square feet	530	54	9	63	10	52	62
Fire Station ³	_	20	1	1	2	1	1	2
Phase 1 Subtotal Total	4,520	133	244	377	274	207	481	

		Weekday						
			AM Peak-hour		Р	M Peak-ho	ur	
Use	Size	Daily	In	Out	Total	In	Out	Total
Phase 2				· · · · · · · · · · · · · · · · · · ·				
All Ages Single-family Homes ¹	201 dwelling units	1,900	37	112	149	125	74	199
Phase 3	·	<u> </u>						'
All Ages Single-family Homes ¹	133 dwelling units	1,260	25	73	98	83	49	132
Age Restricted Single- family Homes ⁴	422 dwelling units	1,800	33	68	101	77	50	127
Phase 3 Subtotal		3060	58	141	199	160	99	259
Total Project Trips	9,480	228	497	725	559	380	939	
Notes: ¹ ITE land use category 210—Single-family Homes (Adj Streets, 7-9A, 4-6P): Daily: (T) = 9.44 (X) AM Peak-hour: T = 0.74(X); Enter = 25 percent; Exit = 75 percent PM Peak-hour: T = 0.99 (X); Enter = 63 percent; Exit = 37 percent ² ITE between terms of (X); Enter = 63 percent; Exit = 37 percent								

Table 3.14-6 (cont.): Vehicle Trip Generation Estimates—Office Option

 ITE land use category /10—Office (Adj Streets, 7-9A, 4-6P): Daily: (T) = 9.74 (X)
 AM Peak-hour: T = 1.16 (X); Enter = 86 percent; Exit = 14 percent PM Peak-hour: T = 1.15 (X); Enter = 16 percent; Exit = 84 percent

³ Based on Observations of Fire Station 9, 70, and 86 in Contra Costa County

 ⁴ ITE land use category 252—Senior Adult Housing—Attached (Adj Streets, 7-9A, 4-6P): Daily: (T) = 4.27 (X)
 AM Peak-hour: T = 0.24 (X); Enter = 33 percent; Exit = 67 percent

PM Peak-hour: T = 0.30 (X); Enter = 61 percent; Exit = 39 percent

Source: Trip Generation Manual (10th Edition), ITE 2019; Fehr & Peers June 2019.

With the Village Center developed with all retail uses, the proposed project is expected to generate approximately 10,990 daily vehicle trips, including approximately 713 AM peak-hour and 1,083 PM peak-hour trips, including the trip generating potential of the commercial uses on Deer Valley Road and the fire station. With the Village Center developed with all office uses, the proposed project is expected to generate 9,480 daily trips, including 725 AM peak-hour and 939 PM peak-hour trips. Overall, the retail option is expected to generate significantly more daily and PM peak-hour trips than an office development; during the AM peak-hour, an office development would generate 22 more inbound trips as compared to a retail development, but fewer outbound trips (12 more overall trips). This slight difference in trip generation is not expected to result in changed conclusions for the assessment of AM peak-hour operations in the area, and would likely result in better travel conditions as it would provide more employment opportunities in the area. Therefore, for the purposes of the traffic analysis, development of an all commercial/retail center was assumed.

It is expected that some proportion of trips generated by the proposed Village Center would have an origin or destination within the residential portion of the development. However, as there are not

specific uses proposed, the level of internal trip making is difficult to quantify. Additionally, given the size of the proposed project, it is expected that many trips to the Village Center originating from the residential uses would be vehicle trips. Therefore, internal trips are considered in the project trip assignment phase.

For the Village Center if developed as a retail center, a proportion of the trips could be trips that are already on the roadway system. These trips are typically referred to as pass-by or diverted trips. However, as the proposed uses are unknown and through traffic volumes are relatively low on the portion of Deer Valley Road adjacent to the project site, no pass-by or diverted trip reductions were considered in the initial trip generation estimates. As the proposed project commercial components are better defined, the application of appropriate pass-by rates and recalculation of applicable fair-share contributions (if applicable) is recommended.

Trip Distribution and Assignment

Project trip distribution refers to the directions of approach and departure that vehicles would take to access and leave the site. Estimates of regional project trip distribution were developed based on existing travel patterns in the area, a select zone analysis using the CCTA travel demand model, and the location of complementary land uses, such as schools, employment centers, and retail/recreational opportunities. Separate estimates were developed for the residential and commercial portions of the proposed project, as they are likely to have different trip distribution patterns. The resulting trip distribution percentages are shown on Exhibit 3.14-3. Project trips were then assigned to the roadway network as shown on Exhibit 3.14-4 for the existing roadway network, Exhibit 3.14-5 for the near-term roadway network, and Exhibit 3.14-6 for the cumulative roadway network. The volumes presented in these figures represent the full project build-out.

Project Phasing

The project is proposed to be constructed in three major phases. Exhibit 3.14-7 shows the conceptual phasing plan for the project. As the proposed project would likely be built-out over many years, the transportation impacts of the project may not materialize until substantial portions of the proposed project are built and occupied.

In Phase 1, two roadway connections from Deer Valley Road (Sand Creek Road and Street A) would be constructed in addition to frontage improvements on Deer Valley Road. Sand Creek Road would be extended into the site to provide access to individual neighborhoods. Land uses that would be developed include the commercial site, and up to 421 single-family homes.

In Phase 2, Sand Creek Road would be extended further into the site to provide an additional neighborhood access point. For the purposes of preparing a conservative analysis, the extension of Sand Creek Road to Dallas Ranch Road was not assumed as this analysis is intended to identify when that connection is needed. Additional land uses that would be developed in Phase 2 include up to 201 single-family homes.



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-3 Project Trip Distribution

36230007 • 12/2019 | 3.14-3_proj_trip_distribution.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT THIS PAGE INTENTIONALLY LEFT BLANK



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-4 Project Trip Assignment Existing Roadway Network

36230007 • 12/2019 | 3.14-4_proj_trip_assign_exist_rdwy_network.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT THIS PAGE INTENTIONALLY LEFT BLANK



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-5 Project Trip Assignment Near-Term Roadway Network THIS PAGE INTENTIONALLY LEFT BLANK



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-6 Project Trip Assignment Cumulative Roadway Network

36230007 • 12/2019 | 3.14-6_proj_trip_assign_cumulative_rdwy_network.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT THIS PAGE INTENTIONALLY LEFT BLANK



Source: CBG Civil Engineers, March 13, 2020.



Exhibit 3.14-7 Phasing Plan THIS PAGE INTENTIONALLY LEFT BLANK

Proposed project buildout would occur during Phase 3. The impact analysis under each scenario (existing plus project, near-term plus project, and cumulative plus project were each based on buildout of the proposed project.

Impact Evaluation

Existing Plus Project Traffic

Impact TRANS-1: The project could conflict with a program plan, ordinance or policy of the circulation system under Existing Plus Project traffic conditions.

Construction

The assessment of construction activity considers construction vehicles (including vehicles removing or delivering fill material, bulldozers, and other heavy machinery, as well as building materials delivery) and construction worker activity.

Given the topography of the site, import and/or export of fill is not expected. Proposed project construction would likely stage any large vehicles (i.e., earth-moving equipment, cranes, etc.) on the site prior to beginning site work, and would remove these vehicles at project completion. As such, a daily influx of construction equipment is unlikely.

Based on information from other residential developments, approximately five workers per day are needed for each home under construction, with one to two deliveries per week of materials for each home. Not all homes are expected to be under construction at the same time and construction workers tend to arrive/depart work sites outside typical commute periods. Assuming 10 percent of homes under construction at the peak of project construction, there could be 570 workers on-site at one time (up to 114 homes with five workers for each home), plus additional people such as building inspectors, supervisors, and others. Maximum site activity could result in 2,000 to 3,000 daily trips to/from the site (including up to 500 truck trips), which is less than would be generated by the proposed project at completion.

Certain construction-related activities could create potential conflicts with other roadway users, including the following: activities resulting in lane closures along the proposed project frontage, construction vehicles queuing within the public right-of-way waiting entry to the site, construction worker parking in non-designated parking areas, or construction debris on public streets. Construction impacts would be temporary in nature; however, this impact is considered potentially significant.

Although construction impacts would be temporary, development of a construction management plan would reduce the potential for construction vehicle conflicts with other roadway users. Mitigation Measure (MM) TRANS-1a requires the Applicant to implement a Construction Traffic Management Plan for City review and approval. Implementation of a Construction Traffic Management Plan would reduce the temporary construction impact to a less than significant level.

Existing Plus Project Conditions

The Existing and Existing Plus Project analysis results are presented in Table 3.14-7, based on the traffic volumes and intersection configurations presented on Exhibit 3.14-8. The addition of proposed project traffic would increase average delay at the signalized project intersections and

would worsen already deficient operations at the Hillcrest Avenue at SR-4 Eastbound Ramp intersection. No signalized intersections that are currently operating within the City's LOS standard are projected to degrade beyond the established LOS standard with the addition of proposed project traffic in the existing condition.

Table 3.14-7: Existing Plus Project Conditions Peak-hour Intersection Level of Service
Summary

				Existing		Existing Plus Proje	
	Intersection	Control ¹	Peak-hour	Delay ²	LOS	Delay ²	LOS
1.	Lone Tree Way/A Street/SR-4 Westbound Ramps	Signal	AM PM	13 9	B A	14 9	B A
2.	Lone Tree Way/A Street/SR-4 Eastbound Ramps	Signal	AM PM	15 15	B B	17 17	B B
3.	Hillcrest Avenue/Sunset Drive/Slatten Ranch Road	Signal	AM PM	18 17	B B	18 17	B B
4.	Slatten Ranch Road/SR-4 Westbound Ramps	Signal	AM PM	8 8	A A	8 8	A A
5.	Hillcrest Avenue/SR-4 Eastbound Ramps	Signal	AM PM	30 90	C F	30 99	C F
6.	Lone Tree Way/Davison Drive	Signal	AM PM	17 15	B B	18 16	C C
7.	Deer Valley Road/Hillcrest Avenue/Davison Drive	Signal	AM PM	26 29	C C	27 30	C B
8.	Lone Tree Way/James Donlon Boulevard	Signal	AM PM	19 16	B B	20 17	D B
9.	Lone Tree Way/Dallas Ranch Road	Signal	AM PM	27 16	C B	33 18	D C
10.	Lone Tree Way/Deer Valley Road	Signal	AM PM	30 21	C C	36 26	B C
11.	Lone Tree Way/Hillcrest Avenue	Signal	AM PM	19 20	B C	19 21	B C
12.	Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	17 32	B C	18 34	A B
13.	Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way	Signal	AM PM	9 12	A B	9 13	C B
14.	Prewett Ranch Drive/Dallas Ranch Road	Signal	AM PM	19 14	B B	20 14	C B
15.	Prewett Ranch Drive/Deer Valley Road	Signal	AM PM	27 14	C B	30 15	B B
16.	Deer Valley Road/Wellness Way/Street A	Signal	AM PM	7 5	A A	13 13	B B

			Existing		Existing Plus Project	
Intersection	Control ¹	Peak-hour	Delay ²	LOS	Delay ²	LOS
17. Sand Creek Road/Deer Valley	Signal	AM	9	A	11	B
Road		PM	7	A	8	A
18. Sand Creek Road/Hillcrest Avenue (future intersection)	Signal	AM PM	_ _	_ _		_ _
19. Sand Creek Road/Heidorn Ranch Road (future intersection)	Signal	AM PM	_ _			_ _
20. Sand Creek Road/SR-4 Eastbound	Signal	AM	4	A	4	A
Ramps		PM	4	A	4	A
21. Sand Creek Road/SR-4	Signal	AM	5	A	5	A
Westbound Ramps		PM	6	A	5	A
22. Balfour Road/Deer Valley Road	SSSC	AM PM	14 (23) 11 (14)	B (C) B (B)	27 (52) 14 (22)	D (F) B (C)
23. Balfour Road/SR-4 Eastbound	Signal	AM	33	C	34	C
Ramps		PM	30	C	32	C
24. Balfour Road/SR-4 Westbound	Signal	AM	25	A	25	C
Ramps		PM	23	A	22	C
25. Prewett Ranch Drive/Hillcrest	Signal	AM	19	B	21	B
Avenue		PM	16	B	17	B

Table 3.14-7 (cont.): Existing Plus Project Conditions Peak-hour Intersection Level of Service Summary

Notes:

Bold indicates potentially deficient operations. Bold Italics indicates potentially significant impact.

¹ Signal = signalized intersection; SSSC = side-street stop-controlled

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method for vehicles. Source: Fehr & Peers 2019.

Vehicle queues are expected to increase slightly with the addition of proposed project traffic, but would be generally contained within the available storage space. For intersections that are projected to operate at LOS D or better during the AM and PM peak-hours (as either roundabouts or signalized intersections), it is expected that vehicle queue spillback can be managed through signal timing adjustments, which the City of Antioch periodically undertakes to optimize travel flow along major corridors.

At the Deer Valley Road at Balfour Road intersection, the addition of proposed project traffic would result in LOS F conditions for the side-street movement, resulting in a potentially significant impact. Peak-hour signal warrants would be satisfied with the addition of proposed project traffic during the AM peak-hour with Phase 1 development.

Daily Roadway Segment Operation

Automatic machine traffic counts were conducted over a 72-hour period (Tuesday through Thursday) on clear days in August 2019 with area schools in session along Prewett Ranch Drive as some vehicle

traffic accessing the site could travel through Prewett Ranch Drive to access Hillcrest Avenue and Sand Creek Road prior to the completion of the Sand Creek Road extension between Hillcrest Avenue and Deer Valley Road. To assess the effects of the addition of proposed project traffic on Prewett Ranch Drive in the existing condition, the daily trip generation estimates were applied to the project trip assignment. The resulting trips were then added to the existing traffic volumes. The percent increase in project trips was also calculated, with the results presented in Table 3.14-8.

	Segment	Daily Traffic	Project Traffic	Existing Plus Project	Daily Fluctuation	Project Increase			
1.	Prewett Ranch Drive, east of Deer Valley Road	7,510	520	8,030	± 1.2 percent	7 percent			
2.	Prewett Ranch Drive at Diablo Vista Elementary School	4,050	520	4,570	± 1.8 percent	13 percent			
3.	Prewett Ranch Drive, west of Hillcrest Avenue	3,970	520	4,490	± 2.9 percent	13 percent			
Source: Fehr & Peers 2019.									

Table 3.14-8: Existing Plus Project Conditions Average Daily Traffic

For Segments 1 and 2, the Existing Plus Project daily traffic volumes are below the maximum desired level for a residential collector roadway without front-on housing. For Segment 3 between Grass Valley Way and Hillcrest Avenue, existing traffic volumes exceed the desired level for a residential collector roadway with front-on housing (3,000 vehicles per day), with the proposed project expected to increase vehicle traffic by up to 13 percent.

Hillcrest Avenue at SR-4 Eastbound Ramps

The Hillcrest Avenue at SR-4 Eastbound Ramps intersection operates at a deficient LOS F during the PM peak-hour prior to the addition of proposed project traffic in the existing condition. The addition of proposed project traffic would worsen operations and increase delay by 9 seconds. Based on the significance criteria, this is considered a significant impact. This impact would occur with Phase 1 of the project. This interchange has been built to its ultimate right-of-way and no additional physical improvements are planned. Poor operations at this intersection are primarily due to the proximity of adjacent intersections that affect vehicle progression through the interchange area. As a result, adjusting the timing of the traffic signals would improve operations and allow increased travel through the interchange.

Mitigation Measure (MM) TRANS-1b requires the project Applicant to fund the design and installation of Adaptive Signal Control Technologies (ASCT) or other traffic signal interconnect system approved by the City at the following intersections:

- Slatten Ranch Road at SR-4 Westbound Ramps
- Slatten Ranch Road/Sunset Drive at Hillcrest Avenue
- Hillcrest Avenue at SR-4 Eastbound Ramps
- East Tregallas Road/Larkspur Drive at Hillcrest Avenue


Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS[™]

Exhibit 3.14-8 Existing with Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

36230007 • 01/2020 | 3.14-8_exist_w_proj_PHITV_lane_config_traf_control.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT

ASCT are able to adjust traffic signal cycle lengths and phasing based on actual conditions with the ability to adjust signal timing parameters to best serve actual conditions every few minutes.

In conjunction with the signal timing adjustments, the project Applicant shall also work with the City and Caltrans to design and install potential restriping options within the Hillcrest Avenue at SR-4 interchange area that improve vehicle and bicycle travel through the interchange area.

The design process shall start prior to the issuance of the 10th residential building permit for the project, and installation of the traffic signal interconnect system and restriping shall be completed prior to the issuance of the 422nd building permit unless the City of Antioch Engineer determines that design and installation delays are beyond the control of the project Applicant. If such a determination is made, the City would be required to refund any unused fees. This is reflected in MM TRANS-1b.

With signal timing adjustments to better serve projected traffic flows, intersection operations would improve to an acceptable level, reducing the impact to a less-than-significant level, as shown in Table 3.14-9.

Although the implementation of the above measures would reduce the impact to a less-than significant level, Caltrans controls the operations of the traffic signals at the Slatten Ranch Road at SR-4 Westbound Ramps and Hillcrest Avenue at SR-4 Eastbound Ramps intersection. Caltrans staff has indicated initial support for the striping changes and installation of traffic signal equipment to improve operations for all modes of travel through the interchange; however, the City cannot assure full implementation of this improvement and the impact would remain significant and unavoidable if Caltrans does not authorize and/or accept the improvements.

Table 3.14-9: Existing Plus Project with Mitigation Conditions Peak-hour Intersection Levelof Service Summary

				Existing		Existing Pl	us Project	Existing Plus Project with Mitigation	
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
5.	Hillcrest Avenue/SR-4 Eastbound Ramps	Signal	AM PM	32 90	C F	32 99	C F	32 44	C D
22.	Balfour Road/Deer Valley Road	SSSC/ Signal	AM PM	14 (23) 11 (14)	B (C) B (B)	27 (52) 14 (22)	D (F) B (C)	8 7	A A

Notes:

Bold indicates potentially deficient operations. *Bold Italics* indicates potentially significant impact.

¹ Signal = signalized intersection; SSSC = side-street stop-controlled

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method for vehicles. Source: Fehr & Peers 2019.

Transportation

Balfour Road at Deer Valley Road

The addition of proposed project-generated vehicle trips during the AM peak-hour would result in LOS F conditions for side-street movements and would result in peak-hour signal warrants being satisfied with the addition of full-buildout proposed project traffic in the existing condition. Based on the significance criteria, this is considered a significant impact.

The project Applicant shall install a traffic signal at this intersection in conjunction with other planned improvements, including the construction of a southbound left-turn lane, as well as separate westbound left and right-turn lanes. Improvements shall be completed prior to the issuance of the 431st residential building permit. These improvements would result in overall acceptable service levels, reducing the proposed project impact to a less-than-significant level, as shown in Table 3.14-8, because the project Applicant would construct the improvements. The responsibility for improvements to this intersection are shared by the City of Antioch and the City of Brentwood. Therefore, a reimbursement agreement with the City of Brentwood for half the signal costs and the cost of all improvements on Balfour Road could be sought. Although the project Applicant would be required to make the improvement, the impact could remain significant and unavoidable if either the City of Brentwood or Contra Costa County do not approve/accept the improvements. This is reflected in MM TRANS-1c.

Phasing Analysis under Existing Plus Project Conditions

To provide better insight into when each improvement needs to be implemented, Fehr & Peers considered the development of just Phase 1, as well as development of Phases 1 and 2 under Existing Plus Project Conditions. Existing Plus Project Conditions for Phase 1 and Phase 2 are presented on Exhibits 3.14-9 and 3.14-10.

Results of the phasing analysis indicate that the addition of traffic from Phase 1 would worsen the operations of the Hillcrest Avenue/SR-4 Eastbound intersection, but would not result in any new deficiencies, even considering all project access from Deer Valley Road. As such, MM TRANS-1b would be required for Phase 1, but MM TRANS-1c would not be required.

The addition of proposed project traffic through Phase 2 would result in an impact at the Deer Valley Road at Balfour Road intersection as the side street would degrade to LOS E and peak-hour signal warrants would be met. As such, MM TRANS-1c would be required for implementation of Phase 2.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

- **MM TRANS-1a** Prior to issuance of grading permits, the project Applicant shall retain a qualified transportation consultant to prepare and submit a Construction Traffic Management Plan to the City of Antioch for review and approval. The plan shall include:
 - Project staging plan to maximize on-site storage of materials and equipment;
 - A set of comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak-hours; lane closure proceedings; signs, cones, and other warning devices for drivers; and designation of construction access routes;

- Permitted construction hours;
- Location of construction staging;
- Identification of parking areas for construction employees, site visitors, and inspectors, including on-site locations; and
- Provisions for street sweeping to remove construction related debris on public streets.
- MM TRANS-1b Prior to issuance of the first building permit, the project Applicant shall provide fees to the City of Antioch to fund the design and installation of Adaptive Signal Control Technologies (ASCT) or other traffic signal interconnect system approved by the City at the following intersections:
 - Slatten Ranch Road at SR-4 Westbound Ramps
 - Slatten Ranch Road/Sunset Drive at Hillcrest Avenue
 - Hillcrest Avenue at SR-4 Eastbound Ramps
 - East Tregallas Road/Larkspur Drive at Hillcrest Avenue

In conjunction with the signal timing adjustments, the Applicant shall work with the City and Caltrans to design and install potential restriping options within the Hillcrest Avenue at SR-4 interchange area that improve vehicle and bicycle travel through the interchange area.

The design process for these improvements shall start prior to the issuance of the 10th residential building permit for the proposed project, and installation of the traffic signal interconnect system and restriping shall be completed prior to the issuance of the 422nd building permit unless the City of Antioch Engineer determines that design and installation delays are beyond the control of the project Applicant.

MM TRANS-1c Prior to issuance of the 431st building permit, the project Applicant shall install a traffic signal at the intersection at Balfour Road/Deer Valley Road in conjunction with other planned improvements, including the construction of a southbound left-turn lane, as well as separate westbound left and right-turn lanes.

Level of Significance After Mitigation

TRANS-1a—Less Than Significant

TRANS-1b—Significant and Unavoidable (unless and until Caltrans accepts the improvements)

TRANS-1c—Significant and Unavoidable (unless and until the City of Brentwood and Contra Costa County accepts the improvements).

Near-term Traffic

Impact TRANS-2: The project could conflict with a program plan, ordinance or policy of the circulation system under Near-term traffic conditions.

The near-term scenario reflects existing traffic counts plus traffic from approved and pending developments that are expected to be completed and occupied in the next 5 to 10 years. Near-term conditions without and with the project are evaluated. This scenario also includes transportation projects programmed for implementation over the near-term horizon, and construction of required transportation mitigation measures for approved projects, as the traffic generated by those projects is considered in this scenario.

Near-term Forecasts

The available City of Brentwood Project Status Report (May 2019) and City of Antioch Project Pipeline (as of January 2019) at the time the proposed project Notice of Preparation (NOP) was issued were reviewed to identify developments to include in this scenario. Developments that could generate additional traffic through the project area are summarized in Table 3.14-10 and their locations shown on Exhibit 3.14-11.

Map Location	Project Name	Size	Land Use Activity	Status
1	Park Ridge, Antioch	525 dwelling units	Single-family Homes	Approved, under construction
2	Heidorn Village, Antioch	117 dwelling units	Single-family Homes	Approved, under construction
3	Aviano, Antioch	533 dwelling units	Single-family Homes	Approved, under construction
4	Promenade—Vineyards at Sand Creek, Antioch	641 dwelling units	Single-family Homes	Approved, under construction
5	Laurel Ranch, Antioch	180 dwelling units; 10 acres commercial	Single-family Homes	Approved
6	Wildflower Station, Antioch	22 single-family 98 Condos 89,400 square feet commercial	Mixed-Use	Approved
7	Parkside Villas, Brentwood	37 dwelling units	Single-family Homes	Approved
8	Bridle Gate Residential Elementary School, Brentwood	265 dwelling units 700 students	Single-family Homes Elementary School	Pending Pending
8	Bridle Gate Commercial, Brentwood	150,000 square feet	Shopping Center	Pending
8	The Enclave, Brentwood	258 dwelling units	Apartments	Pending

Table 3.14-10: Pending and Approved Projects Summary

Map Location	Project Name	Size	Land Use	Status						
9	Brentwood Country Club, Brentwood	63 dwelling units 123 units	Detached Active Adult Residential Care Facility	Approved						
10	Orfanos, Brentwood	160 dwelling units	Single-family Homes	Approved						
11	Alvarez Partners, Brentwood	48 dwelling units	Single-family Homes	Approved						
12	Streets of Brentwood, Brentwood	320 dwelling units 32,000 square feet	Apartments Shopping Center	Pending						
13	Shops at Lone Tree Village, Brentwood	54,000 square feet	Shopping Center	Pending						
14	Quail Cove	32 dwelling units	Single Family Homes	Approved						
Source: Fe	Source: Fehr & Peers 2019.									

Near-term project vehicle trip generation was estimated using trip generation rates and equations for the proposed land uses from the ITE Trip Generation Manual (10th Edition). Traffic generated by approved and pending developments was added to the existing traffic volumes to provide the basis for the Near-term without Project analysis, as presented on Exhibit 3.14-12. The existing traffic counts were also increased by 5 percent to account for traffic growth from projects outside the immediate project area that could add through traffic to the area. Project traffic volumes from Exhibit 3.14-5 were added to the Near-term without Project forecasts to estimate Near-term with Project volumes at the project intersections, as presented on Exhibit 3.14-13.

Near-term Roadway Assumptions

A number of roadway improvements are conditioned on near-term developments and considered in the near-term forecasts, including an extension of Hillcrest Avenue from its current terminus to an extension of Sand Creek Road, improvements to Heidorn Ranch Road, the extension of Sand Creek Road from SR-4 in the east to a new terminus by the Dozier-Libbey Medical High School, the extension of Prewitt Ranch Drive to Heidorn Ranch Road, and the Laurel Road extension from SR-4 to its current terminus east of Canada Valley Road.

For the extension of Sand Creek Road, no direct through travel would be permitted between Deer Valley Road and Hillcrest Avenue; however, vehicles would be able to travel through Prewett Ranch Drive to Hillcrest Avenue to Sand Creek Road to access destinations to the east.

Lone Tree Way is also planned to be restriped to provide three through lanes in both the eastbound and westbound directions from west of Deer Valley Road to Hillcrest Avenue; at the Lone Tree Way/Deer Valley Road intersection, the third westbound through lane would become a second westbound left-turn lane. As part of the proposed project, roadway improvements would be constructed to extend Sand Creek Road from Deer Valley Road to Dallas Ranch Road, and Deer Valley Road would be improved along the proposed project frontage to provide two travel lanes in each direction through the Sand Creek Road intersection, where it would taper to a two-lane cross-section.

Near-term Traffic Conditions

The analysis results are presented in Table 3.14-11, based on the traffic volumes and lane configurations presented on Exhibit 3.14-12 and Exhibit 3.14-13. In the Near-term condition, the Hillcrest Avenue at SR-4 Eastbound Ramp and Lone Tree Way at SR-4 Eastbound Ramp would operate at deficient levels prior to the addition of proposed project traffic. All other project intersections would operate at acceptable service levels prior to the addition of proposed project traffic.

Table 3.14-11: Near-term Conditions Peak-hour Intersection Level of Service Summa	ary
---	-----

			Poak	Near-term without Project		Near-term with Project		
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	
1.	Lone Tree Way/A Street/SR-4 Westbound Ramps	Signal	AM PM	16 10	B A	19 10	B B	
2.	Lone Tree Way/A Street/SR-4 Eastbound Ramps	Signal	AM PM	19 19	B B	21 22	C C	
3.	Hillcrest Avenue/Sunset Drive/Slatten Ranch Road	Signal	AM PM	16 18	B B	16 18	B B	
4.	Slatten Ranch Road/SR-4 Westbound Ramps	Signal	AM PM	8 9	A A	8 9	A A	
5.	Hillcrest Avenue/SR-4 Eastbound Ramps	Signal	AM PM	46 121	D F	50 133	D F	
6.	Lone Tree Way/Davison Drive	Signal	AM PM	20 17	C B	24 18	C B	
7.	Deer Valley Road/Hillcrest Avenue/Davison Drive	Signal	AM PM	31 45	C D	32 46	C D	
8.	Lone Tree Way/James Donlon Boulevard	Signal	AM PM	21 18	C B	22 20	C C	
9.	Lone Tree Way/Dallas Ranch Road	Signal	AM PM	30 17	D B	38 19	D C	
10	Lone Tree Way/Deer Valley Road	Signal	AM PM	35 27	C C	40 33	C C	
11	Lone Tree Way/Hillcrest Avenue	Signal	AM PM	43 34	D C	46 36	D D	
12	Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	24 56.7	С Е	24 57.4	C E	
13	Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way	Signal	AM PM	12 21	B C	12 21	B C	

		Poak-	Near-term without Project		Near-term with Project		
Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	
14. Prewett Ranch Drive/Dallas	Signal	AM	19	B	21	С	
Ranch Road		PM	15	B	14	В	
15. Prewett Ranch Drive/Deer	Signal	AM	34	C	43	D	
Valley Road		PM	17	B	24	C	
16. Deer Valley Road/Wellness	Signal	AM	6	A	15	B	
Way/Street A ³		PM	5	A	15	B	
17. Sand Creek Road/Deer Valley Road ³	Signal	AM PM	9 7	A A	11 9	C C	
18. Sand Creek Road/Hillcrest	Signal	AM	5	A	6	A	
Avenue		PM	5	A	6	A	
19. Sand Creek Road/Heidorn Ranch	Signal	AM	17	B	18	B	
Road		PM	21	C	22	D	
20. Sand Creek Road/SR-4	Signal	AM	10	B	11	A	
Eastbound Ramps		PM	14	B	25	A	
21. Sand Creek Road/SR-4	Signal	AM	7	A	7	A	
Westbound Ramps		PM	9	A	9	A	
22. Balfour Road/Deer Valley Road	SSSC	AM PM	18 (33) 12 (21)	C (D) B (C)	34 (71) 20 (37)	D (F) B (C)	
23. Balfour Road/SR-4 Eastbound	Signal	AM	32	C	33	B	
Ramps		PM	31	C	32	B	
24. Balfour Road/SR-4 Westbound	Signal	AM	24	C	24	B	
Ramps		PM	21	C	21	B	
25. Prewett Ranch Drive/Hillcrest	Signal	AM	20	C	27	C	
Avenue		PM	15	B	18	B	

Table 3.14-11 (cont.): Near-term Conditions Peak-hour Intersection Level of Service Summary

Notes:

Bold indicates potentially deficient operations. Bold Italics indicates potentially significant impact.

¹ Signal = signalized intersection; SSSC = side-street stop-controlled

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method for vehicles.

³ Traffic signal timings optimized in "with project" conditions to better accommodate changed geometry. Source: Fehr & Peers 2019.

Peak-hour signal warrants would be met at the Balfour Road at Deer Valley Road intersection in the Near-term condition prior to the addition of proposed project traffic due to traffic growth from approved and pending projects. With the addition of proposed project traffic, operations of the two deficient intersections would further degrade, and operations of the side-street movement at the Deer Valley Road at Balfour Road intersection would degrade from acceptable to unacceptable. All other project intersections would operate at acceptable service levels with the addition of proposed project traffic.

Vehicle queues are expected to increase at project intersections as traffic volumes increase, which would further increase with the addition of proposed project traffic. Monitoring and adjusting traffic signal timings in response to actual traffic volumes to minimize the potential for vehicle queue spillback is recommended.

Daily Roadway Segment Operation

Traffic from Near-term projects was added to the existing daily traffic volumes on Prewett Ranch Drive, with the resulting volumes shown in Table 3.14-12. Proposed project trips that could use the roadway were then estimated considering the changes to the roadway network in the Near-term condition discussed previously and added to the Near-term without Project volumes. The percent increase in proposed project trips was also calculated, with the results presented in Table 3.14-12.

	Segment	Daily Traffic	Project Traffic	Existing Plus Project	Daily Fluctuation	Project Increase
1.	Prewett Ranch Drive, east of Deer Valley Road	7,990	1,500	9,490	± 1.2 percent	19 percent
2.	Prewett Ranch Drive at Diablo Vista Elementary School	4,360	1,500	5,860	± 1.8 percent	34 percent
3.	Prewett Ranch Drive, west of Hillcrest Avenue	4,280	1,500	5,780	± 2.9 percent	35 percent
Soι	urce: Fehr & Peers 2019.					

Table 3.14-12: Near-term Conditions Average Daily Traffic

For Segments 1 and 2, the near-term daily traffic volumes considering the addition of proposed project traffic are below the maximum desired level for a residential collector roadway without front-on housing. For Segment 3 between Grass Valley Way and Hillcrest Avenue, existing traffic volumes exceed the desired level for a residential collector roadway with front-on housing (3,000 vehicles per day). In the Near-term condition, volumes are expected to further increase and the addition of proposed project traffic would further add vehicle travel to the roadway, with the proposed project expected to increase traffic volumes on this roadway segment more than the existing daily fluctuation.

Impacts and Mitigation

The addition of near-term traffic would result in impacts at three intersections:

Hillcrest Avenue at SR-4 Eastbound Ramps

The Hillcrest Avenue at SR-4 Eastbound Ramps intersection operates at a deficient LOS F during the PM peak-hour prior to the addition of proposed project traffic in the Near-term condition. The addition of proposed project traffic would worsen operations and increase average delay by 12 seconds. Based on the significance criteria, this is considered a significant impact.

This interchange has been built to its ultimate right-of-way and no additional physical improvements are planned. Poor operations at this intersection are primarily due to the close proximity of adjacent intersections that affect vehicle progression through the interchange area. As a result, adjusting the timing of the traffic signals would improve operations and allow increased travel through the interchange. These improvements are reflected in MM TRANS-1b.



FIRSTCARBON SOLUTIONS™

Exhibit 3.14-9 Project Trip Assignment Existing Roadway Network — Phase 1

36230007 • 01/2020 | 3.14-9_proj_trip_assign_existing_rdwy_network_phase1.cdr



FIRSTCARBON SOLUTIONS™

Exhibit 3.14-10 Project Trip Assignment Existing Roadway Network — Phase 2

36230007 • 01/2020 | 3.14-10_proj_trip_assign_existing_rdwy_network_phase2.cdr



FIRSTCARBON SOLUTIONS™

Exhibit 3.14-11 Approved and Pending Project Locations

36230007 • 01/2020 | 3.14-11_approved_pending_proj_loc.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-12 Near-Term without Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls





Exhibit 3.14-13 Near-Term with Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

36230007 • 01/2020 | 3.14-13_near_term_w_proj_PHITV_lane_config_traf_controls.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT

As other projects would benefit from this improvement, a reimbursement agreement could be established by the project Applicant with the City of Antioch. During the PM peak-hour in the Nearterm condition, proposed project traffic represents 1.8 percent of the traffic flow, other near-term growth represents 5.9 percent of traffic flow, and existing traffic represents 92.3 percent of traffic flow.

With signal timing adjustments to better serve projected traffic flows, intersection operations would improve to LOS D during the PM peak-hour, reducing the impact to a less-than-significant level, as shown in Table 3.14-13.

Although the implementation of the above measures would reduce the impact to a less-than significant level, Caltrans controls the operations of the traffic signals at the Slatten Ranch Road at SR-4 Westbound Ramps and Hillcrest Avenue at SR-4 Eastbound Ramps intersections. Although Caltrans staff has indicated initial support for the striping changes and installation of traffic signal equipment to improve operations for all modes of travel through the interchange, the City cannot assure full implementation of this improvement and the impact would remain significant and unavoidable if Caltrans does not accept the improvements.

Lone Tree Way at SR-4 Eastbound Ramps

The Lone Tree Way at SR-4 Eastbound Ramp intersection is projected to operate at a deficient LOS E in the PM peak-hour prior to the addition of proposed project traffic in the Near-term condition. The proposed project would increase traffic through this intersection, resulting in a significant impact.

Improvements at this interchange are programmed in the East Contra Costa Regional Fee and Financing Authority (ECCRFFA) regional fee program, although specific improvements or the timing of their installation have not yet been identified. Fees are based on the land use type and are payable at the time building permits are issued based on either the number of dwelling units for residential uses or square-footage for non-residential uses, as established through a nexus study.

MM TRANS-2 requires the project Applicant to pay its fair share towards potential improvements at this intersection through participation in the ECCRFFA regional fee program. Potential improvements under consideration include optimization of the signal timing or widening of the southbound off-ramp to provide a second southbound right-turn only lane. These improvements would result in overall acceptable service levels, reducing the proposed project impact to a less-than-significant level, as shown in Table 3.14-12. However, because specific improvements and their timing have not yet been established, the payment of fees cannot assure that the improvement would be implemented when the impact occurs; therefore, the impact would remain significant and unavoidable.

Balfour Road at Deer Valley Road

The addition of proposed project-generated vehicle trips during the AM peak-hour would result in LOS F conditions for the side-street movement; peak-hour signal warrants would be satisfied prior to the addition to proposed project traffic. Based on the significance criteria, this is considered a significant impact. MM TRANS-1b, discussed previously, would address this impact.

Post mitigation LOS is shown in Table 3.14-13.

Table 3.14-13: Near-term With Project With Mitigation Conditions Peak-hour IntersectionLevel of Service Summary

			Poak-	Near-tern Pro	n Without ject	Near-term without I	with Project Vitigation	Near-term with Project with Mitigation		
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS	
5.	Hillcrest Avenue/SR- 4 Eastbound Ramps	Signal	AM PM	46 121	D F	50 133	D F	39 38	D D	
12	. Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	24 56.7	С Е	24 57.4	С Е	24 53	C D	
22	. Balfour Road/Deer Valley Road	SSSC/ Signal	AM PM	18 (33) 12 (21)	C (D) B (C)	34 (71) 20 (37)	D (F) B (C)	8 7	A A	

Notes:

Bold indicates potentially deficient operations. Bold Italics indicates potentially significant impact.

¹ Signal = signalized intersection

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method for vehicles. Source: Fehr & Peers 2019.

Phasing Analysis for the Near-Term Plus Project Conditions

To provide better insight into when each improvement needs to be implemented, Fehr & Peers considered the development of just Phase 1, as well as development of Phases 1 and 2 under Near-term Conditions. Near-Term Conditions for Phase 1 and Phase 2 are presented on Exhibits 3.14-14 and 3.14-15.

The addition of proposed project traffic through Phase 1 would worsen average delay at the already deficient intersections, and would result in deficient operations for the side-street movement at the Deer Valley Road at Balfour Road intersection. Peak-hour signal warrants would also be satisfied. As such, MM TRANS-1b would be required.

With the addition of traffic through Phase 2, no additional deficiencies were identified and operations of the already deficient intersections would continue to worsen. MM TRANS-2 would be required to address the worsening operation at the Lone Tree/SR-4 Eastbound ramp intersection.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

Implement MM TRANS-1b, MM TRANS-1c, and:

MM TRANS-2 Prior to issuance of the first building permit, the project Applicant shall provide the City of Antioch with East Contra Costa Regional Fee and Financing Authority regional transportation impact fees in accordance with the latest adopted fee schedule to support improvements at the Lone Tree Way/SR-4 Eastbound ramp intersection. If the required fees would not support the necessary improvements at the intersection of Lone Tree Way and the Eastbound ramp of SR-4, then no such fees shall be required.



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-14 Project Trip Assignment Near-Term Roadway Network — Phase 1



FIRSTCARBON SOLUTIONS™

Exhibit 3.14-15 Project Trip Assignment Near-Term Roadway Network — Phase 2

Level of Significance After Mitigation

Significant and Unavoidable (until the improvements are implemented)

Cumulative Traffic

Impact TRANS-3: The project could conflict with a program plan, ordinance or policy of the circulation system under Cumulative Traffic Conditions.

The future condition analysis considers development within the City of Antioch as described in the General Plan, as well as development in Brentwood given that some project intersections are in close proximity to the Brentwood/Antioch border.

Cumulative Traffic Forecasts

To assess future growth with planned development in both the cities of Antioch and Brentwood, several sources of data were reviewed, including the Contra Costa County Travel Demand Model, future traffic projections as documented in the administrative draft Antioch Transportation Impact Fee, future projections from the City of Brentwood Priority Area 1 Specific Plan EIR (June 2018), and projections developed as part of the Antioch Aviano and Vineyards at Sand Creek transportation impact studies. Traffic forecasts within the immediate project area were reviewed to ensure that known developments were adequately reflected in the forecasts, such as the Bridle Gate Project located on the south side of the proposed Sand Creek extensions, west of SR-4, and the development of the Albers Property, east of the project site. Minor adjustments were made to the forecasts to balance traffic volumes between closely spaced intersections in the project area. The resulting Cumulative without Project forecasts are presented in Exhibit 3.14-16, which are representative of conditions over the next 20 to 25 years. The project volumes from Exhibit 3.14-6 Cumulative without Project traffic volumes to represent Cumulative with Project conditions, as presented on Exhibit 3.14-17.

The potential traffic shifts associated with completing the connection of Sand Creek Road at Dallas Ranch Road to SR-4 are also reflected in the volumes presented on Exhibit 3.14-17.

Cumulative Roadway Assumptions

In addition to the roadway improvements considered in the analysis of Near-term conditions, the extension of Hillcrest Avenue to Balfour Road was considered in the Cumulative condition in conjunction with the construction of Sand Creek Road between the Kaiser Permanente Antioch Medical Center and Deer Valley Road. Widening of SR-4 to provide two travel lanes in each direction from south of Balfour Road to Marsh Creek Road was assumed to be completed in the Cumulative condition.

As part of the proposed project, roadway improvements would be constructed to extend Sand Creek Road from Deer Valley Road to Dallas Ranch Road, and Deer Valley Road would be improved along the proposed project frontage to provide two travel lanes in each direction through the Sand Creek Road intersection, where it would taper to a two-lane cross-section.

The assumed lane configurations in each scenario are shown on Exhibit 3.14-16 and Exhibit 3.14-17. Vehicle traffic generated by the proposed project would contribute to the need for local and regional

roadway improvements. The proposed project would contribute to the construction of regional roadway improvements through the payment of regional transportation impact fees to the ECCRFFA.

Analysis of Cumulative Conditions

The analysis results are presented in Table 3.14-14, based on the traffic volumes presented on Exhibit 3.14-16 and Exhibit 3.14-17.

Table 3.14-14: Cumulative Conditions Peak-hour Intersection Level of Service Summa	ary
--	-----

			Peak-	Cumula without P	tive roject	Cumulativ Proje	e with ct	
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Impact?
1.	Lone Tree Way/A Street/SR-4 Westbound Ramps	Signal	AM PM	25 33	C C	30 38	C D	No No
2.	Lone Tree Way/A Street/SR-4 Eastbound Ramps	Signal	AM PM	22 30	C C	24 45	C D	No No
3.	Hillcrest Avenue/Sunset Drive/Slatten Ranch Road	Signal	AM PM	24 41	C D	24 42	C D	No No
4.	Slatten Ranch Road/SR-4 Westbound Ramps	Signal	AM PM	31 12	C B	32 12	C B	No No
5.	Hillcrest Avenue/SR-4 Eastbound Ramps	Signal	AM PM	94 227	F	96 235	F F	Yes; increases traffic at deficient location
6.	Lone Tree Way/Davison Drive	Signal	AM PM	43 22	D C	56 24	Е С	Yes ; results in LOS E operations
7.	Deer Valley Road/Hillcrest Avenue/Davison Drive	Signal	AM PM	67 107	E F	68 116	E F	Yes; increases traffic at deficient location
8.	Lone Tree Way/James Donlon Boulevard	Signal	AM PM	31 21	C C	33 23	C C	No No
9.	Lone Tree Way/Dallas Ranch Road	Signal	AM PM	31 17	C B	38 20	D C	No No
10.	Lone Tree Way/Deer Valley Road	Signal	AM PM	41 38	D D	46 48	D D	No No
11.	Lone Tree Way/Hillcrest Avenue	Signal	AM PM	81 77	F	82 79	F I	Yes; increases traffic at deficient location
12.	Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	97 133	F	98 134	F F	Yes; increases traffic at deficient location

			Peak-	Cumula without P	Cumulative without Project		Cumulative with Project		
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Impact?	
13.	Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way	Signal	AM PM	68 87	E F	69 88	E F	Yes; increases traffic at deficient location	
14.	Prewett Ranch Drive/Dallas Ranch Road	Signal	AM PM	27 17	C B	30 18	C B	No No	
15.	Prewett Ranch Drive/Deer Valley Road	Signal	AM PM	78 23	E C	68 24	E C	No; results in a decrease in delay with the provision of parallel capacity.	
16.	Deer Valley Road/Wellness Way/Street A	Signal	AM PM	10 7	A A	11 6	B A	No No	
17.	Sand Creek Road/Deer Valley Road	Signal	AM PM	9 10	A A	17 14	B B	No No	
18.	Sand Creek Road/Hillcrest Avenue	Signal	AM PM	44 49	D D	47 54	D D	No No	
19.	Sand Creek Road/Heidorn Ranch Road	Signal	AM PM	14 14	B B	14 15	B B	No No	
20.	Sand Creek Road/SR-4 Eastbound Ramps	Signal	AM PM	81 103	F F	90 120	F F	Yes; increases average delay more than 5 seconds	
21.	Sand Creek Road/SR-4 Westbound Ramps	Signal	AM PM	56 24	E C	62 27	Е С	Yes; increases average delay more than 5 seconds	
22.	Balfour Road/Deer Valley Road	SSSC	AM PM	> 150 (> 180) 98 (>180)	F (F) F (F)	> 150 (> 180) 139 (>180)	F (F) F (F)	Yes; deficient side-street and overall operations and signal warrants met.	
23.	Balfour Road/SR-4 Eastbound Ramps	Signal	AM PM	43 56	D E	43 58	D E	Yes; increases traffic at deficient location	

Table 3.14-14 (cont.): Cumulative Conditions Peak-hour Intersection Level of ServiceSummary

Table 3.14-14 (cont.): Cumulative Conditions Peak-hour Intersection Level of Service Summary

			Peak-	Cumulative without Project		Cumulative with Project		
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Impact?
24.	Balfour Road/SR-4 Westbound Ramps	Signal	AM PM	25 19	C B	25 19	C B	No No
25	Prewett Ranch Drive/Hillcrest Avenue	Signal	AM PM	39 18	D B	41 19	D B	No No

Notes:

Bold reflects potentially deficient operations; Bold Italics reflects potentially significant impact.

Signal = signalized intersection; SSSC = side-street stop-controlled

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method forvehicles.

³ Intersection operations improve with the proposed project as the combination of the Sand Creek Road connection to Dallas Ranch Road and the Sand Creek Road extension between Dozier-Libbey Medical High School and Deer Valley Road is expected to result in some existing travel from the Dallas Ranch neighborhood to the Sand Creek Road corridor, shifting traffic from the Prewett Ranch Road intersection.

Source: Fehr & Peers 2019.

Ten intersections are projected to operate at deficient levels in the Cumulative condition prior to the addition of proposed project traffic:

- Hillcrest Avenue at SR-4 Eastbound Ramps—LOS F AM and PM Peak-hour
- Deer Valley at Hillcrest/Davison Drive—LOS E AM Peak-hour and LOS F PM Peak-hour
- Lone Tree Way at Hillcrest Avenue—LOS F AM Peak-hour and PM Peak-hour
- Lone Tree Way at SR-4 Eastbound Ramps—LOS F AM and PM Peak-hour
- Lone Tree Way at SR-4 Westbound Ramps—LOS F AM Peak-hour and PM Peak-hour
- Prewett Ranch Drive at Deer Valley Road—LOS E AM Peak-hour
- Sand Creek Road at SR-4 Eastbound Ramps—LOS F AM and PM Peak-hour
- Sand Creek Road at SR-4 Westbound Ramps—LOS E AM Peak-hour
- Balfour Road at Deer Valley Road—LOS F AM and PM Peak-hour
- Balfour Road at SR-4 Eastbound Ramps—LOS E PM Peak-hour

The addition of proposed project traffic and associated roadway improvements would improve operations of the Prewett Ranch Drive at Deer Valley Road intersection. Delay at all other intersections would increase, resulting in potentially significant impacts. The addition of proposed project traffic would also result in LOS E operations at the Lone Tree Way at Davison Drive intersection in the AM peak-hour.



Cumulative without Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

36230007 • 01/2020 | 3.14-16_cumulative_wo_proj_PHITV_lane_config_traf_controls.cdr

SOLUTIONS[™]

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT



FIRSTCARBON SOLUTIONS™ Exhibit 3.14-17 Cumulative with Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

36230007 • 01/2020 | 3.14-17_cumulative_w_proj_PHITV_lane_config_traf_controls.cdr

CITY OF ANTIOCH • THE RANCH PROJECT ENVIRONMENTAL IMPACT REPORT

Vehicle queues are expected to increase at project intersections as traffic volumes increase, which would further increase with the addition of proposed project traffic. Monitoring and adjusting traffic signal timings in response to actual traffic volumes to minimize the potential for vehicle queue spillback is recommended. Peak-hour signal warrants are satisfied at the Balfour Road at Deer Valley Road intersection in the Cumulative condition prior to the addition of proposed project traffic.

Daily Roadway Segment Operation

Cumulative traffic forecasts were developed for Prewett Ranch Drive based on the same procedures and assumptions described previously for intersections, with the resulting volumes shown in Table 3.14-15. Project trips were then estimated considering the changes to the roadway network in the Cumulative condition with Project, and then added to the Cumulative without Project volumes. With the construction of the proposed project roadway system, some existing trips that originate in the Dallas Ranch neighborhoods are expected to shift from traveling on Prewett Ranch Drive to Sand Creek Road. The percent increase in proposed project trips was also calculated, with the results presented in Table 3.14-15.

	Segment	Daily Traffic	Project Traffic	Existing Plus Project	Daily Fluctuation	Project Increase
1.	Prewett Ranch Drive, east of Deer Valley Road	7,000	80	(900)	± 1.2 percent	1 percent
2.	Prewett Ranch Drive at Diablo Vista Elementary School	3,800	80	(900)	± 1.8 percent	1 percent
3.	Prewett Ranch Drive, west of Hillcrest Avenue	3,700	80	(900)	± 2.9 percent	1 percent
Source: Fehr & Peers 2019.						

Table 3.14-15: Cumulative Conditions	Average Daily	Traffic
--------------------------------------	----------------------	---------

With completion of the Sand Creek Road corridor, and the resulting traffic shifts away from Prewett Ranch Drive, the segments of Prewett Ranch Drive between Deer Valley Road and Hillcrest Avenue are expected to experience levels of daily traffic appropriate for the roadway type.

Cumulative Impacts and Mitigation

Hillcrest Avenue at SR-4 Eastbound Ramps

The Hillcrest Avenue at SR-4 Eastbound Ramps intersection operates at a deficient LOS F during both peak-hours prior to the addition of proposed project traffic in the Cumulative condition. The addition of proposed project traffic would worsen operations by 2 seconds in the AM peak-hour and 8 seconds in the evening peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

As already noted in MM TRANS-1b, the project Applicant shall fund the design and installation of ASCT or other traffic signal interconnect system approved by the City at the following intersections (same as MM TRANS-1b):

- Slatten Ranch Road at SR-4 Westbound Ramps
- Slatten Ranch Road/Sunset Drive at Hillcrest Avenue
- Hillcrest Avenue at SR-4 Eastbound Ramps
- East Tregallas Road/Larkspur Drive at Hillcrest Avenue

In conjunction with the signal timing adjustments, the project Applicant shall also work with the City and Caltrans to design and install potential restriping options within the Hillcrest Avenue at SR-4 interchange area that improve vehicle and bicycle travel through the interchange area.

The design process shall start prior to the issuance of the 10th residential building permit for the proposed project and installation shall be completed prior to the issuance of the 422nd building permit unless the City of Antioch Engineer determines that design and installation delays are beyond the control of the project Applicant.

With signal timing adjustments to better serve projected traffic flows, intersection operations would improve to better than the Without Project condition, as shown in Table 3.14-15.

Although the implementation of the above measures would reduce the impact to a less-than significant level, Caltrans controls the operations of the traffic signals at the Slatten Ranch Road at SR-4 Westbound Ramps and Hillcrest Avenue at SR-4 Eastbound Ramps intersection. Although Caltrans staff has indicated initial support for the striping changes and installation of traffic signal equipment to improve operations for all modes of travel through the interchange, the City cannot assure full implementation of this improvement and the impact would remain significant and unavoidable if Caltrans does not accept the improvements.

Lone Tree Way at Davison Drive

The Lone Tree Way at Davison Drive intersection is projected to operate at an acceptable LOS D in the AM peak-hour prior to the addition of proposed project traffic in the Cumulative condition. The addition of proposed project traffic would result in LOS E operations. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

To mitigate the impact, the westbound approach of Davison Drive should be restriped to convert the westbound through lane to a left-through shared lane. The median on the south leg of the intersection may need to be reconstructed to allow concurrent left-turn movements on the westbound approach. Implementation of this improvement in combination with retiming of the traffic signals along the corridor would result in overall acceptable service levels, reducing the project's cumulative impact to a less than significant level, as shown in Table 3.14-16. This recommendation is reflected in MM TRANS-3a.
Deer Valley Road at Hillcrest Avenue/Davison Drive

The Deer Valley Road at Hillcrest Avenue/Davison Drive intersection is projected to operate at an unacceptable LOS E in the AM peak-hour and LOS F in the PM peak-hour prior to the addition of proposed project traffic in the Cumulative condition. The proposed project would add traffic and increase delay by 1 second in the AM peak-hour and 9 seconds in the PM peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

To mitigate this impact, ASCT or other traffic signal interconnect system approved by the City shall be implemented at the following intersections:

- Deer Valley Road at Hillcrest Avenue/Davison Drive
- Hillcrest Avenue at Hillcrest Crossroads

This would create an adaptive signal control corridor between SR-4 and Deer Valley Road on Hillcrest Avenue. Implementation of this improvement in combination with retiming of the traffic signals along the corridor would result in better operations than the Cumulative without Project condition, when also implemented with MM TRANS-1b, reducing the proposed project cumulative impact to a lessthan-significant level, as shown in Table 3.14-11. This recommendation is reflected in MM TRANS-3b.

Lone Tree Way at Hillcrest Avenue

The Lone Tree Way at Hillcrest Avenue intersection is projected to operate at a deficient LOS E in the AM peak-hour and a LOS F in the PM peak-hour prior to the addition of proposed project traffic in the Cumulative condition and the proposed project would add traffic through the intersection, increasing delay during the AM peak-hour by 1 second and in the PM peak-hour by 2 seconds. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

To mitigate the impact, the eastbound approach of Lone Tree Way shall be modified to provide two left-turn lanes, two through lanes, and a through-right-shared lane. This improvement would result in acceptable operations during the AM peak-hour when the addition of proposed project traffic results in a significant impact, reducing the proposed project impact to less-than-significant, as presented in Table 3.14-11. This recommendation is reflected in MM TRANS-3c.

Lone Tree Way at SR-4 Eastbound Ramps

The Lone Tree Way at SR-4 Eastbound Ramps intersection is projected to operate at a deficient LOS F in the AM and PM peak-hours prior to the addition of proposed project traffic in the Cumulative condition, and the proposed project would add traffic through the intersection, increasing delay by 1 second in the AM peak-hour and 1 second in the PM peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact. This impact would occur with Phase 1 of the proposed project. Proposed project traffic comprises 1 percent of overall traffic growth through the interchange in the Cumulative condition.

MM TRANS-2 requires the project Applicant to pay its fair share towards potential improvements at this intersection through participation in the ECCRFFA regional fee program. Improvements may include optimization of the signal timing or widening of the southbound off-ramp to provide a second southbound right-turn only lane.

These potential improvements would improve intersections operations; however, they would not result in LOS D operations, as presented in Table 3.14-16 (effects of signal timing shown in Table 3.14-16), in the Cumulative condition. Therefore, as payment of fees cannot assure that effective improvements would be implemented, the cumulative impact would remain significant and unavoidable.

Lone Tree Way at SR-4 Westbound Ramps/Jeffery Way

The Lone Tree Way at SR-4 Westbound Ramps/Jeffery Way intersection is projected to operate at a deficient LOS F in the AM and PM peak-hours prior to the addition of proposed project traffic in the Cumulative condition, and the proposed project would add traffic through the intersection and increase delay by 1 second in the AM peak-hour and 1 second in the PM peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact. As detailed in Chapter 7, this impact would occur with Phase 1 of the proposed project.

MM TRANS-3c requires the project Applicant to restripe the westbound approach to provide a second westbound left-turn lane (requires widening of the south leg of the intersection to provide a second southbound receiving lane, which is currently under construction) by the time the 431st residential building permit is issued. This improvement is under construction by others and would only be required if not already in place by the time the 431st residential building permit is issued.

This improvement would result in acceptable operations during the PM peak-hour and decrease the delay in the AM peak-hour to the same as under the Without Project condition. Because the improvement cannot achieve acceptable operations during the AM peak-hour and because the City of Antioch cannot assure its implementation because the intersection is located in the City of Brentwood, the impact would remain significant and unavoidable.

Sand Creek Road at SR-4 Eastbound Ramps

The Sand Creek Road at SR-4 Eastbound Ramps intersection is projected to operate at a deficient LOS F in the PM peak-hour prior to the addition of proposed project traffic in the Cumulative condition, and the proposed project would add traffic through the intersection, increasing average delay by 9 seconds during the AM peak-hour and 17 seconds during the PM peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

MM TRANS-2 requires the project Applicant to pay its proportionate share of the improvements that would improve operations through participation in the ECCRFFA regional fee program. Planned improvements include construction of a slip-ramp for the eastbound Sand Creek to southbound SR-4 movement, eliminating the conflicting left-turn movement at the intersection.

This improvement is included in the regional fee program and implementation of this improvement would result in overall acceptable service levels. However, at the time of Draft EIR release, the fee program does not necessarily cover the actual cost of the necessary improvements and, therefore, the residual significance of this impact is significant and unavoidable.

Sand Creek Road at SR-4 Westbound Ramps

The Sand Creek Road at SR-4 Westbound Ramps intersection is projected to operate at a deficient LOS E in the AM peak-hour prior to the addition of proposed project traffic in the Cumulative condition, and the proposed project would increase delay by 6 seconds during the AM peak-hour. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

To mitigate the impact, the westbound approach of Sand Creek Road shall be modified to provide two through lanes and two right-turn only lanes. This improvement is not included in the regional fee program and, therefore, no mechanism currently exists to allow the project Applicant to contribute to this improvement. MM TRANS-3d requires the project Applicant to contribute its proportionate share to this improvement provided that it is included in an adopted fee program. Until that occurs, the City of Antioch cannot assure that this proposed project would be implemented, and the impact would remain significant and unavoidable.

Balfour Road at Deer Valley Road

The addition of proposed project-generated vehicle trips during both the AM and PM peak-hours would worsen deficient conditions. Peak-hour signal warrants are also met prior to the addition of proposed project traffic in the Cumulative condition. Based on the significance criteria, this is considered a significant impact.

The implementation of MM TRANS-1c, which requires the installation of a traffic signal and implementation of lane improvements, would result in overall acceptable service levels, reducing the proposed project's impact to a less than cumulatively considerable level, as shown in Table 3.14-16.

Balfour Road at SR-4 Eastbound Ramps

The Balfour Road at SR-4 Eastbound Ramps intersection is projected to operate at a deficient LOS E in the PM peak-hour prior to the addition of proposed project traffic in the Cumulative condition, and the proposed project would add 2 seconds of delay at the intersection. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

MM TRANS-2 requires the project Applicant to pay its proportionate share of improvements that would improve operations. Restriping the southbound approach to provide two left turn lanes and one right-turn only lane would result in overall acceptable service levels, as shown in Table 3.14-15. Inclusion of this improvement or one of similar effectiveness (restriping the southbound approach to provide a left-turn lane, a shared left-through right lane, and a right-turn only lane) is proposed to be added to the ECCRFFA Fee Program, and the project Applicant is coordinating with CCTA to review and confirm details and timing for this modification to the fee program.

Even though improvements at this interchange may be included in the regional fee program, they have not yet been included. Thus, the City of Antioch cannot assure that the improvement would be implemented and the cumulative impact would remain significant and unavoidable.

Table 3.14-16: Cumulative With Project With Mitigation Conditions Peak-hour IntersectionLOS Summary

			Poak	Cumulat	tive	Cumulative Project	with t	Cumula Project wit	tive with h Mitigation
	Intersection	Control ¹	hour	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
5.	Hillcrest Avenue/SR- 4 Eastbound Ramps	Signal	AM PM	94 227	F F	96 235	F F	68 224	E F
6.	Lone Tree Way/Davison Drive	Signal	AM PM	43 22	D C	56 24	Е С	39 20	D C
7.	Deer Valley Road/Hillcrest Avenue/Davison Drive	Signal	AM PM	67 107	E F	59 <i>98</i>	E F	55 63	D E
11.	Lone Tree Way/ Hillcrest Avenue	Signal	AM PM	81 77	F E	82 79	F E	42 60	D E
12.	Lone Tree Way/SR-4 Eastbound Ramps	Signal	AM PM	97 133	F F	<i>98</i> 134	F F	92 131	F F
13.	Lone Tree Way/SR-4 Westbound Ramps/Jeffery Way	Signal	AM PM	68 87	E F	69 88	E F	68 51	E D
20.	Sand Creek Road/ SR-4 EB Ramps	Signal	AM PM	81 103	F F	90 120	F F	22 32	C C
21.	Sand Creek Road/ SR-4 WB Ramps	Signal	AM PM	57 24	E C	62 27	Е С	44 22	D C
22.	Balfour Road/Deer Valley Road	SSSC/ Signal	AM PM	> 150 (> 180) 98 (> 180)	F (F) F (F)	> 150 (> 180) 139 (> 180)	F (F) F (F)	12 12	B B
23.	Balfour Road/SR-4 Eastbound Ramps	Signal	AM PM	43 56	D E	43 58	D <i>E</i>	55 40	D D

Notes:

¹ Signal = signalized intersection

² Average intersection delay is calculated for all signalized intersections using the HCM 6th Edition method for vehicles. Source: Fehr & Peers 2019.

Phasing Analysis for the Cumulative Plus Project Condition

To provide better insight into when each improvement needs to be implemented, Fehr & Peers considered the development of just Phase 1, as well as development of Phases 1 and 2 under Cumulative Conditions. Cumulative Conditions for Phase 1 and Phase 2 are presented on Exhibits 3.14-18 and 3.14-19.



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-18 Project Trip Assignment Cumulative Roadway Network — Phase 1

THIS PAGE INTENTIONALLY LEFT BLANK



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-19 Project Trip Assignment Cumulative Roadway Network — Phase 2

THIS PAGE INTENTIONALLY LEFT BLANK

In the Cumulative condition, project impacts were identified at the following intersections with project buildout; for all but two locations, as noted below, the impact in the Cumulative condition would occur with the Phase 1 project:

- Hillcrest Avenue at SR-4 Eastbound Ramps (with Phase 1)
- Lone Tree Way at Davidson Drive (with Buildout Only)
- Deer Valley at Hillcrest/Davison Drive (with Phase 1)
- Lone Tree Way at Deer Valley Road (with Phase 2)
- Lone Tree Way at Hillcrest Avenue (with Phase 1)
- Lone Tree Way at SR-4 Eastbound Ramps (with Phase 1)
- Lone Tree Way at SR-4 Westbound Ramps (with Phase 1)
- Sand Creek Road at SR-4 Eastbound Ramps (with Phase 1)
- Sand Creek Road at SR-4 Westbound Ramps (with Phase 1)
- Balfour Road at Deer Valley Road (with Phase 1)
- Balfour Road at SR-4 Eastbound Ramps (with Phase 1)

Moreover, the addition of Phase 1 proposed project traffic in the Cumulative condition would result in deficient operations of the Prewett Ranch Drive at Deer Valley Road. Construction of the Sand Creek Road extension to Dallas Ranch Road would shift traffic from Prewett Drive, resulting in better operations under project buildout conditions than the no project condition. Nevertheless, the other impacts would remain significant and require mitigation. As such, MMs TRANS-1b, TRANS-1c, TRANS-3b, and TRANS-3c would be required for Phase 1.

In addition to the previously identified impacts, Phase 1 would result in one additional impact (at Prewett Ranch Drive/Deer Valley Road), and Phase 2 would result in one additional impact (at Lone Tree Way/Deer Valley Road). These additional impacts are discussed below.

Prewett Ranch Drive/Deer Valley Road

This intersection is projected to operate at LOS E prior to the addition of proposed project traffic during the AM peak-hour in the Cumulative condition. The addition of proposed project traffic through Phase 1 would worsen LOS E operations and increase traffic. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

This intersection has been built to its ultimate configurations and no reconfigurations within the existing intersection cross-section that would result in acceptable operations were identified.

MM TRANS-3f requires that if not already completed by others, the project Applicant shall construct Sand Creek Road from the Kaiser Permanente Antioch Medical Center entrance roadway to the western boundary of the Dozier Libbey High School prior to the issuance of the 421st residential building permit for the proposed project as a two-lane roadway (one lane in each direction) along the ultimate alignment, connecting to the portion of Sand Creek Road at Dozier Libbey High School to the segment constructed by others. Construction of that portion of Sand Creek Road would shift existing and future traffic and provide other travel routes for proposed project traffic. Construction of the aforementioned improvements would result in acceptable intersection operations through project buildout reducing the proposed project's cumulative impact to a less than cumulatively considerable level. Additionally, it would reduce the level of vehicle traffic on Prewett Ranch Road.

As these connections would provide benefit for other development projects in the area, the project Applicant may enter into a reimbursement agreement with the City of Antioch for improvement costs beyond the project's fair share. Additionally, should the Sand Creek Road extension be added to the ECCRFFA program, regional fee credit could be sought. Construction of this improvement would reduce the proposed project's cumulative impact to a less-than-significant level.

Lone Tree Way/Deer Valley Road

This intersection is projected to operate at LOS D prior to the addition of proposed project traffic during the PM peak-hour. The addition of proposed project traffic through Phase 2 would result in LOS E operations. Based on the significance criteria, this is considered a significant cumulative impact.

This intersection has been built to its ultimate configurations and no reconfigurations within the existing intersection cross-section that would result in acceptable operations were identified.

MM TRANS-3e requires the project Applicant to construct the Sand Creek Road extension from Deer Valley Road to Dallas Ranch Road as a four-lane roadway prior to the issuance of the 622nd residential building permit. The construction of this four lane extension of Sand Creek Road between Deer Valley Road and Dallas Ranch Road would shift enough of the proposed project traffic from the intersection of Lone Tree Way at Deer Valley Road to Lone Tree Way at Dallas Ranch Road, to improve the operations of this intersection to an acceptable level through project buildout, reducing the project's significant cumulative impact to a less-than-significant cumulative impact.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

The project Applicant shall implement MM TRANS-1b, MM TRANS-1c, and MM TRANS-2 as well as the following additional mitigation measures:

- **MM TRANS-3a** Prior to issuance of the 1,000th residential building permit, the project Applicant shall implement the following improvements to the Lone Tree Way/Davison Drive:
 - 1. The westbound approach of the Davison Drive approach shall be converted from a westbound through lane to a left-through shared lane; and
 - 2. If determined necessary by the City of Antioch Engineer, the project Applicant shall reconstruct the median on the south leg of the intersection to allow concurrent left-turn movements on the westbound approach.

- **MM TRANS-3b** The design process shall start prior to the issuance of the 10th residential building permit for the proposed project, and installation shall be completed prior to the issuance of the 422nd building permit unless the City of Antioch City Engineer determines that design and installation delays are beyond the control of the project Applicant, the project Applicant shall fund the design and installation of Adaptive Signal Control Technologies (ASCT) or other traffic signal interconnect system approved by the City at the following intersections:
 - Deer Valley Road/Hillcrest Avenue-Davison Drive
 - Hillcrest Avenue/Hillcrest Crossroads

The ASCT system at the Deer Valley Road at Hillcrest Avenue/Davison Drive and Hillcrest Avenue at Hillcrest Crossroads shall be coordinated with the ASCT systems identified as part of Mitigation Measure (MM) TRANS-1b.

- **MM TRANS-3c** Prior to issuance of the 431st residential building permit, project Applicant shall restripe the westbound approach of Lone Tree Way at SR-4 Westbound Ramps/Jeffery Way to provide a second westbound left-turn lane (requires widening of the south leg of the intersection to provide a second southbound receiving lane, which is currently under construction). This improvement is under construction by others and shall only be required if not already in place by the time the 431st residential building permit is issued.
- MM TRANS-3d Prior to issuance of the first building permit, the project Applicant shall provide the City of Antioch with East Contra Costa Regional Fee and Financing Authority regional transportation impact fees in accordance with the latest adopted fee schedule to support improvements at the Sand Creek Road/SR-4 Westbound Ramps intersection. If the required fees would not support the necessary improvements at the intersection, then no such fees shall be required.
- **MM TRANS-3e** Prior to the issuance of the 622nd residential building permit, the project Applicant shall have started construction on the Sand Creek Road extension from Deer Valley Road to Dallas Ranch Road as a four-lane roadway.
- MM TRANS-3f Prior to the issuance of the 421st residential building permit for the proposed project, the project Applicant shall have started construction on Sand Creek Road from the Kaiser Permanente Antioch Medical Center entrance roadway to the western boundary of the Dozier Libbey High School as a two-lane roadway (one lane in each direction) along the ultimate alignment, connecting to the portion of Sand Creek Road at Dozier Libbey High School to be constructed by others.

Level of Significance After Mitigation

Significant and Unavoidable

Freeway Analysis

Impact TRANS-4: The project would conflict with a program plan, ordinance or policy of the circulation system.

Existing

Mainline traffic counts were conducted on SR-4 south of Balfour Road in January 2019. Traffic volumes at the interchanges along the corridor were used to estimate traffic volumes on the mainline segments from south of Balfour Road to west of Lone Tree Way/A Street. Project traffic volumes were then considered. The traffic volumes and number of travel lanes were used to calculate vehicle speeds using the HCM 6th Edition method, which were then used to calculate the delay index. The results were verified through travel of the corridor during peak-hours.

The results are presented in Table 3.14-17 for the AM peak-hour and Table 3.14-18 for the PM peakhour. SR-4 from south of Balfour Road through Lone Tree Way/A Street generally operates at freeflow speeds during both the AM and PM peak-hours. SR 160 also operates with minimal congestion during peak-hours. With the addition of proposed project traffic in the existing condition, all mainline freeway segments in the immediate project area would continue to operate within the established service objective and the proposed project impact to freeway operations in the immediate project vicinity in the existing condition is considered less-than-significant. However, there are greater levels of congestion on SR-4 further west of Lone Tree Way/A Street and the proposed project would add vehicle traffic to these roadway segments. The proposed project's percentage of overall traffic would be minimal, but it would contribute to worsening levels of congestion along the SR-4 corridor.

			Existing		Existing P	lus Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree	EB	3,325	1.00	3,381	1.00
	Way/A Street	WB ¹	3,931	1.00	4,085	1.00
2.	SR-4, west of Hillcrest	EB	2,931	1.00	2,946	1.00
	Avenue	WB ¹	3,248	1.00	3,253	1.00
3.	SR-4, west of SR-160	EB	2,472	1.00	2,484	1.00
		WB	2,710	1.00	2,715	1.00
4.	SR-4, west of Laurel Road	EB	2,756	1.00	2,761	1.00
		WB	3,318	1.00	3,330	1.00
5.	SR-4, north of Lone Tree	SB	2,800	1.01	2,805	1.01
	Way	NB	2,909	1.02	2,921	1.02
6.	SR-4, north of Sand Creek	SB	2,461	1.00	2,496	1.00
	Road	NB	2,837	1.01	2,851	1.01

Table 3.14-17: Existing Conditions Freeway Operations Summary—AM Peak-hour

			Existing		Existing Plus Project	
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
7.	SR-4, north of Balfour	SB	2,022	1.05	2,022	1.05
	Road	NB	2,036	1.05	2,036	1.05
8.	SR-4, south of Balfour Road	SB	1,201	1.20	1,275	1.32
		NB	940	1.03	968	1.04
9.	SR-160, north of SR-4	NB	1,284	1.00	1,308	1.00
		SB	960	1.00	970	1.00

Table 3.14-17 (cont.): Existing Conditions Freeway Operations Summary—AM Peak-hour

Note:

¹ AM peak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes and reduces the number of mixed-flow lanes available during the AM peak-hour.

Source: Fehr & Peers 2019.

Table 3.14-18: Existing Conditions Freeway Operations Summary—PM Peak-hour

			Existing		Existing P	lus Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree Way/A Street	EB1	5,977	1.06	6,151	1.08
		WB	4,334	1.00	4,444	1.00
2.	SR-4, west of Hillcrest Avenue	EB1	5,267	1.02	5,313	1.02
		WB	3,771	1.00	3,771	1.00
3.	SR-4, west of SR-160	EB	4,383	1.00	4,391	1.00
		WB	3,506	1.00	3,520	1.00
4.	SR-4, west of Laurel Road	EB	4,361	1.02	4,375	1.02
		WB	2,957	1.00	2,965	1.00
5.	SR-4, north of Lone Tree Way	SB	3,731	1.11	3,745	1.12
		NB	2,990	1.02	2,998	1.02
6.	SR-4, north of Sand Creek Road	SB	3,205	1.03	3,234	1.04
		NB	2,947	1.02	2,991	1.02
7.	SR-4, north of Balfour Road	SB	2,058	1.06	2,028	1.05
		NB	2,235	1.11	2,235	1.11
8.	SR-4, south of Balfour Road	SB	1,015	1.05	1,069	1.08
		NB	1,431	1.82	1,518	2.31
9.	SR-160, north of SR-4	NB	1,143	1.00	1,159	1.00
		SB	1,670	1.00	1,698	1.00

		Existing		Existing Pl	us Project
Segment	Direction	Volume	Delay Index	Volume	Delay Index
Note: ¹ PM peak-hour analysis reflects operation of the H and reduces the number of mixed-flow lanes ava Source: Fehr & Peers 2019.	IOV lane, which ilable during the	carries app PM peak-h	proximately 13 nour.	percent of tra	ffic volumes

Table 3.14-18 (cont.): Existing Conditions Freeway Operations Summary—PM Peak-hour

Near-term

Near-term freeway forecasts were developed based on the same method used to develop the nearterm intersection forecasts, both without and with the project. No freeway improvements over the existing condition were considered in the evaluation of the Near-term condition. The Near-term without and with Project analysis results are presented in Table 3.14-19 and Table 3.14-20 for the AM and PM peak-hours, respectively, based on the estimates of Near-term traffic volumes, plus estimates of proposed project traffic.

			Near-term		Near-term	with Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree	EB	3,658	1.00	3,719	1.00
	Way/A Street	WB1	4,660	1.01	4,814	1.01
2.	SR-4, west of Hillcrest	EB	3,204	1.00	3,224	1.00
	Avenue	WB1	3,760	1.00	3,780	1.00
3.	SR-4, west of SR-160	EB	2,724	1.00	2,741	1.00
		WB	3,189	1.00	3,209	1.00
4.	SR-4, west of Laurel Road	EB	3,049	1.00	3,059	1.00
		WB	3,785	1.01	3,812	1.01
5.	SR-4, north of Lone Tree	SB	3,124	1.03	3,134	1.03
	Way	NB	3,270	1.04	3,297	1.04
6.	SR-4, north of Sand Creek	SB	2,737	1.01	2,742	1.01
	Road	NB	3,232	1.04	3,247	1.04
7.	SR-4, north of Balfour	SB	2,487	1.00	2,516	1.00
	Road	NB	2,297	1.00	2,305	1.00
8.	SR-4, south of Balfour	SB	1,602	3.02	1,676	3.90
	Road	NB	1,130	1.12	1,158	1.00

Table 3.14-19: Near-term Conditions Freeway Operations Summary—AM Peak-hour

Table 3.14-19 (cont.): Near-term Conditions Freeway Operations Summary—AM Peak hour

			Near	Near-term		with Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
9.	SR-160, north of SR-4	NB	1,436	1.00	1,460	1.00
		SB	1,165	1.00	1,175	1.00

Note:

¹ AM peak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes and reduces the number of mixed-flow lanes available during the AM peak-hour.

Source: Fehr & Peers 2019.

			Near-term		Near-term	with Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree	EB1	6,762	1.17	6,950	1.21
	Way/A Street	WB	4,901	1.00	5,003	1.00
2.	SR-4, west of Hillcrest	EB1	5,882	1.06	5,942	1.06
	Avenue	WB	4,196	1.00	4,198	1.00
3.	SR-4, west of SR-160	EB	4,952	1.00	4,974	1.00
		WB	3,920	1.00	3,936	1.00
4.	SR-4, west of Laurel Road	EB	5,026	1.05	5,054	1.05
		WB	3,401	1.00	3,411	1.00
5.	SR-4, north of Lone Tree Way	SB	4,229	1.31	4,257	1.33
		NB	3,501	1.07	3,511	1.07
6.	SR-4, north of Sand Creek	SB	3,599	1.09	3,613	1.09
	Road	NB	3,405	1.06	3,415	1.06
7.	SR-4, north of Balfour	SB	2,465	1.00	2,485	1.00
	Road	NB	2,807	1.01	2,832	1.01
8.	SR-4, south of Balfour	SB	1,330	1.46	1,384	1.63
	Road	NB	1,909	9.20	1,996	12.70
9.	SR-160, north of SR-4	NB	1,275	1.00	1,291	1.00
		SB	1,868	1.00	1,896	1.00

Table 3.14-20: Near-term Conditions Freeway Operations Summary—PM Peak-hour

Note:

¹ PM peak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes and reduces the number of mixed-flow lanes available during the PM peak-hour. Source: Fehr & Peers 2019. In the Near-term condition, the segment of SR-4 south of Balfour Road would experience increased congestion with a delay index greater than 2.5 in the southbound direction during the AM peak-hour and in the northbound direction during the PM peak-hour. The proposed project would worsen operations on this segment, but would not result in additional project-segments to degrade beyond the established standard. Additionally, the proposed project would contribute to worsening levels of congestion on SR-4 further west of the project area.

Cumulative

Cumulative freeway forecasts were developed based on the same method used to develop the cumulative intersection forecasts, both without and with the proposed project. The Cumulative without and with Project analysis results are presented in Table 3.14-21 and Table 3.14-22 for the AM and PM peak-hours, respectively, based on the estimates of cumulative traffic volumes, plus estimates of proposed project traffic. In the Cumulative condition, all freeway segments in the project area are projected to continue operating within the Multimodal Transportation Service Objective (MTSO), as planned improvements to SR-4 south of Balfour Road would improve operations of the segment between Marsh Creek Road and Balfour Road.

			Cumulative		Cumulative with Project	
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree	EB	4,320	1.00	4,390	1.00
	Way/A Street	WB ¹	5,250	1.02	5,404	1.03
2.	SR-4, west of Hillcrest	EB	3,640	1.00	3,675	1.00
	Avenue	WB1	4,390	1.01	4,410	1.01
3.	SR-4, west of SR-160	EB	2,890	1.00	2,922	1.00
		WB	3,550	1.00	3,570	1.00
4.	SR-4, west of Laurel Road	EB	3,250	1.00	3,275	1.00
		WB	4,310	1.01	4,337	1.01
5.	SR-4, north of Lone Tree	SB	3,190	1.03	3,215	1.03
	Way	NB	3,850	1.15	3,877	1.16
6.	SR-4, north of Sand Creek	SB	2,620	1.01	2,645	1.01
	Road	NB	3,450	1.06	3,477	1.07
7.	SR-4, north of Balfour	SB	2,370	1.00	2,444	1.00
	Road	NB	2,560	1.01	2,584	1.01
8.	SR-4, south of Balfour	SB	1,420	1.00	1,494	1.00
	Road	NB	1,520	1.00	1,278	1.00
9.	SR-160, north of SR-4	NB	1,600	1.00	1,624	1.00
		SB	1,200	1.00	1,210	1.00

Table 3.14-21: Cumulative Conditions Freeway Operations Summary—AM Peak-hour

Table 3.14-21 (cont.): Cumulative Conditions Freeway Operations Summary—AM Peak-hour

		Cumulative		Cumulative	with Project
Segment	Direction	Volume	Delay Index	Volume	Delay Index
Note: ¹ AM neak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes					

AM peak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes and reduces the number of mixed-flow lanes available during the AM peak-hour.
Source: Solar 2, Dears 2010.

Source: Fehr & Peers 2019.

Table 3.14-22: Cumulative Conditions Freeway Operations Summary—PM Peak-hour

			Cumulative		Cumulative	with Project
	Segment	Direction	Volume	Delay Index	Volume	Delay Index
1.	SR-4, west of Lone Tree	EB1	8,290	1.87	8,464	2.03
	Way/A Street	WB	6,980	1.07	7,092	1.08
2.	SR-4, west of Hillcrest	EB1	7,440	1.37	7,502	1.39
	Avenue	WB	6,010	1.02	6,022	1.02
3.	SR-4, west of SR-160	EB	5,170	1.01	5,194	1.01
		WB	5,420	1.01	5,446	1.01
4.	SR-4, west of Laurel Road	EB	5,070	1.05	5,100	1.05
		WB	4,720	1.03	4,738	1.03
5.	SR-4, north of Lone Tree	SB	4,320	1.37	4,350	1.39
	Way	NB	4,780	1.83	4,798	1.86
6.	SR-4, north of Sand Creek	SB	4,220	1.31	4,250	1.32
	Road	NB	4,070	1.23	4,088	1.24
7.	SR-4, north of Balfour	SB	2,830	1.01	2,873	1.01
	Road	NB	3,240	1.04	3,314	1.04
8.	SR-4, south of Balfour	SB	1,760	1.00	1,814	1.00
	Road	NB	2,400	1.00	2,487	1.00
9.	SR-160, north of SR-4	NB	1,600	1.00	1,616	1.00
		SB	2,200	1.00	2,230	1.00

Note:

¹ PM peak-hour analysis reflects operation of the HOV lane, which carries approximately 13 percent of traffic volumes and reduces the number of mixed-flow lanes available during the PM peak-hour. Source: Fehr & Peers 2019.

The proposed project would increase traffic on freeways in the project area; it would worsen the operations of SR-4 south of Balfour Road, resulting in a significant impact in the Near-term condition.

The proposed project would also contribute to worsening levels of congestion on SR-4 further west of the project area.

Conclusion

In the Near-term condition, the segment of SR-4 south of Balfour Road would experience increased congestion with a delay index greater than 2.5 in the southbound direction during the AM peak-hour and in the northbound direction during the PM peak-hour. The proposed project would worsen operations on this segment resulting in a potentially significant cumulative impact. Additionally, the proposed project would contribute to worsening levels of congestion on other freeway segments, including SR-4 further west of the project area (between Loveridge Road and Morello Avenue) by adding traffic to freeway segments where the CCTA has documented delay indices higher than 2.5. Based on the significance criteria, any contribution to a cumulative impact would be deemed significant. Thus, the proposed project is considered to result in a cumulatively considerable contribution to a potentially significant cumulative impact.

The CCTA plans to widen SR-4 between Marsh Creek Road and Balfour Road to provide two additional travel lanes (for a total of four—two in each direction). Participation in the ECCRFFA program would constitute a fair-share payment towards this planned improvement and would reduce this impact to a less-than-significant level.

No additional capacity enhancing projects are planned on SR-4 from in the vicinity of the Lone Tree Way/A Street to the west. The CCTA has developed the SR-4 Integrated Corridor Management (ICM) Plan that includes strategies such as adaptive ramp metering, incident management, traffic and transit information systems, traffic arterial and transit information systems, connected vehicle technologies, and integration with the Interstate 80 (I-80) corridor ICM to better manage traffic flows along the corridor.

Although the project Applicant would pay its fair share towards regional transportation improvements through the participation in the ECCRFFA program (as required by MM TRANS-2), the ICM improvement is not part of the fee program and full funding for that improvement has not been identified. Additionally, as the widening of SR-4 between Marsh Creek Road and Balfour Road cannot be assured through the payment of fees, and the effectiveness of the ICM project is uncertain, the proposed project impact to the regional freeway system would remain significant and unavoidable.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures Implement MM TRANS-2.

Level of Significance After Mitigation

Significant and Unavoidable

Vehicle Miles Traveled

Impact TRANS-5:	The project would be inconsistent with CEQA Guidelines Section 15064.3
	subdivision (b).

In response to SB 743, the OPR has updated CEQA Guidelines to include new transportation-related evaluation metrics. Draft Guidelines were developed in August 2014, with updated draft Guidelines prepared January 2016, which incorporated public comments from the August 2014 Guidelines. The OPR released final proposed Guidelines on November 27, 2017, with an associated Technical Advisory Document on Evaluating Transportation Impacts in CEQA dated December 2018. The Updated CEQA Guidelines were finalized in January 2019 by the Natural Resources Agency, which includes a new Section 15064.3 on VMT analysis and thresholds for land use developments. Updated CEQA Guidelines Section 15064.3 states that they do not take effect until July 1, 2020 unless the lead agency adopts them earlier. Changes to Appendix G of the CEQA Guidelines were finalized in January 2019, with methods for evaluating transportation impacts detailed in the Technical Advisory on Evaluating Transportation Impacts in CEQA.

A VMT analysis was conducted pursuant to CEQA Guidelines, as the environmental document may not be certified until after July 1, 2020, and providing the VMT analysis in advance of it being required provides additional information during the decision making process. As neither the City of Antioch nor the Contra Costa Transportation Authority have established any standards or thresholds on VMT, OPR Guidelines were used to assess potential significance.

CEQA Guidelines

CEQA Guideline Section 15064.3(b)(1) states that lead agencies generally should presume that certain projects (including certain residential, retail, and office projects, as well as projects that are a mix of these uses) proposed within 0.5 mile of an existing major transit stop⁴ or an existing stop along a high quality transit corridor⁵ will have a less-than-significant impact on VMT. As the project site is not located along a high-quality transit corridor, the presumption of a less-than-significant impact on VMT does not apply, and a detailed VMT analysis is required.

The OPR's December 2018 Technical Guidance recommends that a proposed residential project exceeding 85 percent of the existing Bay Area regional VMT per capita or Citywide VMT per capita may indicate a significant impact, as would a proposed office project that exceeds 85 percent of the existing regional VMT per employee. For proposed retail projects, the OPR guidance recommends that a net increase in total VMT may indicate a significant transportation impact. The guidance also states that local-serving retail developments smaller than 50,000 square feet may be presumed to have a less-than-significant impact on VMT because adding these retail spaces into the urban fabric improves retail destination proximity, tending to shorten trips and reduce VMT.

⁴ Public Resources Code Section 21064.3: "Major transit stop" means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.

⁵ Public Resources Code Section 21155: A high-quality transit corridor means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

Analysis Methods

To conduct the VMT assessment, Fehr & Peers used the CCTA travel demand model as well as information from the MTC. The CCTA model was used to estimate average trip lengths for the proposed project, while MTC data was used to establish average trip lengths for existing residential uses in Antioch. The existing average trip lengths for the City of Antioch, Contra Costa County and the Bay Area based on the MTC data are presented in Table 3.14-23. Home based trips in Antioch and Contra Costa County are slightly higher than the Bay Area average, while work based trips to jobs in Antioch are much lower than regional averages, indicating a jobs-housing imbalance where more people commute from Antioch to other employment centers, while jobs in Antioch tend to be filled by more local residents.

Land Use Type	Antioch	Contra Costa County	Bay Area
Home Based VMT	17.9	18.0	15.3
Source: MTC, Fehr & Peers 2019.			

Analysis Results

A select zone analysis was conducted using the CCTA model whereby all the trips generated by the residential portion of the project were tracked through the transportation system. Based on this analysis, the proposed project is estimated to generate approximately 22 VMT per day per person. This includes all trips generated by each person that is projected to live in the development that either start or end at home. This level of vehicle travel is higher than the City of Antioch average as well as the Bay Area Average; the proposed project would need to generate less than 15.2 VMT per day per person to be 85 percent of the existing Citywide average per resident, or 13 VMT per day per person to be 85 percent of the existing regional average per resident. Based on these thresholds, this would be a significant impact.

A VMT assessment was not prepared for the proposed commercial uses as the actual uses are unknown. However, up to 50,000 square feet of retail uses may be considered to have a less-thansignificant VMT impact as it is expected to be locally serving. Office or other employment uses are also expected to have a lower than average trip length. The proposed Village Center would accommodate approximately 54,000 square feet of neighborhood commercial uses that would cater to the nearby residents, workers and visitors at the Kaiser Permanente Antioch Medical Center (across the street), and commuters who drive along Deer Valley Road on a daily route. Such neighborhood uses could include businesses such as Starbucks, Jamba Juice, Chipotle, a dry cleaners, a café or sandwich shop, a pet store/groomers, etc. The Village Center is not proposed to be a regional shopping center.

Conclusion

Results of the VMT analysis indicate that the proposed project would contribute to an increase in VMT on a per-capita basis as the proposed project adds a housing development that would require residents to travel longer-than-average distances to meet their daily needs. While various project components (i.e., the pedestrian and bicycle facilities, neighborhood commercial uses) and mitigation measures (i.e., intersection signalization, etc.) would reduce some potential VMT impacts, there is no way to guarantee a reduction in estimated vehicle trips. Accordingly, the VMT impacts cannot be reduced to a less than significant level.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

MM TRANS-1 through MM TRANS-8

Level of Significance After Mitigation

Significant and Unavoidable

Roadway Safety Hazards

Impact TRANS-6:	The project would not substantially increase hazards due to a geometric design
	feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g.,
	farm equipment).

Access to the project site would be provided by a new roadway—Sand Creek Road—connecting the terminus of Dallas Ranch Road to Deer Valley Road. As proposed, Sand Creek Road and Street B would be up to four lanes with the remaining roadways within the project site developed as two-lane roadways.

Through the project site, Sand Creek Road would provide either a 96-foot right-of-way (when development is proposed on one side of the street) or a 112-foot right-of-way (when development is proposed on both sides of the street). The cross-section would generally include a 6-foot wide sidewalk, 10-foot wide landscape buffer, 8-foot wide bicycle lane, and two 12-foot wide travel lanes in each direction plus a 16-foot wide median that would allow for turn pockets to be provided at intersections. Along some portions of the street section, additional right-of-way to provide landscaping outside the public right-of-way is also proposed on each side of the street.

Deer Valley Road along the project frontage would be improved to provide sidewalks, landscape buffer, bicycle lane, and additional travel lanes to match the cross-section on the opposite side of the roadway. An additional landscape setback is also proposed in the vicinity of the Village Center.

Other major streets through the project site would provide one vehicle lane in each direction in addition to sidewalks, bicycle facilities, and landscaping. There ultimate design would conform to City Code requirements.

Typical internal local residential streets would feature two travel lanes within rights-of-ways ranging from 37 to 54 feet in width. With the exception of private lanes/alleys, local streets would include on-street vehicle parking, either on one or both sides of the street, as well as 4 to 5-foot wide sidewalks on both sides of the streets. Private alleys or courts may be used to access residential units, and would be allowed to be narrower than public streets; such alleys or courts would not be anticipated to offer on-street parking or sidewalks. A small number of local residential streets would abut open space areas with readily accessible trail systems, and therefore, include a 2-foot wide curb and gutter without parking lanes or sidewalks.

Projected peak-hour turning movement forecasts the major roadway connections are presented on Exhibit 3.14-12, representative of Cumulative conditions. As shown, most intersections are projected to carry low volumes. Analysis was conducted for the three primary internal intersections under both traffic signal and roundabout as presented Table 3.14-24. Cumulative a.m. and p.m. peak-hour volumes with the project are shown on Exhibit 3.14-20. As shown, internal intersections are projected to operate at acceptable levels under either a two-lane or four-lane Sand Creek Road.

			Roundabout		Traffic Signal	
Intersection		Peak-hour	Delay ²	LOS	Delay ²	LOS
25. Sa	and Creek Road/B Street	AM PM	7 9	A A	17 17	B B
26. Sa	and Creek Road/Village 3	AM PM	6 8	A A	29 29	C C
27. Sa	and Creek Road/A Street	AM PM	7 8	A A	18 19	B C
28. Sa	and Creek Road/Street D	AM PM	6 7	A A	25 29	C C
29. B	Street/C Street	AM PM	4 5	A A	N/A	N/A
30. Sa	and Creek Road/Deer Valley Road	AM PM	15 15	B B	17 14	B B

Table 3.14-24: Cumulative With Project Conditions Internal Intersection LOS Summary

¹ Signal = signalized intersection

² Delay is based on HCM 6th Edition method for vehicles.

Source: Fehr & Peers 2019.

Level of Significance

Less Than Significant



Source: FEHR & PEERS, December 2019.

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-20 Cumulative AM and PM Peak Hour Volumes with Project

36230007 • 12/2019 | 3.14-20_cumulative_AM_and_PM_PHV_w_proj.cdr

THIS PAGE INTENTIONALLY LEFT BLANK

Emergency Access

Impact TRANS-7: The project could result in inadequate emergency access.

Several factors determine whether a project has sufficient access for emergency vehicles, including:

- 1. Number of access points (both public and emergency access only)
- 2. Width of access points
- 3. Width of internal roadways

Based on the 2016 California Fire Code as amended by Contra Costa County Ordinance 2016-23, the minimum number of access roads serving residential development(s) shall be based upon the number of dwelling units served as follows:

- Multiple Family Residential Projects having more than 100 dwelling units should be provided with two separated and approved fire apparatus access roads (D106.1)
- Development of one or two-family dwellings where the number of dwelling units exceed 30 shall be provided with two separate and approved fire apparatus access roads; where there are more than 30-dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3 of the California Fire Code, access from two directions shall not be required (D107.1)

Access to the proposed project would be provided from new roadway connections from Deer Valley Road via Street A and an extension of Sand Creek Road connecting to Dallas Ranch Road. Access to Villages 1 through 8 would be provided from multiple locations, meeting or exceeding the Fire Code requirements. Access to Villages 9, 10, 11, and 12 with a total of 555 units would be restricted to a single public access roadway. A secondary emergency access connection from Empire Mine Road is proposed. This configuration may not meet the California Fire Code and the Contra Costa County Fire Protection District (CCCFPD) Ordinance (D107.1).

MM TRANS-7 requires the emergency access points for Villages 9, 10, 11, and 12 to be reviewed and approved by the City of Antioch and CCCFPD to ensure that adequate access for large emergency vehicles is provided.

Cross-sections for the proposed streets within the project site were reviewed. All street sections provide a minimum of 20-feet of clearway (meaning no obstructions in terms of parked vehicles, landscaping, etc.), such that sufficient width is provided for emergency vehicle access and circulation.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

MM TRANS-7 Prior to recordation of the final map, the City of Antioch and Contra Costa County Fire Protection District shall review and approve the proposed emergency access points for Villages 9, 10, 11, and 12 to ensure that adequate access is provided for large emergency vehicles in accordance with the California Fire Code.

Level of Significance After Mitigation

Less Than Significant

Public Transit, Bicycles, and Pedestrians

Impact TRANS-8:	The project would provide adequate access for public transit, bicycles, or pedestrians.
	- F - J F

The Master Development Plan includes a Pedestrian and Bicycle Plan for the proposed project. (See Exhibit 3.14-21) This Exhibit also identifies the proposed public transit stops.

Public Transit

No transit service is currently provided to the project site as it is undeveloped. A BART station is located approximately 4 miles from the site in the vicinity of Hillcrest Avenue at SR-4, and an additional BART station may be constructed within the median of SR-4 between Lone Tree Way and Sand Creek Road, approximately 2.5 to 4 miles east of the project site. Bus pullouts are shown along Sand Creek Road at Street B and west of Deer Valley Road to accommodate the potential for TriDelta Transit to serve the site. Bus turnouts and shelters meeting TriDelta Transit requirements would be provided.

Although transit facilities would be provided on Sand Creek Road, numerous neighborhoods, specifically in the southwestern portion of the site would be located more than 0.25-mile walk to a bus stop, reducing the potential for transit trips for residents of those neighborhoods.

MM TRANS-8a requires the project Applicant to consult with TriDelta Transit to determine if additional transit facilities should be provided and, if so, prepare and submit plans depicting transit stops.

Bicycles

The proposed project includes Class II bicycle lanes to be constructed on Sand Creek Road, Deer Valley Road, and Streets A, B, and C. A number of off-street trails would also be constructed. The onstreet Class II bicycle facilities are proposed to provide 8-foot wide bicycle lanes adjacent to 12-foot or 13-foot wide travel lanes.

MM TRANS-8b requires the project Applicant to prepare and submit plans depicting bicycle circulation facilities as final improvement plans for individual neighborhoods are processed through the City of Antioch.

Pedestrians

Several roadway types are proposed within the development, including arterial, collector, local and hillside roadways. Arterial roadways would provide a minimum 6-foot wide sidewalk on both sides of the street, except where a parallel Class I trail is provided. Collector and local roadways would provide a 5-foot wide sidewalk on both sides of the street where development is proposed; if development would only occur on one side of the street, the sidewalk would be placed adjacent to development, with a Class I trail provided on the opposite side of the street. Sidewalks on the hillside roadways are proposed to be 4-feet wide. The proposed sidewalk network would connect to the site to adjacent developments, providing continuous pedestrian connections in the area. The project would also construct a number of off-street trails, ranging from a 4-foot wide natural tail to a 10-foot wide asphalt trail with stabilized shoulders to accommodate emergency vehicle access.



Source: CBG Civil Engineers, January, 2020

FIRSTCARBON SOLUTIONS™

Exhibit 3.14-21 Pedestrian and Bicycle Network

THIS PAGE INTENTIONALLY LEFT BLANK

MM TRANS-8c requires the project Applicant to prepare and submit plans depicting pedestrian facilities as circulation facilities as final improvement plans for individual neighborhoods are processed through the City of Antioch.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

- **MM TRANS-8a** The project Applicant shall consult with TriDelta Transit to determine if additional transit facilities shall be provided throughout the site. If transit stop locations are identified, the project Applicant shall include those locations on the improvement plans for the requisite tentative map being processed by the City. The improvement plans shall include pedestrian passages through cul-de-sacs and other potential barriers to minimize pedestrian walking distances to any transit stops identified.
- **MM TRANS-8b** The project Applicant shall identify the bicycle circulation facilities on all final improvement plans submitted to the City. Such facilities may include a painted buffer between the bicycle lanes and the vehicular travel way, reducing the travel lane width to 11-feet each to allow for a 7-foot wide bicycle lane and a 3-foot wide buffer between the bicycle lanes and the vehicular travel-way on the proposed arterial streets. In addition, appropriate bicycle crossing treatments shall be provided at roundabouts to be constructed as part of the proposed project.
- **MM TRANS-8c** The project Applicant shall identify pedestrian circulation facilities on all final improvement plans submitted to the City. These plans shall show primary pedestrian routes connecting neighborhood destinations and marked crosswalks at key uncontrolled pedestrian crossing locations. In addition, the plans shall demonstrate that signalized intersections provide crosswalks and pedestrian actuation. At roundabouts to be constructed as part of the project, appropriate pedestrian crossing treatments shall be provided.

Level of Significance After Mitigation

Less Than Significant

3.14.5 - Cumulative Impacts

This evaluation of transportation impacts is inherently cumulative, as it considers the impacts of the project in combination with past, present, and future projects. Refer to Table 3.14-7 for a list of the cumulative projects considered in this analysis. Refer to the conclusions of Impacts TRANS-1 through TRANS-8 for the analysis therein.

Level of Cumulative Significance Before Mitigation

Potentially Significant

Mitigation Measures

Implement MM TRANS-1a, MM TRANS-1b, MM TRANS-1c, MM TRANS-2, MM TRANS-3a, MM TRANS-3b, MM TRANS-3c, MM TRANS-3d, MM TRANS-3e, MM TRANS-3f, MM TRANS-7, MM TRANS-8a, MM TRANS-8b, MM TRANS-8c.

Level of Cumulative Significance After Mitigation

Significant and Unavoidable